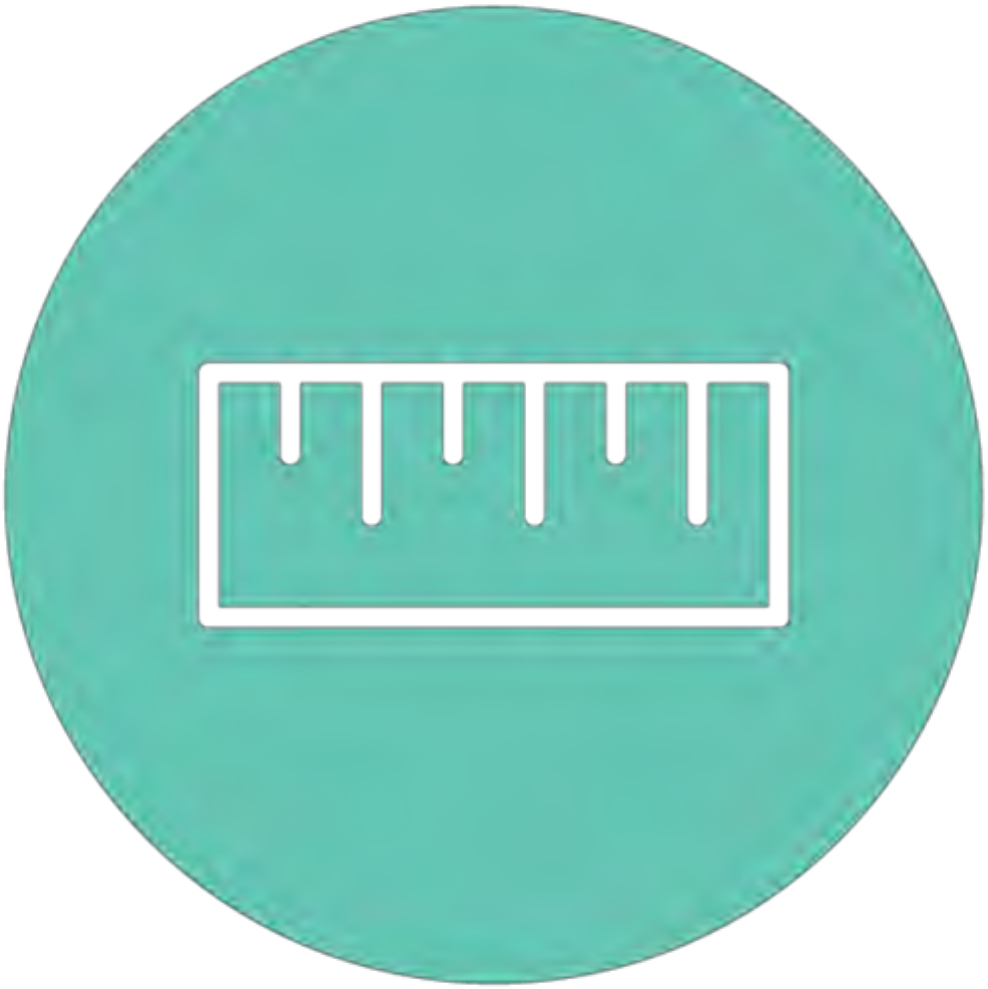
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Mayfield, Phase 1

EIA Volume 2

September 2019

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24 July 2019

Angela Leckie
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Dear Angela

EIA Scoping Addendum – Mayfield, Phase 1

This Addendum to the Environmental Impact Assessment (EIA) Request for a Scoping Opinion has been prepared in respect of the proposed redevelopment of Mayfield (Phase 1) for new office buildings, multi-storey car park and public realm.

Phase 1 forms part of a wider adopted Strategic Regeneration Framework (SRF) for Mayfield, which is a commercially-led development that seeks to deliver 150,000 sq. m. of office space, 1,500 residential units, 650 hotel rooms, a public park, and various dispersed retail and leisure uses across the site on both a temporary and permanent basis.

The initial Scoping Report was submitted to Manchester City Council on 26 January 2019 in order to agree the extent of the Environmental Statement to be submitted with the forthcoming Planning Application for Phase 1 of Mayfield. The applicant is the Mayfield Development Partnership Limited.

It was agreed with the Local Planning Authority that, due to the inclusion of an additional office block (Plot M) and omission of residential development (Plots G and H) within the forthcoming Phase 1 application, an addendum to the Scoping Report should be prepared to confirm the scope of the EIA.

Plot M is proposed to be a 13 storey office block comprising approximately 31,000 sq. m. (GEA) located adjacent to Nether Street to the west and Bond Street to the south, located to the south of the River Medlock.

As such, this Addendum briefly reviews the potential additional elements to be scoped into the EIA and confirms that, following a review by the relevant EIA technical consultants, the conclusions and scope of the original EIA Scoping Report remain unchanged as a result of the proposed addition of Plot M to the Phase 1 application and Plots G and H being excluded.

It should be read together with the original Scoping Report appended, which explains the proposals, application boundary, rationale for the proposed EIA scope, topic areas and identified receptors and associated impacts, amongst other matters. For the avoidance of doubt, the remainder of the development for Mayfield Phase 1 remains as described in the original Scoping Report (dated January 2019), save for Plot M being included, Plots G and H being excluded and the following:

- Cumulative schemes to be included as part of the EIA Assessment have been updated and re-appended to the original Scoping Report; and

- Demolition activities set out in 2.22 – 2.29 of the original Scoping Report have now been completed.

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Proposal Summary

The Site is split into overlapping elements and covers an area of approximately 8.5ha, of which 2.6ha will be covered by a new public park.

In summary, the Proposed Development includes the development plots and the indicative maximum parameters for each as set out below:

- Mayfield Park: Circa 6.5 acres (2.63 ha) of public park, including hard and soft landscaping to be delivered in phases with indicative zones for new and improved river crossings;
- Plot O (Office): Ground plus 8 storey office-led circa 90,000 sq. ft. (GIA) or 8,900 sq. m. with active ground floor uses and public realm;
- Plot N (MSCP): Ground plus 10 storey MSCP for circa 600 car parking spaces;
- Highways and Infrastructure Works: creation of new junction from London Road, creation of new access road to the southern boundary of Mayfield servicing Plots O, N, and M, flood alleviation and re-profiling of the River Medlock.

The Proposed Development is also now likely to include one further commercial office building as follows:

- Located north of Bond Street and east of Nether Street at the south of the Mayfield SRF area, referred to as Plot M, comprises a 13 storey office block (including ground and mezzanine) at circa 32,000 sq. m. (GEA) with associated access, amenity, public realm and back of house facilities.

The additional development plot is therefore proposed to be assessed as part of the Phase 1 Development for Mayfield and necessitates an updated Scoping Opinion to be secured from the Local Planning Authority and relevant statutory bodies.

EIA Methodology

Following discussions, the Phase 1 planning applications will now be submitted in two planning submissions during Q4 2019. As such, we propose a multi-stage Phase 1 EIA is prepared that will consider Phase 1 as a whole, with the planning applications assessed within that EIA proposed to be split as follows:

1) September 2019: Application 1 (Multi-storey car park (Plot N) and associated public realm; office building (Plot O) and associated public realm; southern access road; Baring Street public realm): land bounded by Bond Street to the south, Baring Street to the west, and Fairfield Street to the north, occupied by highways, surface car parking, hardstanding and the River Medlock.

2) October 2019: Application 2 Office (Plot M) and associated public realm: land bounded by Bond Street to the south, River Medlock to the north and Nether Street to the west.

The Phase 1 EIA would then be updated to reflect design development on Plots M to accompany submission of Application 2 in October 2019 as relevant. This could be in the form of an Addendum to the approved Phase 1 EIA so that it would not likely impact the robustness of the submitted EIA for Application 1.

The first iteration of the Phase 1 EIA to be submitted will incorporate testing of the detailed Application 1 scheme, but for Application 2 the testing will be on the basis of information available at Stage 2 design freeze or fixed quantum for those schemes and assuming a reasonable worst-case policy compliant scheme (e.g. drainage provided in line with guidance, remediation to acceptable standards in line with end use etc.).

Similar to a standard EIA approach, different delivery phasing scenarios would need to be tested within the Phase 1 EIA where possible and pertinent to do so, e.g. Application 1 alone and Application 1 with Application

2, in addition to impacts associated with the baseline and committed developments. This would be typically as follows:

1) Baseline, including schemes currently under construction;

2) Baseline and Phase 1 (two scenarios: Application 1 alone; Application 1 with Application 2);

3) Baseline, Phase 1 (Applications 1 and 2) and Cumulative (i.e. nearby schemes with Planning Permission); and

4) Baseline, Phase 1, Cumulative and wider Strategic Regeneration Framework and nearby Frameworks.

Characteristics of Potential Effect

The inclusion of Plot M and removal of Plot G and H from Phase 1 has been reviewed by technical consultants and discussed with the Local Planning Authority in order to understand whether the Scope of the EIA changes, which are set out below in the same order as the EIA Scoping Report for ease of reference.

1.1 Issues Scoped Out of the EIA

Agricultural Circumstances

As stated previously, the Site is entirely on brownfield land so there would be no likely significant effects with respect to agriculture. This discipline can therefore be scoped out of the EIA.

Aviation

The inclusion of Plot M does not change the previously set out reasons for scoping aviation out of the ES as it is below the 90m (AOD) aviation safeguard threshold.

Climate Change

It is not considered that the Phase 1 proposals with the inclusion of Plot M will result in any likely significant effects on climate change. The Proposed Development's effects on climate change and climatic factors for individual topics will be considered within the relevant chapters of the ES and in supporting technical documentation relating to energy hierarchy, efficiency and reuse.

Electronic Interference

Given its comparative scale and location, the inclusion of Plot M would not result in likely significant environmental effects in relation to TV reception. It is therefore considered that the assessment of electronic interference can be scoped out of the ES and provided in a standalone technical report.

Human Health

As previously set out, the construction phase will be considered and mitigation will be proposed as part of a Construction Management Plan submitted with the Planning Application(s) in order to mitigate any potentially significant impacts.

During the operational phase, the potential impacts will be fully considered at the design development stage and mitigation will be proposed as part of the relevant ES chapter on Noise and Vibration and Air Quality and supporting technical reports, such as an Acoustic Impact Assessment and Air Quality Assessment.

The inclusion of Plot M is not considered likely to generate significant effects beyond that previously set out in the EIA Scoping Report.

Archaeology

Plot M is located within the main site area at ground level, where it is concluded that this impact will not have a significant effect on archaeological remains. This discipline can therefore be scoped out of the EIA, providing that a comprehensive archaeological desk-based assessment is prepared to assess the potential impact of the Proposed Development on the sub-surface archaeological resource.

The Phase 1 applications will still be supported by an archaeological assessment and provide recommendations for a Written Scheme of Investigation.

Heritage

Due to the distance of these identified heritage assets from the Site, alongside the existing enclosed urban form, it was considered that the Proposed Development would not have any significant impacts on historic built environment resource.

Waste

An ES Chapter in relation to waste is not considered to merit inclusion as the Proposed Development is not anticipated to generate significant effects given the location and prerequisites of designing waste storage facilities in the Proposed Development.

The management of solid waste will be taken into account and the implications of waste generation should be built into the scheme design. In so doing, the applicant can demonstrate that the necessary waste management infrastructure (i.e. for storage and collection of separated waste for recycling and disposal) would be delivered.

The design development stage will consider a wide range of space-saving and impact-minimising waste management facility infrastructure that is currently available. A description of these will be provided in accordance with the Duty of Care Regulations implemented under section 34(5) of the Environmental Protection Act.

Waste materials generated by the demolition or construction phase will be managed to avoid significant environmental impacts in line with a Construction Management Plan to be submitted with the application.

1.2 Environmental Statement Chapters

For completeness, Plot M was to be included within the Environmental Statement as part of the cumulative assessment set out in the individual ES chapters. Now Plot M is proposed to be included in Phase 1, the assessment of impact of this additional building will be assessed quantitatively, rather than qualitative judgements, or as set out below.

Socio-Economic

As requested by the Local Planning Authority during the EIA Scoping Exercise undertaken to date, this chapter of the ES would assess the likely significant effects of the Proposed Development with respect to the socio-economic environment. This will include direct and indirect construction phase (temporary) and operational phase (permanent) effects on the local and regional environment.

The study area for assessment will be defined on two levels:

- Likely effects on the Site and immediate surrounds, representing the ‘Site’ scale;

- Likely effects on the area within a 7-mile radius of the Site, representing the 'local sub-regional' scale.

A 7-mile radius study area is considered suitable for a densely populated urban area, and is based on advice set out by English Partnerships, now known as Homes England. As more information emerges, the study area for assessment may be redefined to better suit the characteristics of the local environment.

Socio-economic effects of the Proposed Development are anticipated to include the following topics:

- Population;
- Employment;
- Local expenditure;
- Education and training;
- Healthcare; and
- Open space, recreation and amenity.

Baseline data will be gathered to ascertain the socio-economic characteristics of the study area. These will be gathered from a range of recognised sources, such as the Office for National Statistics 2011 Census, Labour Force Survey, and Experian Micromarketer. Data relating to schools within the catchment area and their capacity will be sourced from the Department for Education requested from the relevant departments of MCC.

The most up-to-date data will be used where available; the Local Authority is invited to comment on any relevant sources of information to inform the assessment. Data for both the county and for the city region will be considered.

The assessment will utilise both quantitative and qualitative methods to consider baseline characteristics and likely impacts. Regard will be given to policy guidance and strategies within the wider area where relevant.

There are no specific technical criteria to classify the significance of socio-economic effects. Therefore, professional judgement will be applied to consider effects in terms of their overall impact on the study area at various scales.

Daylight, Sunlight, Overshadowing and Solar Glare

As a result of the inclusion of Plot M within the Phase 1 proposals, the scope of the Daylight, Sunlight, Overshadowing and Solar Glare chapter will extend beyond the previously set out assessment scope to cover impacts generated by the additional buildings.

This will include an assessment of daylight and sunlight impact on nearby sensitive receptors with relevant and specific mitigation measures proposed. The absence of modelling for certain phases will be covered by referencing the results of the cumulative scenario, which shows no discernible impact to certain properties from all Proposed Development.

Noise and Vibration

Through inclusion of Plot M within the proposals, the scope of the assessment will not change as set out in the previously issued EIA Scoping Report appended to this letter. The cumulative impact of delivering the proposals in relation to the construction phase of development will now include the simultaneous delivery of

Plot M to understand the impact on nearby sensitive receptors and provide specific mitigation measures to reduce any potentially significant impacts to a non-significant level.

On this basis, we would propose to model the worst case scenario (i.e. all of Phase 1 combined) from a noise perspective and provide qualitative commentary on the sub scenarios, as the expected minor changes in traffic flows between the options (given Phase 1 includes the car park for the wider site) would unlikely be significant.

Building services plant noise from Plot M during the operational stage will be considered in relation to nearby and proposed sensitive receptors.

Wind Microclimate

The method of assessment as set out in the EIA Scoping Report will remain the same following the inclusion of Plot M within Phase 1.

The Proposed Development, within the context of existing buildings, will be assessed for comfort and safety without mitigation. If mitigation is found to be required this will be incorporated and tested to ensure the receptor complies with the comfort and safety criteria.

Likely mitigation measures would include additional tree planting around the park or design features inherent within the design of the proposed building, such as wind baffles and canopies.

Water Resources and Flood Risk

Application 1 of Phase 1 includes the important reprofiling of the site to alleviate flood risk and raise site levels for the proposed plots, and therefore the majority of flood mitigation on site will have been achieved. Appropriate mitigation in the form of on-site attenuation will be proposed to reduce the run-off and discharge rates into the River Medlock.

The intention would be to undertake flood risk modelling including the re-profiling that will impact the flood plain for Phase 1 only. We would then include chapters in the Phase 1 FRA that take into account the future buildings that may come forward, however as these will not have an impact on the flood plain no further modelling should be required. We will therefore assess the impacts on the future phases qualitatively in the ES to be submitted in relation to Phase 1 for both Applications 1 and 2.

Air Quality

The main generator of impacts associated with air quality are as a result of the traffic generated by the Proposed Development. Due to the availability of traffic data, only scenarios assessing Phase 1 and the wider development of the SRF will be included to provide the impact of both Phase 1 and a future development year scenario.

As the proposal for Plot M does not include on site car parking, the additional traffic generated by the proposals during the operational phase are not anticipated to have significant effects to air quality, however the proposals will be assessed fully to identify any effects, and will be mitigated if necessary.

Additional traffic will be generated by the construction phase of development and those movements associated with servicing the development plots, but this is not anticipated to generate a significant impact beyond that previously scoped in to be considered within the ES.

Ecology

Plot M is located also on brownfield land to the south of the Mayfield SRF area. Characterisation of impacts will be based on a number of factors including the extent, magnitude, reversibility and duration of the

impact. An assessment will then be made regarding whether or not the effect of these impacts will be significant to any important ecological feature and mitigation proposed on site to achieve biodiversity net gain.

There are opportunities for enhancing the ecological value of the site within the scheme, particularly in association with naturalising the river channel and creation of riverside habitats and provision of a replacement habitat for black redstart. The scheme will seek to achieve biodiversity net gain across the Phase 1 development plots.

Potential operational effects of the development on ecology include the potential for increases in light spill, noise and human disturbance, deterring fauna species from utilising the site and adjacent areas. As such, minimising indirect impacts, such as light spill, on the river corridor will be an important mitigation strategy for the scheme and detailed within the submission.

Ground Conditions

Following the inclusion of Plot M within Phase 1, the ES Chapter and Phase 1 Desk Top Assessment with conceptual site modelling will still consider potential ground contamination impacts and effects associated with construction of the development as well as potential operational impacts and effects. This remains unchanged from the original Scoping Report.

Traffic and Transport

The traffic and transport impact of Plot M will be fully assessed in the Transport Assessment and ES chapter. As no additional car parking spaces are being proposed by Plot M, the majority of car movements for the overall site will be generated by Application 1, with servicing and waste collections adding to this for Plot M.

Appropriate levels of mitigation will be proposed to mitigate any adverse effect occurring and the assessments will identify how effective they might be with supporting evidence.

The mitigation measures will be evaluated and monitored over time through the Travel Plan which will have an ongoing remit to monitor and influence travel behaviour to deliver positive environmental outcomes. Servicing and waste management strategies will seek to further reduce the vehicle movements to and from the site.

Townscape and Visual Impact

In the Townscape and Visual Impact ES Chapter, effects will be assessed as a function of both the magnitude of the impact or change and the sensitivity of the townscape resource or visual receptor affected.

Plot M will be observed from nearby traffic locations and it is relatively exposed but not in a sensitive location, so a CGI will be produced in order to appreciate the impact of this additional plot and in the context of Plots O and N. Views toward and across the site are still to be agreed with MCC.

Plot M will be assessed cumulatively in the context of development associated with Phase 1 and other nearby committed developments. The Institute of Environmental Management and Assessment (IEMA) / Landscape Institute 'Guidelines for Landscape and Visual Impact Assessment' (3rd Ed., 2013) will be used as the principal source of guidance for the methodology for this assessment.

Conclusion

In view of the above information, it can be concluded that there is unlikely to be any potential additional significant effects on the environment on or close to the application site, beyond those already identified within the EIA Scoping Report as a result of the proposed addition of Plot M and omission of Plot G and H within Phase 1.

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On this basis, we request the Local Planning Authority provide this information to Statutory Consultees to confirm that the conclusions of the previously submitted EIA Scoping Report and consequential scope of the Environmental Statement to be submitted with the Phase 1 applications remain valid or as detailed in this letter.

Yours sincerely

Mark Underwood
Deloitte LLP

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Real Estate



Mayfield, Phase 1 – EIA Scoping Report

Environmental Impact Assessment (EIA) Screening and Scoping Report

January 2019

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Appendix E - Ecology Survey
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1 Introduction

1.1 This Environmental Impact Assessment (EIA) Screening and Scoping Report has been prepared in respect of the proposals for the development of Phase 1 of the Mayfield Strategic Regeneration Framework (SRF) Area, located on and adjacent to the south of the Mayfield Depot in Manchester City Centre (the 'Site').

1.2 The term 'Proposed Development' used within this Report refers to all stages of construction and the operation of the development.

1.3 This Screening and Scoping Report is submitted to Manchester City Council as a request for a Scoping Opinion under Regulation 15 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. In accordance with Regulation 15, paragraph 2, this report contains:

- A brief description of the nature and purpose of the Proposed Development and its possible effects on the environment.
- A plan sufficient to identify the land enclosed at Appendix A.

EIA Requirements

1.4 The EIA process is the mechanism by which development proposals are appraised in relation to the environmental criteria as well as socio-economic, engineering and technical considerations. The EIA process defines the context of the Proposed Development and examines the issues considered pertinent.

1.5 The purpose of the EIA is to establish both the nature of the Proposed Development and the environment within which it is likely to taking place in order to identify likely significant effects on the environment that may arise. This is also undertaken by comparing the existing situation at the start of the work (baseline) with the situation once the Proposed Development is in place.

1.6 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 require that any Proposed Development falling within the description of a 'Schedule 2 development' within the meaning of the Regulations, will be subject to an EIA where such development is likely to have 'significant' effects on the environment by virtue of such factors as its nature, size or location (Regulation 4(2)).

1.7 The Proposed Development falls under the category of "Infrastructure Projects – Urban Development Projects" (Schedule 2, 10, (b)) as described in the Regulations. The applicable threshold above which EIA is likely to be required 5 hectare (ha) or if the development includes more than 150 dwellings. The indicative thresholds and criteria state that:

"In addition to the physical scale of such developments, consideration should be given to the potential increase in traffic, emissions and noise. EIA is unlikely to be required for the redevelopment of land unless the new development is on a significantly greater scale than the previous use, or the types of impact are of a markedly different nature or there is a high level of contamination".

1.8 The Site is split into 4 no. overlapping elements and covers an area of approximately 8.5ha, of which 2.6ha will be covered by a new public park. In summary, the Proposed Development includes the development plots and the indicative maximum parameters for each as set out below:

- Mayfield Park: Circa 6.5 acres (2.63 ha) of public park, including hard and soft landscaping to be delivered in phases with indicative zone for a new bridge to be identified;
- Plot O (Office): Ground plus 8 storey office-led circa 90,000 sq. ft. (GIA) or 9,000 sq. m. with active ground floor uses, public realm and riverside walkway;
- Plot N (MSCP): Ground plus 10 storey MSCP for circa 600 car parking spaces, cycle storage and energy infrastructure;

- Plots G and H (Residential): G - ground and lower ground plus 35 storeys; H – ground plus 21 storeys containing a total of up to 650 units. This plot also includes ancillary amenity space, including external podium level for residents, ground floor active uses with circa 1,200 sq. m. commercial (A1, A2, A3, A4, B1 or D2), cycle parking (1:1) and disabled persons' car parking at ground level for residents; and

- Highways and Infrastructure Works: creation of new junction from the Mancunian Way, creation of new access road to the southern boundary of Mayfield servicing Plots O, N, G and H, flood alleviation and re-profiling of the River Medlock.

1.9 On this basis, the application exceeds the indicative applicable EIA thresholds. Given the nature of the Proposed Development in regard to the redevelopment and reconfiguration of the Site, an EIA is considered appropriate to test the likely significant effects of the Proposed Development.

1.10 The Applicant therefore proposes to submit an Environmental Statement (in relation to certain topic areas where there is likely to be a significant effect on the environment) in support of the related planning applications.

Purpose of the Scoping Report

1.11 The process of identifying likely significant effects on the environment which should be addressed by the EIA is termed 'scoping' and the results are presented as a Scoping Report.

1.12 Regulation 15 of the EIA Regulations set out the requirements for obtaining a scoping opinion from the relevant planning authority.

1.13 This Scoping Report sets out the framework within which the Environmental Statement ('ES') will be produced and the topic areas and information that will be contained within the document. It is issued to Manchester City Council ('MCC') for circulation to Statutory Consultees and other organisations who are invited to express their views on the proposed scope of the EIA, or suggest additional issues which may be considered to be of significance. The views expressed by Statutory Consultees will then be used by the LPA to inform the formal Scoping Opinion.

1.14 The LPA is required to respond to a formal require for a Scoping Opinion within five weeks of registering receipt.

1.15 The EIA team, as set out in Table 1-1, will be co-ordinated and lead by Deloitte Real Estate.

Table 1-1: EIA Project Team

Topic	Assessment Carried Out By
Townscape and Visual Impact	Chris Burnett Associates
Noise and Vibration	Buro Happold
Air Quality	
Wind	
Ground Conditions	
Ecology	
Water Resources and Flood Risk	
Traffic and Transport	
Daylight, Sunlight, Overshadowing and Solar Glare	

1.16 Sustainability and the impact of the Proposed Development on climate change is an integral part of the design process and will also be considered throughout the EIA. Further standalone reports explaining the approach to sustainability policy objectives will accompany the applications for planning permission.

1.17 The remainder of this report is structured as follows:

- Section 2: Site and the Proposed Development
- Section 3: Scope, Structure and Consultation
- Section 4: EIA Methodology
- Section 5: ES Chapters

2 Site Description and Proposed Development

Site Description

2.1 The site is located entirely within the Mayfield Strategic Regeneration Framework (SRF) area, which lies to the south of Fairfield Street in Manchester city centre, in close proximity to Piccadilly mainline railway station. The Mayfield SRF area is bounded by Fairfield Street to the north; Temperance Street to the north-east; the Mancunian Way Ring Road (A635) to the south; and Baring Street / London Road (A6) to the west.

2.2 The wider SRF regeneration site extends to approximately 12.14ha overall, of which 8.5ha is subject to either permanent or temporary redevelopment, enabling or highways works, as described in this report and identified in Appendix A. For ease of reference, the site covered by this EIA Scoping Opinion Request comprises four overlapping plots within an overall Phase 1 boundary.

2.3 A large part of the northern side of the Mayfield area is occupied by the Mayfield Depot building and associated railway infrastructure, which was formerly in use as a passenger railway station, and latterly as a Royal Mail depot.

2.4 The north-east of the Mayfield area is bounded by Temperance Street, where the arches of former railway infrastructure are occupied by various workshops, storage spaces and meanwhile uses. Centrally and to the south of the Mayfield SRF area, low rise warehouses and industrial units are interspersed by open land and surface car parking.

2.5 The western end of the Mayfield SRF area is bordered by Baring Street, beyond which the area is characterised by more recent residential-based development, including the Macdonald Hotel and purpose built student accommodation.

2.6 With regard to environmental qualities of the site, the River Medlock runs through it and under some of the existing buildings via a culvert, which are proposed for demolition prior to the submission of the application for Phase 1 as set out in the planning history section of this report. The site also contains the possibility for protected species to be present, such as common pipistrelle (bats). A bird breeding survey has also been completed in respect of the Site and there is potential for breeding birds in a number of locations during the nesting season (March to September inclusive).

2.7 There are a number of existing Category C trees within the Site. These are not protected by Tree Preservation Orders (TPOs) and have been identified as being suitable for removal as part of survey work completed by Buro Happold to facilitate future development.

2.8 The site is located partially in Flood Zone 3 in accordance with the Environment Agency Flood Maps and confirmed by the Environment Agency following consultation.

2.9 The Site is not located within a conservation area, nor does it contain any listed buildings, save for the Grade II Listed Star and Garter public house. Beyond the site boundary, the nearest listed buildings are Piccadilly Station (Grade II*), the former Station Goods Office (Grade II) and London Road Fire Station (Grade II*). There are 19 listed buildings within a 500m radius of the site boundary.

2.10 A Site Location Plan identifying the area of redevelopment for Phase 1 is provided at Appendix A.

Site Context

2.11 Manchester's increasingly buoyant economy continues to benefit from growth in financial and professional services and is being further strengthened and diversified by high added value growth in key sectors such as creative and digital, science and innovation, culture, sport and tourism.

2.12 Manchester has a population of approximately 541,300, which is growing and lies at the heart of a conurbation extending to almost 3 million people. Population growth in recent years has been

particularly evident in a younger 20-35 years demographic. This group is attracted to Manchester's lifestyle and increasing employment opportunities, and this in turn is driving further economic growth, enhanced productivity and demand for new homes.

2.13 Economic growth has also been supported by Manchester's expanding international connections, centres of excellence in research and higher education, and investment in transport infrastructure, which has deepened labour markets.

2.14 Prospects for economic growth are closely tied to the ability to attract and retain the most talented individuals. It is therefore critical to focus efforts on improving Greater Manchester's attractiveness as a location to live, study, work, invest and do business. In this regard, a key priority is the delivery of high quality residential accommodation, consistent with the requirements of Manchester's Residential Quality Guidance, and located within neighbourhoods of choice.

2.15 The Manchester Strategy 2016-25 also identifies a clear vision for Manchester's future, where all residents can access and benefit from the opportunities created by economic growth. Over a thirty year programme of transformation, Manchester has become recognised as one of Europe's most exciting and dynamic cities. With a diverse population of now easily more than half a million people, the City of Manchester is located at the heart of Greater Manchester, the largest conurbation outside of London.

2.16 The Greater Manchester sub-region, which has a resident population of over 2.78 million and a combined GVA of over £62.8 billion, accounts for around two fifths of the North West's economic output. In 2016, almost one third of the £62.8 billion of GVA generated in Greater Manchester was produced in the City of Manchester.

2.17 Manchester is one of the fastest growing cities in Europe. By 2025, in excess of 600,000 people are expected to live in the city, up 7.6% on the 2015 estimate. Employment growth of 8.9% is forecast in Manchester between 2016 and 2025 (and 14.1% in the period 2016 to 2036). This growth rate is forecast to add 35,200 jobs to the Manchester economy, taking the total employment level towards 430,000 in 2025.

2.18 In addition, a significant proportion of forecast employment growth is expected to occur in sectors with higher than average GVA. GVA is expected to increase by 21.8% to 2025 with a 45.2% change forecast from 2016 to 2036. During this period, GVA across Greater Manchester is forecast to rise by an average of 2.26% per year, increasing to over £82.8 billion by 2036. A number of key documents that reflect this context are as follows:

- The Greater Manchester Strategy (2016)
- One Manchester: The Manchester Strategy (2016)
- Manchester City Centre Strategic Plan (2016)

Strategic Regeneration Framework

2.19 In addition to the above documents that provide overall strategic objectives for both the city and the wider region, the Mayfield Strategic Regeneration Framework (2018) supports the comprehensive reconfiguration and redevelopment of the site.

2.20 The vision for Mayfield is to deliver a world class, transformational, distinctive and imaginative commercially-led neighbourhood, anchored by Mayfield Park. The Mayfield Partnership proposes to capitalise on the site's existing assets: the Mayfield Depot; the River Medlock; and its gateway location at the heart of an extensive transport network, to become a destination for work, play and living for all.

2.21 The Mayfield area will deliver a series of significant regeneration benefits, which in turn will help drive wider economic growth within Manchester city centre and adjacent neighbourhoods, including Ardwick and the communities of East Manchester, as well as improving connectivity to these areas.

Planning History

2.22 The site has a limited planning history either on site or adjacent to it. Three parts of the planning history are of relevance to the Phase 1 proposals, including approval for demolition works across the Strategic Regeneration Framework Area (PP Ref.: 121901/DEM/2018), Grub and the Gatehouse in situ (PP Ref.: 121245/FO/2018) and the adoption of the Mayfield SRF in May 2018.

2.23 The Prior Notification for Demolition Works was approved in December 2018 and the works are due to take place between January and June 2019 prior to permanent redevelopment of the site coming forward. The impact of the above demolition application has been considered within the application submitted to and approved by MCC and an EIA Screening Request was submitted to confirm that the demolition works do not constitute EIA.

2.24 The building footprints that are proposed to be subject to demolition extend to approximately 1.05ha, however there will be a zone around these buildings that will be used by the demolition contractors to undertake the works. It is estimated that this zone will extend to approximately up to 1.58ha in size.

2.25 Protection measures will be put in place prior to the buildings on site being demolished to ensure that the impact on the river is mitigated, including any potential flooding issues. The scope of these measures has been agreed following consultation with the Environment Agency. The threat of the invasive Japanese Knotweed species, which is primarily located around the River Medlock, is in the process of being managed and removed from site.

2.26 The buildings proposed for Phase 1 demolition works have physical features that mean they have the potential for roosting or foraging bats, as detailed in the enclosed Ecological Surveys. The impact and appropriate mitigation measures include a bat mitigation strategy and a Natural England Protected Species Licence has been applied for as it is required prior to works commencing, where applicable.

2.27 Demolition of these buildings therefore does not form part of this EIA Screening and Scoping request as this will be complete by June 2019 prior to Phase 1 coming forward. The impact of these demolition works are therefore proposed to be scoped out of the EIA.

2.28 The application in relation to the permanent inclusion of the Gatehouse within the Mayfield SRF area was granted Planning Permission on 04 December 2018. This proposed the permanent retention of the Gatehouse and the retention of the temporary area of landscaping and pop-up food stalls until proposals for Phase 1 are brought forward. The Gatehouse will form part of the baseline in terms of uses currently on site as part of the Phase 1 application.

2.29 The area is also subject to a Strategic Regeneration Framework that was adopted in May 2018. This seeks to deliver office space, residential development and further areas of public realm in addition to the repositioning of the Mayfield Depot with meanwhile uses interspersed across the site. Areas outside of Phase 1, forming later phases of the SRF, will be the subject of separate Planning Applications and will be subject to a similar EIA Screening and / or Scoping process. In order to ensure a robust assessment for Phase 1, later phases of development will be assessed cumulatively as part of the EIA for Phase 1.

The Development Proposals

2.30 Following the demolition of the majority of on-site structures, being carried out under a separate Planning Application, the Proposed Development would involve the construction of:

- Mayfield Park: Circa 6.5 acres (2.63 ha) of public park, including hard and soft landscaping to be delivered in phases with indicative zone for a new bridge to be identified;
- Plot O (Office): Ground plus 8 storey office-led circa 90,000 sq. ft. (GIA) or 9,000 sq. m. with active ground floor uses, public realm and riverside walkway;
- Plot N (MSCP): Ground plus 10 storey MSCP for circa 600 car parking spaces, cycle storage and energy infrastructure;
- Plots G and H (Residential): G - ground and lower ground plus up to 40 storeys; H – ground plus up to 26 storeys containing a total of up to 650 units. This plot also includes ancillary amenity space, including external podium level for residents, ground floor active uses with circa 1,200 sq. m. commercial (A1, A2, A3, A4, B1 or D2), cycle parking (1:1) and disabled persons' car parking at ground level for residents; and

- Highways and Infrastructure Works: creation of new junction from the Mancunian Way, creation of new access road to the southern boundary of Mayfield servicing Plots O, N, G and H, flood alleviation and re-profiling of the River Medlock.

2.31 In summary, the Proposed Development for Phase 1 is set out in Table 2-1 below:

Measurement	Proposed Development
Proposed Site Area	8.5ha
Proposed Development	A Planning Application for Phase 1 of the Mayfield redevelopment, comprising: the construction of Mayfield Park; an office building (Use Class B1) with ground floor retail (Use Classes A1 retail, A3 restaurant and café, and A4 bar); a 600 space multi-storey car park incorporating a new sub-station; two residential buildings on podium level (Use Class C3) providing up to 650 dwellings together with associated amenity space and ground floor retail (Use Classes A1 retail, A3 restaurant and café, A4 bar, B1 business and D2 assembly and leisure); highways' works including the installation of a new junction and access roads; landscaping and public realm associated with the new buildings; pedestrian and cycle routes, and cycle parking facilities; engineering and infrastructure works; interim environmental improvements to Baring Street and adjacent existing green space and associated works.
Proposed Building Footprint	Plot O and N – circa 3,500 sq. m. at ground level. Plot G and H – circa 10,000 sq. m. at ground level.
Proposed Development Floorspace	Plot O – 9,000 sq. m., including ground floor retail or other commercial space with Use Class B1 office above. Plot N – up to 600 parking spaces. Plot G and H – 41,000 sq. m. including 650 residential units (Use Class C3) and ground floor commercial space (A1, A2, A3, A4, B1 and D2).
Proposed Development Height	Plot O – up to 72m AOD (30m AGL) including roof level. Plot N – up to 72m AOD (30m AGL) including roof level. Plot G and H – up to 180m AOD (140m AGL).
Proposed Landscaping / Open Space	There will be 2.63 hectares of both temporary and permanent public space to be delivered as part of the proposals to provide the largest area of natural and semi-natural greenspace in Manchester City Centre, which will also provide flood risk defenses adjacent to the River Medlock by providing a floodplain. In addition to the public areas of greenspace, the proposals will deliver a series of private external amenity spaces.

Table 2-1: Development Parameters

3 Scope, Structure and Consultation

Scope

3.1 The intention of this Scoping Report is to enable the team, Manchester City Council and statutory bodies to determine which technical disciplines are pertinent to the Proposed Development and the scope of assessment required in order for any likely significant effects on the environment to be addressed as part of the EIA process.

3.2 The information presented in the ES will be provided in accordance with Schedule 4 of the EIA Regulations and will include:

- A description of the Proposed Development;
- An outline of the main alternatives studied;
- A description of the aspects of the environment likely to be significantly affected by the proposals;
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment;
- A non-technical summary; and
- An indication of any difficulties encountered by the Applicant in compiling the required information.

3.3 The introductory chapters for the ES will provide the following information:

- An introduction to the ES in a legislative and the Site specific context;
- Description of the Site and proposals;
- Alternatives considered and project design evolution;
- EIA methodology;
- Construction methodology and programme;
- ES Structure; and
- Details of the EIA project team.

3.4 The geographical coverage of the EIA will be determined by a number of factors including:

- The physical extent of work;
- The nature of the baseline environment, including the location of sensitive receptors;
- The distance over which effects will be significant; and
- The presence and type of "pathways" along which impacts may be spread.

Issues to be Scoped Out of the EIA

3.5 It is considered that the following disciplines will not give rise to likely significant effects on the environment and would therefore not require inclusion in the ES. An explanation for each discipline is given below.

Agricultural Circumstances

3.6 The Site is entirely on brownfield land so there would be no likely significant effects with respect to agriculture. This discipline can therefore be scoped out of the EIA.

Aviation

3.7 The height of the Proposed Development will be up to 40 storeys (approximately up to 180m AOD), which exceeds the 90m (AOD) aviation safeguard threshold. Whilst there may be an impact in relation to aviation, the relevant consultation will be undertaken with NATS and the Manchester Airport Safeguarding Team, confirming the final height and location of the buildings to ensure that appropriate mitigation is designed into the scheme if required. The site is also located in Manchester City Centre, approximately 13.5km to the north of Manchester Airport.

3.8 On this basis, it is not likely significant effects would be expected with respect to aviation. This discipline can therefore be scoped out of the EIA.

Climate Change

3.9 The proposals will have an impact on climate change during the construction and operational phase of the Proposed Development through the emission of greenhouse gases and use of materials sourced off site, including transportation and manufacture of those materials. Sustainability measures have informed the design process from the outset, including climate change mitigation, energy usage and low-bodied carbon building materials where possible.

3.10 An Energy Strategy and Environmental Standards Statement will be submitted as part of the planning application(s), outlining this process in greater detail including an assessment of the energy efficiency of the Proposed Development and use of low carbon technologies.

3.11 Any impacts of climate change on the wind microclimate, such as accelerated wind speeds, will be considered as part of the wind assessment. The site is located adjacent to Flood Zone 3 and the Flood Risk Assessment that will support the Water Resources Chapter of the ES will fully consider the impacts of climate change in this regard and recommend appropriate mitigation measures.

3.12 For example, the development offers regrading of the site in order to better provide flood defenses adjacent to the River Medlock and also to reduce the potential for flooding down river by attenuating water and increasing lag time of the surface water run off by increasing permeable surfaces, planting and landscaping and sustainable drainage systems.

3.13 It is not considered that the proposals will result in any likely significant effects on climate change. The Proposed Development's effects on climate change and climatic factors for individual topics will be considered within the relevant chapters of the ES.

Electronic Interference

3.14 Tall buildings and structures could disrupt wireless services by physically blocking the signal or reflecting signals from the sides of the structure. However, in the United Kingdom, TV signals switched over to digital during 2012 and are less susceptible to interference. The Proposed Development is not considered to have the capacity to significantly disrupt telecommunications infrastructure.

3.15 The study areas for potential television interference are well defined within Ofcom guidance and based on previous experience. The most common and most practical approach is to:

1. Identify the areas where interference would be the most likely based on formal guidance.
2. Collect baseline survey measurements within the locations that are at risk.
3. Identify the most likely mitigation options within potentially affected areas.
4. Evaluate any complaints post-construction against the predicted effects and baseline survey data.
5. Implement mitigation if effects are shown to be attributable to the development.

3.16 In accordance with the above, there is generally no requirement for pre-commencement mitigation measures to be installed. Steps 1-3 will be undertaken within the technical report and steps 4 and 5 would be recommended post-construction if issues are subsequently reported to be likely.

3.17 A TV Reception Survey will therefore be conducted in order to assess baseline reception and identify and mitigate potential impacts on telecommunications infrastructure. It is therefore considered that the assessment of electronic interference can be scoped out of the EIA.

Human Health

3.18 The proposal is located in an urban environment and the site is entirely occupied by existing buildings, surface car parking, highways infrastructure and natural features, including the River Medlock. The immediate environs are characterised by both low rise and high rise residential and commercial development that are typical of the city centre.

3.19 There will be some short term impacts to human health during the construction phase with the potential for accidental spillages, dust and noise and vibration as a result of construction activity. These activities will be considered and mitigation will be proposed as part of a Construction Management Plan submitted with the Planning Application(s) in order to mitigate any potentially significant impacts.

3.20 During the operational phase, the proposal could potentially have impacts on health as a result of traffic movements and the associated air quality and noise impacts resulting from the nearby Mancunian Way and adjacent railway viaduct. These potential impacts will be fully considered at the design development stage and mitigation will be proposed as part of the relevant ES chapter on Noise and Vibration and Air Quality and supporting technical reports, such as an Acoustic Impact Assessment and Air Quality Assessment.

Socio-Economic

3.21 The socio-economic effects will be considered in detail as relevant as part of the supporting Planning Statement for the application(s).

3.22 The proposals may create some short-term employment during the construction phase, however the effect is not considered to be significant.

3.23 The proposed uses would create long-term employment opportunities during the operational phase, the effect of which would be positive but not significant. Similarly, while the proposals would be economically and socially beneficial through the delivery of new housing, for example in terms of additional Council Tax receipts and local expenditure, these are not considered to be of a significant scale.

3.24 Whilst the influx of new residents will cause an increased pressure on local open spaces, schools and healthcare infrastructure, a new park is proposed as part of Phase 1 and there is provision currently being considered in relation to amenities such as GP surgeries, nurseries and schools. The provision of new facilities would mitigate the levels of demand inherently generated by the proposals.

3.25 Therefore, likely significant effects on the environment with respect to socio-economic issues are not anticipated and it is considered that an ES chapter is not required.

Archaeology

3.26 The Site was occupied from the late 18th century by the Mayfield Print Works, which emerged as one of the largest textile-finishing works in Manchester. The development of this large industrial complex will almost certainly have removed any archaeological remains pertaining to earlier periods. Moreover the Site lies beyond the fringe of Manchester's historic core and the potential for archaeological remains pre-dating the late 18th century is considered to be low regardless of intensive development from the late 18th century onwards.

3.27 There are no below-ground archaeological remains that are afforded statutory protection as designated heritage assets that would require preservation in-situ. Nevertheless, there is still some potential for the Proposed Development to impact on buried archaeological remains of potentially high local / borough interest, specifically the remains of the textile-finishing works.

3.28 However, following a review of the baseline conditions and consultation with GMAAS, it is concluded that this impact will not have a significant effect on archaeological remains. This discipline can therefore be scoped out of the EIA, providing that a comprehensive archaeological desk-based assessment is prepared to assess the potential impact of the Proposed Development on the sub-surface archaeological resource.

3.29 This assessment is likely to conclude that the Site will merit further archaeological investigation in advance of, or during, development works. This approach is in line with the National Planning Policy Framework (NPPF) and local planning policies.

3.30 The desk-based assessment will draw upon the following sources:

- the findings of previous archaeological investigations carried out on or near to the site;
- review of the Greater Manchester Historic Environment Record and local archives; and
- review of Historic England's online National Heritage List for England.

3.31 Following completion of the desk-based assessment, a qualitative assessment of the potential effects of the Proposed Development on the archaeological resource of the Site will be undertaken. Where necessary, recommendations will be made regarding a strategy to record and advance an understanding of any below-ground remains that may be damaged or destroyed during the proposed construction work, in a manner appropriate and proportionate to their importance and impact.

Heritage

3.32 Initial baseline studies have identified that within a 500m study area of the Site there are 19 Listed Buildings. These heritage assets are largely located around Ardwick Green and Piccadilly Station/ London Road Fire Station.

3.33 A standalone Heritage Statement will be prepared in support of the planning application(s). This report will assess the existing character of the Site and its immediate environs, the wider study area and the significance / sensitivity of the settings of the individually identified Listed Buildings. This assessment will allow for key viewpoints to be identified in conjunction with the Proposed Development, in order to assess the potential visual impact.

3.34 The Historic Built Environment impact assessment will be undertaken in general accordance with or with reference to national and local policy and guidance.

3.35 Due to the distance of these identified heritage assets from the Site, alongside the existing enclosed urban form, it is considered that the Proposed Development will not have any significant impacts on historic built environment resource. Mitigation for any potential adverse impacts will be provided by the wider public benefits of the scheme.

Scoping Summary

3.36 Table 3-1 provides a summary of the scoping exercise undertaken and the technical disciplines that will be considered within the ES. It also identifies what supplementary technical reports will be prepared and submitted as standalone documents in support of the application(s).

Table 3-1: Environmental Statement Scoping Summary

Technical Discipline	ES Chapter / Technical Appendix	Non EIA Assessment	Consultant
Air Quality	✓	x	Buro Happold
Archaeology	x	✓	Salford Archaeology
Climate Change	x	✓	Buro Happold
Daylight, Sunlight and Overshadowing	✓	x	Buro Happold
Ecology	✓	x	Buro Happold

Technical Discipline	ES Chapter / Technical Appendix	Non EIA Assessment	Consultant
Electronic Interference	x	✓	TBC
Ground Conditions	✓	x	Buro Happold
Built Heritage	x	✓	Heritage Architecture
Townscape and Visual Impact	✓	x	Chris Burnett Associates
Human Health	Part of other ES Chapters.	x	Buro Happold
Noise and Vibration	✓	x	Buro Happold
Socio-Economic	x	✓	Deloitte Real Estate
Traffic and Transport	✓	x	Buro Happold
Water Resources, Drainage and Flood Risk	✓	x	Buro Happold
Wind Microclimate	✓	x	Buro Happold

Cumulative Effects Assessment

3.37 An assessment of committed developments including those with recent planning permissions and those expected to come forward in the near future will be undertaken as part of the ES. There is no agreed / standard threshold for how far the assessment should go, therefore a professional judgement has been taken regarding which schemes to highlight, taking into consideration the site location and characteristics.

3.38 Full details of the developments to be included as part of the cumulative assessment are included at **Appendix B.** The EIA for Phase 1 will also include a cumulative assessment of the wider Mayfield Strategic Regeneration Framework for completeness. Schemes currently being delivered on site will form part of the baseline.

3.39 The Applicant seeks the agreement from the Local Planning Authority to the scope of committed developments and invites guidance on any additional schemes not listed.

Consultation

3.40 A process of stakeholder consultation has already commenced with regard to the Proposed Development. Members of the project team have met with senior officers from the Local Planning Authority, members of the public and statutory consultees during the formation of the SRF.

3.41 In addition the project team will consult the following stakeholders prior to submitting the planning applications:

- Manchester City Council;
- Greater Manchester Police;
- Transport for Greater Manchester (TfGM);
- Canal and Rivers Trust;

- Environment Agency (EA);
- Highways Agency;
- Historic England;
- Natural England;
- Greater Manchester Ecology Unit (GMEU)
- Greater Manchester Archaeological Advisory Service (GMAAS);
- Manchester Airport Safeguarding Team; and
- United Utilities.

4 EIA Methodology

4.1 The EIA will assess both the construction and operational phases of the Proposed Development.

4.2 The ES is anticipated to comprise two volumes, the first of which will set out the findings with respect to each of the environmental disciplines that have been examined as part of the EIA. Volume 2 will include all the supporting documents and technical appendices relating to the chapters. A Non-Technical Summary ('NTS') will be produced and will form a standalone document.

4.3 Each ES chapter will follow the headings set out below to ensure the final document is transparent, consistent and accessible:

- Introduction;
- Policy Context;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Identification and Evaluation of Key Effects;
- Mitigation Measures;
- Residual Effects;
- Cumulative Effects; and
- Non-technical summary.

4.4 Each chapter sub-heading is explained in further detail below.

Introduction

4.5 This section will introduce the assessment discipline and the purpose for which it is being undertaken.

Policy Context

4.6 This section will include a summary of national, regional and local policies of relevance to the environmental discipline and assessment. Relevant legislation will be summarised where applicable.

Assessment Methodology and Significance Criteria

4.7 This section will provide an explanation of methods used in undertaking the technical study with reference to published standards, guidelines and best practice. The application of significance criteria will also be discussed.

4.8 It will also outline any difficulties encountered in compiling the required information.

Baseline Conditions

4.9 This will include a description of the environment as it is currently and as it is expected to change given the project were not to proceed (i.e. 'do-nothing' scenario). The method used to obtain this information will be clearly identified. Baseline data will be collected in such a way that the importance of the particular subject area to be affected can be placed in its context and surroundings so that the effects of the proposed changes can be predicted.

4.10 Baseline conditions will include implemented planning permissions that are under construction.

Identification and Evaluation of Likely Significant Effects

4.11 This section will identify the likely significant effects on the environment resulting from the Proposed Development.

4.12 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the effects can be positive or negative. The general criteria to be used in carrying out this process are detailed below.

Prediction of Impact Magnitude

4.13 The methodology for determining the scale or magnitude of change caused by the impact is set out below.

Table 4.1: Methodology for Assessing Magnitude of Change

Magnitude of Change	Criteria for assessing magnitude of change caused by an impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline conditions such that the post development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Prediction of Receptor Sensitivity

4.14 The sensitivity of a receptor is based on the relative importance of the receptor using the scale set out below.

Table 4.2: Methodology for Determining Sensitivity

Sensitivity	Examples of Receptor
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.

Assessment of Effect Significance

4.15 Effect significance will be calculated using the matrix in Table 4.3. This illustrates the interaction between impact magnitude and receptor sensitivity.

Table 4.3: Effect Significance Matrix

Magnitude	Sensitivity		
	High	**Moderate**	**Low**
Major	Major Adverse/Beneficial	Major - Moderate Adverse/Beneficial	Moderate - Minor Adverse/Beneficial
Moderate	Major - Moderate Adverse/Beneficial	Moderate – Minor Adverse/Beneficial	Minor Adverse/Beneficial
Minor	Moderate – Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor - Negligible
Negligible	Negligible	Negligible	Negligible

Mitigation Measures

4.16 Adverse effects will be considered for mitigation and specific mitigation measures put forward, where practicable. Mitigation measures considered may include modification of the project, compensation and the provision of alternative solutions as well as pollution control. The extent of the mitigation measures and how these will be effective will be discussed. Where the effectiveness is uncertain or depends upon assumptions about operating procedures, data will be introduced to justify the acceptance of these assumptions.

4.17 The approach to mitigation will follow best practice guidance, which suggests a hierarchical approach. The UNEP EIA Training Resource Manual (2002) advises that impacts should ideally be:

i. Avoided; if not

ii. Minimised; and or

iii. Compensated.

4.18 Three 'types' of mitigation are characterised in IEMA's Special Report – The State of Environmental Impact Assessment Practice in the UK (2011):

- EIA influence at design stage;
- Standard construction practices for minimising effects; and
- Follow-up actions for implementation post-consent.

4.19 Clear details of when and how the mitigation measures were carried out, or will be carried out, are to be given within the Environmental Statement. When certainty of impact magnitude and/or effectiveness of mitigation over time exists, monitoring programmes will be proposed to enable subsequent adjustment of mitigation measures, as necessary.

4.20 The opportunity for enhancement measures will also be considered where appropriate.

Cumulative Effects

4.21 Two types of cumulative effect will be assessed:

- Type 1 - Cumulative effects are the interactions between effects of the construction and Proposed Development works on a single receptor.
- Type 2 - Cumulative effects are those that arise from incremental changes caused by other past, present or reasonably foreseeable actions together with the construction and Proposed Development works.

4.22 The cumulative effects of the proposals and the identified committed developments will be assessed.

4.23 A list of known committed developments is set out at Appendix B. The Council are requested to review and comment on this list in their EIA Scoping Opinion.

Residual Effects

4.24 The residual effects, i.e. the effects of the proposals assuming implementation of proposed mitigation, will be determined. The residual effects represent the overall likely significant effect of the Proposed Development on the environment having taken account of practicable/available mitigation measures.

5 Environmental Statement Chapters

5.1 Under each section topic, a summary of the content of the section, the methodology and scope of assessment is given. Where relevant, the assumptions of the assessment are described. Current relevant legislation or recognised guidance for individual assessments will be adhered to, where necessary.

Policy Context

5.2 The ES will refer to the Local and the National Planning Policy Framework (and any associated guidance available) with reference to all environmental, social and economic policies of relevance to the Proposed Development.

Daylight, Sunlight, Overshadowing and Solar Glare

Introduction

5.3 This chapter of the ES would assess the likely significant effects of the Proposed Development on the environment with respect to daylight, sunlight, overshadowing and solar glare, with an emphasis on ascertaining the impact on both nearby outdoor spaces, windows on nearby buildings and other sensitive receptors, including passing trains.

5.4 Daylight and Sunlight studies will be undertaken to establish the impact of the Proposed Development on the amenity of existing adjacent properties and areas of public realm to be delivered.

5.5 The assessment will focus on establishing the current levels of daylight and sunlight available to the adjacent residential properties and hotels and the impact that the massing of the Proposed Development's design has on the daylight and sunlight amenity currently enjoyed and public areas proposed on site.

5.6 The receptors of the daylight and sunlight assessments will be the windows of habitable rooms where the adjacent occupants have a reasonable expectation of daylight.

5.7 Receptors for permanent overshadowing studies will include gardens and permanent open amenity spaces where pedestrian leisure activities are expected.

5.8 In relation to solar glare and glint, a section of the Daylight and Sunlight report will assess the location and orientation of the building including materials used to quantify the impact on passing trains on the viaduct.

Baseline Conditions

5.9 A 3D model of the existing sensitive properties and windows will be constructed via a number of sources, such as planning drawings, site visits and specific survey data.

5.10 In the case of properties and structures that do not have sensitive receptors, but may impact the daylight and sunlight to the sensitive receptors of other existing buildings, Z-mapping (or similar) will be used to populate the 3D model with the properties' height and mass.

Method of Assessment

5.11 BRE Report 209, entitled "Site Layout Planning for Daylight and Sunlight – a guide to good practice" will be used as the method to assess the impacts. The BRE Report 209 recommends a methodology for assessing the effect that the massing of the proposed building will have, if any, on daylight enjoyed by individual windows of adjoining properties.

5.12 In accordance with the BRE Report 209 an initial test of the windows will be undertaken to establish whether further, more detailed testing needs to be undertaken. Where the test is not passed the daylight amenity will be further tested including the Vertical Sky Component (VSC). Where the VSC is

reduced by more than the BRE recommendations, the Daylight Distribution (DD) values will be assessed for these windows, in order to provide a rounded view of the impacts.

5.13 The BRE Guidelines specify that the Daylight and Sunlight results should be considered flexibly in the context of the Site. For example, there would be a higher expectation for daylight and sunlight in rural or a suburban environment than in a dense city centre location. The important factor is that the levels of daylight and sunlight are appropriate, taking into account planning policy and regeneration requirements, existing massing and recent nearby planning consents.

5.14 Where windows to existing surrounding properties fail to meet the target VSC criteria at the face of the window, an assessment of the before and after scenarios will be undertaken and determine whether the reduction in VSC values exceeds the 20% reduction, which is considered noticeable to occupants by the BRE.

5.15 The new park, to be created as part of the Proposed Development, will be assessed as a future permanent open amenity space in the context of the BRE Report 209. The overshadowing effect of the Proposed Development and surrounding context on the new park will be assessed and tested against the BRE Guidelines.

5.16 The assessment will also include an additional height to account for eye level of a train driver or the height of a railway signal. It will consider whether the development produces a solar reflection that affects train drivers or if the development produces a solar reflection that affects the visibility of railway signals.

Summary of Assessment Scope

Receptor	Impact	Potential Effect
Windows of habitable rooms of existing adjacent residential buildings	Overshadowing of existing adjacent residential buildings	Loss of daylight and sunlight access to adjacent residential buildings
Existing adjacent gardens and permanent open amenity spaces	Overshadowing of existing adjacent gardens and permanent open amenity spaces	Loss of direct sunlight access to existing adjacent gardens and permanent open amenity spaces
Future park permanent open amenity space	Overshadowing of future permanent open amenity space	Excessive overshadowing of future permanent open amenity space
Passing train drivers on the adjacent viaduct	Glint and glare on passing train drivers	Disruption and safety threat to train drivers through glint and glare.

Table 5-1: Daylight, Sunlight, Overshadowing and Solar Glare Assessment Scope

Noise and Vibration

Introduction

5.17 This ES Chapter will describe the baseline conditions currently existing at the site and nearest noise sensitive receptors; methods used to assess the potential effects of noise emitted from the Site on the nearest noise sensitive receptors; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.

5.18 The supporting technical Acoustic Assessment will include a review of the existing noise climate in the area around the site and an appraisal of the potential effect of the noise emitted from site during the construction and operational phases. Mitigation measures will be identified where applicable.

5.19 Environmental noise surveys have been carried out previously at the site and at a number of the noise sensitive premises around the site to understand the baseline noise environment. This survey is contained within Appendix C to this report.

Baseline Conditions

5.20 The proposed site is bounded by the following:

- The B6469 "Fairfield Street" and Manchester Piccadilly rail station to the north;
- The A57(A) "Mancunian Way" to the east and south; and
- Baring Street to the west with residential dwellings and the A6 "London Road" beyond.

5.21 The noise and vibration assessment will therefore take account of the impact of transportation noise and vibration on the Proposed Development as well as the impact of the Proposed Development on the surrounding environment for both construction noise and vibration and operational noise. Co-ordination with the work on the prediction of future traffic flows will be undertaken to quantify the increased in volume of traffic and the impact of trains causing an effect on residents.

Local Noise Sources

5.22 The main sources of noise in the vicinity of the site, noted during the course of the Noise Survey undertaken 13 – 14 February 2017 (Appendix C), were associated with road traffic on Fairfield Street and A57 Mancunian Way to the south, rail movements on the line to the north of the site, and the taxi rank on Baring Street to the west.

Local Vibration Sources

5.23 During the course of the survey, the engineer noted no significant sources of vibration at the Site. On this basis, it is considered that no further assessment of operational vibration is necessary as part of the EIA process.

Nearest Noise and Vibration Sensitive Receptors

5.24 The nearest dwellings potentially affected by the Proposed Development are to the west (Baring Street) and south (Thirsk Street). As other cumulative developments in the area (identified in Appendix B) reach completion, there will be further noise sensitive receptors in the locality.

Method of Assessment

5.25 Construction noise will be predicted at chosen receptor locations to be agreed with the Local Planning Authority, using accepted modelling techniques and industry standard source sound-level data. Guidance on construction noise and vibration is contained within British Standard BS 5228-2:2009+A1:2014.

5.26 Procedures described in Department of Transport / Welsh Office Memorandum '*Calculation of Road Traffic Noise*' (1998) will be used for calculating and measuring road traffic noise. Procedures for the calculation and measurement of railway noise in '*Calculation of Railway Noise'* (DfT, 1995) will also be followed. Railway vibration will be assessed using BS 6472-1:2008 and BS 7385-2:1993.

5.27 Guidance on the impact assessment of traffic noise is provided within the IEMA Guidance Note No. 1 "*Guidance for the Environmental Assessment of Road Traffic"*. The document recommends assessment where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%), and where specifically sensitive areas experience traffic flow increases of 10% or more. The guidance indicates that projected changes in traffic of less than 10% create no discernible environmental noise impact.

5.28 BS 4142:2014 '*Methods for rating and assessing industrial and commercial sound'* is widely used for assessing the impact of noise from mechanical services plant. The assessment parameter is the 'rating level' ($L_{Ar,T}$) of the plant noise assessed at the position of residential properties compared with the 'background' level ($L_{A90,T}$).

5.29 Reference will be made to the following documents as part of the assessment:

- British Standard (BS) 5228-1 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Part 1: Noise';
- BS 5228-2 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration';
- International Organisation for Standardisation (ISO) 9613-2: 1996 'Attenuation of sound during propagation outdoors. Part 2: General method of calculation';
- BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound';
- BS 8233: 2014 'Guidance in sound insulation and noise reduction for buildings';
- BS 7385: 1993 'Evaluation and measurement for vibration in buildings';
- BS 6472: 2008 'Guide to evaluation of human exposure to vibration in buildings';
- Control of Pollution Act 1974;
- Calculation of Road Traffic Noise (CRTN) (DoT, 1988);
- Design Manual for Road and Bridges (DMRB) Volume 11 Section 3 Part 7 HD213/11 (Revision 1)' Traffic Noise and Vibration' (Highways Agency, 2011);
- Manchester City Council 'GD 03 – Information for Developers', December 2015; and
- Manchester City Council 'Planning and Noise Technical Guidance', December 2015.

Potential effects of Construction Phase

5.30 Demolition and construction has the potential to generate high levels of noise and vibration through activities such as material movements, earthworks, ground improvement and piling, crushing and breaking, which will all be assessed. The potential for propagation of ground-borne noise and vibration due to piling works will be also assessed, for the most part, the majority of the nearest noise sensitive receivers are probably too far away to be impacted to any significant degree. The most exposed properties are located to the west beyond Baring Street. Some noise impact could be expected off-site due to construction vehicle movements.

Potential Effects of Operational Impacts

5.31 Potentially, there may be an impact on the nearest noise sensitive receptors due to noise breaking out of the commercial units and from any building services plant associated with the development. This will primarily be assessed using BS 4142:2014 and Manchester City Councils 'Planning & Noise Technical Guidance'.

Summary of Assessment Scope

Table 5-2: Noise and Vibration Summary

Receptor	Impact	Potential Effect
NSR1 Square One – Network Rail offices, north	Noise from construction activities	Potential adverse impact from noise and vibration at noise sensitive

Receptor	Impact	Potential Effect
NSR2 Residential dwellings – Baring Street, west	Human exposure to construction vibration Building exposure to construction vibration Noise from construction traffic Operational noise from fixed plant and equipment Operational traffic noise	receptors (without appropriate mitigation)
NSR 3 Commercial units to the south on Cakebread Street, south west		
NSR 4 Residential dwellings – Paddock Street, south east		
New residents introduced on site		

Wind Microclimate

Introduction

5.32 This section describes the scope of the proposed wind microclimate assessment and ES chapter.

5.33 The Proposed Development will introduce a number of tall buildings, with the potential to create accelerated pedestrian level winds through downdraughts and channelling of winds between the buildings. It will also introduce a number of amenity spaces, where recreational activities will be more sensitive to wind conditions and will potentially require purposeful design of the landscaping scheme.

5.34 A detailed wind microclimate assessment will therefore be carried out to assess the suitability of conditions for planned pedestrian activities within the Site and confirm that the Proposed Development does not unduly impact on the suitability of wind conditions for existing and future pedestrian activities in the surrounding area.

Baseline Conditions

5.35 Based on wind climate statistics from Manchester Airport, winds from the southerly quadrant are prevalent. Light to moderate winds from the south and south-south-east are most common, whilst stronger winds more frequently blow from the south-south-west. Winds from the west-south-west also occur frequently, and extreme wind speeds (relevant to pedestrian safety) are most likely to blow from this direction. Northerly winds are generally light and rare, though cold north-easterly winds are common during spring. Wind speeds are generally higher during winter and lower during summer.

5.36 The Site is sheltered at low-level from the prevailing southerly winds, but is more exposed to the stronger west-south-westerly winds. The existing Site does not include any dominant buildings likely to significantly accelerate these winds, but also offers only limited shelter to taller surrounding buildings to the north and west of the Site. The resulting suitability of pedestrian level wind conditions, in and around the Site, for existing activities will be assessed in detail based on the methodology outlined below.

Method of Assessment

5.37 Due to the sensitive, recreational activities to be introduced and the potential for the Proposed Development to create accelerated pedestrian level winds, a detailed wind microclimate assessment will be carried out based on CFD (Computational Fluid Dynamics) virtual wind tunnel, in accordance with industry best practice. Where required, mitigation measures will be developed to ensure an acceptable residual effect in terms of suitability of conditions for planned pedestrian activities in and around the Site.

5.38 The closest and most suitable wind data provided by the MET Office will be obtained to allow the Wind Frequency Analysis to be completed. This will be applied as boundary conditions for a CFD virtual Wind Tunnel that will be used to quantify the wind microclimate of the site and its surroundings. This includes:

- Wind translation from the wind data location to the development.
- Topographical data available for the surroundings and geometrical data of the Proposed Development.

5.39 The evaluation criteria that will be used will be based on the Lawson Criteria to assess the level of comfort for both existing sensitive receptors, new residential uses, public routes and open spaces proposed as part of the development. From this, the following will be identified:

- Potential impacts and effects from the development.
- Cumulative impacts and effect before and after construction of the Proposed Development and any residual effects following mitigation measures.
- Assessment of the significance of effect through comparison of the new development and the comfort Lawson criterion (including yearly, seasonal and worst season effects), and safety where necessary.

5.40 Assessment of the following scenarios will be completed:

- The existing site and existing surrounding buildings.
- The Proposed Development and existing surrounding buildings.
- The Proposed Development and proposed future surrounding buildings (cumulative scenario).

5.41 If mitigation is found to be required to mitigate adverse wind effects, a quantitative assessment of proposed mitigation will be carried out. The quantitative assessment will be compared with previous results for the existing receptors and Proposed Development without mitigation. Likely mitigation measures include additional tree planting around the park or design features inherent within the design of the proposed building, such as wind baffles and canopies.

Summary of Assessment Scope

5.42 Potential impacts and effects during the construction and operational phases to be addressed in the EIA are as follows:

- Short term temporary effects on local wind conditions and sensitive receptors (pedestrian activities) during construction activities.
- Residual long term wind effects on local conditions and surrounding areas caused by the new development. The long term wind effects will be addressed for both existing sensitive receptors and new residential uses proposed as part of the development.

Table 5-3 - Wind Microclimate

Receptor	Impact	Potential Effect
Pedestrian activities in and around the site	Wind acceleration through new buildings introduced on site.	Effect on comfort and safety.

Receptor	Impact	Potential Effect
Pedestrian activities at balconies and terraces	Wind acceleration through new buildings introduced on site.	Effect on comfort and safety.
Entrance doors	Wind acceleration through new buildings introduced on site.	Effect on comfort and safety.

Water Resources and Flood Risk

Introduction

5.43 The Water Resources and Flood Risk chapter of the ES will assess the potential effects of the Proposed Development on the surrounding water environment and the potential effects of the water environment on the Proposed Development. This will include an assessment of the potential change in water supply, foul drainage, surface water drainage, pollution prevention and flood risk.

5.44 The current drainage arrangements for the site will be reviewed as part of the drainage strategy to be developed for the Proposed Development. Appropriate dialogue will be held with United Utilities (foul water and surface water) and the Environment Agency (EA) (surface water) to agree connections and flow rates.

5.45 The nearest surface water feature to the site is the River Medlock, which passes through the centre of the Site from east to west and is culverted at various points.

5.46 The site falls within the North West River Basin District. The associated River Basin Management Plan sets a number of actions to meet the requirements (i.e. good status) of the Water Framework Directive (WFD).

5.47 With regard to the WFD classification system, the River Medlock in this location is heavily modified and is currently designated as achieving moderate potential for ecological quality. The River Medlock in this location is designated as good for chemical quality. The classifications described above are projected to stay the same into the next planning period.

Baseline Conditions

5.48 A River Survey has been undertaken and is appended to this EIA Scoping Report (Appendix D) and the findings are summarised in this section.

5.49 The River Medlock is contained within a deep rectangular brick/stone walled channel. The condition of the river varies; some of the river walls are in a derelict state, with parts collapsed into the river. In many locations, siltation has built up on one or both sides of the river bank. The silt deposits have enabled the dense growth of vegetation along almost the entire corridor. Japanese Knotweed is currently present along the riparian corridor within the site.

5.50 The Environment Agency's flood risk mapping shows parts of the existing site to be highly susceptible to flooding with the River Medlock canalised between the high walls and under industrial buildings. Flooding of the site is concentrated around the Medlock in the central area (Flood Zone 3 High risk) with some Flood Zone 2 (Medium risk) beyond these areas. However, the majority of the site is situated within Flood Zone 1 (Low risk), which has a flood risk of less than 0.1% annual exceedance probability.

5.51 Surface water flood risk is therefore considered low to very low at the majority of the site, with local depressions at medium to high risk and the site is located within a Critical Drainage Area. Flood risk from ground water and artificial sources is currently considered low to very low at the site.

5.52 The baseline assessment will consider the existing scenario both on and around the Proposed Development site. Data will be gathered from the following sources:

- Envirocheck report;

- Site visits;
- Consultation with the relevant authorities (i.e. through pre-development enquiries);
- EA data on current quality of existing surface water features in line with the requirements of WFD;
- Review of existing permitted discharges and surface and ground water abstractions;
- Ground investigation data and river sampling where available;
- Review of existing surface water runoff regime and flood risk issues. Note a detailed Flood Risk Assessment (FRA) which will include hydraulic modelling and drainage strategy will inform the baseline study and will form an Appendix to the ES; and
- A review and summary of relevant international, national and local legislation relating to the water environment.

Method of Assessment

5.53 Potential effects on the water environment arising from the Proposed Development will be assessed against the baseline condition. Effects will be assessed for both the construction and operational phases of development.

5.54 Potential changes to pollution to the surface water environment will be assessed through a qualitative based approach.

5.55 In relation to flood risk, this assessment will involve a review of the Proposed Development in terms of both compatibility with the National Planning Policy Framework (NPPF), the associated Planning Policy Guidance (PPG) and the requirement of the Manchester City Council Strategic Flood Risk Assessment (SFRA) 2011.

5.56 Hydraulic modelling is required to demonstrate changes within the floodplain will have negligible or beneficial effects in terms of flooding to off-site areas. Agreement in principle to the proposed floodplain changes will be sought in advance through consultation with the relevant statutory authorities. The Flood Risk Assessment (FRA) will refer to, and append, the hydraulic modelling report and any relevant correspondence with the EA.

5.57 The drainage strategy will provide a level of quantification and appraisal with regard to drainage impacts for both foul water and surface water flows. This will be summarised in EIA terms within the Water Resources ES Chapter.

5.58 The utilities appraisal for the site will determine the existing utility baseline condition on the site with regard to potable water and provide a level of prediction for constraints and capacities. The findings will be summarised in the Water Resources ES Chapter.

5.59 The effect significance will be based on assessing the effect magnitude (i.e. the deviation from the baseline condition) and the sensitivity of the likely receptor. Professional judgement and the use of a matrix approach will determine if potential effects are considered to be significant.

Summary of Assessment Scope

5.60 An initial review of the Proposed Development and existing surrounding water environment suggests that potential unmitigated significant effects during the construction phase may include:

- Localised changes in surface water flow regime during rainfall events;
- Deterioration of the quality of surface water run-off from the site which may deteriorate the quality of downstream water bodies and groundwater through infiltration;
- Disturbance of in river sediment and downstream pollution as a result of in-river works; and

- Accidental leaks and spillages of hazardous material which could adversely affect the quality of downstream water bodies and groundwater through infiltration.

5.61 An initial review of the scheme and the existing surrounding water environment suggests that potential significant effects during the operational phase may include:

- Increased water demand and foul water demands from the site placing pressure on infrastructure;
- Potential change of surface water flow regime across the site changing capacity requirements for surface water sewer network;
- Deterioration of the quality of surface water run-off, which may deteriorate the quality of nearby water bodies, via the surface water sewerage network;
- Changes to surface water discharge rates which may increase flood risk to the site, adjacent sites and areas downstream;
- Effect on groundwater resources through identified pathways as a result of piling or other enabling and groundworks; and
- The Proposed Development vulnerability to flood risk.

Table 5-4: Water Resources Summary

Receptor	Impact	Potential Effect
River Medlock	Damage by pollution or contamination by dust, waste or run-off	Reduced water quality of the River Medlock
Existing nearby, and future residents / construction workers / human receptors	Increased flood risk of existing nearby receptors, construction workers, and future residents of the Mayfield development from fluvial, groundwater, surface water or sewer flooding – located within Flood Zone 3a and 2	Flooding affecting residents, businesses and future site users
Surface water environment	Potential changes to pollution of the surface water environment	Potential deterioration of surface water run-off Potential deterioration of quality of nearby water bodies as a result of the above
Potable and foul water demand	Increased demand for water within the site	Increased pressure on local water resources
Change of surface water flow across the site	Increased surface water discharge rates	Increased flood risk to the site, adjacent sites and areas downstream; increased pressure on local sewer capacity

Air Quality

Introduction

5.62 The Site lies within Manchester's Air Quality Management Area (AQMA) and detailed consideration of the potential air quality impacts of the Proposed Development will need to be incorporated into the Environmental Statement.

5.63 The Air Quality ES chapter will provide detailed assessments of both the effects of the existing air quality on people living and working on or near the Site, and the impact of the Proposed Development

itself on local air quality. Should significant adverse air quality effects be identified, mitigation measures will be proposed to ensure that the air quality impacts of the Proposed Development are minimised to an acceptable level.

Baseline Conditions

5.64 The Site is located in Manchester's designated AQMA. The existing concentrations of nitrogen dioxide (NO_2) and fine particulate matter (PM_{10}) are known to exceed regulatory air quality standards in this area and are therefore the key pollutants of concern. Air quality monitoring data for these pollutants will be obtained from Manchester City Council as well as background air quality data from DEFRA. Predictions of the baseline air quality for the year of opening will be calculated.

Method of Assessment

Potential Construction Effects

5.65 The Proposed Development will generate dust and other air emissions during construction, which will have the potential to cause dust nuisance and elevated pollutant concentrations.

5.66 The potential impacts and nuisance from dust emissions generated during construction will be assessed using the Institute of Air Quality Management (IAQM) guidance on the assessment of dust from construction activities.

5.67 This guidance provides a qualitative methodology for assessing the potential air quality impacts from various site construction activities (demolition, earthworks, construction and trackout) and provides site specific mitigation measures to minimise these potential impacts. Construction impacts can occur up to 350 metres from a site boundary, and therefore sensitive receptors within this distance (as well as any onsite receptors) will be considered in the assessment.

Potential Operational Effects

5.68 Traffic generated by the Proposed Development and any proposed energy/combustion plant will give rise to emissions, which can affect local air quality, in particular concentrations of NO_2, and particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}) and 2.5µm ($PM_{2.5}$).

5.69 As the development will introduce receptors into an AQMA it will also be necessary to assess the exposure of future occupants in relation to air quality objectives, in order to ensure the site is acceptable for its proposed use, and to propose any necessary mitigation measures where significant effects are identified.

5.70 Operational assessment will be carried out in line with IAQM planning guidance (Holman et al., 2017), and where necessary the air dispersion model ADMS-Roads will be used to predict the impact of emissions on pollutant concentrations at nearby sensitive receptors as a result of the Proposed Development. Pollutant concentrations will be predicted at selected sensitive receptors representing worst-case exposure to local air quality.

5.71 The assessment will consider the following scenarios:

- Existing baseline year;
- 'Do Nothing' (year of opening): future baseline without development; and
- 'Do Something' (year of opening): future baseline with development.

5.72 A comparison of results in future 'Do Nothing' and 'Do Something' scenarios will allow the effect of the Proposed Development to be determined in line with IAQM planning guidance. The cumulative effects of committed developments will be taken into consideration in both scenarios.

5.73 Where significant adverse effects are predicted, appropriate mitigation measures will be recommended through discussions with the client, the design team and Manchester City Council.

Summary of Assessment Scope

Receptor	Impact	Potential Effect
Existing and future surrounding properties sensitive to construction effects (up to 350m from the site boundary), including residential properties to the west and south of the site and commercial properties to the south and north-east.	Emissions generated during the construction phase, including dust and elevated pollutant concentrations	Nuisance from dust soiling and health effects associated with elevated pollutant concentrations.
Existing air quality sensitive receptors (residential properties)	Impact of emissions associated with traffic generated by the Proposed Development and any proposed energy/combustion plant	Health effects associated with elevated pollutant concentrations.
Future proposed residential properties	Emissions in particular from surrounding roads as well as any proposed energy/combustion plant	Health effects associated with elevated pollutant concentrations.

Table 5-5: Air Quality Summary

Ecology

Introduction

5.74 This chapter of the ES will assess the potential effects of the Proposed Development on ecology, including impacts and effects on protected species and habitats of conservation importance. In addition, potential impacts and effects on nearby statutory and non-statutory designated sites will be assessed as well as the cumulative effects of the development at a local and regional level.

Baseline Conditions

5.75 Ecology surveys carried out between late 2016 and 2018 identified a number of ecological constraints and opportunities associated with development of the site.

5.76 The site is not situated within or immediately adjacent to any statutory or non-statutory designated sites although part of two designated sites, the Rochdale and Ashton Canals, lie within 1km of the site.

5.77 Habitats present on site include buildings (occupied and derelict), the disused railway depot, the culverted and canalised River Medlock, extensive areas of hardstanding and a range of semi-natural habitats typical of urban brownfield sites. Small bat roosts are present in six locations including culverted sections of the River Medlock.

5.78 Vegetation along the river corridor is currently dominated by the invasive plant Japanese knotweed, but also provides an important foraging and commuting corridor for bats.

5.79 The habitat on site is also considered suitable for black redstart, a rare breeder in the UK that is known to occur near the Mayfield site. In addition, the Environment Agency has indicated that the river will require restoration, including naturalisation of the river banks.

Method of Assessment

Baseline Assessment

5.80 The baseline assessment for the ecology chapter of the ES will be based on an updated extended Phase 1 survey including desk study with records obtained from the local biological records centre in combination with a suite of ecological surveys carried out since December 2016. These include:

- Ecological Assessment and Bat Inspection (December 2016, updated November 2017);

- Bat Surveys (November 2017);
- Black Redstart and Breeding Bird Survey Report (November 2017);
- River Survey (November 2017); and
- Bat inspection and emergence survey report – Buildings B2 and culverts B24/B26 (November 2018).

5.81 The main body of the above Surveys are included in Appendix E of this Report for completeness.

Effect prediction and assessment of effect significance

5.82 The assessment for the ES will be carried out in accordance with the Chartered Institute of Ecology and Environmental Management's Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland (CIEEM, 2018). This document provides best practice guidance on identifying when and where an EcIA is required, determination of the importance of ecological features, and characterisation of impacts including cumulative impacts.

5.83 The importance of ecological features will be determined on a geographic scale in accordance with CIEEM 2018 guidelines. Some features have a pre-assigned geographic value (i.e. sites protected at a national, county/metropolitan or local level). Others will be valued based on relevant legal, policy and local planning guidance documents, available baseline assessment information and professional knowledge of the ecological feature being assessed.

5.84 In accordance with the guidelines, only features considered to be important (those of local value or above) will be evaluated further in the impact assessment. However, ecological enhancements on site and statutory requirements regarding legally protected species may still seek to include these features in mitigation/enhancement plans.

5.85 Characterisation of impacts will be based on a number of factors including the extent, magnitude, reversibility and duration of the impact. An assessment will then be made regarding whether or not the effect of these impacts will be significant to the important ecological feature. Under CIEEM 2018 guidelines, a significant effect is defined as one which 'either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general'. Where a significant effect is identified, the geographic scale of that effect is set out as either local, county/metropolitan, regional or national level based on available quantitative information and professional knowledge as above.

5.86 Measures to avoid, reduce and compensate ecological impacts will be described and an assessment of residual ecological impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects will be made.

5.87 The process for evaluating the importance of ecological features, assessing impacts and determining the significance of their effects, both before and after mitigation in accordance with CIEEM 2018 guidelines, will be described fully in the EIA.

Summary of Assessment Scope

5.88 Potential construction effects are considered to be:

- Loss and/or disturbance to flora and fauna;
- Loss of existing on-site habitats during construction; and
- Damage/disturbance to adjacent sites/habitats of ecological value, or the species utilising these.

5.89 There is the potential for the River Medlock, habitats and species utilising these, including protected species, to be indirectly impacted through pollution, lighting, noise and dust during construction.

5.90 Works to buildings and culverts that contain bat roosts will need to be carried out under licence from Natural England with the provision of replacement roosting habitats as required.

5.91 Operational effects of the development on ecology include the potential for increases in light spill, noise and human disturbance, deterring fauna species from utilising the site and adjacent areas. As such, minimising indirect impacts, such as light spill, on the river corridor will be an important mitigation strategy for the scheme.

5.92 There are opportunities for enhancing the ecological value of the site within the scheme, particularly in association with naturalising the river channel and creation of riverside habitats and provision of a replacement habitat for black redstart. Removal of Japanese knotweed, undertaken by specialist contractors with a long-term strategy for management of invasive plant species, will further improve the ecology of the river corridor.

Table 5-6: Ecology Summary

Receptor	Impact	Potential Effect
Nearby statutory and non-statutory designated sites	Damage by pollution or contamination by dust, waste or run-off	Damage to the important features of the site, harming the habitats and species present within the sites and impacting use of the sites by wildlife
River Medlock	Damage by pollution or contamination by dust, waste or run-off Naturalisation of the river corridor and creation of riverside habitats	Damage to the downstream habitats and species associated with the river and impacting use by wildlife Provision of ecologically valuable habitat and a range of biodiversity benefits. Vegetated river retains a movement corridor for wildlife, forms a habitat 'stepping stone' and contributes to green infrastructure in this part of Manchester
Black redstart	Loss of suitable habitat on site	Reduction in available habitat within Manchester suitable for black redstart with a detrimental effect on the local population
Local fauna including black redstart, generalist birds and invertebrates	Indirect impacts from noise/vibration, light, dust and run-off during demolition and construction and noise, human disturbance and lighting during operation	Reduction in use or avoidance of site for breeding, resting and foraging with a detrimental effect on the local populations
Foraging and commuting bats	Loss of habitat and disruption of foraging and commuting corridors by lighting during construction and operation	Reduction in use or avoidance of site /River Medlock corridor for foraging and commuting by bats, with a detrimental effect on the local bat population
Roosting bats	Killing, injury or disturbance of individual bats, and damage or destruction of their roosts	Death, injury or disturbance of individual bats, and damage or destruction of their roosts leading to a reduction in roosting opportunities on the site with potential adverse effect on local bat populations
Breeding birds	Killing and injury of birds, and destruction of active nests	Damage or destruction of active birds' nests, direct harm to birds, temporary loss of available nesting habitat during construction, and potential disturbance to nearby nesting birds, all leading to adverse effects on local bird populations

Receptor	Impact	Potential Effect
Land free of Japanese knotweed	Spread of non-native invasive species on or beyond site	Competition for resources and reduction in space available for local flora, reduction in local species diversity
Biodiversity	Landscaping with native species and species of benefit to wildlife, creation of extensive biodiverse habitat for black redstart and provision of additional features to benefit invertebrates and generalist bird species	Provision of net gain for biodiversity and ecology and strengthening of resilience and adaptability to climate change

Ground Conditions

Introduction

5.93 The purpose of this assessment is to identify the existing soil and geological conditions, evaluate the potential for contamination and evaluate the potential effects on ground conditions during both the construction and operational phases of the Proposed Development.

5.94 The scope of the assessment will be based around the individual characteristics that will have differing impacts of the Proposed Development on ground conditions and hydrogeology, such as basement construction or retention of existing structures.

5.95 In the UK the assessment of risk from ground contamination follows the Source - Pathway - Receptor approach. If one of these three elements is absent, it is considered that there is no risk of harm. On a site where there is no history of contaminative land uses with no sources of any significance, any contamination is likely to be very minor in terms of concentration and nature and is likely to be localised.

5.96 In such a case, the relevant receptors are likely to be restricted to human receptors (e.g. construction workers, residents, visitors and neighbours) and the buildings or below ground infrastructure. Any water resource receptors, in the form of groundwater within the vicinity of the site and any surface water courses or water bodies will also be considered within the Water Resource and Flood Risk ES chapter.

Baseline Conditions

5.97 A Phase I Desk Study Report (Buro Happold report entitled 035548 Mayfield Regeneration, Geo-environmental and Geotechnical Desk Study Report dated August 2017) has been produced for the development site. This Report is included as an Appendix to this EIA Scoping Request (Appendix F) and summarised below for completeness.

5.98 In terms of ground conditions, the Site is underlain by Made Ground, Quaternary Glacial Till and Sherwood Sandstone. Recent Alluvial deposits are recorded adjacent to the River Medlock. The solid geology is Sherwood Sandstone underlain by Manchester Marls at depth. The Sherwood Sandstone is a Principal Aquifer. Groundwater underlying the Site is considered likely to be in hydraulic continuity with the River Medlock. Localised groundwater may be encountered in the Made Ground deposits perched on underlying low permeability Glacial Till.

5.99 The Site has a long predominantly industrial history with a range of potentially contaminative uses. This includes Mayfield Works, Chapelfield Works, Mayfield Station & associated infrastructure, printing works, ice works, baths, cotton mills, Hanover Mills, Fairfield Street Garage, Ardwick Tannery, scrap yard, timber yards, Britannia Brewery, iron works, tanks, a mortuary, various depots and smaller commercial and industrial facilities.

5.100 Based on the Desk Study assessment, the likelihood of potential ground contamination affecting the Proposed Development was considered to be of moderate/low risk. The potential contamination Source-Pathway-Receptor linkages identified as part of the Desk Study should be investigated as part of the site specific ground investigation and laboratory testing.

5.101 Based on the current development proposal, the Phase I Desk Study Report concludes that the baseline condition has a number of potential sources of contamination and thus a moderate risk of ground contamination. There may be a potential risk of harm to both human and environmental receptors requiring further assessment and in this case it is proposed that a full ground conditions assessment is scoped in to the ES as a technical appendix (Volume 2). Scheme specific ground investigations together with groundwater and ground gas monitoring data will need to be completed in accordance with the current development proposals.

5.102 The baseline section of the ES chapter will include a review and summary of all available data and any previous investigation work undertaken on site to date.

Method of Assessment

5.103 A conceptual model of the site that describes the environmental features of the site together with the expected interaction of potential contamination sources with the environment will be developed.

5.104 This model will be done by undertaking a Source – Pathway – Receptor assessment of the site:

- Sources - potential or known contaminant sources e.g. historic site land uses.
- Pathways - mechanisms/systems thorough which exposure to a contaminant could occur e.g. direct contact or migration through air, over land or via permeable ground.
- Receptors - sensitive environmental receptors that could be adversely affected by a contaminant e.g. site occupiers, groundwater resources, and ecological resources.

5.105 Where a source, relevant pathway and receptor are present a "contaminant linkage" is created, whereby there is a circumstance through which some level of environmental harm could occur, it must to be assessed and mitigation measures identified as appropriate.

5.106 The methodology for effect prediction is based on assessing both the magnitude of the changes expected and the sensitivity of the receptors. Criteria for assessing the significance of potential human and environmental effects will be based on a qualitative assessment of the magnitude of the effect, or how far the effect deviates from the baseline condition and the receptor sensitivity. For example, a large magnitude of effect would be considered to be:

- A short term (acute) or long term (chronic) adverse effect on human health equivalent to "significant harm" as defined by the Environmental Protection Act (1990).
- A persistent and extensive pollution of water resource or ecosystem equivalent to Category 1 pollution incident.
- Catastrophic damage to crops, buildings or infrastructure.

5.107 Receptors are considered to have varying degrees of sensitivity to contamination potentially present beneath the site based on potential effects and the integrity of any site specific exposure pathways. The significance of ground conditions effects are influenced by this receptor sensitivity. Receptors of high sensitivity are considered to be:

- Human receptors either on site or on neighbouring sites occupying land in residential with external soft landscaped amenity areas, allotments or children's play areas.
- Construction worker human receptors engaged in extensive earthworks.
- Environmental receptors such as a major aquifer of regional importance that is used for potable water supply, a highly ecologically sensitive watercourse or water bodies, a nationally or internationally designated ecological site.

5.108 The assessment of 'effect magnitude and sensitivity' of the receptor are used to qualitatively assess the 'effect significance' of the Proposed Development. Effects have the potential to be either adverse or beneficial.

5.109 For example, the development may remove a source of contamination or may break a pathway that currently links a source to a receptor, given that ground contamination relies on a Source, Pathway and Receptor to be present. The significance of the effect depends upon the sensitivity of the receptor and the ways in which the development can provide a Pathway to the Receptor.

5.110 The significance of an effect also takes account of the timescales involved, i.e. short-term (less than three years duration), medium-term (between three and 10 years duration) or long term (in excess of 10 years duration) in addition to the extent of the area affected.

Summary of Assessment Scope

5.111 The assessment will consider potential ground contamination impacts and effects associated with construction of the development as well as potential operational impacts and effects.

5.112 The Ground Conditions ES chapter will address issues relating to existing ground conditions at the development site, with the aim of ensuring that suitable and safe conditions are achieved in the redevelopment of the various end-uses of the Proposed Development.

5.113 The assessment will take full consideration of the conceptual model of the site, including the potential sources of contamination, the receptors that could be affected and the pathways that could link these sources to the receptors. For the purposes of this chapter, ground conditions include issues associated with the geological, hydrogeological and hydrological regimes, including the soil gasses and vapours, chemicals within ground mass below the site, within the surface water bodies on and adjacent to the site and within groundwater beneath the site.

5.114 A range of effects associated with the design, construction and operation of the Proposed Development will be considered, including potential ground contamination. The assessment shall be carried out with reference to the relevant sections of the NPPF (July 2018) and local planning guidance, relevant British Standards, CIRIA C665 and other relevant good practice guidance.

5.115 The assessment will consider land affected by contamination that may affect, or be affected by, the construction and operation of the Proposed Development. Remediation and construction schemes can have an impact on and from the geology, soils, groundwater, surface waters and ecology of the area.

5.116 Constraints could also be imposed on the construction of the Proposed Development as a result of existing ground conditions. The assessment methodology is designed to identify both adverse and beneficial impacts in addition to identifying ways in which to minimise adverse effects and to maximise beneficial effects. There is also an opportunity for environmental gain through any remediation carried out as an integral element of the redevelopment, where the proposed works impinge on residual contaminated land which otherwise would remain un-remediated.

Table 5-7: Ground Conditions Summary

Receptor	Impact	Potential Effect
Human Health – current site users	Release of contaminants/ground gas during construction.	Exposure pathways to contamination in Made Ground - oral ingestion of soil, dermal contact of soil, soil dust inhalation. Migration of ground gas.
Human health – off-site public	Release of contaminants/ground gas during construction.	Outdoor inhalation of site dust. Migration of ground gas
Environment – Chester Formation (Sherwood Sandstone – Principal Aquifer)	Release of contaminants during construction.	Vertical migration of leachate from on-site Made Ground. Spillage from fuel in car parks/construction plant/storage areas.

Receptor	Impact	Potential Effect
Environment – River Medlock	Release of contaminants during construction.	Vertical migration of leachate from on-site Made Ground. Spillage from fuel in car parks/construction plant/storage areas.
Environment – onsite vegetation (green space)	Release of contaminants during construction.	Plant uptake of phytotoxic metals from Made Ground.
Property – onsite property	Release of contaminants/ground gas during construction.	Soil dust inhalation. Migration of ground gas.
Property – offsite property	Release of contaminants/ground gas during construction.	Migration of site derived dust during construction. Migration of ground gas.

Traffic and Transport

Introduction

5.117 This chapter of the ES will consider whether the Proposed Development has the potential to create significant effects on the environment in relation to traffic and transportation.

5.118 A Transport Assessment (TA) will be prepared in relation to the Proposed Development and will be appended to the ES (Volume 2). This will include a full multi-modal impact assessment of the Proposed Development on all transport infrastructure in the vicinity of the site. Potential environmental impacts may arise during both the construction and operational phases through extra vehicle trips that might arrive at the Site and from any new transport infrastructure.

5.119 The potential implications that may arise from additional traffic are described in the Institute of Environmental Assessment (IEA) Guidelines for the Environmental Assessment of Road Traffic (1993), and based upon this the proposed scope of the assessment will include:

- Severance;
- Driver Delay;
- Pedestrian Amenity;
- Accidents and Safety;
- Hazardous Loads; and
- Dust and Dirt.

Baseline Conditions

5.120 The relevant baseline conditions within the study area will be described in detail in the TA and will be summarised in the ES chapter. This will include the existing baseline and the 'assessment baseline' years to be agreed with Transport for Greater Manchester (TfGM). These baseline scenarios will then be compared with the completion years for each phase of the development, including an intermediate year when the development will be partially complete and the future predicted situation in the future year when the scheme would be fully complete and operational.

5.121 This would be undertaken with and without the Proposed Development so as to compare the impact of the development against the predicted situation should the development not be built (i.e. the 'Do Nothing' scenario). The existing baseline year will likely be 2019, which represents the submission date of the planning application. Baseline data within the study area will be gathered from the following sources:

- Published/web-based AADT/AAWT information
- Traffic data provided by MCC/TfGM
- The traffic surveys that were undertaken in July 2018;
- Road traffic Accident Statistics for the latest available five-year period;
- Local, regional and national planning policy documents; and
- Discussions with MCC/ TfGM

Method of Assessment

5.122 The method to assess the traffic and transport implications of the Proposed Development will be in accordance with national and local planning policy. Notably this assessment will be undertaken in consultation and agreement with Manchester City Council Highways' Officers and TfGM. As the traffic model is operated by MCC/TfGM, the inputs into the assessment will be agreed by the Highway Authority in advance of any planning submission. The implications against the existing site conditions will be established by the determining the net change in traffic from the new development compared to its baseline scenario.

5.123 The forecast of new development trips is made using the TRICS (version 7) database of trips attracted to the standard land uses. The distribution of that traffic over the wider network is made by the DEVTRIPS programme, which is used by TfGM to predict the origins and destinations of traffic within the SATURN model.

5.124 The traffic flow forecasts will be presented for AM and PM peak hours and off-peak periods. The off-peak model will form the basis for testing a large cultural event. These traffic flows will also include the proportion of HGVs and factors will be applied to derive 18 hour AAWT and 24 hour AADT flows which are also required for the Noise and Air Quality Assessments and form separate chapters of the Environmental Statement.

5.125 The key assessment will be a comparison of the future traffic levels forecast with the Proposed Development against the baseline assessment. That assessment will consider committed developments in the area as identified in Appendix B.

5.126 The highway links that are considered worthy of further assessment will be identified using the IEA thresholds guidance as described previously. The areas that will be subject to further assessment are therefore those that experience a change in flows greater than 30%. Where there are sensitive locations then a change in traffic flow of 10% would merit further analysis.

5.127 The existing public highway network that forms the boundary to the Mayfield SRF together with key junctions has been identified by MCC and TfGM to be assessed for the impact of the Mayfield development.

5.128 Potential receptors will be people using the transport infrastructure to make journeys within the study area for each mode of transport. The scope will be finalised with MCC/TfGM and will include

- Pedestrians
- Cyclists
- Rail and tram passengers
- Bus passengers

- Car drivers

5.129 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. The significance criteria will take account of the following factors:

- The value of the resource (e.g. international, national, regional and local level importance);
- The magnitude of the impact;
- The duration involved;
- The reversibility of the effect; and
- The number and sensitivity of receptors.

5.130 Any adverse effect should be considered for mitigation. The mitigation measures will be set out and would identify how effective they might be together with supporting evidence. The mitigation measures will be evaluated and monitored over time through the Travel Plan, which would have an ongoing remit to monitor and influence travel behaviour to deliver good environmental outcomes.

5.131 The cumulative effect of other committed developments will be considered in the modelling process. Where there are several impacts on a receptor the combined effects will also be considered.

5.132 Following mitigation, the remaining effect on receptors will be estimated in order to clarify the residual impact of the proposals.

Summary of Assessment Scope

5.133 Example receptor – impact – effect relationships are included in the following table. These are examples, and a full assessment will depend on the findings of the TA.

Table 5-8:Transport and Traffic Summary

Receptor	Impact	Potential Effect
Car Driver	New pedestrian crossing points on Mancunian Way, London Road and Fairfield St	Change in journey time
Pedestrians	Changes to vehicles routes within SRF area	Concentration of vehicle movements on limited number of junctions impacting on pedestrian crossing locations
Pedestrians and cyclists	Temporary increase in HGVs and goods vehicles during construction	Increased risk to pedestrian and cyclist safety.

Townscape and Visual Impact

Introduction

5.134 In the Townscape and Visual Impact ES Chapter, effects will be assessed as a function of both the magnitude of the impact or change and the sensitivity of the townscape resource or visual receptor affected. The adopted method of Townscape Appraisal (TA) has been devised to address the specific effects likely to result from a development of the scale, nature and location of the Proposed Development. The methodology draws upon the following established best practice guidance:

- Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA) (Landscape Institute) (LI) and Institute of Environmental Management & Assessment (IEMA), 2013; and
- Townscape Character Assessment, Technical Information Note 05/2017.

5.135 Photographs from representative viewpoints will be produced in compliance with the following:

- Advice Note 01/11: Photography and photomontage in landscape and visual impact assessment (Landscape Institute, 2011).

5.136 Geographical data sets will be created to test the theoretical visibility of the Proposed Development, which will be used to inform both the architecture and masterplan design and also the visual assessment and field surveys.

5.137 The extent of the area within which the Proposed Development will be likely to result in visual effects or indirect effects on townscape character, is limited by the local landform and extent of existing built-up areas.

5.138 The study area is proposed to be set at a distance of 1.5km around the site, beyond which it is not considered that effects on landscape character or visual amenity will be likely to result from the Proposed Development. This is in line with GLVIA (paragraphs 5.2 and 6.2).

Baseline Conditions

5.139 Townscape impacts can arise from the addition of, or changes to, physical features in the townscape, which affect its character. The townscape assessment addresses the impacts of the Proposed Development on townscape character and resources. The contribution of conservation areas to the townscape and the way they could be affected by the Proposed Development are discussed in this chapter.

5.140 The assessment of townscape impacts is structured around the identification of distinct blocks of townscape defined through homogeneity of scale, materials, land use, heritage, street pattern, open space, amongst other factors.

Existing Site

5.141 The site is characterised by a considerable variety in building heights, from the single-storey industrial units through to the 8-10 metre high railway infrastructure. Most of the industrial units are single storey warehouse structures with pitched roofs supported by steel frame structures with masonry walls.

5.142 The Mayfield Depot is a two storey structure. The Star and Garter public house is a three storey building, with fenestration within the Mansard roof.

5.143 The higher rise western part of the site is occupied by the c. 11 storey MacDonald Hotel and several student residences. More recently student residential developments have pushed building heights, with Unite's Piccadilly Point scheme being notably higher at around 19 domestic storeys.

Zone of Visual Impact

5.144 The railway line, as it approaches Piccadilly Station from the south west, will be a key viewpoint for passengers entering the City by train. The site will also be highly visible to vehicles on the elevated Mancunian Way, which forms part of the inner ring road. Upon completion, the Proposed Development will be visible from a number of locations as demonstrated by the accompanying impact diagram.

5.145 Given the massing and topography of the city, it is unsurprising that the site is predominantly visible from the east, particularly along the Medlock Valley and within the low lying residential and industrial areas. Key views will be from primary roads, including from the A6 and Hyde Road, both key arterial routes in to the city, and the inner city ring road approaching from the west and passing to the north. The railway line, as it approaches Piccadilly Station from the south west, will also be a key viewpoint for passengers entering the City by train.

5.146 Views will be particularly considered in relation to heritage assets. This includes views from Ancoats Conservation Area to the north of the site, which contains a high concentration of listed buildings from the late nineteenth and early twentieth centuries, as well as views along Ashton and Rochdale Canals, both of which have a large number of designated heritage assets along them, as well as being notable pedestrian approaches in to the city centre.

5.147 Detailed analysis will also be taken in relation to views from the Ardwick Green area, which has 12 designated heritage assets within the immediate vicinity.

Method of Assessment

5.148 The Institute of Environmental Management and Assessment (IEMA) / Landscape Institute 'Guidelines for Landscape and Visual Impact Assessment' (3rd Ed., 2013) will be used as the principal source of guidance for the methodology for this assessment. The Historic England Advice Note (no.4) on Tall Buildings, which supersedes the 2007 guidance, will also be used as relevant guidance. A Zone of Theoretical Visibility (ZTV) map will be produced using Lidar data superimposed onto a 10K map to provide an indication of the Proposed Developments' visibility and guide the selection of viewpoints.

5.149 A number of 'representative viewpoints' will then be selected, all within the identified Zone of Visual Impact and ZTV identified above, will be confirmed following extensive fieldwork. This will inform the assessment of the effect of the Proposed Development on townscape character, views and visual receptors in more detail and on a comprehensive basis, taking in short, medium and long range views from publicly accessible viewpoints. Receptors fall into two categories: Townscape receptors and Visual Receptors.

Townscape: Sensitivity of Receptor and magnitude of change

5.150 The sensitivity of a townscape receptor is an expression of its ability to accommodate the Proposed Development. Sensitivity is a judgement based on a combination of the susceptibility of the type of change or development proposed and the value attached to the townscape. Susceptibility indicates the ability of a defined townscape receptor to accommodate the Proposed Development "without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies." (GLVIA, 3rd version, para 5.40). Susceptibility is evaluated for each receptor type. The overall sensitivity of each townscape receptor would be rated within the range of High-Medium-Low and would be informed by combining the susceptibility and townscape value.

5.151 The magnitude of a townscape effect is assessed in terms of its size or scale, the geographical extent of the area influenced by that effect, and its duration and degree of reversibility and would be rated within the range of Major-Moderate-Minor-Negligible-No Change

Visual: Sensitivity of receptor and magnitude of change

5.152 In terms of assessing the baseline visual sensitivity, key factors to consider are the type of view and the likely numbers and types of viewers (the visual receptors). The type of view and the number of viewers are described in the following terms

- Glimpsed (i.e. in passing)/ Filtered/Oblique / Framed /Open Views; and
- Few/Moderate / Many Viewers

5.153 The value attached to views has regard to a number of factors, including:

- Recognition through planning designations or heritage assets; and
- The popularity of the viewpoint, its appearance in guidebooks, literature or art, on tourist maps and the facilities provided for its enjoyment.

5.154 The GLVIA identifies that the susceptibility of visual receptors to changes in views and visual amenity is a function of:

- The occupation or activity of people experiencing the view at a particular location; and
- The extent to which their attention or interest may therefore be focused on the views and visual amenity they experience at particular locations.

5.155 The assessment of receptor sensitivity is rated on the scale High-Medium-Low and combines judgements on the susceptibility of the receptor to the specific type of development proposed and the value attributed to that receptor.The magnitude of a visual effect is assessed in terms of its size or scale, the geographical extent of the area influenced and its duration and degree of reversibility and will be rated within the range of Major-Moderate-Minor-Negligible-No Change.

Significance of effect

5.156 The objective of the assessment process would be to identify and evaluate the likely significant effects arising from the Proposed Development. Significance indicates the importance or gravity of the effect. Whilst there would be a degree of professional judgement involved in determining the significance of townscape and visual effects, they can broadly be determined by the interaction of the sensitivity of the receptor and the magnitude of change.

5.157 The Townscape and Visual Impact Assessment will be supported by Accurate Verified Views (AVRs) consisting of rendered and wireline images of the Proposed Development superimposed onto baseline photographs which are accurately surveyed from selected viewpoints. The Landscape Institute's Advice Note 01/11 'Photography and Photomontage in Landscape and Visual Impact Assessment' will be used to inform the methods for production of visualisations.

5.158 Assessments will be made for the baseline year of 2019 during demolition and construction and on completion.

Summary of Assessment Scope

5.159 Table 5-9 summarises the townscape and visual receptors identified for inclusion in the assessment in the ES.

Table 5-9: TVIA Summary

Receptor	Impact	Potential Effect
Townscape character	Townscape impacts	Addition of new elements or features that will influence the character and distinctiveness of the townscape
Visual receptors	Townscape and visual impacts on people	Effects on receptors who are most sensitive and least sensitive to changes in the view dependent on category of receptor

Cumulative Assessment

Intra-relationship of Effects

5.160 The key effect which has the potential to have an intra-relationship is Heritage. Heritage matters are intimately linked to townscape and visual considerations and, although they are dealt with in a separate standalone heritage statement, they will be considered here as key components of the City fabric and the TVIA.

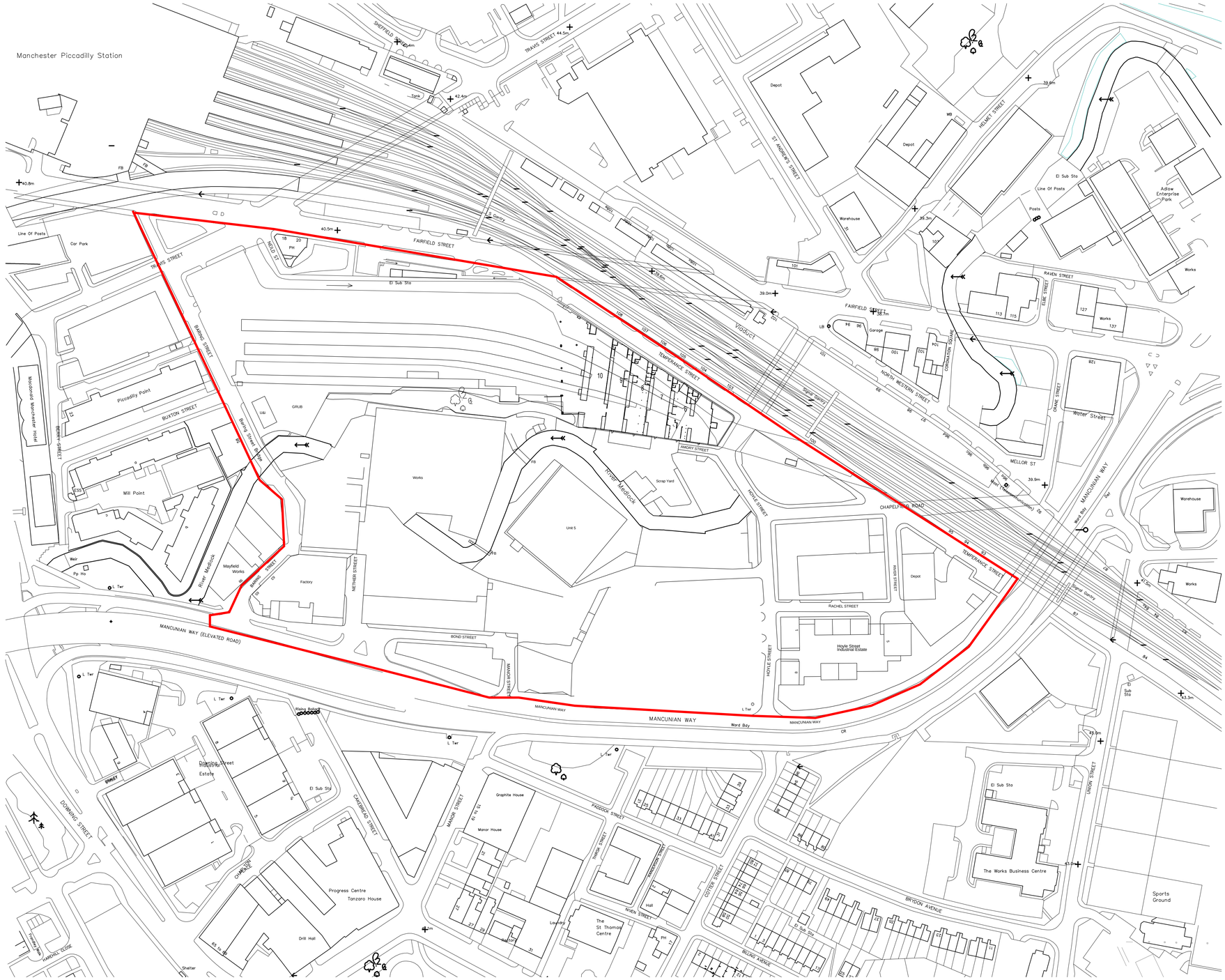
Inter-relationship of Effects

5.161 There are a considerable number of committed developments surrounding and close to the site. Those which are to be included within the assessment will be agreed with MCC council officers and included in the verified views montages to provide a cumulative assessment. Potential impacts upon the receptors, proposed mitigation and residual impacts will also be considered for construction and operation phases.

Proposed Mitigation and Residual Effects

5.162 The iterative nature of the design process will result in a certain amount of 'embedded mitigation' to limit the potential impacts of the development at construction and operational stage. Any supplementary mitigation and predicted residual townscape and visual effects will be described within the assessment.

Appendix A: Site Location Plan



EXISTING SITE LOCATION PLAN 1:1250

N

0 12.5 25 37.5 50 62.5 75

notes

1. DO NOT SCALE FROM THIS DRAWING - USE FIGURED DIMENSIONS ONLY
2. TO BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS / SPECIALISTS DRAWINGS. REPORT ANY DISCREPANCIES BEFORE AFFECTED WORK COMMENCES
3. ALL SETTING OUT DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR BEFORE WORK COMMENCES

rev. description

client: U&i plc

project: MAYFIELD

drawing title: EXISTING SITE LOCATION PLAN

drawing number: 20352_SK399

revision: -

drawing status: PLANNING

scale: 1:1250 @A1

date: 12.11.18

drawn by: SK

checked by: SG

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Appendix B – Cumulative Schemes and Baseline Developments

Application Reference	Proposal	Date Approved	Map No.
Baseline			
116450/FO/2017	Erection of part 17, part 36 storey building to comprise 411 residential apartments (Class C3) (14 studios, 136 x 1 bed, 228 x 2 bed and 33 x 3 bed) with mid and top roof level private dining / media room / gardens, ground and mezzanine floor residential amenity uses and lower ground, ground and mezzanine level commercial uses (Class A1 (shop), A2 (Financial and Professional Services), A3 (Restaurant and Cafe), A4 (Drinking Establishment), B1 (Offices), D1 (Non-residential Institutions Creche only) and D2 (Assembly and Leisure - Gym only)) and associated junction improvements to Oxford Road / Charles Street, access, servicing, and landscaping).	Approved – 12 September 2017. Currently being delivered.	1
114863/FO/2016	Erection of 18 storey serviced apartment building (384 units) with ancillary retail (A1, A2, A3, A4), residents' hub and associated access and landscaping.	Approved – 09 March 2017. Currently being delivered.	2
111027/FO/2016	Erection of 17 storey building to comprise 266 residential apartments (Class C3) (14 studios, 56 x 1 bed, 168 x 2 bed and 28 x 3 bed) with top roof level private dining / media room / gardens, ground and mezzanine floor residential amenity uses including a gym and home working lounge, plus ground and mezzanine level commercial uses (Class A1 (shop), A2 (Financial and Professional Services), A3 (Restaurant and Cafe), A4 (Drinking Establishment), B1 (Offices), D1 (Non-residential Institutions - creche only) and D2 (Assembly and Leisure - gym only)) and associated access, servicing, and landscaping.	Approved – 01 July 2016. Currently being delivered.	3
	Non material amendment (116418/NMC/2017): to allow changes to the Energy Strategy, height and massing (1.4m reduction), amendment to facades and glazing and internal changes including amendments required to deliver the energy and ventilation needs for the building.	Approved 15 June 2017.	
111025/FO/2016	Erection of two buildings (18 and 14 storeys (Blocks 2 and 4)) comprising offices (Class B1) with ground and mezzanine floor commercial uses (Class A1 (shop), A2 (Financial and Professional Services), A3 (Restaurant and Cafe), A4 (Drinking Establishment), B1 (Offices), D1(Non-residential Institutions - Creche only) and D2 (Assembly and Leisure - Gym only)) and rooftop restaurant (Class A3) with associated external terrace (Block 4), creation of public green space with pavilion building (Block 3) for events space / uses within	Approved – June 2016. Currently being delivered.	4

Application Reference	Proposal	Date Approved	Map No.
	Classes A1, A3, A4, D1 (Exhibition Hall / Public Hall only), D2(Concert Hall / Music Hall only)(Sui Generis) accessed from ground level within basement level below alongside creation of areas of public realm including tree planting and all associated access and servicing.		
111028/FO/2016	Demolition of any existing structures and erection of multi-storey car park (1028 spaces including 50 disabled) in 10 storey building, with ground and mezzanine commercial uses (Class A1 (shop), A2 (Financial and Professional Services), A3 (Restaurant and Cafe), A4 (Drinking Establishment), B1 (Offices), D1 (Non-residential Institutions Creche only) and D2 (Assembly and Leisure Gym only)) and associated access, servicing, landscaping and cycle parking facilities.	Approved – June 2016. Currently being delivered.	5
116450/FO/2017	Erection of part 17, part 36 storey building to comprise 411 residential apartments (Class C3) (14 studios, 136 x 1 bed, 228 x 2 bed and 33 x 3 bed) with mid and top roof level private dining / media room / gardens, ground and mezzanine floor residential amenity uses and lower ground, ground and mezzanine level commercial uses (Class A1 (shop), A2 (Financial and Professional Services), A3 (Restaurant and Cafe), A4 (Drinking Establishment), B1 (Offices), D1 (Non-residential Institutions Creche only) and D2 (Assembly and Leisure - Gym only)) and associated junction improvements to Oxford Road / Charles Street, access, servicing, and landscaping).	Approved – 12 September 2017. Currently being delivered.	6
111758/FO/2016	Construction of a new engineering campus (MEC Hall) to provide facilities for higher education purposes including laboratory spaces, teaching space, lecture theatres and workshop space (Use Class D1). New extension to Oddfellow Hall to provide meet and teach rooms (Use Class D1) and partial change of use to include a new cafe / restaurant (Use Class A3) in Oddfellow Hall. New bridge link from the existing James Chadwick Building to the proposed MEC Hall and cafes / restaurants (Use Class A1 and or A3), public realm and landscaping works, cycle and disabled parking facilities, gas bottle storage areas, new servicing arrangements and associated highway and engineering works.	Approved – 22 June 2016. Currently being delivered.	7
	Minor material amendment (122203/JO/2018): to vary condition number 2 (approved drawings) to allow developmental changes to design and amend conditions: 3 (cleaning of contractors vehicles) , 4 Building materials / samples), 5	Approved – 11 April 2019.	

Application Reference	Proposal	Date Approved	Map No.
	(ground investigation), 6 (Construction Management Plan), 8 (Secured by Design), 9 (Surface Water Drainage), 10 (Public Realm), 11 (Wind Mitigation Measures), 12 (Sustainable Drainage SuDS), 31 (TV Reception) and 32 (Local Labour Agreement) attached to planning permission 111758/FO/2016/C1 to reflect previously agreed details and conditions that have been partially / fully discharged.		
114585/FO/2016	Erection of three residential buildings (Building 1 comprising 15 storeys plus plant space, Building 2 comprising 11 storeys plus plant space and Building 3 comprising 14 storeys plus plant space) to provide 351 residential units (Use Class C3) 117 x 1 bed, 218 x 2 bed and 16 x 3 bed) al with ground floor commercial uses (Class A1 (Shop), A3 (Restaurant and Cafe) and D1 (Non Residential Institution Use- Art Gallery) and new public space with related access, servicing, landscaping and associated works with parking for 254 vehicles, 224 cycles within 4 levels of existing basement car park.	Approved – 09 March 2017. Currently being delivered.	8
109948/FO/2015	Erection of a part 10, part 8, part 7, part 6 and part 5 storey building to form 201 residential apartments (C3a) with ancillary ground floor gym area for residents with pedestrian access from Great Ancoats Street and vehicular access from Advent Way and Isaac Way along with associated hard and soft landscaping, car parking, boundary treatment and other associated works.	Approved - 11 Dec 2015. Currently being delivered.	9
	Minor material amendment (117800/JO/2017): Variation of planning condition 2 associated with planning permission 109948/FO/2015/N2 to allow elevational alterations and re-siting of buildings.	Approved – 9 October 2017.	
	Non material amendment (114403/NMC/2016): to allow for repositioning and elevational alterations of the north building.	Approved – 19 December 2016.	
113363/FO/2016	Conversion of former Crusader Works to create 126 apartments (Use Class C3) and associated elevational alterations; the erection of a 10 storey building containing 75 apartments (Class C3) following the demolition of Block 4; the creation of a new landscaped courtyard following the demolition of existing buildings within a shared yard space; and, the provision of 201 cycle parking spaces, lighting and other associated works.	Approved - 21 Oct 2016. Currently being delivered.	10

Application Reference	Proposal	Date Approved	Map No.
112034/FO/2016	Creation of approximately 478 residential units (160 x 1 bed and 318 x 2 bed) and commercial space comprising: (a) Conversion and extension of existing 12 storey building to 15 storeys (The Tower) comprising residential accommodation (Class C3 - 123 units) above ground and first floor (Class A1 (Shop), A2 (Financial and Professional Services), A3 (Restaurants and Cafe), A4 (Drinking Establishment), B1 (Office), D1 (Non-residential institutions - crèche, nursery, clinic and health centre, art gallery only) and D2 (Assembly and Leisure - Gymnasium, indoor sport and recreation only), (b) Erection of 2 x 14-16 storey buildings (Block C and F comprising residential accommodation (Class C3 - 136 units (C) and 209 units (F)) above ground and first floor (Class A1 (Shop), A2 (Financial and Professional Services), A3 (Restaurants and Cafe), A4 (Drinking Establishment), B1 (Office),D1 (Non-residential institutions - crèche, nursery, clinic and health centre, art gallery only) and D2 (Assembly and Leisure - Gymnasium, indoor sport and recreation only), Building F and Tower to be linked by podium; and (c) change of use of existing 1 storey building on stilts (The Bungalow) to Class A1 (Shop), A2 (Financial and Professional Services), A3 (Restaurants and Cafe), A4 (Drinking Establishment), B1 (Office), D1 (Non-residential institutions - crèche, nursery, clinic and health centre, art gallery only) and D2 (Assembly and Leisure - Gymnasium, indoor sport and recreation only) and hard and soft landscaping comprising central public square, commercial and retail terraces, private residents terrace and public/private roof top gardens with car parking for 69 vehicles located at ground and first floor levels and associated works to facilitate servicing and access following demolition to existing teaching and library buildings.	Approved 28 Sep 2016. Currently being delivered.	11
110276/FO/2015	Demolition of existing buildings and erection of 12 townhouses and 345 (109 x one bed and 236 x 2 bed) apartments, ground floor commercial unit (243sq. m, Use Classes A1, A2, B1 and D1 (excluding places of worship, church halls, public halls and non- residential education and training centres) within a part 31, part 15, part 9 storey building, 77 basement and 20 surface parking spaces, 180 cycle parking spaces, ancillary tenant amenity facilities including outdoor communal amenity space at roof level above the 9 and 15 storey elements , associated hard and soft	Approved - 04 Mar 2016. Currently being delivered.	12

Application Reference	Proposal	Date Approved	Map No.
	landscaping and other associated works including servicing access and 9 off site parking spaces.		
114818/FO/2016	Erection of 9 storey building to provide 137 hotel bedrooms (Use Class C1) with associated ancillary hotel operated restaurant (Class A3) and bar (Class A4) uses to include 14 cycle parking spaces, an external seating area, public realm, landscaping and highways works.	Approved - 07 Apr 2017. Currently being delivered.	13
115570/FO/2017	Conversion of buildings to provided 58 residential apartments (Class C3) (26 x 1 bed and 32 x 2 bed) (41 units in Minshull House and 18 units in Minto Turner Building) above lower ground and ground floor Class A1 (shop), A2 (Financial and Professional Services), A3 (Restaurant and Cafe), A4 (Drinking Establishment), B1 (Offices), D1(Non-residential Institutions creche, nursery, clinic and health centre, art gallery only) and D2 (Assembly and Leisure - Gymnasium, indoor sport and recreation only), ground floor extension to Minshull House to provide additional commercial space (uses as specified above), creation of 59 secure cycle parking spaces and works to provide hard and soft landscaping including new public square in front of Minshull House and pedestrian route along Little David Street to the Kampus Courtyard, servicing and access.	Approved - 06 Jun 2017. Currently being delivered.	14
Cumulative			
107245/FO/2014	Erection of 13 storey building comprising 34 apartments (3 x 1 bed, 28 x 2 bed and 3 x 3 bed duplex) with ground floor D2 (Assembly and Leisure) Use with associated landscaping, highways, engineering and other associated works following removal of section of retaining wall.	Approved – 04 March 2016.	15
118267/FO/2017	Full planning permission for the demolition of existing buildings on site and their replacement with a mixed use (sui generis) development comprising 3 towers ranging in height (from 14, 20 and to 25 storeys (including lower ground floor level) and intermediary link buildings and providing: 403 units of Co-Living residential accommodation with associated shared amenity spaces; 94 units of purpose built student accommodation with associated shared amenity spaces; ground floor commercial floor space and children's day nursery together with cycle parking, recycling and refuse bin storage, associated plant and public realm enhancements to Granby Row,	Approved – 01 June 2018.	16

Application Reference	Proposal	Date Approved	Map No.
	Echo Street, Cobourg Street and Back Acton Street.		
	Minor material amendment (122732/JO/2019): to allow developmental changes to design, and remove / amend conditions: 3 (cleaning of contractors vehicles) , 4 Building materials / samples), 6 (Construction Management Plan), 8 (Secured by Design), 9 (Surface Water Drainage), 10 (Public Realm/ landscape works), 11 (Wind Mitigation Measures), 12 (Sustainable Drainage SuDS), 31 (protected species), 32 (fumes vapours and odours) and 34 (acoustic insulation) attached to planning permission 118267/FO/2017 to reflect previously agreed details and conditions that have been partially / fully discharged.	Approved – 13 May 2019.	
116099/FO/2017	Refurbishment, restoration, reconfiguration and extension of former London Road Fire Station site to create a mixed use development comprising of hotel (Use Class C1), workspace/office (Use Class B1), commercial floorspace for shop and food and drink uses (Use Classes A1, A3 and A4), residential apartments (Use Class C3) and cinema and spa (Use Class D2), together with creation of new basement area, access and highways works, servicing, rooftop plant, landscaping and associated works.	Approved - 31 Jul 2017.	17
122599/FO/2019	Demolition of existing building and erection of a 13 / part 14 (plant level) storey building to create a 275-bedroom hotel (Class C1) use.	Pending determination. Validated 24 April 2019.	18
123728/FO/2019	Temporary change of use for a 5 year period for the Mayfield Depot from Use Class B8 to Sui Generis Use Class, comprising theatre, music, dance, performance-related activities (Sui Generis), cinema and conferencing (Use Class D2), food and drink festivals including external food and drink operators (Use Class A3 and A4), art exhibitions and markets (Use Class A1/D2), marketing suites and offices (Use Class B1), with associated demolition, external alterations, landscaping, servicing and access.	Pending determination. Validated 28 May 2019.	19
123095/FO/2019	Construction of a full height extension to house 2no. passenger lifts, a two storey ground floor extension to create a dedicated executive entrance and lounge with internal remodelling.	Pending determination. Validated 10 June 2019.	20


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Appendix C - Noise Survey

BUROHAPPOLD ENGINEERING

Mayfield Temporary Use

Noise Statement

035548

17 February 2017

Revision 02

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Revision	Description	Issued by	Date	Checked
00	Noise Statement	BFB	01.02.17	BFB
01	Noise Statement	BFB	02.02.17	BFB
02	Inclusion of survey data	FP	17.02.17	BFB

\\SRV-bath03\project filing\035548 Mayfield Regeneration Development\F41 Acoustics\03 Reports\0. Acoustic Statement\Rev 02\170202 BFB 035548 Acoustic Statement 02.docx

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author	**Ben F Burgess**
date	**17.02.17**
approved	**Ben F Burgess**
signature	
date	**17.02.17**

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Glossary

Term	Definition
Decibel (dB)	The decibel scale is used to measure, among other things, the level of sound in the form of Sound Pressure Level (SPL). The measurement is a logarithmic scale based on the ratio of two pressures (the pressure caused by a sound field compared to the minimum audible pressure level), which closely follows the way loudness is perceived by the human ear. The decibel, one tenth of a Bel, is used for convenience, keeping the numbers more manageable.
A-Weighting	The A-Weighting scale is a frequency weighting curve applied to measurements in order to mimic the sensitivity of the human ear at different frequencies. A capital A is suffixed to units to show that the A-Weighting curve has been applied, e.g. dB(A). There are also B, C, D, and E scales for use for higher level signals, although these are rarely used except in very loud instances like measuring ground crew exposure to aircraft noise. Linear measurements, with no weighting applied, can be shown either with a suffixed L or with no weighting suffix at all.
Statistical Noise Levels	Noise levels that vary greatly over time are usually expressed using statistical values of the level exceeded for a stated percentage of the time. These are denoted Lx, showing the level that is exceeded x% of the time. LA90 is considered to be the (A-Weighted) background noise level with unusually loud events being excluded. LA10 is usually used for the measurement of traffic noise.
Frequency	Frequency is the rate of repetition of a sound wave, measured in cycles per second. The higher the frequency of an audio signal, the subjectively higher the pitch to the listener. Human hearing covers a frequency range of approximately 20Hz to 20kHz. For measurement purposes the audio spectrum is normally divided into Octave Bands, where the mid-frequency of one band is double the frequency of the mid-point of the band below. These bands are then sometimes subdivided into 1/3 Octave Bands or smaller Narrow Bands when more detailed analysis is necessary.
$L_{Aeq,T}$	Equivalent continuous sound pressure level (dB, A-weighted) over a period of time, T.

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1 Noise Statement

1.1 Introduction

BuroHappold have prepared this noise statement to accompany an application for Full Planning Permission for the construction of a temporary four-storey event space and office and related landscaping associated with the Mayfield regeneration masterplan.

The location of the proposed development is within the Mayfield regeneration area, adjacent to Manchester Piccadilly train station. The application site is to the east of Baring Street and the north of the River Medlock. The site is accessed directly from Baring Street.

The proposed event space and office is to be a scaffold and timber structure including containers at ground and first floor, to create a temporary mixed use development that will be the first phase of the wider Mayfield regeneration. The intention of the proposed temporary use is to raise the profile of Mayfield as a regeneration area and is intended to kick-start the regeneration process.

The proposed development is of a high quality and unique design to set a precedent for future development and use of the wider Site. The proposed development has been designed specifically to integrate with and provide a gateway to the regeneration area when it comes forward.

The development includes the erection of a four storey building with event and exhibition space (sui generis) at ground and first floor to include market, food and drink, theatre, film, music events and associated ancillary activities, and marketing and commercial floorspace at first and second floor (sui generis), and related access and landscaping.

The figure below shows the approximate location for the proposed development. As can be seen from the figure, there are nearby existing student residences to the immediate west of the site, and these are considered to be the nearest noise-sensitive receptors (*NSRs)*.



Figure 1-1 - Site and nearest noise-sensitive receivers

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Given that the scheme includes performance/events space, public areas in which patrons can convene, and the potential possibility of mechanical services plant (e.g. to ventilate the shipping containers, or to provide kitchen extract from the food and beverage provision) there is the possibility that the development will generate a certain level of noise impact. At this early stage in the proposals, the purpose of this acoustic statement is to suggest noise limits for agreement with the Local Authority.

Since the first issue of this noise statement, a baseline survey has been carried out on site.

1.2 Potential Noise Sources

Based on the information received to date, it is anticipated that the primary sources of noise likely to be associated with the proposed development are:

- Entertainment noise (outdoor stage area)
- Entertainment noise (events space)
- Servicing, deliveries and refuse (ground floor)
- Patron noise (all areas)
- Services plant noise (all areas)

Reference should be made to the plans accompanying the planning application for the full site layout and proposed uses.

1.3 External Noise Survey Results

Environmental noise surveys were carried out on the 13th of February 2017 to assess the suitability of the site for the proposed uses and to identify any potential impacts of the development on adjacent sensitive receptors (NSR1 & NSR2).

The results of the environmental noise survey will be used for :

- Defining the current minimum noise levels for assessing the likelihood of disturbances due to the new development at the nearest noise sensitive receptors.

1.3.1 Survey methodology

Figure 1-2 presents the site and the location of the short term noise survey (position 1).

Surveys began the 13th of February 2017 at approximately 21:00 at position 1. Measurements were made for 15 minute periods until approximately 00:00.

The time period chosen for the surveys was intended to reflect the quietest period of a typical weekday/weeknight during which the temporary site will be operational. The hours of operation are understood to be 08:00 – 00:00. On this basis, the quietest hours of this period are anticipated to be between 22:00 and 00:00, and the survey therefore included these times.

Basing the assessment (and any limits for noise) on levels measured during this period is considerd to provide the most robust method of working. Adherence to limits based on these levels should see that the impact outside of this quietest period is somewhat lower.

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Figure 1-2 Location of the site (red), NSRs (blue) and location of the noise survey measuments

1.3.2 Noise instrumentation

The sound level meters were prooogrammed to log various noise parameters, including $L_{Aeq,T}$, $L_{AF,max}$ and $L_{A90,T}$ at the measurement location.

Table 1-1 presents the noise instrumentation used during the survey.

Instrumentation	Serial Number
B&K 4231 Calibrator	2438725
B&K 2250 sound level meter (used for short term measurements)	3008216
B&K 4189 microphone	2983647

Table 1-1 Noise survey instrumentation

The meters were calibrated before and after use with the calibrator. No significant drift was witnessed (≤±0.5dB). Calibration certificates for all equipment are available upon request.

1.3.3 Weather

During the survey, the temperature was approximately 7˚C with wind speed no greater than 5ms^{-1}.

1.3.4 Noise survey results

A summary of the results of the surveys is shown in Table 1-2. The values are as follows :

- **$L_{Aeq,15mins}$** – the average A-weighted sound pressure level within a 15 minute period

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- Typically thought of as the average ambient noise level at a particular time, and likely to be due to a combination of various noise sources, near and far

- **$L_{AF,max}$** – the maximum instantaneous A-weighted sound pressure level measured during a 15 minute period
  - Typically corresponding to a short-duration event with a very high SPL, for example motorbike passing by, car horn etc.

- **$L_{A90,15mins}$** – the A-weighted sound pressure level exceeded for 90% of the measurement period
  - i.e. a level which would be perceived as a constant, background noise level. Typically largely unaffected by local traffic pass-by or by transient events. More usually attributable to constantly-running building services plant or distant road traffic. What you would hear when there is no local traffic present (or other readily-identifiable noise source)

The 'typical' values reported in the following table are averages of each descriptor during the relevant measurement period.

The $L_{Aeq,T}$ has been averaged logarithmically. The $L_{AF,max}$ values shown are the highest measured on site. The $L_{A90,T}$ values are median integers.

Short term noise measurements (13/02/2017) (dB)					
Period	**Start time**	**End time**	**$L_{Aeq,T}$**	**$L_{AF,max}$**	**$L_{A90,T}$**
Location 1 (see figure 2)					
Night	13/02/2017 21:11	13/02/2017 21:26	59	68	56
	13/02/2017 21:32	13/02/2017 21:47	63	84	55
	13/02/2017 22:07	13/02/2017 22:22	62	77	58
	13/02/2017 22:26	13/02/2017 22:41	59	76	55
	13/02/2017 22:46	13/02/2017 23:01	58	75	55
	13/02/2017 23:11	13/02/2017 23:26	58	71	54
	13/02/2017 23:30	13/02/2017 23:45	62	78	56
	13/02/2017 23:46	14/02/2017 00:01	60	77	55
Typical			**60**	**84**	**56**

Table 1-2 Short term noise survey results – Night-time

1.3.5 Discussion

The levels measured during the short term measurements indicate that the site is exposed to moderate levels of environmental noise. The main sources of noise in the vicinity are road traffic on Fairfield Street, the railway to the north of the site, and the taxi rank on Baring street.

1.4 Suggested Noise Limits

In order to adequately protect residential amenity in nearby residential blocks, limits will be required in terms of noise impact. Various documentation and best-practice techniques exist which relate to the various noise sources listed above, and these are considered in the sub-sections below.

1.4.1 Local policy

The planning & noise technical guidance from Manchester City Council references the World Health Organisation guidelines and British Standard 8233 which are described below. In the context of government policy, Manchester City Council requires that developments aim for :

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- *1. A noise level between the No Observed Effect Level (this is the level of noise exposure below which no effect at all on health or quality of life can be detected) and the Lowest Observed Adverse Effect Level (this is the level of noise exposure above which adverse effects on health and quality of life can be detected)*
- If point 1 cannot be achieved then :
- 2. If the assessment results in a level between the Lowest Observed Adverse Effect Level and the Significant Observed Adverse Effect Level (this is the level of noise exposure above which significant adverse effects on health and quality of life occur), mitigation will be necessary to reduce the level and thus conditions will be attached.
- If points 1 & 2 cannot be achieved then :
- If the assessment results in a Significant Observed Adverse Effect Level after mitigation, the application will be recommended for refusal.

The levels referred to in the policy guidance listed above (i.e. No Observed Effect Level, or NOEL, Lowest Observed Adverse Effect Level, or LOAEL etc.) refer to the National Planning Policy Framework document. Instead of setting definitive limits or quantitative target values, the document places the onus on professionals (such as engineering consultants and environmental health officers) to assess the context of proposals and make judgements accordingly. The following sections are aimed at starting these discussions, to be later augmented by noise survey data to be collected in the future.

1.4.2 Entertainment and patron noise

The World Health Organisation "Guidelines for Community Noise" gives guideline values at which 'moderate' or 'serious' annoyance is typically experienced in 'outdoor living areas' during the daytime and evening as 50 and 55 dB LAeq,16hrs respectively.

British Standard 8233 (Guidance on Sound Insulation and Reduction For Buildings) expands on these noise limits, suggesting that:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres…a compromise between elevated noise levels and other factors…might be warranted.'

Although the student residences do not appear to have external amenity areas such as gardens, the upper limits referred to in BS 8233 and the WHO Guidelines are considered to have merit as a starting point for agreement. On this basis it is considered that the cumulative noise impact from the proposed development may be adequately tolerated by local residents if it is approximately 55 dB(A) LAeq,16hrs at the most exposed external façade of the NSRs.

1.4.2.1 Suggested limits vs existing levels

The noise survey results, in Table 1-2, show that the typical background noise ($L_{A90,T}$) measured at the nearest sensitive receptors during the quietest part of a typical day is $L_{A90,T}$ 56 dB(A).

Therefore, assuming the suggested limit of $L_{Aeq,T}$ 55 dB(A) is adhered to, the subsequent noise impact due to the temporary development would be lower than the existing levels of background noise.

Whilst the noise impact from the development may still potentially be audible at times, British Standard 4142 states that:

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- The lower the rating level relative to the background level, the less likely it is that the specific sound will have an adverse impact
- Where the rating level does not exceed the background level, this is an indication that the specific sound will have a low impact, depending on context

It should be noted that BS 4142 refers to a 'Rating level' in which the noise source is corrected for tonality, intermittency and other acoustically distinguishable characteristics. Entertainment noise is likely to include some of these features, which would potentially increase the possibility of adverse impact.

However, in terms of providing context, it is considered likely that the proximity of the student residences to the proposed site may mean that many of the residents are in fact patrons of the site themselves, potentially reducing the possiblilty of annoyance. It is also noted that the assessment considers the quietest part of the day/night when the development would be operational, and that the impact at most times would be lower than assessed (due to an increase in background noise levels).

1.4.2.2 Suggested limits at source

From examination of the site plan, the 'gable end' of the nearest student block (NSR1) does not have operable residential windows, meaning that the closest part of the nearest NSR would be approximately 55m from the centre of the site, incurring an attenuation due to distance of 35 dB (assuming point sources of noise).

This therefore suggests the cumulative noise limit in the centre of the site may be acceptable to local residents if it is no greater than $L_{Aeq,16hrs}$ 90 dB(A). This is likely to permit most unamplified sources of entertainment and patron noise but is likely to require some consideration of any amplified noise at later stages in the process. Any isolated events that breach this level, will need to be agreed with MCC in advance.

For further information on events, including operating times, reference should be made to the Events Strategy submitted with the planning application. As the temporary noise policy will depend on the number and nature of the events proposed – this should be developed as scheduling progresses. The temporary noise policy should comply with the Noise Council code of practice on environmental noise at concerts.

1.4.3 Servicing, deliveries and refuse

It is considered that the existing student residences in the vicinity of the site will already have regular deliveries, refuse collection and service operations associated with their usages. In principle, it is considered that additional (similar or identical) noise sources will be adequately tolerated provided that they occur during daytime hours (for example 08:00-20:00) only.

1.4.4 Services plant noise

Services plant could be adequately assessed in accordance with British Standard 4142, which provides a method of comparing industrial/commercial noise impact against existing background noise levels. The likely level of perceived impact varies with context, however the standard does state that "Where the rating level does not exceed the background level, this is an indication that the specific sound will have a low impact".

On this basis, it is suggested that a suitable level of noise impact from plant may be to target a value lower than the existing level of background noise, when assessed at the nearest NSRs.

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1.4.4.1 Services plant noise limits

As described in Section 1.3, measurements of the background noise level were conducted at the nearest noise sensitive receptors located in the vicinity of the development.

The plant noise limits will be set out as at leat 5 dB below the existing $L_{A90,15mn}$, which is a common limitation accepted, and will serve to see that the noise impact from plant on existing receptors is minimal.

Therefore, the acceptable moise levels from plant associated with the development at the nearest noise sensitive receptors are shown in Table 1-3 :

NSR Location	Period	Plant Noise Limits	
		Existing measured background noise levels	Limit of plant noise from the development at the nearest noise sensitive receptors
		$L_{A90,T}$ dB typical value	$L_{Aeq,T}$ dB (1h)
Student residential	NSR – Night	56	51

Table 1-3 Existing noise levels at the NSRs, resulting from the measurements & limiting levels for plant noise impact

1.4.4.2 Discussion & levels at source

As can be seen in Table 1-3, plant must be limited to $L_{Aeq,T}$ 51 dB(A), when measured at the residential locations, during all times in which the development is operational.

It should be noted that these are cumulative limits for all plant items operating simultaneously. However, these are not considered to be stringent limits due to the high background noise in the vicinity of the nearest noise sensitive receptors.

As decribed above, the closest part of the nearest NSR would be approximately 55m from the centre of the site, incurring an attenuation due to distance of 35 dB (assuming point sources of noise).

Therefore, it can be assumed that the cumulative noise impact from plant items should have a limitation of $L_{Aeq,T}$ of 86 dB(A) when measured at source, assuming this location to be in the centre of the site. This is not considered an onerous limit for the type of plant expected at the site, and would permit (for example) 10 items each with a sound pressure level of $L_{Aeq,T}$ 75 dB(A) at source (i.e. 1m from the item in question).

It should be noted that plant locations are not known at present. Should any items be proposed in closer proximity to the NSRs than suggested above, the limits would need to be reduced accordingly.

1.5 Conclusions and National / Local Policy Adherence

As discussed in sections above, local policy requires that an assessment is carried out in accordance with the NPPF, which does not provide a quantitative framework for assessing external noise impact. Instead, the onus is on planning and engineering professionals to agree on criteria which represent a level of noise impact which does not adversely impact on quality of life for existing residents.

MCC policy suggests that the aim should be to provide a level of impact between the NOEL (no observable effect level) and the LOAEL (lowest observed adverse effect level).

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1.5.1 Entertainment and patron noise

Adherence with the proposed limits should see a noise impact 1 dB lower than the existing background noise levels, which could (at the quietest period of the day/night) see an increase in the background level of approximately 2 dB. Given that the threshold of perceptibility for most humans is 3 dB, this level of impact is considered to be marginally less than the LOAEL, and therefore in line with the MCC suggestion.

1.5.2 Deliveries and refuse

Adherence with the proposed method of mitigation is expected to see that (whilst individual deliveries or activities may be perceptible) these would not be perceived as problematic over and above the existing, similar activities for the residential blocks themselves. Delvieries and refuse pick-ups would therefore be considered the LOAEL, with the impact for the vast majority of the time (when no activity is taking place) being the NOEL.

1.5.3 Plant noise

Adherence with the proposed limits should see a noise impact 5 dB lower than the existing background noise levels, which could (at the quietest period of the day/night) see an increase in the background level of less than 1 dB. Given that the threshold of perceptibility for most humans is 3 dB, this level of impact is considered to be less than the LOAEL (and close to the NOEL), and therefore in line with the MCC suggestion.

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Appendix D - River Survey

BUROHAPPOLD ENGINEERING

Mayfield Regeneration

River Strategy Report

035548

24 November 2017

Revision 00

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Revision	Description	Issued by	Date	Checked
00	River strategy report	RG	24/11/17	AD

\\SRV-bath03\project filing\035548 Mayfield Regeneration Development\F34 Water\03 Reports\171113 River Strategy report\MRP-BHE-ZZ-ZZ-RP-YW-0001-Water SR 00.docx

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Glossary

Term	Definition
Annual Exceedance Probability (AEP)	The Probability that a storm event will be exceeded in any given year
Attenuation	A method to reduce a flood peak to prevent flooding, often utilising temporary storage, but increasing the duration of the flow
Design Flood Level	This is the level of flooding that flood defences or mitigation measures are designed against. This is typically the 1% (1 in 100) flood level.
Design Team	BuroHappold Engineering (BHE) and Studio Egret West (SEW)
Discharge	The rate of flow of water measured in terms of volume per unit time
Floodplain	Area of land adjacent to a water course which water flows or is stored during a flood event, or would otherwise be flooded in the absence of flood defences
Flood Resilience	Improving flood resistance, e.g. reducing the risk of properties against flooding events
Flood Risk	The level of risk to personal safety and damage to property resulting from flooding due to the frequency or likelihood of flood events
Flood Risk Assessment (FRA)	An assessment of the flood risks to the proposed development over its expected lifetime and the possible flood risks to the surrounding areas, assessing flood flows, flood storage capacity and runoff
Fluvial Flooding	Related or connected to a watercourse (river or stream)
Mitigation	Actions taken to reduce either the probability of flooding or the consequences of flooding or a combination of the two
Permeability	The measures of ease with which a fluid can flow through a porous medium.
Red line boundary	Boundary drawn to indicate the site area on which the planning application is based
Residual Risk	The risk that remains after risk management and mitigation measures have been implemented
Resilience	Improving the flood resistance, e.g. Buildings
Return Period	The average frequency of a specified condition. An 'n' year event is one that occurs on average over the long term, once every 'n' years
Risk	Risk is the probability that an event will occur and the impact (or consequences) associated with that event
Runoff	Water flow over surfaces to the drainage system. Runoff occurs if the ground is impermeable or if permeable ground is saturated.
Surface Water Flooding	Surface water flooding occurs when the volume of water is unable to filtrate through the ground to enter drainage systems, and therefore runs quickly off land and results in localised flooding. This type of flooding is usually associated with intense rainfall.
Sustainable Drainage Systems (SuDS)	SuDS are used as a strategy to manage surface water in a sustainable manner or least damaging solution through management practices and physical structures.

Abbreviations

Term	Definition
AEP	Annual Exceedance Probability
DFE	Design Flood Event
EA	Environment Agency
F+G	Faithful and Gould (Project Manager)
NPPF	National Planning Policy Framework
SEW	Studio Egret West (Architect)
SRF	Strategic Regeneration Framework
U+I	Client

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1 Executive Summary

1.1 Introduction

BuroHappold Engineering has been collaborating with the Client and Design Team with regard to the flood risk on the site from River Medlock since the early days of the Project. Since November 2016, we have visited the site several times and collated available data from several sources. A Flood Risk Scoping report prepared in December 2016 identified the main sources of flooding to the site and set the initial flood-related constraints and parameters for the masterplan.

From the outset, the river corridor of the Mayfield Regeneration has been established as the centrepiece of the redevelopment, not only in terms of biodiversity, human interaction and landscaping, but importantly in terms of flood risk mitigation. The proposed scheme has been modelled iteratively to understand the impact of the proposals on the baseline (current) flood risk for the upstream, downstream and site areas. Following the modelling of several scheme iterations, the SRF Scheme was established that achieves the necessary degree of flood mitigation to the development proposals themselves for the lifetime of the development, including the potential effects of climate change. The SRF Scheme also minimises the flood impact off the site to acceptable levels.

During our work on Mayfield Regeneration we have consulted with the Environment Agency (EA), who has statutory permissive powers and responsibilities over the River Medlock, which is a designated Main River. Under the Defra Urban Pioneer scheme, the Design Team and the EA have coordinated their efforts to achieve an exemplar project in terms of sustainability. This collaboration is ongoing, with the objective of gaining EA approval of the modelling work and the SRF Scheme proposals for flood management and mitigation in advance of the SRF submission for planning approval..

In conjunction with the modelling work, we have developed hard, composite and soft options for the river edge treatment along the corridor and have investigated construction methodologies for these options. These options will be developed further during design development and in collaboration with the Design Team.

1.2 Summary of River Strategy

The emerging strategy for the River Medlock through the Mayfield Regeneration at the SRF stage can be summarised as follows:

- Make **space for water** within the site
- Restore a naturalised river channel to **convey flood flows** fully coordinated with the landscape strategy
- Integrate **Defra Pioneer** wider catchment strategy, where possible, to capture benefits
- Ensure the topography relates to the river with **river edges that balance hard and soft treatments** to provide **improved safe access** to the riverside for all
- **Improve biodiversity** by '**daylighting' culverts,** providing **setback for the river margins**, **wetland areas** and areas for **wilder naturalisation**
- **Integrate SuDS** in to the surface water management proposals

1.3 Key design parameters and outcomes

The key design outcomes of our work are summarised in the table below.

Subject	Element	Findings
Flood risk	Fluvial flooding	The site is in Flood Zone 1, 2 and 3. Flood Zone 3 (high risk) covers the centre of the site. Small parts of the site lie within Flood Zone 2 (medium risk) and the majority of the site lies in Flood Zone 1
	Other sources (groundwater, surface water, artificial)	Low to very low risk from other sources of flooding
Flood mitigation measures	Finished Floor Levels (FFL)	Current advice on FFL recommends building levels to be set at **36.44m AOD.** FFL will be refined during design development.
Access requirements	EA maintenance access	As a minimum, pedestrian access to one bank will be provided to allow inspection (width 1.2m). Vehicular access would allow full maintenance of the park and River Medlock channel (Land Rover 2.4m wide by 2.1m high with turning space if no through route).
Hydraulic modelling	Landscape design and flow restriction	Several schemes were tested through hydraulic modelling; the SRF Scheme park levels are shown in Figure 1-1 below. A flow restriction at the proposed bridge location replicates the effect of the 'day-lighted' culvert.
Channel profile	River edge treatment	Edge treatments have been developed for different areas. Strategy depends on floodplain, landscape, degree of contamination and proposed topography

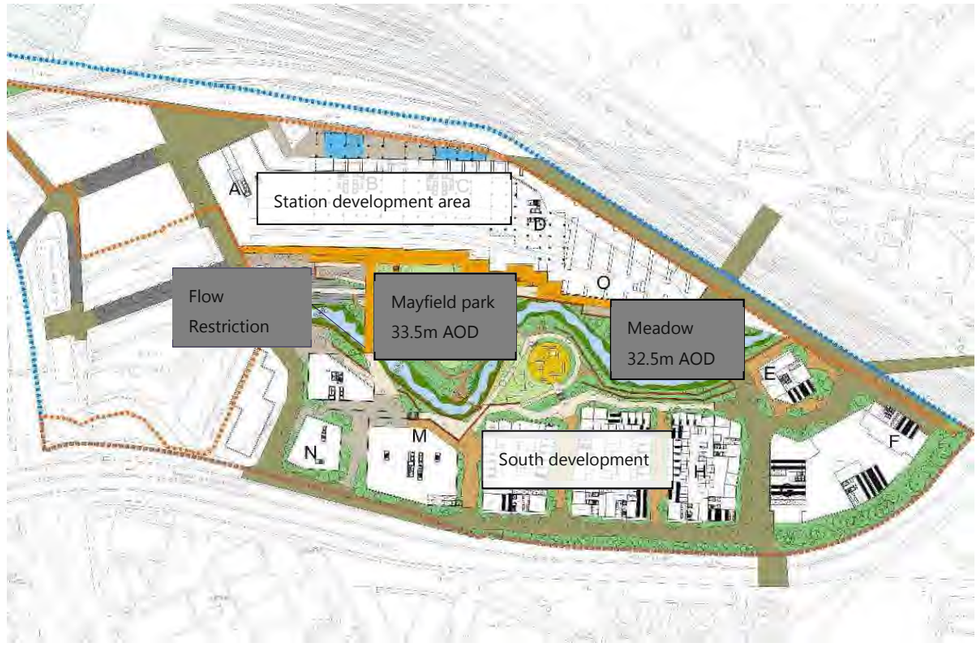


Figure 1-1 - SRF Scheme park levels

1.4 Next steps

At the current stage, we are currently seeking feedback on the BH Baseline and the SRF Scheme hydraulic models from the EA.

During future stages, we will be continuing our modelling work through design development to ensure changes in the landscape design have negligible effect on flood levels upstream and downstream. The EA comments on the SRF Scheme model will be incorporated to the design development and the model will be improved to reflect the right level of detail. Flow restriction details will be developed further to align with the client's and architect's vision.

A full site-specific Flood Risk Assessment will be required to accompany the planning documentation.

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2 Basis of the Report

2.1 Flood Levels

A pre-development enquiry to the EA in late 2016 yielded a range of data that was used to inform the preliminary flood mitigation strategy. A flood risk scoping report was prepared, a summary of which appears in Section 2.2 below.

The EA advised that finished floor levels (FFL) for new development should be set above the flood level derived from the 1 in 100 year event +35% CC (climate change) + 600mm freeboard, or the 1 in 100 year event +70% CC, whichever is higher), while also considering the 1 in 1000 year flood levels. Table 2—1 was produced based on the EA data and node locations shown in Figure 2-1.

Table 2—1 Preliminary flood level data

EA Node	1 in 100 year (mAOD)	1 in 1000 year (mAOD)	1 in 100 year +35%CC (mAOD)	1 in 100 year +35%CC (mAOD) +600mm	1 in 100 year+70%CC (mAOD)	Recommended Finished Floor Levels (mAOD)
1	35.21	36.12	35.64	36.24	36.01	**36.24**
2	34.65	36.44	35.55	36.15	36.03	**36.44**
3	33.90	35.67	34.75	35.35	35.30	**35.67**
4	*33.40*	*35.22*	*34.42*	-	*34.83*	-
5	*32.45*	*34.82*	*34.02*	-	*34.41*	-



Figure 2-1 EA node locations

The EA has been approached to clarify their advice regarding the 1 in 1000 levels, and they have confirmed that developers should consider incorporating flood resilient/flood resistant design where finished floor levels are set below the 1 in 1000 year flood level. The preliminary design advice adopted is therefore that the building FFL should be set above all of the above flood event levels, whichever is highest. For general design purposes building FFL should be set at 36.44m AOD as highlighted in green in Table 2-1.

2.2 Flood Risk Scoping

A Flood Risk Scoping report was prepared on 19th December 2016 that informed the client of the preliminary flood risk advice and of the required next steps in order to work towards a planning submission with a site specific Flood Risk Assessment.

2.2.1 Summary

The Flood Risk Scoping report summary is included here in its entirety:

BuroHappold Engineering has been commissioned by U+I to undertake a flood risk scoping study for the Mayfield Regeneration Development. The purpose of the scoping study is to identify current and potential future risks of flooding to the existing site, so as to inform the emerging regeneration proposals.

The project site is approximately 9 hectares and currently comprises of the disused Mayfield train station to the north, warehouses in the centre and a scrap metal yard towards the east. The River Medlock passes through the centre of the site, flowing from east to west, contained within a rectangular brick walled channel. The development proposals include the construction of new buildings for commercial and residential uses and the restoration and repurposing of Mayfield train station for commercial uses.

The site is currently situated within the Environment Agency (EA) Flood Zones 1, 2 and 3. Flood Zone 3 covers the centre of the site, small parts of the site rest within Flood Zone 2 and the rest majority of the site is situated within Flood Zone 1. The central parts of the site are therefore at medium to high risk from fluvial flooding. Flood risk from ground water, surface water and artificial sources is currently considered low to very low at the site.

BuroHappold submitted a pre-application enquiry to the EA. The EA has provided flood level information form their flood model for a range of flood events at several locations along the River Medlock. The EA has also provided pre-application advice with regards to Finished Floor Levels, compensatory storage, riparian access and ownership, river restoration and general comments on the proposed masterplan.

In order to reduce the flood risk to the site now and in the future, the following mitigation measures are recommended:

- *The Finished Floor Levels (FFL) should be set at least 600mm above the 1% annual exceedance probability (AEP) + 35% climate change allowance or at the 1% AEP + 70% climate change allowance, whichever is highest, while ensuring the development is safe during the 0.1% AEP event;*
- *As a preliminary recommendation and based on the current EA hydraulic model, the levels of the office buildings proposed at the south of the River Medlock should be raised from the existing levels (34m AOD-37m AOD) to the recommended FFL of 36.44m AOD. A full topographic survey should be procured and used to refine the EA hydraulic model in order to provide site specific flood levels and updated Finished Floor Level advice;*
- *Safe access and egress should be provided in flood risk areas for pedestrian and vehicular access in the event of flood;*
- *Any increase in flood levels due to development in the floodplain will need to be compensated by providing alternative flood plain storage. The EA hydraulic model should be used to represent proposed levels along the river and ensure that flood levels are not increased upstream or downstream;*

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- *As the River Medlock is a designated 'Main River', the EA has powers to carry out maintenance or improvements works to the river itself and within 8 metres of the top of bank. Easements to both banks are desirable, but required at least to one bank throughout the development area. Environmental Permits will be required for works within the 8 metres zone.*
- *The surface water drainage strategy should ensure there is no flooding for the 1 in 100 year event with allowance for climate change, while following the hierarchy of drainage solutions and implementing SuDS techniques.*
- *The Sequential Test will most probably not be required for the proposed development. If the proposals include only commercial development within Flood Zone 3 and the residential development is maintained within Flood Zone 1 or 2 (as per current proposals), no Exception Test will be required.*

A Flood Risk Assessment will be required as part of the planning application. The assessment will built on the findings of this scoping study to demonstrate that with mitigation measures in place the development is safe for the lifetime of the development without increasing flood risk elsewhere.

A summary of the key findings from the scoping study are provided in the following table.

Subject	Element	Findings
Site Flood Risk	Fluvial	The site is in Flood Zone 1, 2 and 3. Flood Zone 3 covers the centre of the site. Small parts of the site lie within Flood Zone 2 and the majority of the site lies in Flood Zone 1
	Ground Water	Low risk
	Surface Water	Very low to low risk of surface water flooding at the majority of the site. Local depressions at medium and high risk.
	Artificial sources	Low risk
Mitigation measures	Finished Floor Levels	Set at least 600mm above the 1% annual exceedance probability (AEP) + 35% climate change allowance or at the 1% AEP + 70% climate change allowance, whichever is highest. The development should be safe under the 0.1% annual exceedance probability (AEP) event
	Climate change allowances	35% to 70% allowance
	Safe access and egress	Safe access and egress should be provided in flood risk areas for pedestrian and vehicular access in the event of flood
	Floodplain compensation	To ensure risk is not increased elsewhere based on the 1% AEP + 35%CC.
	Riparian access	Easements of 8 metres to both banks are desirable to allow access to the EA for repair and maintenance works, but at least to one bank throughout the development area
	Permits	Environmental Permits will be required for works within 8 metres from the river banks
	Surface water drainage strategy	No flooding for the 1 in 100 year with allowance for climate change. Hierarchy of drainage solutions to be followed, SuDS techniques to be implemented
Planning requirements	Sequential Test	The Sequential Test will most probably not be required for the proposed development
	Exception Test	If the proposals include only commercial development within Flood Zone 3 and the residential development is maintained within Flood Zone 1 or 2 (as per current proposals), no Exception Test will be required.

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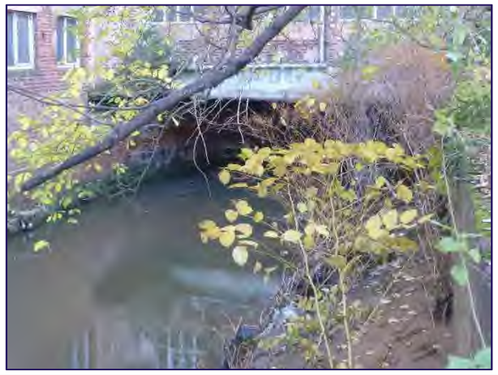
3 Existing Conditions

3.1 EA Pre-Development Enquiry

A pre-development enquiry was submitted to the EA in November 2017 requesting site specific data relating to flood risk and surface water drainage, as well as hydraulic modelling files. This information was received soon after the enquiry submission.

3.2 Site Visit

A number of visits have been made to site by BuroHappold at various times of the year (between October 2016 and November 2017) during which different river conditions were observed. The river through the site is difficult to view due to the existing industrial development and the extent of vegetation, particularly during the summer months; refer to Figure 3-1.



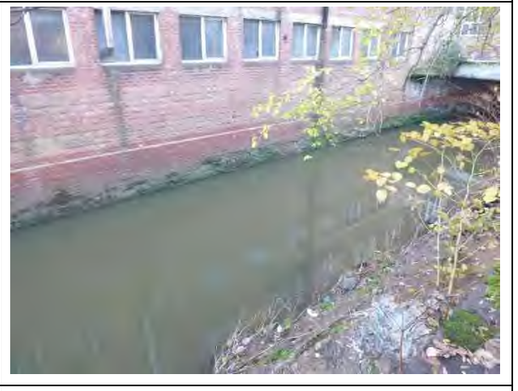
A. Siltation and vegetation building up on one side of the river (Photograph taken facing West)



B. Dense vegetation growth on the silt deposits (Photograph taken facing East)



C. Dense vegetation has caused damage to the river walls (Photograph taken facing East)



D. Japanese Knotweed present along most of the river corridor (Photograph taken facing West)

Figure 3-1 Site visit photographs

Noteworthy features from the various site visits have included:

- Highly incised brick/masonry channel within site
- Generally poor condition river walls in need of removal, replacement or significant repair
- Meandering river with limited opportunity for access
- Japanese Knotweed at a number of locations throughout the length of the site
- Two existing culverts offering a 'daylighting' opportunity

3.3 Topographic Survey

Malcom Hughes (topographic surveyors), together with BuroHappold visited site in June 2017 to assess the viability of a river corridor topographic survey (ground levels and position) and bathymetric survey (river bed levels).

From the site visit is was clear that access to the river channel was not going to be possible for two reasons:

1. The presence of Japanese Knotweed obscuring clear line of sight;
2. The incised nature of the river channel preventing survey team full unobstructed access to the watercourse.

The surveyor suggested a two-stage approach to the survey to be commenced when the vegetation had essentially died back during the winter months.

A topographic survey of the areas around the river corridor was completed in July 2017 by Malcom Hughes. The survey provided adequate information to develop a detailed 3D surface of the surrounding area (excluding the river corridor) that has been used for preliminary cut/fill calculations and site representation in the BH Baseline hydraulic model, as discussed in following sections.

3.4 Design Team Site Walkover

The BuroHappold visited site on 03/10/2017 together with F+G to investigate the Mayfield site in relation to the proposed riverside landscape park. The joint site walkover was useful in order to fully understand the various drivers for flood risk management set against the desired outcomes for the supporting landscape. Figure 3-2 summarises the main observations of the walkover.

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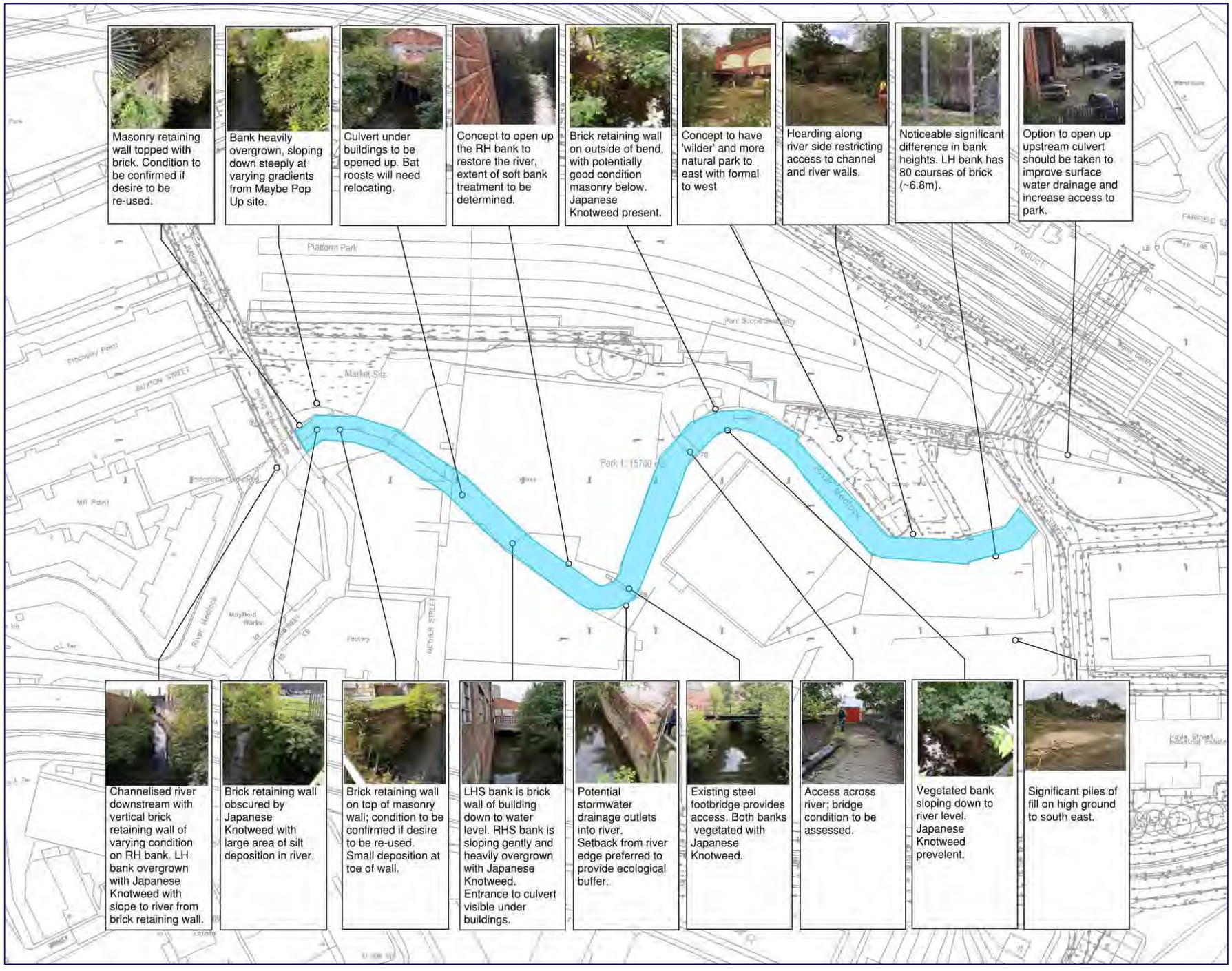


Figure 3-2 Site walkover observations

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3.5 River Corridor Survey

A river corridor survey is usually required for the following reasons:

1. The EA hydraulic model, received as part of the EA data request, is required to be updated with the latest topographical data to ensure the 'best available information' is used for the work. The location of the river walls and river bed is required at a series of cross sections to ensure that the model representation is sufficient. However, agreement from the EA was received (13/07/2017) that their existing model could be used to establish a baseline model. They stated "*We would have no objections to the use of the model in its existing state as the baseline case. However, we would recommend that you identify any obvious visual changes in the channel that depart from the current sections used in the model.*"
2. Topographic details are required to ensure the earthworks cut/fill model accurately reflects the existing landform and river corridor.
3. Hard and soft bed levels are required in order to quantify the amount of silt in the river as this may need to be removed.

As stated in Section 3.3 the river corridor topography survey was planned to be completed in two stages:

- The Stage 1 river corridor topographic survey was completed between 13/11/2017 and 15/11/2017. No entry to the watercourse was planned but an accurate representation of the banks of the river was obtained remotely.
- Delivery of draft drawings allowed early review, with the intention that a detailed methodology and cost would be able to be produced for the Stage 2 survey that included bathymetry.
- A Stage 2 survey has yet to be carried out due to access restrictions.

3.6 River Wall Condition Survey

The River Medlock corridor has been highly altered over time resulting in the current arrangement of brick and masonry walls and culverts. The river banks and culverts are highly variable over the entire length of the Mayfield site.

For the proposed works to be defined and specified, an understanding of the condition of the existing river walls is required. Whilst by inspection it can be seen that some lengths of the river walls are in poor condition, it may be that the Design Team wish to retain some of the existing river walls in the final design to highlight some of the historic context of the Medlock through the Mayfield site. Some parts of the river walls are made from masonry (dressed gritstone), that when refurbished could provide a suitable historic backdrop to the park that would tie together the story of the rivers industrial past in this reach of the river.

There are two culverts along the river corridor within the site boundary (approximately 65m and 35m in length) that are planned to be opened-up or 'daylighted'. This has significant benefits for biodiversity and the public realm, although the known bat roosts would have to be transferred to other suitable areas within the park. The culvert dimensions will allow suitably qualified surveyors entry, though they must be certified Confined Spaces trained.

At the time of writing this report, an instruction for the river wall and culvert condition survey has not been received.

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4 Strategy for River Restoration within the Site

4.1 Strategic Regeneration Framework (SRF)

Text and images for input in to the draft SRF documentation was prepared during October 2017. In particular, the following sections set out the river corridor approach:

4.1.1 Place Making, Park and Public Realm - Water and flood management approach

The backbone for the regeneration of Mayfield is the proposed park and restoration of the River Medlock. The revitalised river will dovetail with other planned improvement works that are being progressing further upstream in the wider Medlock catchment. By removing the old culverts and high-sided river walls and opening up the river, particularly on the north bank, natural river edges with a range of habitats can be created. Integrated flood storage will be provided in the park by allowing some parts of the park to flood when necessary.

Safe public pedestrian access will be possible to the river directly from the park by features such as stepping stones, rock weirs, riverside walks and boardwalks. The river edges will be softened in places to allow marginal wetland areas to be created not only giving space for water, but space for recreation and wildlife as well. It will be a truly multi-use space.

New pedestrian bridged links will help maximise the benefits that the Medlock can offer even when the Medlock floodplain is in use during a significant flood event. Opening up the river will allow the floodplain to be clearly defined so that a safe environment for floodwater can be created at times when high river flows are expected.

Maintenance access will also be improved that will allow the river corridor to be managed effectively where necessary, and give access to the Environment Agency to allow them to manage the overall flood risk to the catchment. This access for inspection and maintenance would integrate with a landscape management plan that would set out the requirements for maintaining the park and the riverside areas, reduced through precise planting of the natural features.

4.1.2 Site Analysis – Flood Risk

The River Medlock passes through the centre of the site, flowing from east to west, contained within a deep rectangular brick/stone walled channel. The condition of the river varies. Some of the river walls are in a derelict state, with parts collapsed into the river. In many locations, siltation has built up on one or both sides of the river bank. The silt deposits have enabled the dense growth of vegetation along almost the entire corridor. Japanese Knotweed is currently present along the riparian corridor within the site.

The Environment Agency's flood risk mapping shows parts of the existing site to be highly susceptible to flooding with the River Medlock canalised between the high walls and under industrial buildings. Flooding of the site is concentrated around the Medlock in the central area (Flood Zone 3 High risk) with some Flood Zone 2 (Medium risk) on the margins. However, the majority of the site is situated within Flood Zone 1 (Low risk) with a flood risk less than 0.1% (on average one occurrence in 1000 years). Flood risk from ground water, surface water and artificial sources is currently considered low to very low at the site.

The regeneration of Mayfield will allow the river corridor and floodplain to be carefully reprofiled using the results of detailed hydraulic modelling, that will ensure the park can reduce the risk of flooding and mitigate for the effects of climate change. The well-considered design will ensure that there will be no detrimental effects upstream or downstream, with finished floor levels for property set well above design flood levels as recommended by the Environment Agency (EA). This will ensure the development is safe, with appropriate pedestrian and vehicular access, even during the 0.1% AEP event for maintenance or improvements works.

Surface water runoff will be attenuated as required including allowance for climate change, while following the hierarchy of drainage solutions in order to implement Sustainable Drainage Systems (SuDS) techniques. It is hoped that more natural techniques can be adopted to integrate well with the park landscape.

A full site specific Flood Risk Assessment will be submitted with the planning application.

The documentation will be prepared for the stakeholders and is anticipated to be finalised during February 2018.

4.2 Treatment of the river

4.2.1 Existing river walls

Within the site the River Medlock is highly constrained by vertical masonry and brick river walls between the existing industrial plots from 2m to over 7m in height. With the redevelopment of the area and the formation of a meaningful park, the intention is to open up these walls and culverts to allow the river to influence the area in a very much more positive way. The design intent is to encourage people to get closer proximity to the water's edge in order to improve the interaction for users and improve biodiversity.



Figure 4-1 Existing river walls

The condition of the existing river walls is generally poor; it is recommended that the existing walls should not be a constraint on the emerging proposals.

A condition survey of the river walls is proposed in order to ascertain which lengths of wall are worth and capable of being preserved or refurbished for use in the detailed design. It may be possible that where the condition of the existing river walls permit, then these could be retained, allowing the story of the restoration of the River Medlock to be understood.

The river wall condition survey will yield information on the visual condition, and likely refurbishment work that would be necessary, It will not include a check on stability at this stage. The results of this survey will provide information to allow relevant costs for refurbishment to be included in the cost plan. Where walls are subsequently demolished, the survey will assist in identifying where material can be recovered and re-used in new river edges or in the facing of new retaining walls that could define and form the proposed new river corridor.

4.2.2 Culverts

There are two culverts within the site red line boundary that carry the River Medlock through the Mayfield site.

The culverting of watercourses in the 1800-1900's was seen as a way to maximise land for development in urban areas, including directly building over the culverts themselves. By opening up the culverts a number of significant benefits will be realised:

- New ecological habitats will be created,
- Biodiversity will be improved,
- Aesthetic and landscape appeal of rivers will be regained,
- Recreation and access to the watercourse will once again be possible.

The condition of the culverts will be surveyed in order to determine the bed condition and the general condition of the culvert primarily for demolition purposes.

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As indicated above, there are bat roosts in the culverts, and licences will be required in order to relocate these – refer to Ecology Strategy Report for further information.

4.2.3 Edge treatment

Hard, soft and hybrid options for the treatment of river edges, marginal fringes and changes in elevation at the edge of the River Medlock have been developed to demonstrate to the Design Team that there are many different approaches that can be used even on a relatively short section of restored river park (see Figures 4-2, 4-3 and 4-4 below). The applicability of each treatment depends on the floodplain, landscape design, degree of contamination of adjacent ground and proposed topography. A coordinated concept design for the river edge treatment is shown in Figure 4-5.

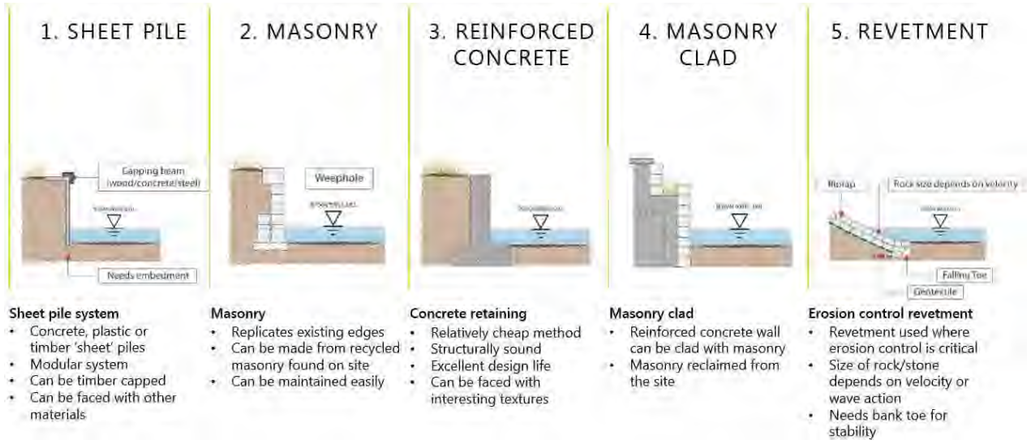


Figure 4-2 Hard Riverbank Options

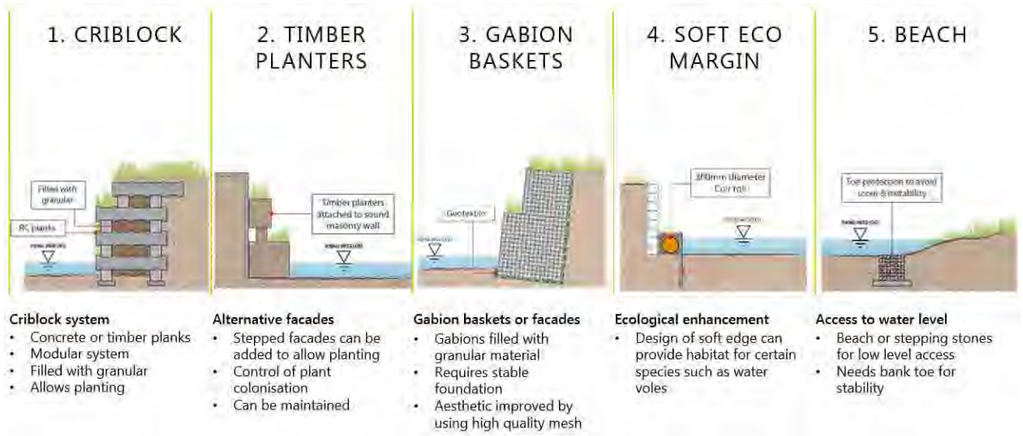


Figure 4-3 Composite Riverbank Options

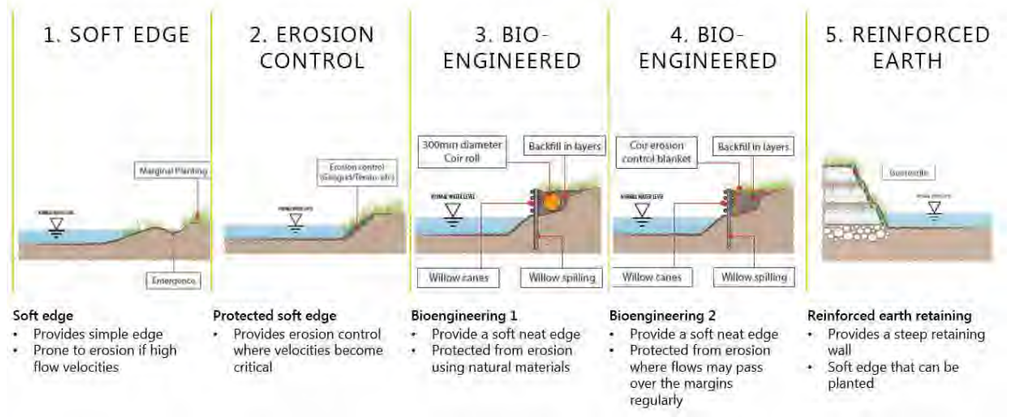


Figure 4-4 Soft Riverbank Options

The edge treatments outlined above can be used alone or in combination to create particular effects for use by park visitors, or more natural solutions for the improvement of biodiversity. Some of these treatments have been used in the concept design.

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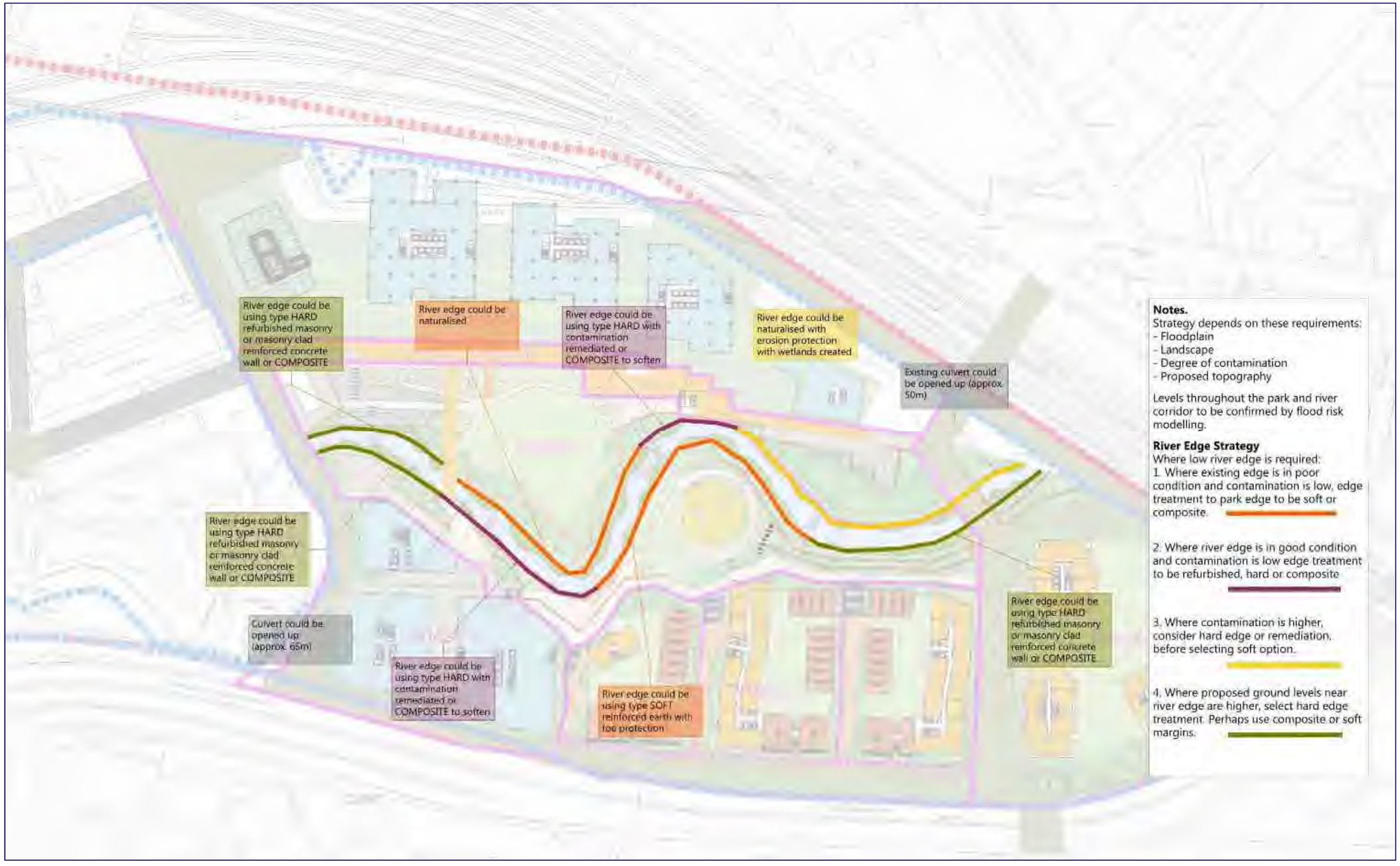


Figure 4-5 - River edge typologies along river corridor

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4.3 Construction Methodology

The emerging design has to be buildable and cost effective to implement by a suitably experienced contractor.

The construction sequence and methodology depends largely on what treatment is to be applied to the river edge for the permanent case. River flows can vary with the changing weather, and dealing with these flows needs to be planned before any works are commenced. The EA requires full risk and method statements (RAMS) to be provided along with their licencing process for works within or adjacent to a watercourse.

Some potential construction approaches are outlined below.

With soft edges a temporary diversion channel on one bank can be excavated to deal with the river flow as shown in Figure 4-6 below. The works can be eventually utilised in the permanent works, therefore saving duplicate excavation.

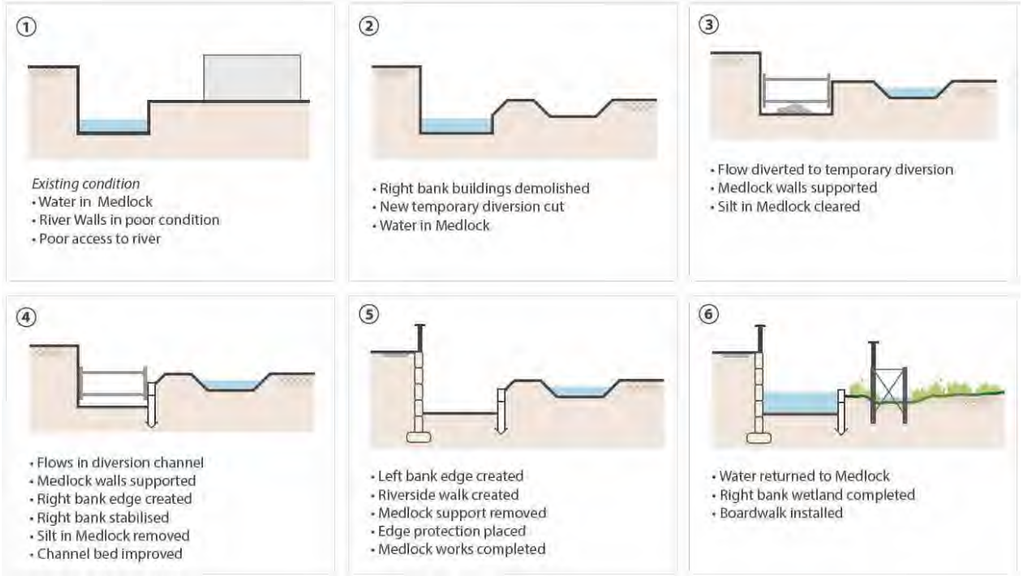


Figure 4-6 Construction methodology for soft edges

With hard edges a temporary flume or culvert can be used to deal with the river flow as shown in Figure 4-7 below. The works would usually be carried out in short (say, 20m) sections to ensure the banks/river walls remain stable.

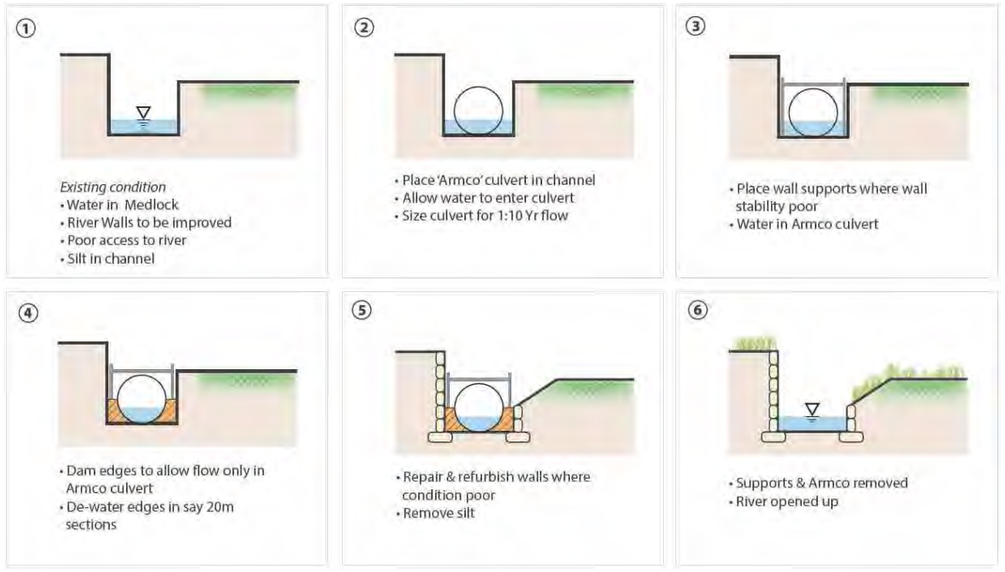


Figure 4-7 Construction methodology for hard edges

4.4 Works to the river bed

The works to the river bed itself is anticipated to include:

- Silt and debris removal – The quantity of silt and debris that is required to be removed will be estimated on completion of the river topography surveys.
- Provision of rock weirs and pools to facilitate and promote public access, improve water quality and improve the overall river aesthetic.
- The provision of flow control – a restriction within the channel is required in order to replicate the flood levels and extents both upstream and downstream of the site that were caused by the existing culverts that are being opened up as part of the works (see Section 4.5 below).

It is our current understanding that the river bed is formed of bedrock and excavation in rock should be anticipated where river bed regrading or excavation for pools is required. The river topography survey Stage 1, or Stage 2 when instructed, will provide further information.

4.5 Flow control

It is proposed that the restored river will be controlled by features that control the river flow under both high flow and low flow conditions. These will generally take the form of restrictions to the channel, changes in level of the river banks, and may include the provision of fixed weirs or rock weirs to aerate/oxygenate, raise the water level at low flow conditions or attenuate and alter the flow characteristics to manage the river flow. Refer to Figure 4-8.

These features will be included and represented in the hydraulic modelling during the detailed design stages.

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Figure 4-8 Flow control examples

4.6 Off-site flood risk impacts and mitigation

The EA manage and promote flood risk management schemes throughout the UK. Under NPPF, the developer is required to ensure and demonstrate that the proposed development will be designed in such a way to be safe and will not increase flood risk elsewhere.

Whilst offsite schemes can be utilised to provide additional flood risk management benefits to the site and wider catchment, currently the EA do not have any schemes in their Capital Works programme for the River Medlock catchment. However, should a scheme come forward for promotion, in order to gain funding from Defra, the project must protect property from flood damage, and an economic justification completed that follows Treasury (Green Book) guidelines. Without further funding projects are unlikely to proceed.

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5 Hydraulic Modelling

5.1 Agreement of the Baseline Model

As a Statutory Consultee under the planning process, the EA will be required to approve the Flood Risk Assessment as part of a planning submission, which is informed by hydraulic modelling for the proposed scheme. Our objective, where possible, will be to agree the hydraulic modelling and the river restoration/flood mitigation strategy with the EA prior to any FRA documentation being finalised and submitted as part of the planning process.

The hydraulic model for the River Medlock that runs through the site was obtained from the EA on 17/11/2016. The EA Medlock Model (2011) is a dynamic 1D-2D model using combined ISIS 1D modelling software and TUFLOW 2D modelling software, modelling both the river channel and floodplain in detail.

The site topographic details surveyed by Malcom Hughes (2017) have been applied to the model in order to create an updated baseline model based on the 'best available information'. This is referred to as the BH Baseline (run BH_007). This has been compared to the EA 2011 Medlock model run, with no significant level changes observed when running the 1 in 100 year event, although more significant changes in extent and flood level were noted in the 1 in 1000 year event.

It is considered that run BH_007 satisfactorily represents the baseline condition at the Mayfield site and is considered fit for the purpose of modelling the future verification runs for the Mayfield Regeneration scheme. A model report has been prepared to request approval from the EA to the updated model baseline.

A baseline modelling Technical Note was submitted to the EA on 17/10/2017 for their review and approval. Approval for the updated baseline model is currently awaited.

5.2 Design Development

The design process is an iterative collaboration between BuroHappold and SEW, with design passing between the Design Team on a regular basis to ensure that the development works from a flood risk management perspective.

For each iteration the following work has to be undertaken as shown in Figure 5-1.

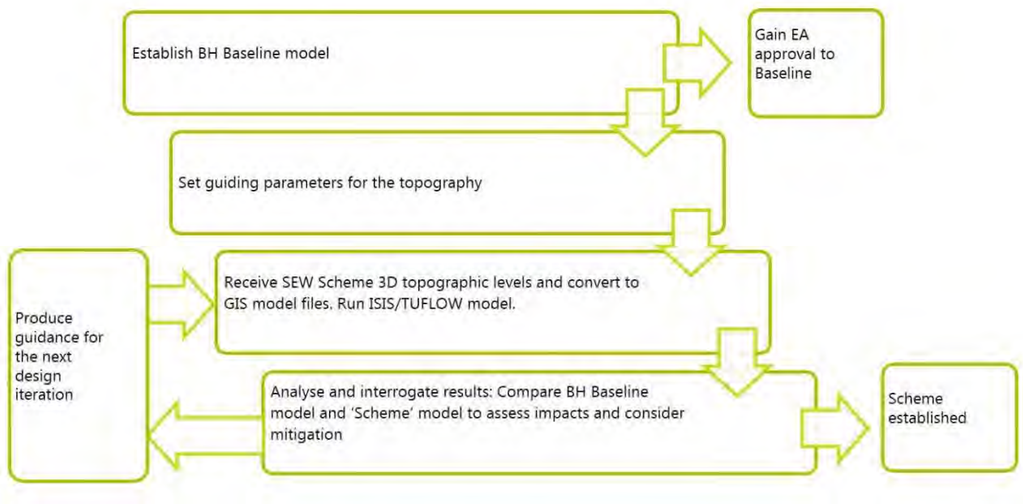


Figure 5-1 Modelling process for the concept

The principal objective of the hydraulic modelling is to develop a satisfactory design for the park that ensures that the development itself is safe, and that has no adverse impact on flooding off site, both upstream and downstream of the development. In order to achieve this, the conveyance and/or storage of flood water through the site must mimic or improve upon the existing condition by allowing flood waters to enter the site at a similar rate to the existing conditions, while also not increasing the flow rate downstream of the site. Any increase in flood depth on site are to be dealt with through on-site mitigation measures. The current design flood event (DFE) used for the modelling is the 1 in 100 year fluvial flood event including the effects of climate change.

The design ground levels for the park and the finished floor levels for the proposed development were initially selected by BuroHappold based on EA advice. An initial set of Mayfield Park ground levels was put forward to the Design Team to ensure that the design of the park would be hydraulically appropriate for all return periods. This advice recommended that the general park level should be 33.5m AOD.

Over 20 separate model iterations have been completed for this stage of the project with the result demonstrating that a concept for the SRF scheme is achievable. The final details for the park will be completed during detailed design.

During these iterations the following design features have been tested:

- With and without the culverts through the existing park;
- With channel adjustments (weirs and width restrictions) required to replicate the culvert removal;
- With a range of park levels to utilise all available storage volume.

5.3 Description of the SRF Scheme

Model run BH_024 (referred to in this section as the SRF Scheme) was compiled based on the SEW masterplan (drg nr 0292-SEW-ZZ-00-DR-T-001000, issued to BHE on 16/10/2017). The main park level was set at 33.50m AOD with the upstream meadow area generally set at 32.50m AOD, lower than the SEW masterplan proposals. Both culverts are shown 'daylighted' or opened-up, and the buildings to the south in plots M,N, J, I and H are set back at least 5m from the river. The masterplan is shown in Figure 5-2. SEW have further refined the park design and made minor adjustments to the levels. These are not considered to be significant in hydraulic modelling terms.

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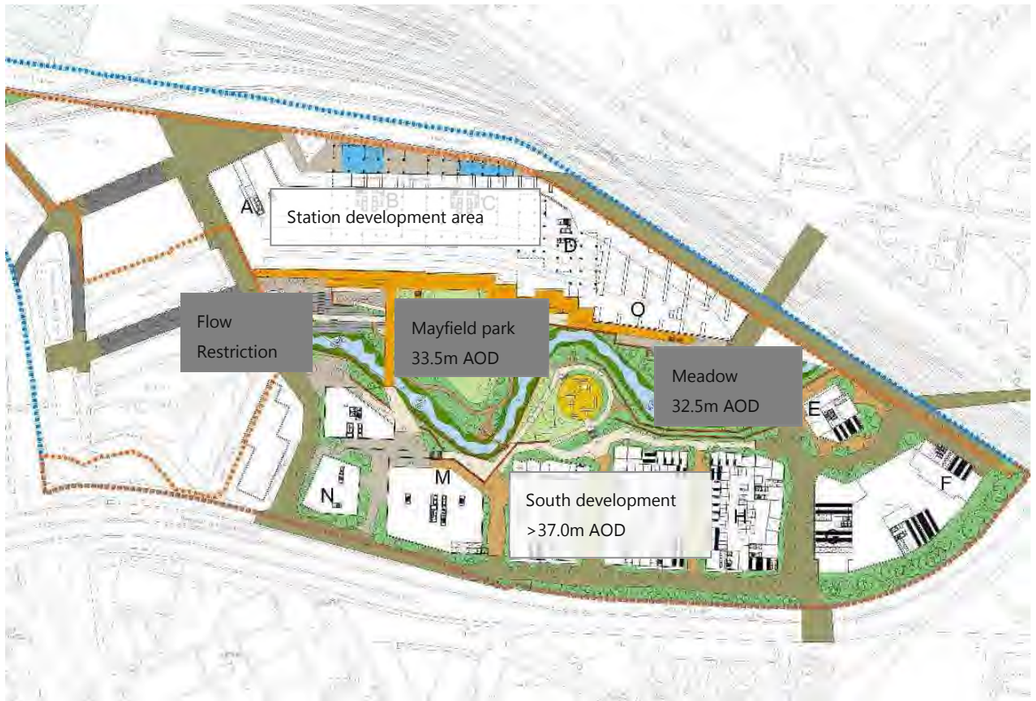


Figure 5-2 SRF Scheme



Figure 5-3 Typical view of park looking east (Sketch by SEW)

In order to replicate the flow control at Hoyle Street Industrial Estate culvert, it was replaced with a 9m wide restriction at the location of the proposed bridge. Additionally, the floodplain was modified to ensure no floodwater could bypass the restriction. The underside of the pedestrian bridge was therefore in-filled to above flood level, which maximised the flood compensation provided within the park areas.

However, as shown in the preliminary sketches in Figure 5-3 it was SEW's design intent that the views across the park should also include the view beneath the bridge. A number of model iterations have been run to investigate whether moving the restriction would provide an adequate restriction to flow, in order to replicate downstream levels as found in the baseline model. Initial attempts to run alternative solutions have been on-going. These model runs have been inconclusive, but can be investigated further during design development. Please refer to Section 8 – Next Steps.

Currently, a restriction across the floodplain beneath the pedestrian bridge is required to a (relatively high) level of 34.8m AOD. Further investigation of the location for the restriction will be investigated during the following stages of design development.

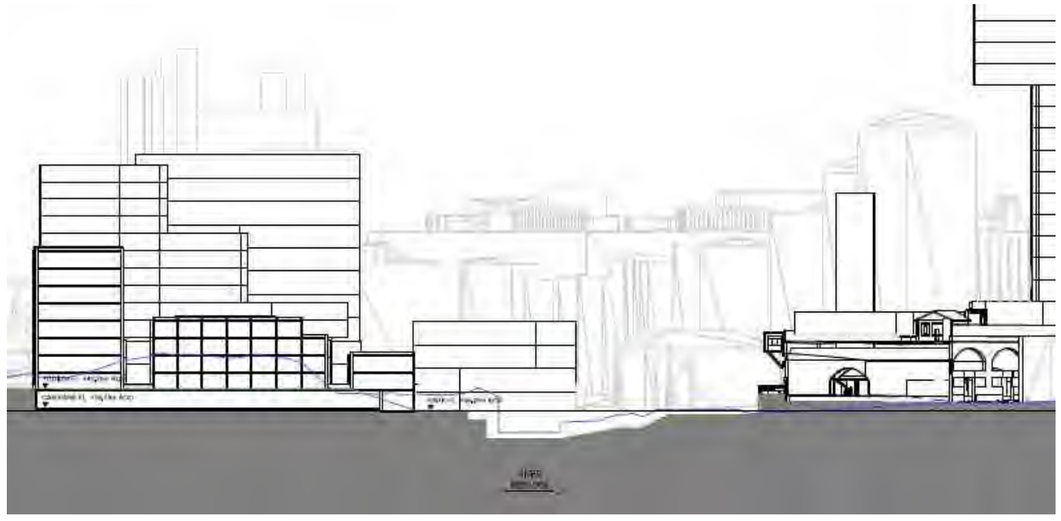


Figure 5-4 Typical section across the park

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5.4 Modelled Scheme

5.4.1 Description of scheme

This section describes the analysis and modelling results that provide a basis for a successful scheme for this strategy report which is proposed to be the basis for further work. This is referred to as run BH_024.

The model tested the effects of a flow restriction at the location of the proposed pedestrian bridge (also the downstream end of the existing culvert), which was proven to sufficiently restrict flows and consequently moderate flood levels downstream. Furthermore, various levels within the park area have been tested to investigate the effects of the additional flood compensation, with run BH_024 giving the most desirable results in the off-site areas downstream of the project. The scheme reflects the main park at a ground level of 33.50m AOD.

5.4.2 Comparison with baseline

Extent Comparison

The hydraulic modelling results show that there are marginal increases in the extent of flooding in the post-development scenario when compared to the baseline scenario. Upstream and downstream of the site there is only a very minor increase in flood extent and significantly less than for previous schemes tested. The flood extent within the park varies from that of the baseline, as per intended landscape design; to create a park that can flood at the north of the river and replace the floodplain on the south where park-side development is proposed. Refer to Figures below.

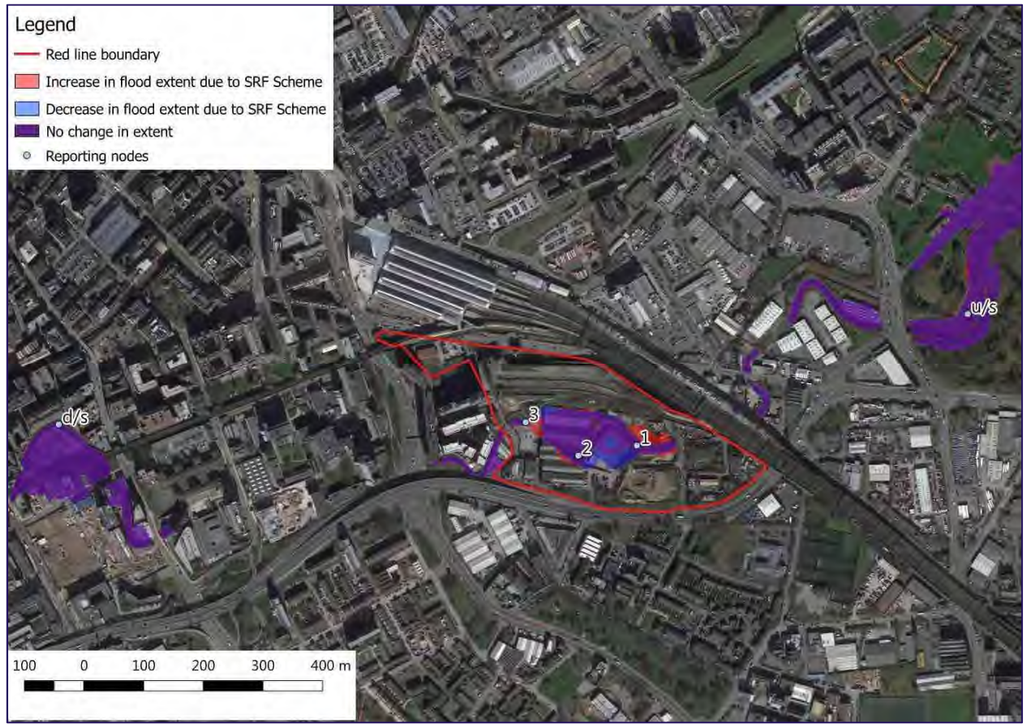


Figure 5-5 Flood extent changes due to SRF Scheme (BH_024)

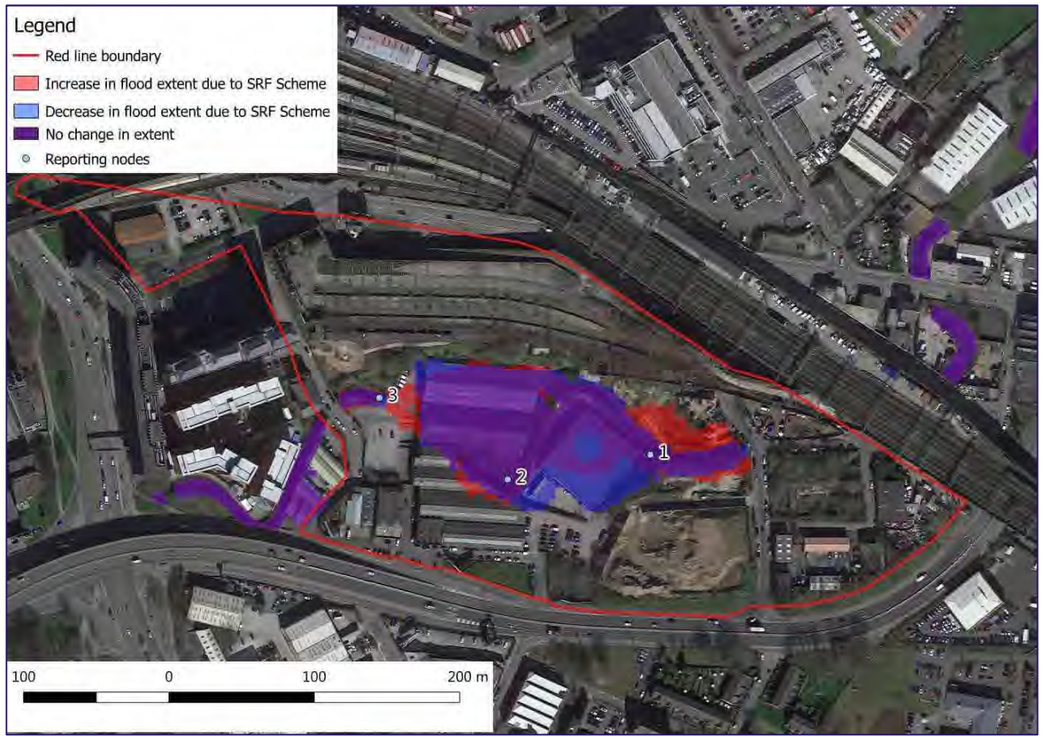


Figure 5-6 - Flood extent changes due to SRF Scheme on site

Flood Depth Comparison

The hydraulic modelling results indicate that there is a general increase in flood levels across the park, and therefore corresponding flood depth, in the post-development scenario when compared to the baseline scenario. This is the desired effect of producing useable flood storage.

Upstream of the site, the general increase in flood depth is approximately 25mm in the worst affected areas. At this stage it is not clear what the hydraulic mechanism is for these increased levels, however, it is proposed to address this in future iterations of the scheme. Downstream, there are very minor increases in flood level of 2mm. This increase in flood level is considered to be well within the tolerances of the hydraulic modelling software used and it is anticipated that this will be acceptable to the EA at the SRF stage. Please refer to Figure 5-6 and Table 5-1.

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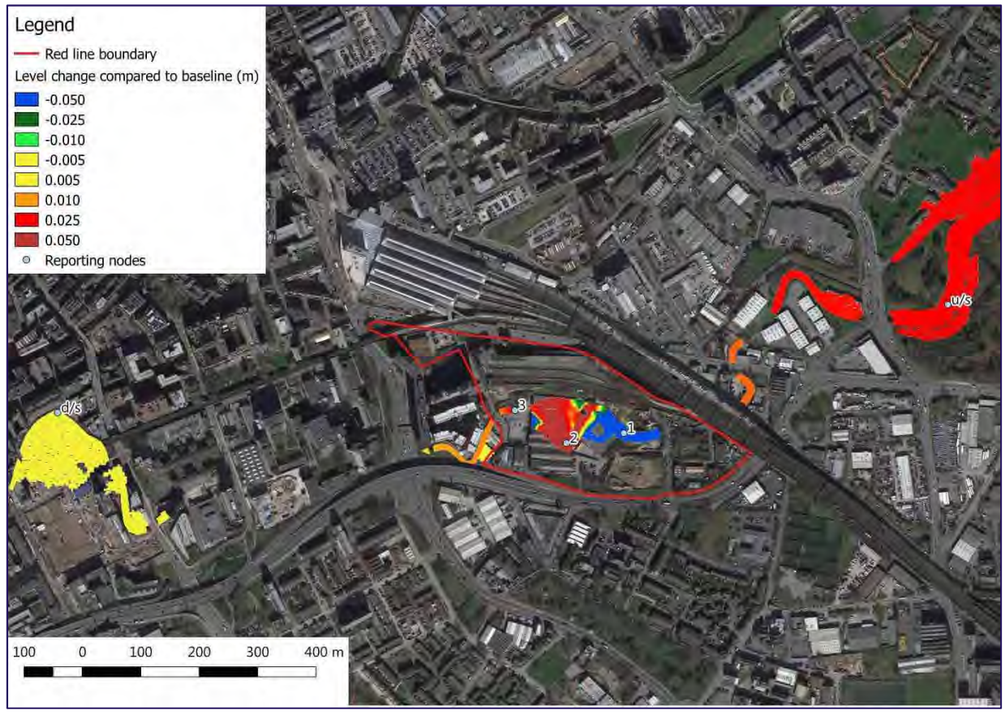


Figure 5-7 Flood level changes (BH_024)

As explained in Section 5.3, the SRF Scheme incorporates a flow restriction across the floodplain; alternative schemes that have similar effect will be investigated during future stages.

Further reductions in impact will aim to be achieved in subsequent design phases.

5.5 Model Results Summary

A summary table of the most important model runs and the flood depth changes compared to the BH baseline are shown in Table 5-1.

Table 5-1 –SRF Scheme flood level changes compared to BH Baseline at the site vicinity

Run name	Scheme	Comment	Downstream	3	2	1	Upstream
BH_007	BH Baseline model	EA model with additional site specific topographic information	31.307mAOD	33.878mAOD	34.568mAOD	34.956mAOD	38.046mAOD
BH_024	SRF Scheme (SEW Scheme 2 with abutment restriction and modified levels)	Park level horizontal at 33.5mAOD	31.309mAOD	33.906mAOD	34.690mAOD	34.702mAOD	38.073mAOD
Flood level changes due to SRF Scheme (mm) Negative value indicates decrease in flood level, positive value indicates increase in flood levels			2mm	28mm	122mm	-254mm	27mm

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6 Stakeholder Engagement

6.1 Liaison with the Environment Agency

6.1.1 Statutory Consultee

The EA is the principal statutory consultee with a scope to cover flood risk projects and assets across England. The EA are therefore the primary public stakeholder, along with the Local Planning Authority, in all items relating to flood risk for the project. Close liaison with the EA has been maintained throughout the project with a good working relationship formed. It is particularly helpful that two of the lead EA team are part-time based in Manchester City Council.

6.1.2 Defra Urban Pioneer

The EA and Manchester City Council are keen to promote the Defra Urban Pioneer:

The Defra 'urban pioneer' is a concept, focussed on Greater Manchester where the EA are aiming to understand, transfer and scale to other areas around the country, key scheme components and delivery outcomes that will help develop cities and their natural capital assets in ways which supports and delivers sustainable, successful communities and the urban spaces these operate in.



6.1.3 Scheme Model Review by the EA

Prior to any formal approval of the hydraulic modelling, the EA will require a review of the Scheme hydraulic model for the project. A detailed review of all the hydraulic modelling files and results may be requested, usually completed by one of their framework consultants. The EA typically allow 6 weeks for this review.

Further refinement of the model, including further modelling runs or further supporting evidence may be requested by the EA, prior to full approval of the model.

6.1.4 EA constraints

Access – The EA has powers to control development within 8m of any Main River. However, the EA currently has no access for inspection and maintenance of the River Medlock which is defined a 'Main River'. Any access that can be provided and designed in will be an improvement on the existing which will be welcomed by the EA. Preliminary advice from the EA (November 2016) stated "*With reference to the submitted masterplan layout, the removal of culverted sections and the creation of open areas adjoining the river would be welcomed. The proposed buildings on the south bank appear very close to the river and creation of clear easements to both banks would be preferable. However, from the viewpoint of accessing the river for maintenance, a clear open space to one bank would be better than what exists currently. Open areas adjoining the river should be kept free of structures and other obstacles that would impede vehicular access along the bank top.*"

It is recommended that at the very least pedestrian/machine access to one bank is provided to allow inspection (width 1.2m). Vehicular access (up to 8.0m) would give enhanced access to allow full maintenance of the park by the developer's Management Company and River Medlock channel by the EA.

Finished Floor Levels - Finished floor levels for development considered to be *More Vulnerable* in accordance with the Flood Risk and Coastal Change Planning Practice Guidance should be set 600mm above the 1 in 100 year plus 35% climate change design flood level (or 1 in 100 year 70% level whichever is the greater), while considering the 1 in 1000 year levels.

6.1.5 EA Consents and Licences

The EA has permissive powers under the Water Act 1991. As such an **environmental permit for flood risk activities** will be required for any works to alter a main river and any works within 8m of the river and any associated river edge structures such as river walls and culverts. This is a separate requirement from any planning consent.

With any subsequent planning application for the development, a **Water Framework Directive (WFD) assessment** may also be required to demonstrate that the works do not adversely affect the watercourse, and where possible, provide benefit to the watercourse. The WFD is a European Directive which commits EU states to improve the quality of water and water bodies.

Riparian ownership brings a number of key responsibilities and these have been summarised in an EA document entitled 'Living on the edge' (April 2016). These recommendations will be further developed with the detailed design of the park.

6.2 Liaison with others

No liaison with other stakeholders has been undertaken to date.

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7 Opportunities and Risks

7.1 Opportunities

A significant number of opportunities exist from a rivers perspective as a result of the successful implementation of the Mayfield Regeneration:

- The site provides great opportunity to create an outstanding ecological network and riparian corridor at the heart of Manchester, creating high quality amenity and greenspace zones.
- Mayfield river park will be core to the regeneration of Mayfield area.
- With attention from the EA Defra Pioneer project, the design and implementation of this scheme will be an example which will be able to be applied to other urban schemes around the country, enhancing the stature of the park.
- Soft bioengineering techniques to enhance banksides where applicable will allow river rehabilitation of the canalised River Medlock. Biodiversity and habitat creation for local species can work well with these techniques.
- Opportunity to have a close working relationship with the EA for the good of the park and the river corridor (e.g. sharing information on asset surveys, landscaping maintenance regimes etc.).
- The area will comprise multi-functioning spaces that enable people interaction, amenity and biodiversity, while allowing flood water to be accommodated during extreme events.

7.2 Risks

Some risks from a flood risk perspective still exist, which should be considered further during the stages of design development:

- EA may require changes prior to approval of the BuroHappold Baseline model
- EA may require changes prior to approval of the BuroHappold Design model for planning submission
- Contamination behind river walls prevents culvert/bank open-up in the locations proposed by the Design Team
- Removal of Japanese Knotweed can be a long, costly operation
- Extent of wall degradation precludes re-use of walls in proposed park
- If current phasing changes, then phasing of river works and building areas will require alignment to ensure flood risk is mitigated through all phases of development.

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8 Next Steps

8.1 Modelling Next Steps

The proposed next steps for hydraulic model development during the current and next stages are as follows:

Current Stage:

- Obtain feedback from EA on BuroHappold Baseline model.
- Obtain feedback from EA on SRF Scheme model for incorporation into future scheme

Future Stage (for planning):

- Investigate effect of relocating the flow control restriction to suit the landscaping requirements,
- Investigate additional storage within the park and meadow areas, resulting from design developments by SEW
- Improve the representation of the Hoyle Street culvert 'daylighting' in the model
- Resolve the apparent upstream impact of the model to ensure that it lies within the tolerances that are acceptable to the Environment Agency and the Local Planning Authority. This tolerance is likely to be ± 10mm.

8.2 Development of the Masterplan

Coordination with the Design Team will again be key during the next stages of design. BuroHappold will collaborate closely with the Architects/Design Team through workshops to ensure effective development of the Scheme to the next level of detail. Detail will be added to the design of the main park, meadow area and river corridor to achieve the desired results in terms of flood risk upstream and downstream, while following the architects vision.

8.3 Planning Submission

A full site-specific Flood Risk Assessment will be prepared to accompany the application, demonstrating no detrimental impact to upstream or downstream areas, while ensuring the site is maintained safe for the design life of the development particularly taking into account potential impacts of climate change. The scheme Flood Risk Scoping report describes the necessary requirements.

During the above process, a close collaboration with the EA under the Defra pioneer will be maintained to ensure timely model and, where possible, FRA approval of the Planning Scheme.

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Appendix E - Ecology Survey

BUROHAPPOLD ENGINEERING

Mayfield Regeneration Development

Ecological Assessment and Bat Inspection

035548

29 November 2017

Revision 01

MRP-BHE-XX-XX-RP-YM-0003

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Revision	Description	Issued by	Date	Checked
00	Ecological Assessment and Bat Inspection	GH	19/12/2016	SH
01	Ecological Assessment and Bat Inspection - updated with vernal and spring plant species (Section 2.2 and Appendix E)	GH	29/11/2017	PO

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date	**29/11/17**

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Glossary

Term	Definition
BAP	Biodiversity Action Plan
CRoW	Countryside and Rights of Way
EU	European Union
GMEU	Greater Manchester Ecology Unit
NERC	Natural Environment and Rural Communities
NPPF	National Planning Policy Framework
PAA	Penny Anderson Associates Ltd
SAC	Special Area of Conservation
SBI	Site of Biological Importance
SSSI	Site of Special Scientific Interest
WCA	Wildlife and Countryside Act

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1 Introduction

1.1 Background

BuroHappold Engineering was instructed to carry out an ecological assessment of a site in central Manchester at and around the former Mayfield Station complex (hereafter referred to as the 'site').

The site is proposed for re-development, including demolition of the majority of existing structures on the site, refurbishment of some of the older remedial works, and modification of the retaining walls along the River Medlock.

This report details the results of a desk study and site survey and evaluates the results in context of the proposed re-development of the site, making recommendations for mitigation and/or any further survey work as required.

1.2 Site Description

The site boundary includes an area approximately 9.1ha, comprising a series of buildings that are predominantly commercial or light industrial units and associated areas of hard and soft landscaping. Some of the existing buildings are still occupied whilst others have been disused for many years.

The site is surrounded on all sides by dense urban development, with tall buildings and busy roads. Manchester Piccadilly rail station is immediately to the north and the River Medlock flows west to east through the centre of the site.

1.3 Legislative Context

A range of international and national legislation has been established in the UK to protect important nature conservation sites and priority species. At the international level, European Union (EU) Directives require individual member states to implement their conservation provisions nationally for the benefit of Europe as a whole. These Directives have been transposed into UK law by the Conservation of Habitats and Species Regulations 2010[1] (further amended in 2011 and 2012); further details can be obtained from the Joint Nature Conservation Committee (JNCC) website at www.jncc.defra.gov.uk.

Other international conventions include the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979), which requires the maintenance of populations of wild flora and fauna, giving particular protection to endangered and vulnerable species; and the Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979), which requires the protection of migratory species throughout their entire range. The above conventions are implemented in England and Wales via the Wildlife and Countryside Act (WCA) (1981) (as amended) and Countryside and Rights of Way (CRoW) Act 2000. This legislation also protects important habitats and sites such as Sites of Special Scientific Interest (SSSI).

[1] *Please note: the text provides a brief summary of the legislation in England and Wales and the original Acts and any amendments should be referred to for the precise wording.*

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At the national level, the UK Post-2010 Biodiversity Framework published in 2012 is the Government's response to the Convention on Biological Diversity (2010). It describes the UK's biological resources, commits a detailed plan for the protection of these resources within the UK's devolved framework across England, Wales, Scotland and Northern Ireland. The document identifies future priorities for nature conservation and adopts a more strategic approach, including ecosystem services and sustainability alongside biodiversity. Despite administrative changes following devolution, there is still an underlying objective of protecting and enhancing a range of priority species and habitats, often still based on the objectives and classifications of the original UK Biodiversity Action Plan (BAP). Biodiversity 2020 is England's national biodiversity strategy. Building on the Natural Environment White Paper published in 2011, this provides a means of delivering the international and EU commitments to biodiversity. Under Biodiversity 2020, Priority Species and Habitats referred to are those of 'Principal Importance' for the conservation of biodiversity in England listed on Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006.

Finally, the National Planning Policy Framework (NPPF), published in 2012 provides guidance for local authorities on the content of the Local Plans and is a material consideration in determining planning applications. The NPPF has replaced much existing planning policy guidance, including Planning Policy Statement 9: Biological and Geological Conservation. Briefly, with an overall focus on sustainable development, the NPPF states that developments should aim to engender positive outcomes for biodiversity, with a particular focus on the maintenance and creation of ecological networks. Furthermore, the NPPF also states that any planning proposals for which significant negative impacts on biodiversity cannot be avoided, mitigated or compensated should be refused. The NPPF states that the planning system should contribute to and enhance the natural environment through a range of actions, including:

- protecting and enhancing valued landscapes, geological interests and soils;
- recognising the wider benefits of ecosystem services; and
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

1.3.1 Protected Species

Details of the protected species legislation relevant to this site can be found in Appendix C.

1.3.2 Invasive Species

Certain non-native species that have been introduced into the UK are regarded as being a threat to native biodiversity. Legislative measures have, therefore, been put in place to prevent the spread of these invasive species in the wild.

Under section 14 of the WCA 1981 (as amended), it is illegal to introduce plants listed under Part II of Schedule 9 of the WCA into the wild or sell these species. Offences include causing the spread of viable plant material or neglecting to contain or appropriately manage non-native species.

Commonly introduced Schedule 9 species include non-native cotoneaster species, specifically, small-leaved cotoneaster *(Cotoneaster microphylla*) and wall cotoneaster (*C. horizontalis*), Himalayan balsam *(Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*).

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2 Methods

2.1 Desk Study

The desk study consisted of a consultation exercise to gather local and site-specific ecological information, the data from which, along with survey results, was used to assess the potential likely effect of the proposed development on habitats and protected species at the site and the surrounding areas.

A request for records of protected and notable species and wildlife sites within 1km of the centre of the site was made to Greater Manchester Ecology Unit (GMEU). A Site Check Report was also undertaken using the online magic.gov website to identify any statutory designated sites within the same radius.

In addition to this, two previous survey reports prepared for the Mayfield Station area of the site by BuroHappold (2009 and 2010) were reviewed for any information that may be relevant to the current assessment.

It is important to note that the desk study results provide an indication of the species present in and around the site, but do not confirm current presence or absence of any particular species. Protected species are often under-recorded in county wildlife databases.

2.2 Phase 1 Habitat Survey

An initial habitat survey was undertaken by experienced ecologists Victoria Burton (ACIEEM)[2] and Hazel Robson (MCIEEM)[3] on 24th November 2016. This is outside the recommended Phase 1 Habitat Survey period of March to October. Some plant species and habitats are not readily identifiable in the winter period. For this reason, walkover habitat surveys were repeated in May and June 2017 to assess if the habitats had changed significantly and identify any vernal and summer species that were not apparent in November 2016.

The survey followed standard methods as set out in the Handbook for Phase 1 Habitat Survey (JNCC 2010) for classifying and mapping British habitats based on the identification of individual plant species. The plant species within the site and their relative abundances are listed in Appendix E, which shows both common and scientific names according to Stace (2010); common names only are referred to in the text.

The extent of each habitat type was mapped in the field, with target notes to highlight any features of particular ecological interest.

2.3 Protected Species Assessment

The survey was 'extended' (Institute of Environmental Assessment 1995, CIEEM 2013) to include a general assessment for the presence or potential presence of protected species, noting any areas of suitable habitat, along with the location and type of any incidental field signs of protected species. In particular, this component of the field survey focused on the potential presence of bats and breeding birds, taking into account any contemporary, relevant desk study records.

[2] *Associate Member of the Chartered Institute of Ecology and Environmental Management.*
[3] *Full Member of the Chartered Institute of Ecology and Environmental Management.*

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In the case of bats, the survey followed current good practice guidelines published by The Bat Conservation Trust (Collins 2016) and was led by ecologist Hazel Robson MCIEEM (Natural England Class 2 Survey Licence: WML-CL18 2015-12600-CLS-CLS).

The survey comprised an assessment of features on each structure that could be used by roosting bats such as small holes and crevices and also features that would provide entry/exit points for bats to access internal areas such as roof voids. A search was made for any evidence of bat presence, such as accumulations of droppings and feeding remains or sightings of the animals themselves. Where safe access was available, the inspection included both internal and external inspection of each structure.

Binoculars (Avian F 8x42), torch (Clulite 1 million candlepower) and endoscope (Rigid Micro CA300) were used to inspect potential roost features where necessary.

The assessment of suitability was based on the broad criteria outlined in Table 2—1 below (Collins 2016), combined with the professional judgement and experience of the surveyor in recognising suitable habitat features and field signs of bats.

Table 2—1 Bat Roost Assessment Criteria (Collins 2016)

Suitability	Description
Negligible	Negligible habitat features on site likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically, but does not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats. (i.e. unlikely to be suitable for maternity or hibernation.)
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost type of high conservation significance.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
Confirmed Roost	A structure with evidence of bat presence, i.e. droppings, feeding remains, audible bat calls heard during daytime survey or sightings of the animals themselves, existing record of bats roosting at the location.

2.4 Limitations

Access into the channel of the River Medlock, which flows through the centre of the site, was limited due to 5m high vertical walls of brick and stone along the entire stretch of the river. The river is also culverted in two sections within the boundary of the site. The river channel could only be observed from a distance from a small number of vantage points, therefore the entire length of the river channel was not observed.

The majority of the structures were fully accessible for inspection. However, several were not, due to health and safety considerations or lack of permission from tenants. At least a partial external assessment was possible in all cases and where further investigation is required to provide a robust assessment this is discussed in the evaluation and recommendations sections.

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3 Results

3.1 Desk Study

Desk study data for designated sites, habitats and species are described in further detail under the sub-headings below, with maps to illustrate locations of various features provided in Appendix D.

3.1.1 Statutory Protected Sites

3.1.1.1 Special Area of Conservation

Special Areas of Conservation (SACs) are protected sites with strict conservation protection, designated under Article 3 of the European Commission Habitats Directive.

There are no SACs in the 1km search area for the site. However, certain stretches of the Rochdale Canal, which is approximately 400m to the north of the site, have been designated a SAC and SSSI (Site of Special Scientific Interest) because it supports the European Protected Species floating water plantain (*Luronium natans*)[4]. It also has a population of white-clawed crayfish (*Austropotamobius pallipes*), which has some legal protection and American pondweed (*Potamogeton epihydrus*), which is a red data book species[5]. Furthermore, sections of the Ashton Canal to the north of the site have floating water plantain and the nationally scarce grasswrack pondweed (*Potamogeton compressus*), both of which are UK Biodiversity Priority Species (refer to Appendix D Maps 1, 2 and 5).

3.1.1.2 Site of Special Scientific Interest

SSSIs are statutory sites designated to support species of plants and animals that find it more difficult to survive in the wider environment. They represent a selection of this country's best wildlife and geological sites, and cover approximately 7% of the terrestrial area of the country (with over 4,000 separate sites in England).

There are no SSSIs in the search zone for the site, although note Section 3.1.1.1.

3.1.2 Non-Statutory Protected Sites

3.1.2.1 Site of Biological Interest

Sites of Biological Interest (SBIs) have no legal protection, but do receive some protection through different policies and they must be taken into consideration by the planning authority when planning applications affect the site. SBIs are assigned one of three grades:

- Grade A SBIs are of county or regional importance (assumes a presumption against development);
- Grade B SBIs are those of district importance; and
- Grade C SBIs are those of local importance.

[4] *Floating water-plantain is protected under Schedule 8 of the WCA 1981. It is also protected under the European Communities Directive 92/43/EEC, on the Conservation of Natural Habitats and of Wild Fauna and Flora - the Habitats Directive and is a S41 priority species.*

[5] *The IUCN Red List of Threatened Species (also known as the IUCN Red List or Red Data List) is an inventory of the global conservation status of biological species.*

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Rochdale Canal, Stott's Lane - Ducie Street Basin and Ashton Canal approximately 400m to the north are both Grade A SBIs. As stated earlier the Rochdale Canal supports regionally important aquatic habitat and species, including internationally important populations of floating water plantain and the Ashton Canal is recognised as important for its submerged aquatic flora (refer to Appendix D Map 1).

3.1.2.2 Regionally Important Geological and Geomorphological Sites (RIGS)

Regionally Important Geological and Geomorphological Sites (RIGS) are locally designated sites of local, regional and national importance for geodiversity and protect important Earth Science and landscape features. They are conserved and protected from development as a material consideration through the planning system.

There are no RIGS within the search zone for the site.

3.1.3 Protected and Notable Species

3.1.3.1 Badgers

There are two records of unspecified badger signs within the search area. Please note that information related to badgers and their setts is confidential and the map provided by GMEU showing the location of the signs is not included in the appendices for this reason.

3.1.3.2 Bats

Table 3—1 shows the number of each species of bat recorded in the search zone and the proximity to the site of the closest roost for each. The most recorded species in the area are common pipistrelle (*Pipistrellus pipistrellus*) and unspecified pipistrelle species (*Pipistrellus* sp.), and a pipistrelle roost is the closest roost to the site (refer to Appendix D Map 4).

Table 3—1 Bat Records Provided by GMEU

Species		No. Roosts	Closest Record of Roost (m)	No. other Signs	Closest Record of Sign (m)
Common Name	**Latin Name**				
Common pipistrelle	*Pipistrellus pipistrellus*	2	850	13	80
Daubenton's bat	*Myotis daubentonii*	0	n/a	1	850
Soprano pipistrelle	*Pipistrellus pygmaeus*	1	370	0	n/a
Pipistrelle species	*Pipistrellus sp.*	6	On site	7	500
Bat species	*Chiroptera sp.*	0	n/a	3	80

The majority of the records returned are for pipistrelle species. There are two native species - common pipistrelle and soprano pipistrelle (*Pipistrellus pygmaeus*). The common pipistrelle is one of the UK's most common bat species, found in a wide range of habitats including suburban and urban habitats. Soprano pipistrelle is also widely distributed across the UK. The soprano pipistrelle record is close to the Rochdale Canal, which is consistent with its preferred feeding habitat by water and the invertebrates it attracts. Where the distinction between the two species has not been made, they are recorded as pipistrelle species. Daubenton's bat (*Myotis daubentonii*) characteristically flies and forages over water, and the record is close to the Ashton Canal to the north of the site.

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There is a record for a pipistrelle roost within the site in the old station (grid reference SJ 8503 9768) and two records of pipistrelle roosts immediately to the north of the site.

3.1.4 Section 41 Species

Some of the rarest and most threatened species are listed under Section 41 (S41) of the 2006 Natural Environment and Rural Communities (NERC) Act and Species of Principal Importance. The Government's Biodiversity 2020 strategy has an ambition to ensure that by 2020 there will be an overall improvement in the status of wildlife and further extinctions of known threatened species. To achieve this, a range of actions have been identified to help in the recovery of S41 species.

3.1.4.1 West European Hedgehog

West European hedgehog (*Erinaceus europaeus*) is classed as a Species of Principal Importance under Section 41 of the NERC Act 2006. Surveys in urban and rural areas indicate falling numbers of hedgehog.

There is a single record for West European hedgehog in the search area, approximately 300m to the south-west of the site, close to the Mancunian Way (refer to Appendix D Map 5).

3.1.4.2 Birds

There are five records for dunnock (*Prunella modularis*), which is also an Amber[6] listed species. They prefer gardens, parks and greenspace and the records are largely from parks and the grounds of buildings. There are four records for Red listed house sparrow (*Passer domesticus*) and common starling (*Sturnus vulgaris*) and two records for song thrush (*Turdus philomelos*). These species were listed because of a decline in the UK population of over 50%. However, they are relatively common species (refer to Appendix D Map 5).

3.1.4.3 Schedule 1 Bird Species

All breeding birds are protected under Section 1 of the Wildlife and Countryside Act (WCA) 1981 (as amended). This protection extends to killing and injuring, and to the destruction of nests, eggs or chicks. Additional protection is offered to bird species listed in Schedule 1 of the WCA 1981, which are protected, for example, from disturbance whilst nesting or attempting to make a nest. The Countryside and Rights of Way (CRoW) Act 2000 makes it an offence to recklessly disturb, in addition to intentionally disturb, Schedule 1 species.

Records of three Schedule 1 species have been provided by GMEU in the search area: black redstart (*Phoenicurus ochruros*), common kingfisher (*Alcedo atthis*) and little ringed plover (*Charadrius dubius*) (refer to Appendix A Figure 1 and Appendix D Map 2).

A section of the site falls within the Black Redstart Priority Area. This identifies an area in central Manchester where the black redstart has been recorded. This species is a rare breeder, passage migrant and winter visitor with a small population concentrated in London and the West Midlands. There are also records of black redstarts attempting to breed in the Piccadilly Basin area of Greater Manchester. A Species Action Plan (Greater Manchester Biodiversity Project 2009) aims to maintain a breeding population in Greater Manchester.

[6] *The UK's birds can be split in to three categories of conservation importance - red, amber and green. Red is the highest conservation priority, with species needing urgent action. Amber is the next most critical group, followed by green.*

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There are 12 records for black redstart largely to the north-west of the site, the closest being approximately 300m to the north. Appendix A Figure 1 shows the location of records for black redstart based on data provided by GMEU. The Manchester Birding Forum website has, over the late spring and summer of 2016, reported many records of black redstart in the city centre both as sightings and birds heard singing. Some of the locations include the Town Hall, Albert and Lincoln Square and the Manchester Art Gallery (Manchester Birding Forum 2016).

There is a single record of common kingfisher in the search area. Common kingfisher is found by still and slow-flowing water, such as canals and rivers, and they nest in holes tunnelled into earth banks. The closest record is about 900m to the west of the site on a canal branch off the Rochdale Canal next to the Bridgewater Hall.

There is a single record for little ringed plover at a brownfield site by Ancoats Canal Basin approximately 800m to the north of the site. Little ringed plover first bred in the UK in 1938. They are summer visitors and breed in unvegetated man-made habitats such as industrial and post-industrial land, gravel pits and shingle river banks.

3.1.4.4 Plant Species

Grass-wrack pondweed is a Species of Principal Importance. It has been recorded at the Ashton Canal and in one of the canal's branches, approximately 600m and 800m to the north of the site (refer to Appendix D Map 5).

European Protected Species floating water plantain is recorded in the Ashton Canal approximately 800m to the north-east of the site.

3.1.5 Other Protected Species

No other records were returned for protected species e.g. otter, invertebrates, reptiles or amphibians.

3.2 Phase 1 Habitat Survey

3.2.1 Main Habitat Types Present

The site chiefly comprises the following habitats, as shown on the Extended Phase 1 Habitat map (Appendix A Figure 2):

- hardstanding;
- buildings;
- spoil;
- ephemeral short perennial vegetation;
- broadleaved scattered trees;
- scattered scrub;
- tall ruderal;
- semi-improved neutral grassland;
- introduced shrub;
- amenity grassland;

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- hedgerow;
- broadleaved semi-natural woodland; and
- running water (River Medlock).

Plant species recorded are listed in Appendix E, and a selection of illustrative photographs of the site are presented in Plates 1 to 16 (Appendix F).

The site is broadly separated into three main areas. The northern boundary is occupied by a former railway station building, platform and associated track bed. This area is at a raised level compared to the rest of the site. Immediately to the south of the former railway station complex is an area known as Colourgates Yard, which is at street level. The remainder of the site is a complex of buildings, mainly warehouses.

Built Structures and Hardstanding

A large proportion of the site is flat hardstanding. In the northern section, this reflects the site's former use as a railway station. Throughout the remainder of the site there are roads, pavements and car parks.

The site has a number of built structures of varying ages and styles. For ease of reference, these have been numbered B1, B2, B3 etc. as illustrated on Appendix A Figure 2: Phase 1 Habitat Plan and Appendix A Figure 3: Bat Roost Assessment Plan.

The structures are described in further detail in relation to their potential use by roosting bats and nesting birds within those sections of this report.

Spoil

Towards the south-eastern corner of the site is an Aggregate Recycling Yard, which is in constant use, and consequently no vegetation is present on the spoil mounds.

Ephemeral - Short Perennial Vegetation

Throughout the site, small patches of ephemeral short perennial vegetation have developed within gaps and crevices in the hardstanding. The vegetation is most extensive where surfaces have fallen into disrepair.

The vegetation is not dominated by any particular species, instead comprising a mixture of mostly low-growing species, such as willowherb, Mugwort and Michaelmas-daisy. The vegetation consists of both widespread and common species that are typically found in wasteland habitats.

Scattered Broadleaved Trees

A number of broadleaved trees are present, ranging from immature to mature and comprising a variety of species, including ash, sycamore and willow. The most mature trees occur along the south-eastern boundary with the Mancunian Way, where there is a row of planted poplars. They are approximately 15m in height and appear to be in good condition.

The River Medlock runs through the centre of the site and the edges of the river corridor are lined with a range of tree species, including ash, sycamore and elder.

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Tall Ruderal Vegetation

Scattered mainly throughout the southern section of the site are areas of tall ruderal vegetation that have developed in areas that have not been in use or managed for some time, including the frontages and footprints of former buildings. Tall ruderal vegetation is most extensive within Colourgates Yard, immediately south of the former railway station complex. The vegetation is not dominated by any particular species and includes common nettle, creeping thistle and rose-bay willowherb. The vegetation composition is not species-rich and consists of common and widespread species.

Scattered Scrub

There are small patches of scattered scrub, dominated by bramble, throughout the site that are associated with similar areas to the tall ruderal vegetation, as shown on the Phase 1 Habitat map (Appendix A Figure 2).

Semi-improved Neutral Grassland

Within the southern section of the site, small patches of semi-improved neutral grassland are present. This has developed in Colourgates Yard, which has remained undeveloped for some time and also within the wider part of the site, where areas of the hardstanding have degraded. The most dominant grass is creeping bent, with Yorkshire fog locally abundant and cock's-foot locally occasional. There are a variety of forbs present, including dandelion, creeping buttercup, colt's-foot and evening primrose, some of which suggest that the grassland is a succession habitat from ephemeral short perennial vegetation. The grassland is not species-rich.

Introduced Shrub

Throughout the site butterfly-bush occurs frequently. It has established within gaps in the hardstanding surface, resulting in a scattered occurrence across the entire site, including the former railway platform. It is also present within gaps in the mortar of walls and buildings. It frequently occurs within other semi-natural habitat types, including the edges of the river corridor.

There are a small number of amenity planting areas, associated with the buildings in the southern section of the site, dominated by non-native shrubs comprising cherry laurel and Oregon-grape.

Amenity Grassland

There are a small number of blocks of amenity grassland within the southern part of the site and the north-western corner. These formal landscaping areas are associated with car parks and buildings and are regularly mown. The species composition is poor and typical of sown grasslands, with perennial rye-grass abundant and few forbs present.

Hedgerow

There is a solitary cherry laurel hedge planted towards the north-west corner of the site, which provides one of the boundaries to a car park.

Semi-Natural Broadleaved Woodland

Within the former railway station complex, the southern edge of the platform supports young birch woodland. The trees are a similar age and height. There is very little understorey, with some bramble present.

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Another small area of birch woodland is present on the southern border that appears to have remained undeveloped for some time and is bordered on all sides by a combination of walls and fences. The trees are more mature and less dense than those within the railway platform and are approximately 10m in height. Silver birch is dominant with a small number of saplings present as an understorey of sycamore and holly. The understorey is sparse and dominated by bramble.

A block of woodland has developed within the footprint and immediate surroundings of a demolished building, of which only some of the external walls remain. A mixture of mature and semi-mature trees are present including sycamore, ash and willow. The woodland is quite dense, with little understorey.

Running Water

The River Medlock runs through the centre of the site. It is heavily engineered, with 5m high vertical walls of brick and stone and there are two culverts. Because of this, the river was difficult to survey, but from limited observation the river appeared to be fast-flowing, with no in-channel vegetation. There are silt banks on the inside of the meanders, which are colonised mainly with Japanese knotweed.

3.2.2 Invasive Non-native Species

Four species listed on Schedule 9 are present within the site: Japanese knotweed, Himalayan balsam, wall cotoneaster and Himalayan cotoneaster. The locations of these species are shown in the Phase 1 Habitat map (Appendix A Figure 2) as Target Notes 1 to 3.

Japanese knotweed is present on the silt banks of the River Medlock in a number of locations. As access to the river was limited, the full extent of Japanese knotweed is likely to be greater than is shown on the Phase 1 Habitat map. Japanese knotweed was not found to be present in any area of the site outside of the river channel.

Himalayan balsam was observed in a variety of locations within Colourgates Yard, including the top of the river corridor. There was also an individual plant growing within a gap in the hardstanding at the north-western corner of B3. There are no large stands of Himalayan balsam, with either individual plants or clusters of several plants noted. However, as access to the River Medlock was limited, the possibility of Himalayan balsam along the river channel cannot be excluded, particularly as it was recorded in this location in previous surveys of the site in 2010.

Three individual plants of wall cotoneaster are located towards the southern edge of the former railway platform. Two further cotoneaster plants are located in two separate locations within the southern section of the site. The exact species could not be confirmed as there are many similar species of cotoneaster, and both flowers and fruits are required for positive identification. However, the species within the hedgerow is likely to be Himalayan cotoneaster, which is a Schedule 9 species.

3.3 Protected Species Assessment

The potential of habitats on site to support protected species or notable are set out below.

3.3.1 Birds

The site visit was carried out at a time of year when bird activity is generally low and summer visitors are absent. Nevertheless, a small level of activity was observed during the site visit. Two grey wagtails (*Motacilla cinerea*) were observed flying over the River Medlock, close to the road bridge at Baring Street, and the dilapidated retaining walls along the river corridor are likely to provide nesting opportunities.

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A wren (*Troglodytes troglodytes*) was singing within the vegetation to the north-west of B3. In addition, a feral pigeon (*Columba livia*) was seen flying within the lower level of B2.

The semi-natural habitats and some of the buildings provide suitable foraging and nesting habitat for a range of species. In particular, the river corridor and the areas of woodland and scattered trees, within which disused birds' nests, likely corvids, were observed indicating previous breeding (see Appendix A Figure 2 Target Note 4). The former railway station buildings (B1 and B2) and also B7, in the south-western corner of the site offered potential nesting areas, in particular for feral pigeons.

It is considered the site provides suitable habitat for black redstart, a rare protected species known to breed within Manchester city centre, and part of the site is within the Black Redstart Priority Area. The species has a Manchester Species Action Plan and has bred or attempted to breed within the Piccadilly Basin area, approximately 500m north of the site, every year between 1992 and 2007 except for 2003.

The River Medlock provides suitable foraging habitat for common kingfisher, another protected species, and the tenant of B6, which is adjacent to the river, related having found a common kingfisher inside the warehouse.

Much of the brick and stone retaining walls along the banks within the site were considered unlikely to offer nesting opportunities for common kingfisher, which burrow into mud on vertical banks. However, in several areas where the retaining walls were in poor condition or partially collapsed there were gaps between the blocks that may provide access to the earth behind and therefore potential nesting sites.

3.3.2 Badger

No signs of badger were observed during the survey. A small number of partially used mammal holes were located within the birch woodland towards the southern edge of the former railway platform (Target Note 6 on the Phase 1 Habitat map and Plate 4). These were considered likely to be used by fox, with one observed in the immediate vicinity during the survey. A strong smell of fox was detected in the area and the holes are not of the typical size and shape of badger sett entrances.

Previous surveys of the site in 2009 and 2010 highlighted a possible badger sett entrance within the same birch woodland though subsequent monitoring revealed no evidence of use by badgers.

3.3.3 Otter and Water Vole

No signs of water vole or otter, such as burrows, latrines or spraints were found on the sections of the River Medlock. However, as noted earlier access to the river channel was limited and a comprehensive survey of the river channel could not be conducted. Given the engineered character of the river in this area, it is unlikely there would be any otter holts present, although there is the possibility that otters could use the river for commuting.

There were few obvious opportunities for water voles to create burrows due to the brick and stone retaining walls, with limited suitable vegetation for feeding, little cover and culverted sections. The site was considered to provide very poor habitat for water vole.

3.3.4 Bats

The majority of the trees are relatively immature and none provide potential roost features such as woodpecker holes or crevices in dead wood that could be used by bats.

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Of the built structures illustrated on the site plan the majority were light industrial or commercial buildings with open plan warehouse style interiors and no roof voids. These provide no potential roost features for bats within the roof structure or interiors. The external walls of some of the units did have crevice features (B8, B10a and B6) suitable for use by species such as pipistrelle bats.

B13 to B17 are relatively modern structures of brick and metal with no features suitable for use by bats on the interior or exterior.

The former Mayfield Station complex (B1 and B2) has crevice features and internal areas that could be used by bats. There is also an existing record of a pipistrelle roost on B2, although the exact location is not specified within the data this was considered likely to be on the external façade. Due to health and safety considerations, the interior rooms of B1 were not accessible for inspection.

B23, situated at the eastern end of B2 at the platform level, has crevice features and access to the interior, which was not accessible for inspection.

B7 has features suitable for crevice-dwelling bat species, including gaps in the brickwork, behind damaged fascia boards and also access to the internal rooms and basement, although no evidence of bat droppings or feeding remains was found inside.

The culvert over the River Medlock (B24) also provides potential roost habitat for bats, considered likely to be similar to conditions to a known common pipistrelle roost location within a culvert at a nearby site that has been surveyed by Penny Anderson Associates (PAA).

The buildings with roost potential are briefly identified in Table 3—2 below, and full notes on all of the structures surveyed are provided in Appendix F.

Table 3—2 Summary of Buildings with Bat Roost Potential

Building No.	Description	Roost Status
B1	Mayfield Station	High Potential
B2	Mayfield station platforms and warehouses	Confirmed Pipistrelle Roost (desk study record) High Potential throughout rest of structure
B6	Northern wall of industrial unit above retaining wall on River Medlock	High Potential
B7a	Disused industrial units (former Towbar Centre)	Moderate Potential
B7b	Disused industrial units (former Towbar Centre)	Negligible Potential
B7c*	Industrial unit used by church group as a meeting room/place of worship.	Negligible Potential
B8*	Brick warehouse/office units with pitched slate roof	Moderate Potential
B10a*	Brick warehouse/office units with pitched slate roof	Moderate Potential
B23*	Small brick building at end of station platforms	High Potential
B24**	Culvert	High Potential
B26**	Culvert	High Potential

*These buildings were subject to external assessment only due to lack of access permission for internal inspection. Full inspection will be required to establish presence and/or suitability of roof voids and other potential roost features.

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**If feasible, an inspection of the interior of the culvert would be useful to identify the nature of any potential roost features within the structure and to search for evidence of bat presence.

3.3.5 Other Protected Species

The River Medlock has some suitable habitat for white-clawed crayfish (Austropotamobius pallipes) as the river is fast-flowing and boulders and large stones are present within the river bed. However, no records of white-clawed crayfish were returned from the desk study.

Brownfield sites in urban areas can sometimes provide suitable habitat for reptiles. The semi-natural habitats surrounding the former railway station complex, including Colourgates Yard immediately to the south, provide some habitats suitable for reptiles for foraging and also potential refuge and hibernacula features. However, given the isolation by urban development, it is considered highly unlikely that reptiles are present within the site.

There are no records of great crested newt (GCN) within 1km of the site. There are no suitable breeding ponds within or near to the site and the site is isolated by urban development and the river, which would present a barrier GCN dispersal. It is therefore considered unlikely that the site supports GCN.

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4 Evaluation

4.1 Designated Sites

The desk study identified a number of protected sites within the search area. However, these were considered to be sufficiently distant and isolated from the site not to be impacted by the development proposals.

4.2 Habitats and Botanical Interest

The Phase 1 Habitat Survey highlighted no areas of habitat of nature conservation interest. Plant species recorded were common, some of which are typical of urban brownfield sites

Previous surveys of the site in 2009 and 2010 identified a sizeable colony (approximately 300 flowering spikes) of southern marsh orchid (*Dactylorhiza praetermissa*) growing on ballast south of the southernmost platform of the former railway station. No orchids were found during the November 2016 Phase 1 Habitat Survey but many southern marsh-orchids were found to be present between June and August 2017 where they had been recorded before. Although orchids are prized for their appearance they are not afforded special protection.

4.3 Protected Species

4.3.1 Birds

Some potential for foraging and nesting birds, including black redstart, was identified on site with a small number of disused birds' nests observed.

All breeding birds, their nests, eggs and dependent young are protected by law, which may have implications for the scheduling of site clearance activities. In addition to this, black redstart and common kingfisher receive additional protection under Schedule 1 of the Wildlife and Countryside Act 1982 (as amended), and if either species are nesting on site then works affecting the nests may be licensable.

The semi-natural habitats and some of the buildings were considered to provide suitable foraging and nesting habitat for a range of species, including black redstart and common kingfisher. The distribution of breeding black redstart is concentrated in city centre areas notably London, Birmingham, Sheffield and Manchester. The black redstart is a rare passage migrant, one of the rarest breeders in the UK and a Schedule 1 species afforded special protection. They are known to breed in small numbers in Greater Manchester and the site provides potential foraging and nesting habitat.

4.3.2 Otter

The section of the River Medlock that flows through the site has the potential to support commuting otters. Otters are protected under the Wildlife and Countryside Act (WCA) 1981 and are also European Protected Species (EPS) and so are protected under the Conservation of Habitats and Species Regulations 2010.

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4.3.3 Bats

Several of the built structures within the site were considered to provide potential roost features for bats. Due to the urban location and the nature of the potential roost features, the most likely species to be present would be common pipistrelle. In addition to this, there is an existing record of a pipistrelle roost on B2 and it is considered unlikely that the refurbishment of this structure could take place without impacting on the roost.

Where roosting bats are present in these structures, their demolition or refurbishment could result in disturbance or loss of the roost(s) as well as presenting a risk of causing harm to individual bats, all of which would be an offence under current wildlife legislation.

The mosaic of vegetated areas was considered to provide an island of semi-natural habitats within the densely development urban landscape, with the river corridor providing a link to other suitable areas within the city. Bat surveys carried out by PAA at other sites within central Manchester have revealed the network of rivers and canals to be a well-used foraging and commuting resource for bats.

Modification of the habitats within the site and in particular any increase in artificial lighting could reduce the value of these areas to foraging bats and potentially fragment the important river corridor that links bat habitats throughout the city.

Section 5 of this report recommends additional survey effort that would be required to provide sufficient information to inform the impact assessment and, if necessary, an appropriate mitigation strategy.

4.3.4 Other Protected/Notable Species

Due to a lack of suitable habitat and/or isolation from other potential habitats, no other protected species are anticipated to be affected by the proposals.

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5 Recommendations

5.1 Further Survey Effort

The following additional surveys are recommended to enable a full assessment of the likely impacts arising from the proposals on protected species, to inform suitable mitigation strategies and highlight any need for licensing by Natural England.

All surveys must follow best practice methods that are relevant at the date of survey and must be undertaken within the correct survey season by appropriately experienced and equipped ecologists.

5.1.1 Bats

In line with current good practice guidelines (Collins 2016), obligations under national planning policy and current wildlife legislation, when assessing any planning application, the Local Planning Authority will require a detailed evaluation of the predicted impacts on bats that would arise from the proposals, including the type of any roost(s) present and the number and species of bats using the roost(s).

Structures B1, B7a, B8, B10a, B23, B24 and part of B6 have been assessed as providing Moderate/High suitability for bats and there is an existing record of a bat roost on B2. Therefore, the following additional surveys are recommended to confirm presence/likely absence of roosting bats, to determine the exact location of the roost previously identified on B2 and to characterise the nature of any roost, including species present and approximate number of individuals.

- Two/three dusk emergence or dawn re-entry surveys for each structure during the bat active season May to September (inclusive), with at least two of the visits before the end of August.

The following additional activity surveys are recommended to investigate the value of the site to foraging and commuting bats and to identify any key flight routes that may be adversely impacted by fragmentation caused by factors such as new lighting.

- Two walked transect surveys, to be carried out during the spring and summer periods; and
- Monitoring using automated detectors for periods of at least 10 nights during the spring and summer periods.

In the context of bat surveys, spring is typically considered to be April/May and summer June/July/August.

5.1.2 Breeding Birds

It is recommended that surveys for breeding birds are carried out, including sufficient effort to detect presence of common kingfisher and black redstart.

The breeding bird survey should follow standard methods based on those devised jointly by the British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservancy Council (JNCC) (Gilbert et al. 1998) and breeding evidence categories (EOAC 1979).

Black redstart is subject to a Species Action Plan in Greater Manchester and in the circumstances where there is a habitat suitable for breeding a survey protocol is prescribed (Greater Manchester Biodiversity Project 2008).

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- Black Redstart - walked transect to be carried out two hours before dawn on three separate occasions between April and July with each visit being at least one week apart; and
- Breeding Bird Survey - walked transect to be made immediately after dawn on three separate occasions late-March and early-July, with at least two hours survey effort and at least four weeks between each survey.

It should be feasible to combine these transects to three site visits, commencing with survey for black redstart before dawn and then continuing with the main breeding bird survey immediately after.

5.1.3 Otter

There is currently no published methodology for undertaking otter surveys, although a range of publications relating to otter ecology and conservation do exist (e.g. Environment Agency 1999; Highways Agency 2001; Chanin 2003). Otter surveys can be undertaken at any time of year, although surveys should not take place immediately after spate conditions, as field signs such as spraint and footprints may be washed away.

One survey visit is required to determine the possible use of the site by otters, comprising a search of suitable features within the river corridor where otters may leave spraints and/or footprints. Consideration should be given in the development design if otter are using the site for commuting to ensure that this can continue.

5.1.4 Other Protected Species and Habitats

Additional surveys or special measures for other protected species are not considered necessary.

The River Medlock is currently a highly engineered watercourse with a consequent reduction in morphological diversity. The physical character of a river and ecological value are linked in that a diverse geomorphology in terms of features and processes supports a greater biodiversity. The re-development of the site offers opportunities to reinstate natural features to increase biodiversity and aesthetic appeal. It is recommended that a river habitat survey is completed to achieve a better understanding of the present condition of the channel and fluvial processes that operate to inform an improved design as an element of the redevelopment

5.1.5 Invasive Non-native Species

It is recommended that advice is sought to implement the safe removal and disposal of Japanese knotweed, Himalayan balsam and cotoneaster as they are invasive Schedule 9 species. Similarly, if any other invasive, non-native species colonise the site, appropriate control and eradication measures to prevent spread of the species would need to be implemented.

5.1.6 Summary of Recommended Additional Survey Effort

Based on the survey results, some further survey effort will be required to fully investigate presence/likely absence of protected species. This information is necessary to inform the assessment of impacts arising from the proposals and to enable an appropriate mitigation strategy to be devised. A summary of these additional surveys are provided in the Table 5—1.

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Table 5—1 Summary of Recommended Additional Survey Effort

Species / Subject	Survey Type and Rationale	Survey Season
Bat roosts	Emergence / re-entry surveys to confirm presence / likely absence of these EPS.	May to September (inclusive)
Bat foraging/ commuting activity	Walked transect / automatic detectors to establish foraging/commuting use of site	April to October (inclusive)
Black redstart	Establish whether this protected species is nesting within the site.	April-July
River Habitat Survey	River habitat survey and fluvial audit to determine present state and inform river restoration design.	Anytime but best when vegetation is not too dense

5.2 Licensing

As there is an existing record of a pipistrelle bat roost in B2, works to this structure may require licensing by Natural England, depending on the nature of the impacts to the roost. In the event that bat roosts are confirmed on any other structures, works affecting those roost(s) may also require licensing.

In the event that black redstarts are confirmed to be breeding on site, any works affecting the nest sites may require a licence from Natural England.

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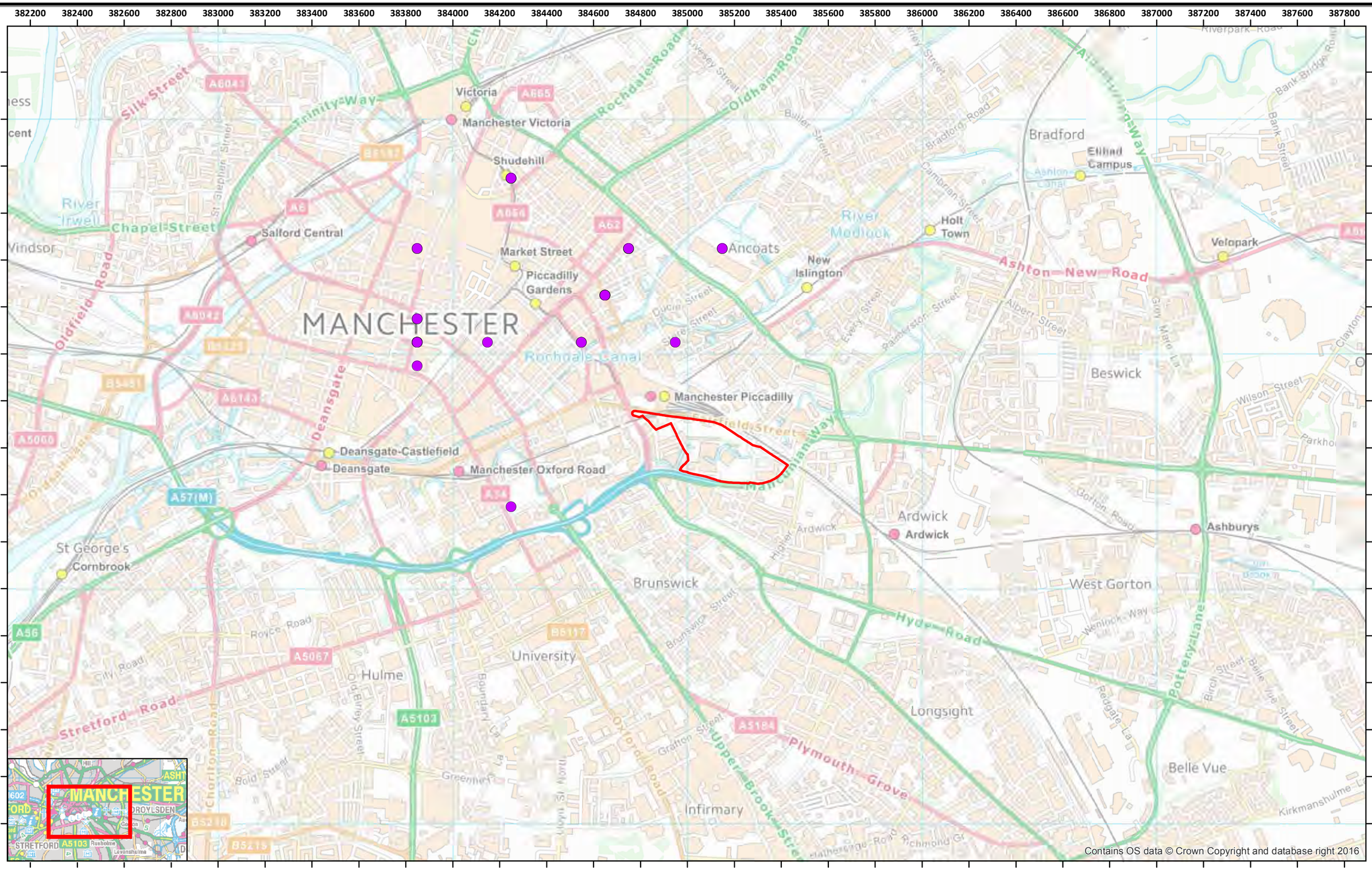
Appendix A - Plans

Figure 1: Black Redstart

Figure 2: Phase 1 Habitat Map

Figure 3: Bat Roost Assessment

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British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

0 1 Metres 2 3 4 5

Legend

- Site_Boundary
- XYMayfield_Black_Redstart

Title:

BLACK REDSTART

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:15,000	Drawing No.	Figure 1
Drawn By	CC	Originator VB	Date JAN 2007
PAA Ref.	G:\PRLG01_Middlewich_Rd_Northwich\Maps	Revision	A

384800 385000 385200 385400

397800 397600 397400

B22 B1 B2 B3 B4 B5 B6 B7a B7b B7c B8 B9 B10a B10b B11 B12 B18 B19 B20 B21 B23 B24 B25 B26 B13 B14 B15 B16 B17

TN1 TN2 TN3 TN4 TN5 TN6

Culvert Culvert

Legend

- Survey boundary

Buildings

- Building demolished pre Nov 2016 survey

Buildings surveyed for bats

- Building number
- Target notes
- B2.2
- J1.4
- J1.3
- A3.1

Phase 1 Linear Features

- <all other values>

DES

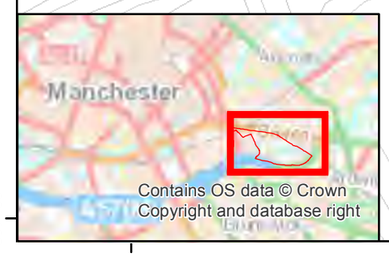
- Fenceline
- Wall

Phase 1 Aereal Features

- hardstanding

Phase 1 classification

- A1.1.1 Broadleaved woodland - semi natural
- A2.2 Scrub - scattered
- A3.1 Broadleaved parkland/scattered trees
- B2.2 Neutral grassland - semi improved
- C3.1 Other tall herb and fern - ruderal
- C3.1-A2.2 Tall herb with scattered trees
- G2 Running water
- Hardstanding
- I12.2 Spoil
- J1.2 Cultivated/disturbed land
- J1.3 Cultivated/disturbed land with ephemeral
- J1.4 Introduced shrub
- J1.4 with A3.1 Introduced shrub with scattered trees
- J2.1.2 Intact hedge - species poor
- J3.6 Buildings



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N

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

0 5 10 20 30 40 50 Metres

TARGET NOTES:

TN1 - Cotoneaster
TN2 - Himalayan balsam
TN3 - Japanese knotweed
TN4 - Old birds nest
TN5 - Scrap yard
TN6 - Aggregate recycling yard

Title:

PHASE 1 HABITAT MAP

Project Name	Mayfield Station, Manchester
Discipline	Ecology
Scale	1:2,000
Drawing No.	Figure 2
Drawn By	JL
Originator	VB/HR
Date	DEC 2016
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps
Revision	A

384800 385000 385200 385400

397800

397600

397400

B22 B1 B2 B23 B21 B25 B20 B3 B4 B5 B6 B9 B10a B10b B7a B7b B7c B8 B24 B19 B12 B26 B18 B15 B16 B17 B13 B14 B11

Culvert

Culvert



BUROHAPPOLD ENGINEERING

N

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

0 5 10 20 30 40 50 Metres

Survey boundary

Desk study record of Pipistrelle roost

No access for survey

Building demolished pre Nov 2016 survey

High potential

Moderate potential

Negligible potential

Title:

BAT ROOST ASSESSMENT

Project Name: Mayfield Station, Manchester			
Discipline: Ecology			
Scale: 1:1,750		Drawing No.: Figure 3	
Drawn By: JL	Originator: VB/HR	Date: DEC 2016	
PAA Ref.: G:\BUHA01_1_Mayfield_Picadilly\Maps		Revision: A	

Appendix B - Plates

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Plate 1 - North western corner, looking north west



Plate 2 - Western section of the former railway station platform, looking east



Plate 3 - Vegetated former railway tracks, looking towards dense birch woodland



Plate 4 - Partially used fox hole within birch woodland of the former railway platform



Plate 5 - Wall cotoneaster within birch woodland of the former railway platform



Plate 6 - Eastern section of the former railway station platform, looking east



Plate 7 - View of Colourgates Yard, looking east



Plate 8 - Himalayan balsam within Colourgates Yard



Plate 9 - Typical view within the southern section of the site, showing a mix of hardstanding, buildings and scattered vegetation



Plate 10 - Himalayan cotoneaster within the southern section of the site



Plate 11 - Typical view of the semi-natural habitats present within the southern section of the site



Plate 12 - A section of the River Medlock towards the centre of the site, with Japanese knotweed on the banks



Plate 13 - Northern edge of the silver birch woodland on the southern site boundary



Plate 14 - Disused birds' nests within the silver birch woodland



Plate 15 - Northern edge of the woodland towards the south eastern corner of the site



Plate 16 - Mature poplars along the south eastern boundary

Appendix C - Summary Legislation Relating to Badgers, Bats, Black Redstart, Breeding Birds, Otters and Reptiles

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SUMMARY OF THE LEGISLATION RELATING TO BADGERS AND THEIR SETTS

Badgers (*Meles meles*) are not an endangered species but have a long history of persecution and cruelty. As such, badgers and their setts are protected under the Protection of Badgers Act 1992 (as amended), which makes it illegal for any person to kill, injure or take a badger. It is also an offence to destroy, damage or obstruct a badger sett, or to disturb a badger whilst it is within a sett. There are also additional offences relating to possession of, buying and selling a dead badger, or anything derived from a badger, and causing a dog to enter a sett.

The Act defines a sett as 'any structure or place which displays signs of current use by a badger'. Setts are defined by English Nature (1995) as 'usually underground tunnel systems providing shelter for badgers, but may include other structures used by badgers such as hay bales, drainage culverts, or cellars'. 'Current use' is more difficult to define but is usually interpreted by the presence/absence of badger field signs over several observations of the sett (Natural England 2006).

Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System* in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to consider the likelihood of any proposed development adversely affecting badgers' foraging territory, or links between them, or significantly increasing the likelihood of road or rail casualties amongst badger populations. The planning guidance for Wales, Technical Advice Note (Wales) 5, identifies the need to comply with the Protection of Badgers Act 1992.

English Nature, 1995. *Species Conservation Handbook*. English Nature, Peterborough.

Natural England, 2006. *Guidance on 'Current Use' in the definition of a badger sett*. Natural England, Peterborough.

Please note: the above text provides a brief summary of the legislation in relation to badgers for England and Wales and the original Act and amendments should be referred to for the precise wording.

SUMMARY OF THE LEGISLATION RELATING TO BATS

All wild species of bat are protected under the Wildlife and Countryside Act (WCA) 1981, which has also been amended by later legislation, including the Countryside and Rights of Way (CRoW) Act 2000 and the Conservation of Habitats and Species Regulations 2010, and this legislation is applicable to England and Wales. Bats are listed on Schedule 5 of the WCA and are therefore subject to some the provisions of Section 9 which, with the amendments, make it an offence to:

- Intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for shelter or protection (S9:4b).
- Intentionally or recklessly obstruct access to any structure or place used for shelter or protection by a bat (S9:4c).

There are additional offences in relation to buying and selling (S9:5) any live or dead animal of this species or anything derived from them.

Bat species are also listed under Annexes IIa and IVa of the EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2010.

The Conservation of Habitats and Species Regulations 2010[1] state that a person commits an offence if they:

(a) deliberately capture, injure or kill any wild animal of a European protected species,

(b) deliberately disturb wild animals of any such species, in such a way as –

  (i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong;

(c) deliberately take or destroy the eggs of such an animal, or

(d) damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead bat or part of such an animal.

In addition, seven native British bat species, including the soprano pipistrelle (*Pipistrellus pygmaeus*) and the brown long-eared bat (*Plecotus auritus*), that are frequently found in buildings, are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006. Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and*

[1] *These regulations have been slightly amended by The Conservation of Habitats and Species Regulations 2012*

Geological Conservation - Statutory Obligations and Their Impact within the Planning System in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Please note: the above text provides a brief summary of the legislation in relation to bats in England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

SUMMARY OF LEGISLATION RELATING TO BLACK REDSTART

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000.

Black redstarts (*Phoenicurus ochruros*) are additionally protected as they are listed on Schedule 1 of the WCA. Therefore, black redstarts, their nests, eggs and young are fully protected at all times throughout England and Wales.

Part 1 (Section 1:1) of the WCA states that:

'If any person intentionally,

(a) kills, injures or takes any wild bird;

(b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or

(c) takes or destroys an egg of any wild bird,

he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) states that:

'If any person intentionally or recklessly,

(a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or

(b) disturbs dependent young of such a bird,

he shall be guilty of an offence and liable to a special penalty.'

In addition, the black redstart is identified as a bird species of moderate conservation concern (‘Amber’ listed) due to its declining breeding population and its rarity as a breeding species within Britain.

Please note: the above text provides a brief summary of the legislation in relation to black redstart for England and Wales and the original Act and any amendments should be referred to for the precise wording.

SUMMARY OF THE LEGISLATION RELATING TO BREEDING BIRDS

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000. This legislation applies in England and Wales.

Part 1 (Section 1:1) of the WCA states that:

> 'If any person intentionally,
>
> (a) kills, injures or takes any wild bird;
>
> (b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or
>
> (c) takes or destroys an egg of any wild bird,
>
> he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) refers to specific birds listed on Schedule 1 of the WCA, and states that:

> 'If any person intentionally or recklessly,
>
> (a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or
>
> (b) disturbs dependent young of such a bird,
>
> he shall be guilty of an offence and liable to a special penalty.'

Schedule 1 includes birds such as barn owl (*Tyto alba*), black redstart (*Phoenicurus ochruros*), wood lark (*Lullula arborea*) and Cetti's warbler (*Cettia cetti*). Please refer to the WCA for a complete list of Schedule 1 species.

Some provisions are made to allow the killing and taking of certain species under certain circumstances, as follows:

- Birds listed on Schedule 2 (Part 1) of the Act may be taken or killed outside of the 'close season' for each individual species (the 'close season' is defined by the Act). This includes various wild duck and geese species.
- Birds listed on Schedule 2 (Part 2) of the Act may be killed or taken by authorised persons at all times. This includes species such as carrion crow (*Corvus corone*), black-billed magpie (*Pica pica*), feral pigeon (*Columba livia*) and greater Canada goose (*Branta canadensis*). An 'authorised person' is defined as a person who has written authorisation to undertake the act from the relevant statutory authority. The written authority is in the form of a licence, either a general licence which covers a number of the more typical 'pest' species, or an individual licence for other individual species. In England these licences are issued by Natural England and in Wales by the Welsh Assembly Government.

Please note: the above text provides a brief summary of the legislation in relation to breeding birds in England and Wales and the original Act and any amendments should be referred to for the precise wording.

SUMMARY OF THE LEGISLATION RELATING TO OTTERS

Otters (*Lutra lutra*), also known as European otters, are protected under the Wildlife and Countryside Act (WCA) 1981, which has also been amended by various later legislation including the Countryside and Rights of Way (CRoW) Act 2000 and the Conservation of Habitats and Species Regulations 2010, and this legislation is applicable to England and Wales. Otters are listed on Schedule 5 of the WCA and are, therefore, subject to some the provisions of Section 9 which, with the amendments, make it an offence to:

- Intentionally or recklessly disturb an otter while it is occupying a structure or place which it uses for shelter or protection (S9:4b).
- Intentionally or recklessly obstruct access to any structure or place used for shelter or protection by an otter (S9:4c).

There are additional offences in relation to buying and selling (S9:5) any live or dead animal of this species or anything derived from them.

Otters are also listed under Annexes IIa and IVa of EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2010[1].

The Conservation of Habitats and Species Regulations 2010 state that a person commits an offence if they:

(a) deliberately capture, injure or kill any wild animal of a European protected species,

(b) deliberately disturb wild animals of any such species, in such a way as –

  (i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong;

(c) deliberately take or destroy the eggs of such an animal, or

(d) damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place, whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead otter or part of such an animal.

In addition, otters are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006. Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System* in respect of statutory obligations for biodiversity and geodiversity conservation.

[1] *These regulations have been slightly amended by The Conservation of Habitats and Species Regulations 2012*

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Please note: the above text provides a brief summary of the legislation in relation to otters for England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

SUMMARY OF THE LEGISLATION RELATING TO REPTILES

All six of the native British reptile species are afforded varying degrees of protection under the Wildlife and Countryside Act (WCA) 1981, as amended by various later legislation, and this legislation is applicable to England and Wales. All six species are listed on Schedule 5 of the WCA.

The four widespread species, common lizard (*Zootoca vivipara*), slow-worm (*Anguis fragilis*), grass snake (*Natrix natrix*) and adder (*Vipera berus*) are afforded part protection under Section 9(1), making it an offence to intentionally kill or injure any of these species of reptile. The two rarer species, sand lizard (*Lacerta agilis*) and smooth snake (*Coronella austriaca*), are subject to a greater degree of protection under Section 9(4) which, with the amendments, make it (in brief) an offence to:

- Intentionally or recklessly disturb a sand lizard or smooth snake while it is occupying a structure or place used for shelter or protection (S9:4b); or
- Intentionally or recklessly obstruct access to any structure or place a sand lizard or smooth snake uses for shelter or protection (S9:4c).

All six species are afforded protection from buying, selling or exchange under Section 9(5) of the WCA.

Sand lizard and smooth snake are also listed under Annexes IIa and IVa of EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2010.

The Conservation of Habitats and Species Regulations 2010 state that a person commits an offence if they:

(a) deliberately capture, injure or kill any wild animal of a European protected species,

(b) deliberately disturb wild animals of any such species, in such a way as –

  (i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong;

(c) deliberately take or destroy the eggs of such an animal, or

(d) damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead sand lizard or smooth snake or part of such an animal.

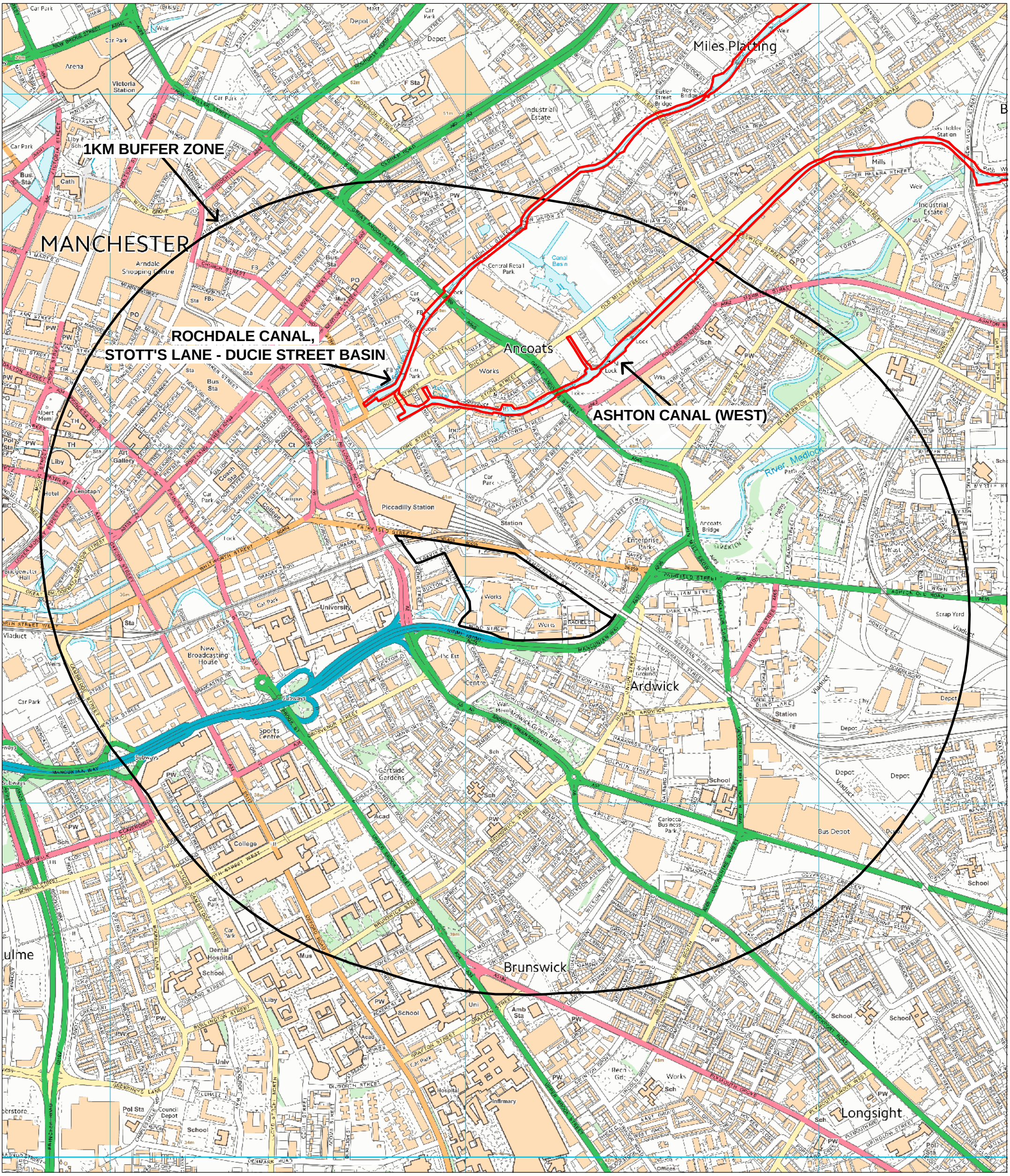
In addition, all six reptile species are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006. Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System* in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Please note: the above text provides a brief summary of the legislation in relation to reptiles for England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

Appendix D - Desk Study Data from Greater Manchester Ecology Unit and Greater Manchester Bird Recording Group

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KEY

SITE OF BIOLOGICAL IMPORTANCE

SBI BOUNDARY

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 1

SCALE 1:10,000

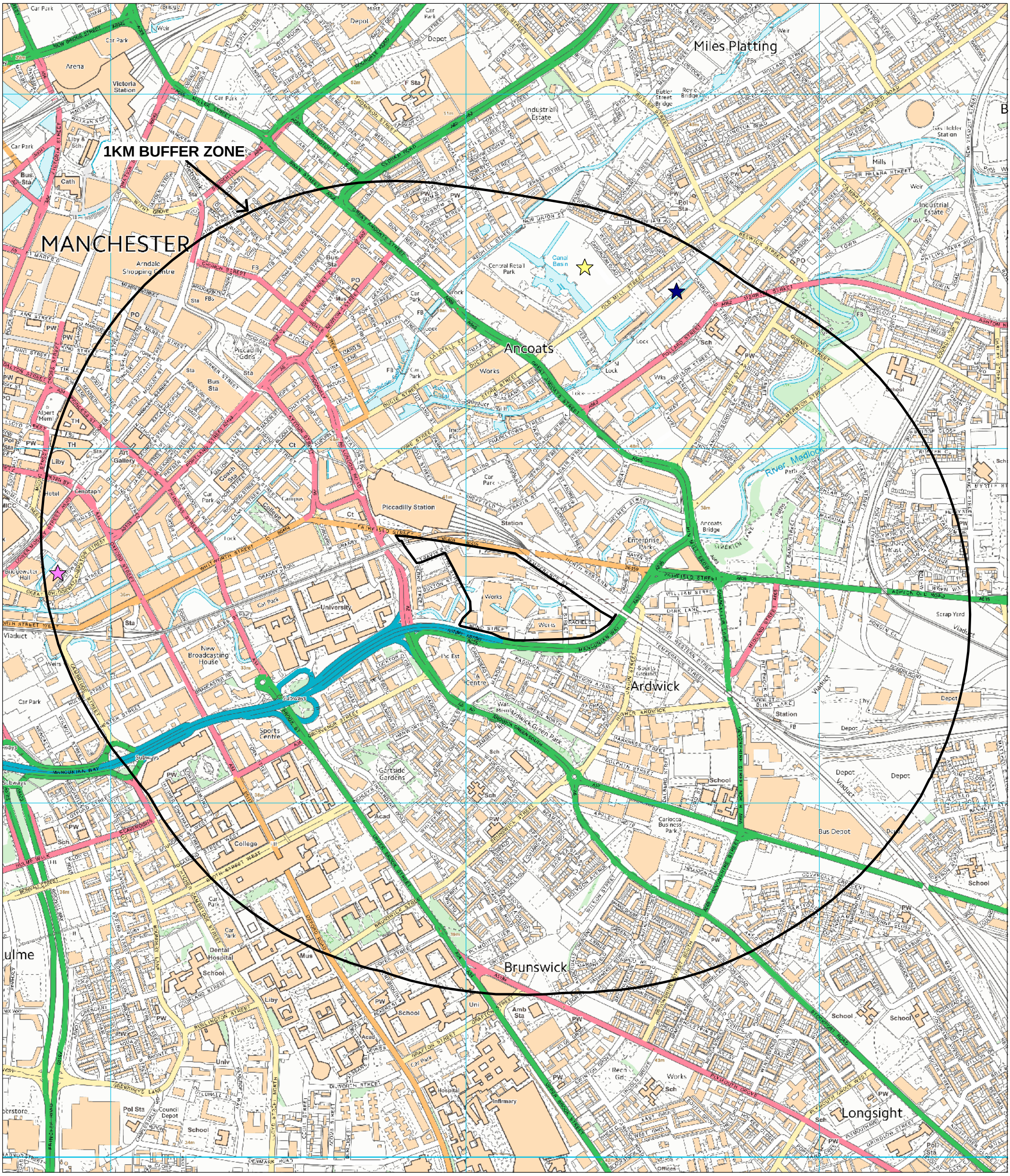
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TAMESIDE MBC LICENCE NO LA100022697, 2016

Greater Manchester Ecology Unit

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Email: gmeu@tameside.gov.uk

Date Produced: 28/11/2016



KEY

PROTECTED SPECIES

- ★ **FLOATING WATER-PLANTAIN**
- ★ **KINGFISHER**
- ★ **LITTLE RINGED PLOVER**

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 2

SCALE 1:10,000

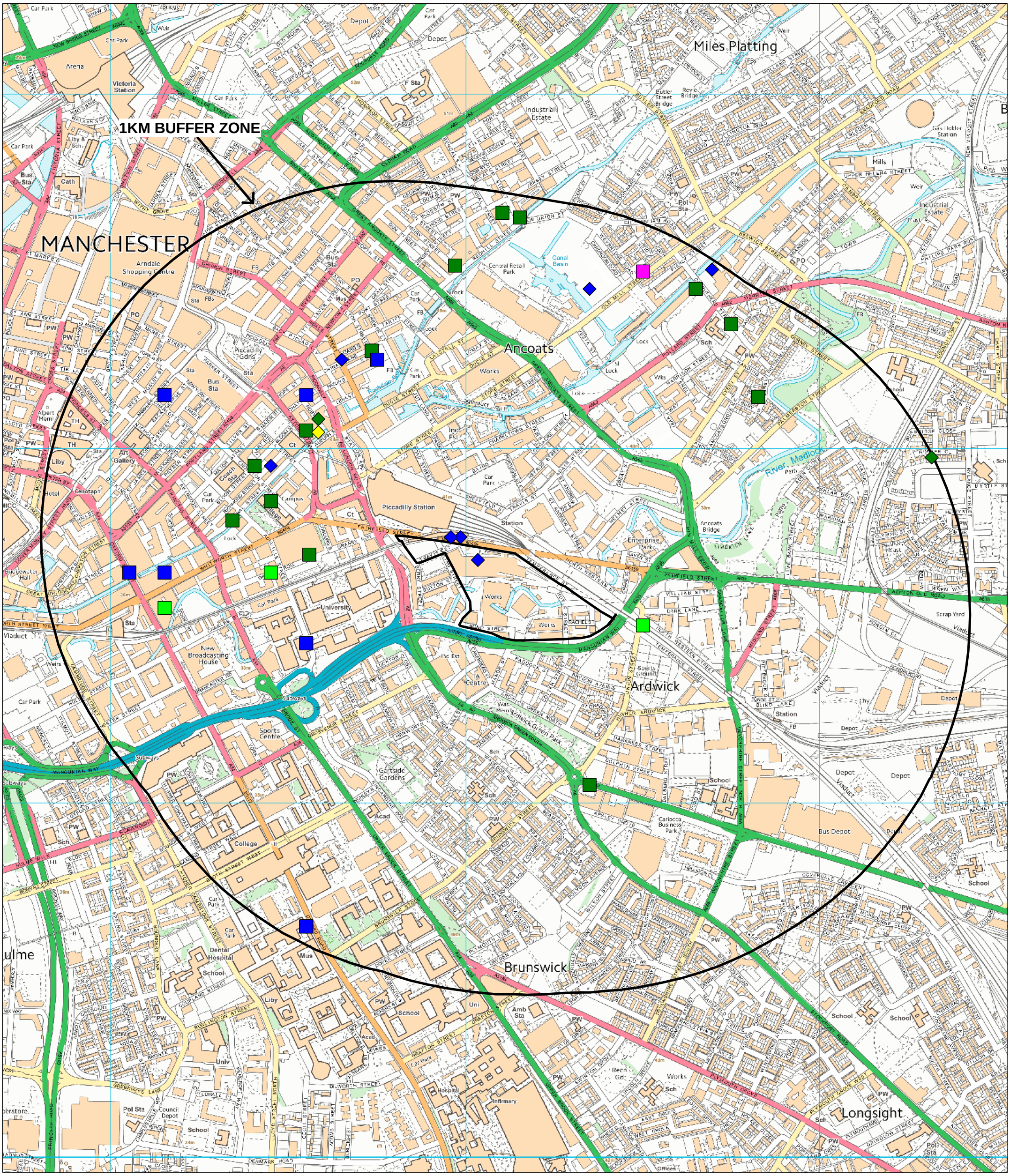
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KEY

BAT ROOSTS

- COMMON PIPISTRELLE
- PIPISTRELLE SP
- SOPRANO PIPISTRELLE

BATS OTHER SIGNS

- BAT SP
- COMMON PIPISTRELLE
- DAUBENTON'S BAT
- PIPISTRELLE SP

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 4

SCALE 1:10,000

BAT DATA COURTESY OF SOUTH LANCS BAT GROUP

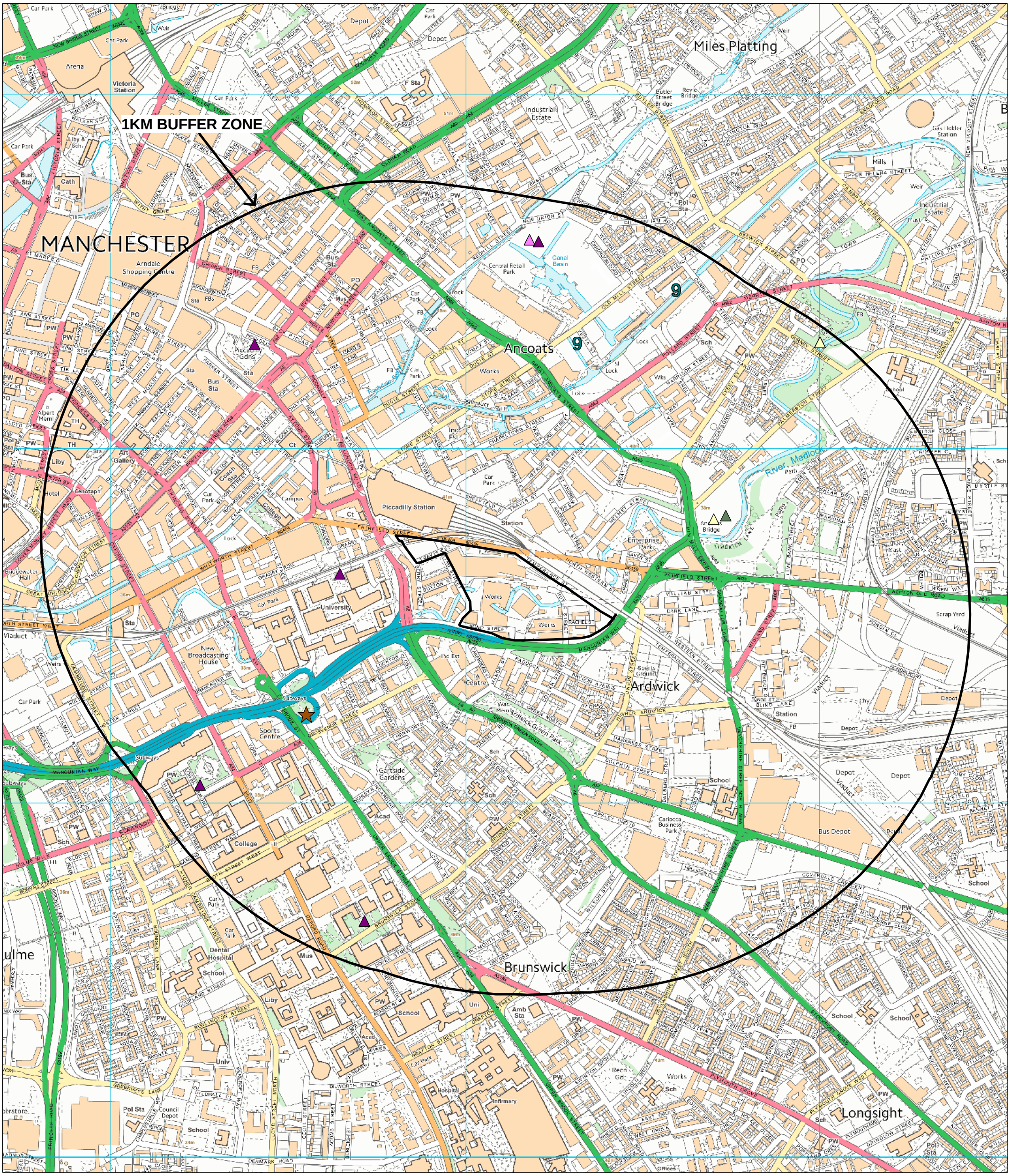
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Date Produced: 28/11/2016



KEY

SECTION 41 SPECIES

- △ BULLFINCH
- ▲ DUNNOCK
- 9 GRASS-WRACK PONDWEED
- △ HERRING GULL
- △ HOUSE SPARROW
- △ SONG THRUSH
- ▲ STARLING
- ★ WEST EUROPEAN HEDGEHOG

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 5

SCALE 1:10,000

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Date Produced: 28/11/2016

GMBRG Black Redstart Dest Study Data

commonName	scientificName	schedule1	redList	site	siteGridRef	easting	northing	startDate	endDate	abundance	sex	stage	status	method	comment	gmbrgRef
Black Redstart	Phoenicurus ochruros	y	y	Albert Square Manchester	SJ838981	383850	398150	09/06/2015	09/06/2015	1			Probable Breeder T - permanent Territory	Field record / observation		sfmc3bkg & 297
Black Redstart	Phoenicurus ochruros	y	y	Albert Square Manchester	SJ838981	383850	398150	08/06/2015	08/06/2015	1		Adult		Field record / observation	On roof of building opposite Manchester Town Hall	ljq9fbwb & 261
Black Redstart	Phoenicurus ochruros	y	y	Canal St/Minshull St Courts (Manchester City Centre)	SJ845980	384550	398050	17/06/2009	17/06/2009	1	male	Adult	Possible Breeder H - in suitable nesting Habitat	Field record / observation	m heard at 0740 and on 19th at 0805hrs	c1q5m5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Canal St/Minshull St Courts (Manchester City Centre)	SJ845980	384550	398050	04/06/2009	04/06/2009	1		Adult	Possible Breeder H - in suitable nesting Habitat	Field record / observation	probable female	5bvij5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Central Retail Park Ancoats	SJ851984	385150	398450	02/06/2008	02/06/2008	1		Adult		Field record / observation	probable female	c7h435ng & 113
Black Redstart	Phoenicurus ochruros	y	y	Central Retail Park Ancoats	SJ851984	385150	398450	11/04/2008	11/04/2008	1		Adult		Field record / observation	singing in a tree there	vml2u5ng & 113
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	19/07/2009	19/07/2009	2		Adult	Probable Breeder P - Pair in suitable nesting habitat	Field record / observation		3n4j65ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	14/07/2009	14/07/2009	2		Adult	Probable Breeder P - Pair in suitable nesting habitat	Field record / observation		qd0db5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	13/07/2009	13/07/2009	1	male	Adult	Probable Breeder T - permanent Territory	Field record / observation		vvl8q5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	12/07/2009	12/07/2009	1		Adult		Field record / observation	still about but difficult	hlvv05ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	05/07/2009	05/07/2009	1		Adult	Confirmed Breeder ON - Occupied Nest	Field record / observation	failed. Nest in I beam over doorway.	zn6nd5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	16/06/2009	16/06/2009	3		Adult	Probable Breeder D - courtship and Display	Field record / observation	2 males fighting, one flew off towards Arndale, other found a female and mating observed	b8u125ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	16/06/2009	16/06/2009	2		Adult		Field record / observation		tmuih5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Chinatown, Manchester city centre	SJ841980	384150	398050	25/06/2010	25/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	nothing at Spear St all week	ud0895nk & 165
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	08/10/2015	08/10/2015	1			Probable Breeder T - permanent Territory	Field record / observation		c8b80bkg & 297
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	12/06/2015	12/06/2015	1		Adult	Probable Breeder T - permanent Territory	Field record / observation	Sang around 0745	3chchbty & 313
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	08/04/2015	08/04/2015	1			Possible Breeder S - Singing male	Field record / observation		wpg7kbkg & 297
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	26/09/2013	26/09/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	ui872bkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	01/08/2013	01/08/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	1q8mqbkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	25/07/2013	25/07/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	blvw9bkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	03/07/2013	03/07/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	f4wmhbkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	03/06/2011	03/06/2011	1	male			Field record / observation		9892o5ng & 119
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	07/06/2010	07/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	roof, 1400 - 1430	l7vfc5nk & -165
Black Redstart	Phoenicurus ochruros	y	y	Oxford Rd Manchester	SJ842973	384250	397350	18/05/2012	18/05/2012	1			Possible Breeder S - Singing male	Field record / observation	on Ackers Street (off Oxford Road) between the Catholic Church and Stopford Building	0t3r1bkg & 121
Black Redstart	Phoenicurus ochruros	y	y	Piccadilly Station Manchester	SJ849980	384950	398050	01/08/2009	01/08/2009	1	female	Adult		Field record / observation	Store St opp bottom of Jutland St	jrz655ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	03/08/2009	03/08/2009	1	male		Possible Breeder H - in suitable nesting Habitat	Field record / observation		t59wt5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	15/07/2009	15/07/2009	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	this is bird from China Lane	61iz15ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	28/06/2009	28/06/2009	2			Possible Breeder H - in suitable nesting Habitat	Field record / observation		1cvmq5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	21/06/2009	21/06/2009	1	female	Adult	Possible Breeder H - in suitable nesting Habitat	Field record / observation	f.	zfjpf5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Shudehill Manchester City Centre	SJ842987	384250	398750	29/06/2009	29/06/2009	1		Adult	Possible Breeder S - Singing male	Field record / observation	Roman St/Edgehill St	i86nv5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Shudehill Manchester City Centre	SJ842987	384250	398750	27/05/2008	27/05/2008	1		Adult		Field record / observation	Male singing on Dantzic St, flew to Shudehill station	zqnc65ng & 113
Black Redstart	Phoenicurus ochruros	y	y	Shudehill Manchester City Centre	SJ842987	384250	398750	09/06/2010	09/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	Newmarket, back of Arndale	m0t0v5nk & 165
Black Redstart	Phoenicurus ochruros	y	y	St. Ann's Square Manchester city centre	SJ838984	383850	398450	11/06/2015	11/06/2015	1		Adult	Probable Breeder T - permanent Territory	Field record / observation	Singing near Mr Thomas's chop house	ldcjubty & 313
Black Redstart	Phoenicurus ochruros	y	y	St. Ann's Square Manchester city centre	SJ838984	383850	398450	14/06/2010	14/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	0950hr	zppw05nk & 165
Black Redstart	Phoenicurus ochruros		y	St. Peter's Square Manchester City Centre	SJ838979	383850	397950	14/05/2008	14/05/2008	1		Adult		Field record / observation	Male, opposite Peter House (7th Floor) on office blocks	or4ks5ng & -131

Appendix E - Plant Species Recorded on the Application Site

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Appendix E Plant Species Recorded on the Application Site

Common Name	Latin Name	Habitat Type with Phase 1 Codes								
		Ephemeral/Short Perennial (J1.3)	Broadleaved Scattered Trees (A3.1)	Tall Ruderal (C3.1)	Scattered Scrub (A2.2)	Semi-improved Neutral Grassland (B2.2)	Introduced Shrub - Scattered/ Amenity planting (J1.4)	Amenity Grassland (J1.2)	Broadleaved Semi-natural Woodland (A1.1.1)	Hedgerow (J2.1.2)
Trees and Shrubs										
Alder	*Alnus glutinosa*		R							
An apple	*Malus* sp.		R							
Ash	*Fraxinus excelsior*		F						O - F	
Birch species	*Betula* sp.								LF	
Broom	*Cytisus scoparius*			R						
Butterfly bush	*Buddleja davidii*						D		R - LO	
Cherry laurel	*Prunus laurocerasus*						LO			D
Cherry species	*Prunus* sp.		R						R	
Dogwood	*Cornus sanguinea*								LO	
Elder	*Sambucus nigra*		O - LD							
Holly	*Ilex aquifolium*								R	
Poplar species	*Populus* sp.		LO - LF							
Silver birch	*Betula pendula*								A - LD	
Swedish whitebeam	*Sorbus intermedia* agg.		R							
Sycamore	*Acer pseudoplatanus*		O - F						O - F	
Willow sp.	*Salix* sp.		R - O						R	
Herbs, Grasses and Ferns										
Annual meadow-grass	*Poa annua*					R				
Black medick	*Medicago lupulina*							LF		
Bracken	*Pteridium aquilinum*			LR						
Bramble	*Rubus fruticosus* agg.	O		O - LF	D	LO	LF		LD	
Canadian fleabane	*Conyza canadensis*	O - F								
Cleavers	*Galium aparine*			LO						
Cock's-foot	*Dactylis glomerata*					R - LO				
Colt's-foot	*Tussilago farfara*					R				
Common bent	*Agrostis capillaris*	F						O		
Common cat's-ear	*Hypochaeris radicata*					O-F				
Common centaury	*Centaurium erythraea*					O-F				
Common figwort	*Scrophularia nodosa*	R								
Common mouse-ear	*Cerastium fontanum*	R						R - O		
Common nettle	*Urtica dioica*	F		O - LD						
Common ragwort	*Senecio jacobaea*	O - F				O		R - O		
Cotoneaster species	*Cotoneaster sp. cf Cotoneaster simonsii*			R			R			
Cow parsley	*Anthriscus sylvestris*			R						
Crane's-bill species	*Geranium* sp.							R		
Creeping bent	*Agrostis stolonifera*					F - LD				
Creeping buttercup	*Ranunculus repens*	R				O		O		
Creeping cinquefoil	*Potentilla reptans*	O-F								
Creeping thistle	*Cirsium arvense*	R		O - F						
Dandelion	*Taraxacum officinale agg.*	O - F				O		O - F		
Dock species	*Rumex* sp.	O		R		R		R		
Evening primrose species	*Oenothera* sp.					R				
Eyebright	*Euphrasia nemorosa*					O-F				
Fern species	*Dryopteris* sp.			O - LF						
Field horsetail	*Equisetum arvense*					O				
Garden lady's-mantle	*Alchemilla mollis*					LR				
Garlic mustard	*Alliaria petiolata*	R		R						
Goat's-beard	*Tragopogon pratensis*	O-F				O-F				
Goldenrod	*Solidago virgaurea*			O - F		R				
Greater plantain	*Plantago major*	O								
Groundsel	*Senecio vulgaris*	R - O								
Hart's-tongue	*Asplenium scholopendrium*	R								
Hawkweed species	*Hieracium* sp.					O-F				
Hedge bindweed	*Calystegia sepium*			LR						

Appendix E Plant Species Recorded on the Application Site

Common Name	Latin Name	Habitat Type with Phase 1 Codes								
		Ephemeral/Short Perennial (J1.3)	Broadleaved Scattered Trees (A3.1)	Tall Ruderal (C3.1)	Scattered Scrub (A2.2)	Semi-improved Neutral Grassland (B2.2)	Introduced Shrub - Scattered/ Amenity planting (J1.4)	Amenity Grassland (J1.2)	Broadleaved Semi-natural Woodland (A1.1.1)	Hedgerow (J2.1.2)
Hedge mustard	*Sisymbrium officinale*	R								
Hemp agrimony	*Eupatorium cannabinum*			O-F	O-F					
Herb-Robert	*Geranium robertianum*	R								
Himalayan balsam	*Impatiens glandulifera*					LO				
Hogweed	*Heracleum sphondylium*			LO						
Ivy	*Hedera helix*	LO								
Knotgrass	*Polygonum aviculare*	R								
Maidenhair spleenwort	*Asplenium trichomanes*	R								
Michaelmas-daisy species	*Aster novi-belgii* agg.	O - F								
Mugwort	*Artemisia vulgaris*	F - LA		O		O				
Nipplewort	*Lapsana communis*	R - O								
Oregon-grape	*Mahonia aquifolium*						LA			
Oxford ragwort	*Senecio squalidus*					R				
Pendulous sedge	*Carex pendula*	R								
Perennial rye-grass	*Lolium perenne*							A		
Perennial sow-thistle	*Sonchus arvensis*	O-F								
Perforate St. John's wort	*Hypericum perforatum*					R				
Polypody species	*Polypodium* sp.	R								
Red clover	*Trifolium pratense*	R				R		R		
Red fescue	*Festuca rubra*	O						O		
Redshank	*Persicaria maculosa*	R								
Ribwort plantain	*Plantago lanceolata*					O		R		
Rosebay willowherb	*Chamerion angustifolium*			O - F						
Scentless mayweed	*Tripleurospermum inodorum*	R								
Shepherd's-purse	*Capsella bursa-pastoris*	R								
Smooth sow-thistle	*Sonchus oleraceus*	O								
Soft-rush	*Juncus effusus*					LR				
Southern marsh-orchid	*Dactylorhiza praetermissa*	LF								
Spear thistle	*Cirsium vulgare*	LR		LO						
Tufted hair-grass	*Deschampsia caespitosa*					LR				
Vetch species	*Vicia* sp.					R		LR		
Wall cotoneaster	*Cotoneaster horizontalis*								LR	
Wavy bitter-cress	*Cardamine flexuosa*	R - O				LF				
White clover	*Trifolium repens*					O		LF		
Willowherb species	*Epilobium* sp.(annual)	F		O - F		R		R		
Yorkshire fog	*Holcus lanatus*					O - LA		R		

Key

D = dominant
A = abundant
F = frequent
O = occasional
R = rare
L = locally

Appendix F - Bat Roost Assessment Data

Reference	Picture	Description	Potential Bat Roost Features and Evidence of Roosting	Assessed Roost Status
B1		Former Mayfield Station. Brick façade with stone parapet and stone lintels to windows. Large decoratively tiled stairwell and offices/warehouse at ground floor, offices and station concourse at second floor. No roof structure remaining. All windows and doors boarded up. **No access to interior due to presence of asbestos & lead paint.**	Damaged wooden fascia boards on external façade providing access to cavity behind. Small crevices in brickwork and around stone lintels on external façade. Unglazed window into stairwell providing potential bat access to internal rooms.	High Potential
B2a		Former station platforms and warehouses. Brick façade with two large internal warehouses. Concrete floor, flat roof supported by concrete pillars. Narrow enclosed ramp from ground level to platforms on southern elevation, supported by metal framework and covered with corrugated sheets. Open ramp on northern elevation. Series of large brick arches beneath platforms at eastern end, each enclosed with wooden boarding and used as warehouse/industrial units.	Crevices on the external façade. Broken windows and gaps around roller shutter doors providing access to internal warehouses. Very limited roost potential within these rooms but considered likely to be used as sheltered foraging site during poor weather conditions. Existing record of pipistrelle roost on northern side, potentially on external façade or at platform level.	Confirmed Roost High Potential on rest of structure

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B3		Industrial unit occupied as warehouse. Brick walls with pitched roof covered with corrugated asbestos cement sheets and numerous plastic skylights. Roof supported by metal framework, open to ridge with no roof voids. Concrete floor.	None	Negligible Potential
B4		Industrial unit occupied by Fedex as warehouse and distribution centre. Brick walls with corrugated metal sheets on front elevation. Pitched roof of corrugated asbestos sheets with numerous plastic skylights. Open to ridge with no roof void.	None	Negligible Potential
B5		Office unit of warehouse complex occupied by Fedex. Metal sheet walls to front elevation, brick walls with pitched roof of corrugated sheets to rest of building. No roof voids.	None	Negligible Potential

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B6		Industrial unit used as storage warehouse together with B9 and B10b. Brick with pitched roof covered with asbestos cement sheets. Roof supported by metal framework, open to ridge with no roof voids. Concrete floor. Large basement, also used for storage.	Crevices on brickwork on northern elevation above River Medlock. Basement provided no obvious crevice features and was too light and disturbed for potential hibernation use.	High Potential
B7a		Disused industrial units, part of former Towbar and Trailer Centre. Two-storey section, brick with pitched slate roof, clay ridge tiles and wooden bargeboards at gable ends. Underside visible from interior - open to ridge and appeared to be lined with wooden or metal boards. Two-storey section at SE corner, brick with pitched roof covered with bitumen felt. **No access for internal inspection on this section, potentially a roof void present.** Single storey section with flat bitumen felt roof. Concrete floors throughout and single glazed windows boarded up or secured with wire mesh.	Numerous crevices in brickwork. Crevices around windows providing bat access to interior of two storey sections. Crevices beneath barge boards, potentially providing access to space between slates and lining beneath. Dilapidated fascia boards at eaves on single storey section.	Moderate Potential

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B7b		Disused industrial units, part of former Towbar and Trailer Centre. Brick walls with pitched roof covered with metal sheets. Wooden ceiling with roof void above – no obvious hatches to provide access for inspection. Underside of roof partially visible at rear of building (adjacent to two-storey section visible in photo for B7a), supported by wooden rafters and fully lined with membrane. Underground basement.	Basement provided no obvious crevice features but was dark and likely to provide relatively stable temperature conditions. In use until relatively recently and therefore likely to have been too disturbed for hibernation use; however, could potentially be used in future now that the building is disused.	Negligible Potential
B7c		Industrial unit, occupied as religious premises. Brick walls with pitched roof covered with bitumen felt and clay ridge and hip tiles. Skylights on roof suggesting no roof void present. Small section at front with flat roof covered with bitumen felt and narrow wooden fascia boards at eaves. **No access permission for inspection.**	None apparent from areas visible.	Full inspection required.
B8a		Industrial/office units. Two-storey brick building, two separate pitched slate roofs with hipped gables. **No access permission for internal inspection.**	Potentially two roof voids. Crevices on external brickwork.	Moderate Potential Full inspection required

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B8b		Industrial units. Two-storey flat roofed building with brick walls with metal sheeting at upper level. **No access permission for internal inspection.**	Unlikely to be any roof void. No obvious crevices on external façade.	Negligible Potential
B9		Industrial unit occupied as factory and storage warehouse, together with B10b and B6. Brick with pitched roof of asbestos cement sheets. Roof supported by metal framework, open to ridge with no roof voids. Concrete floor. Large basement beneath, used for storage.	No roof void. Basement provided no obvious crevice features and was too light and disturbed for potential hibernation use.	Negligible Potential
B10a		Two-storey brick building with brick parapet at front elevation. Four ridges to the roof, covered with slates and clay ridge tiles.	No access for internal inspection	Moderate Potential Full inspection required

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B10b		Industrial unit occupied as factory and storage warehouse, together with B9 and B6. Brick with pitched roof of asbestos cement sheets. Open to ridge with no roof void.	None	Negligible Potential
B11	Previously demolished, site of this building is now amenity grass.			N/a
B12		Industrial unit used as a storage/distribution warehouse. Brick walls with corrugated metal sheeting towards roof level. Shallow pitched roof covered with corrugated sheets, open to ridge with no roof void.	None	Negligible Potential
B13		Industrial unit. Two-storey building with brick walls at ground level and metal sheeting at first floor level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential

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B14		Industrial unit. Two-storey building with brick walls at ground level and metal sheeting at first floor level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential
B15		Industrial unit. Two-storey building with brick walls at ground level and metal sheeting at first floor level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential
B16		Industrial units. Single-storey building with brick walls at ground level and metal sheeting towards roof level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential

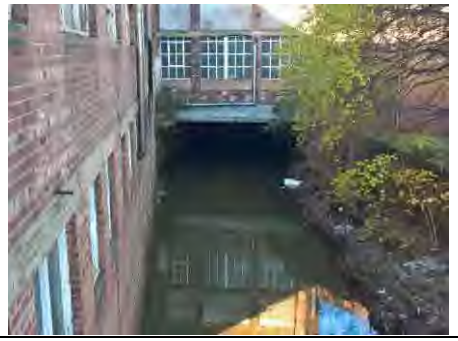
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B17		Industrial unit. Brick walls at ground level and metal sheeting towards roof level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential
B18		Warehouse/industrial unit, used as storage and recycling facility. Brick walls with pitched roof of asbestos cement sheets, open to the ridge with no roof void. Interior very cluttered.	None	Negligible Potential
B19	No access permission for inspection.			Full inspection required
B20		Two-storey brick structure with sloping roof covered with corrugated sheets. Unlikely to have roof void. Narrow wooden fascia board at eaves. **No access permission for inspection.**	None apparent from visible areas	Negligible potential

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B21		Small lean-to structure adjoined to B2. Corrugated metal walls with roller shutter door and sloping metal roof.	None	Negligible Potential
B22		Electricity substation. Metal walls. Pitched roof with metal sheet covering.	None	Negligible Potential
B23		Single-storey brick building. Pitched slate roof with clay ridge tiles and overhanging eaves with wooden soffit and bargeboards at gable ends. Metal roller shutter door (locked) on southern elevation, door and window on eastern gable end boarded up. No access permission for internal inspection.	Gaps between brickwork and soffit providing potential access to cavity within soffit and/or interior of building. Gap beneath end ridge tile at eastern gable end. Gap above roller shutter door.	High Potential

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B24		Culverted section of River Medlock. Length approx. 60m, width approx. 4m, height approx. 2.5-3m above water level. No access for internal inspection.	Bats known to roost in a similar culvert on another nearby site in Manchester.	High Potential
B25		Pair of open fronted garages with brick walls and flat concrete roof. Used for storage but appeared relatively undisturbed.	None	Negligible Potential
B26	No good vantage point to take photograph.	Culverted section of the River Medlock at east of site. Length approx. 60m within the site and extending for at least the same distance beyond the site boundary. **Poor visibility for assessment.**	Bats known to roost in a similar culvert on another nearby site in Manchester.	High Potential

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Appendix F - Phase 1 Geological Survey

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Mayfield Regeneration

Geoenvironmental and Geotechnical Desk Study Report

035548

10 August 2017

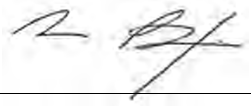
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Revision	Description	Issued by	Date	Checked
00	Issue	GM	10.8.17	RF

\\SRV-bath03\project filing\035548 Mayfield Regeneration Development\F9 Ground Engineering - Site Investigation\03 Reports\Desk Study\Appendix\170713 RF 035548 Geoenvironmental and Geotechnical Desk Study Report 00.docx

This report has been prepared for the sole benefit, use and information of U + I for the purposes set out in the report or instructions commissioning it. The liability of Buro Happold Limited in respect of the information contained in the report will not extend to any third party.

Author	George Mitchell
Date	10.8.17
Approved	Rob Frost
Signature	
Date	10.8.17

..

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Appendix A UXO Assessment

Appendix B Groundsure

Appendix C BuroHappold Design Note

Appendix D BGS Historic Borehole Logs

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Executive Summary

Background	BuroHappold Engineering was commissioned to carry out a geoenvironmental and geotechnical desk study of a Site known as Mayfield Regeneration (the Site). This desk based study provides information on potential ground related risks associated with redevelopment the extent of which is yet to be determined. A previous ground investigation was undertaken in 2009, which included the Mayfield Regeneration area.
Site Setting	The Site is located in Manchester City Centre to the immediate south/southeast of Piccadilly Railway Station. The River Medlock meanders through the central area of the Site (flowing towards the west) and is culverted beneath Hoyle Street. The Site is currently occupied by existing and historical urban development comprising the former Mayfield Railway Station, numerous works / factories, a scrap yard, a depot, Hoyle Street Industrial Estate, derelict land and car parking. The immediate surrounding area comprises urban development including residential (student accommodation/private rental), offices, commercial and industrial facilities. The Site currently has as a range of industrial uses including network rail access, depots, scrap yards, tanks, vehicle repair and waste sites. The proposed future development is likely to include areas of park land and open space in addition to commercial development use.
History	The Site has a long predominantly industrial history with a range of potentially contaminative uses. This includes Mayfield Works, Chapelfield Works, Mayfield Station & associated infrastructure, Printing Works, Ice Works, Baths, Cotton Mills, Hanover Mills, Fairfield Street Garage, Ardwick Tannery, Scrap Yard, Timber Yards, Britannia Brewery, Iron Works, Tanks, a Mortuary, various depots and smaller commercial/industrial facilities.
Geological Setting	The Site is underlain by Made Ground, Quaternary Glacial Till (likely absent in some locations and in the western portion were no boulder clay is recorded) and Sherwood Sandstone. Recent Alluvial deposits are recorded adjacent to the River Medlock. The solid geology is Sherwood Sandstone underlain by Manchester Marls. The Sherwood Sandstone is a Principal Aquifer, capable of supporting water supply and/ or river base flow on a strategic scale. There is one groundwater abstraction over 700m distant from the Site and the Site is not within a groundwater source protection zone. Groundwater underlying the Site is considered likely to be in hydraulic continuity with the River Medlock. Localised groundwater may be encountered in the Made Ground deposits perched on underlying low permeability Glacial Till.
UXO	An Explosive Ordnance Threat Assessment has been undertaken by PLANIT UXB Limited which states that a "Medium" Ordnance Threat Level applies across the Site, and that "a UXO threat management strategy is required to be in place prior to intrusive engineering works".
Geoenvironmental Considerations	Identified potential risks above Low are summarised below: There is a Moderate risk to future Site users and future buildings due to release of ground gases from Made Ground underlying the Site; There is a Moderate/Low risk to Site workers due to the potential for inhalation of ground gas. This risk is likely to be mitigated by standard working practice assuming that no deep poorly ventilated excavations are required. There is a Moderate / Low risk to construction workers, future site users and controlled waters from historic and current site uses which are likely to have contaminated Site Made Ground. This site has a long industrial history which has continued until present day. It appears likely that significant thicknesses of Made Ground are present on site as some areas appears to have been filled and there has been significant redevelopment over the years. This industrial legacy is likely to have contaminated shallow soils to some extent and a ground investigation is required to define the extent of contamination and determine the need for remedial measures as part of development work.
Geotechnical Considerations	The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock. A range of foundation options are possible for the development based on a desk based study of available information, however there is currently insufficient information to create a detailed ground model. A ground investigation will be required to produce a detailed ground model to allow geotechnical design.

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Recommendations	A combined geotechnical and geoenvironmental ground investigation is required to better understand the potential contamination risks identified and to produce a detailed ground model to allow geotechnical design. Sharps and Needles were identified on Site during the Site walkover. It is recommended that a sharps and needle disposal specialist is consulted with regards to identifying the extent of and appropriate measures for Site management and/or removal of these items prior to the start of any construction works. It is also recommended that the site is secured prior to any such removal to prevent further sharps beings dumped on site. Large quantities of Japanese Knotweed were identified on the banks of the River Medlock within the channel during the Site walkover. There was no visual evidence that knotweed had migrated out of the channel onto surrounding areas of the Site, however it is quite possible this has occurred. It is understood that a full survey of the river will be undertaken in the near future, which will fully characterise the extent of knotweed present. It is recommended that a Japanese Knotweed specialist is consulted with regards to identifying the extent of the infestation and recommending appropriate measures for Site management and/or removal of Japanese Knotweed impacted material.

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1 Introduction

1.1 General

This report is the Desktop Geoenvironmental and Geotechnical Study for the Mayfield Regeneration Site (the Site) and was prepared by BuroHappold following instruction from U+I. The purpose of this study is to establish the environmental, geological, hydrological and hydrogeological conditions present at the Mayfield Site that may result in potential contamination or geotechnical risks for development and future Site users.

The Site occupies some 10.25 hectares and lies in Manchester City Centre to the immediate south/southeast of Piccadilly Railway Station. The River Medlock meanders through the central area of the Site (flowing towards the west) and is culverted beneath Hoyle Street. The Site is currently occupied by existing and historical urban development comprising the former Mayfield Railway Station and associated railway lines, numerous works/ factories, derelict land and car parking.

1.2 Study Aims and Objectives

The overall aim of this study was to carry out a geoenvironmental and geotechnical assessment of the Site in order to inform the Client's understanding of potential ground-related risks associated with the proposed redevelopment and regeneration. This study will also form the basis for planning and targeting further ground investigations.

This report will also provide information relevant to restoration/ redevelopment in accordance with the requirements of the National Planning Policy Framework (NPPF 2012). The work was carried out in general accordance with Model Procedures (Environment Agency, 2004), the relevant British Standard (British Standards Institute, 2011), the Environment Agency Guiding Principles (Environment Agency, 2010), Groundwater Protection Policy (Environment Agency, 2013) and other current good practice guidance. The particular objectives were:

- To determine the historical and current use of the Site and its surroundings;
- To determine the nature of the ground conditions and the environmental sensitivity of the Site;
- To assess the potential location, nature and extent of any ground and groundwater contamination;
- To assess the potential risks to people and the environment (natural and built) associated with ground contamination (solid, liquid or gas) for the Site future use;
- To prepare a report based upon all of the above to support a possible future planning application in accordance with NPPF (Department for Communities and Local Goverment, 2012); and
- To evaluate the potential need for and scope of any subsequent Site investigations and/or remedial action or design.

1.3 Information Sources

The principal sources of information for this desk study report include: historical and current topographic maps and public register information from the Groundsure report (Appendix B) previous Site investigation reports (discussed in Section 5); a Site walkover survey; information provided by the local authority, available from the Environment Agency website and other online sources.

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This report is based upon information obtained from third party sources, together with observations from the Site walkover survey. The third party data has been accepted as face value and has not been independently verified. BuroHappold can therefore give no warranty, representation or assurance as to the accuracy or completeness of such information.

1.4 Competence

The work reported here was carried out by a qualified geoenvironmental scientists and geotechnical engineers with relevant degree qualifications, training and experience. The work has been overseen by an Associate Director with experience in the assessment of land affected by contamination who is a Chartered Geologist and a registered SiLC (Specialist in Land Contamination).

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2 Current land use and proposed development

2.1 Site Location, Topography and Current Use

The Site is located in Manchester City Centre to the immediate south/southeast of Piccadilly Railway Station, centred at NGR 385006 397717. The River Medlock meanders through the central area of the Site (flowing towards the west) and is culverted beneath Hoyle Street. The Site is currently occupied by existing and historical urban development comprising the former Mayfield Railway Station and associated railway lines, numerous works / factories, a scrap yard, a depot, Hoyle Street Industrial Estate, derelict land and car parking. The immediate surrounding area comprises urban development including residential (student accommodation/private rental), offices, commercial and industrial facilities.

Overall, the northern half of the Site generally slopes from a maximum spot height of 40.80 m AOD on Fairfield Street towards the River Medlock in the central area of the Site (below 37.80 m AOD recorded at WS5 GIP GI), with the exception of the former Mayfield Station which is recorded at approximately 49.00 m AOD (WS3/WS4 GIP GI). There are no recorded spot heights in the southern half of the Site, however it generally slopes northwards to the River Medlock. There is thus currently a ~12 m difference in height across the Site (Mayfield Station to the River Medlock) separated by slopes with localised or potentially buried retaining structures. A topographical survey is required to fully confirm all Site levels.

2.2 Site Walkover Survey

2.2.1 General

The Site walkover survey was carried out on 4th July 2017, in mild and overcast weather conditions and was generally limited to external areas, though all external areas were accessible. Philippa Hunsworth and George Mitchell from Buro Happold attended, and were escorted around Site by Jonathan Such (JS) of U+I. An annotated plan showing points of interest identified during the survey is included as Appendix E. To describe its variable nature, the Site has been divided into three zones: northern, southern, and the river zone, for ease of reference (Figure 2-1 refers).

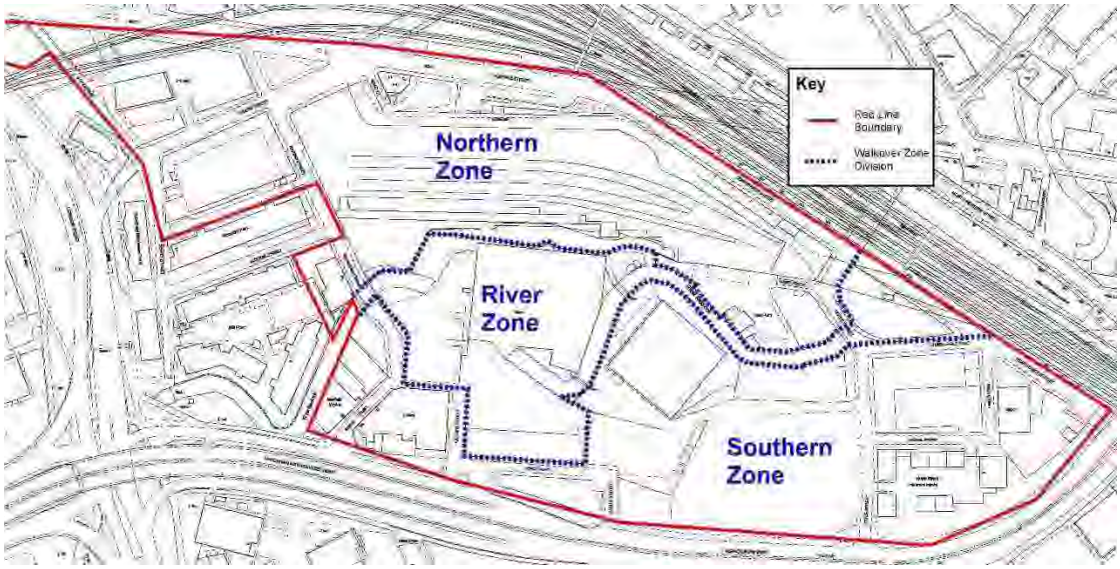


Figure 2-1 Division of the Site into zones.

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2.2.2 Northern Zone

- Area west of Wyre Street / north of arches: Overgrown with long grass and birch trees, Heras fenced off
- Under arches: Full of rubble / overgrown (Photograph 1)
- Between Wyre Street, Travis Street and Baring Street: Car park with tarmac surface. Brown metal building in western area – substation. A GIP 2009 borehole was undertaken in this car park, but unable to locate well cover. (Photograph 2)
- South of Travis Street, west of Baring Street: Tarmac car park for adjacent Macdonald Manchester Hotel. Surrounded by a planter with numerous mature trees. 2 No. substations present in SE corner. ~1 m drop down to Baring Street (east) and ~1.50 m drop down to access road to the south, separated by a chain link fence.
- Triangular parcel of land to north of Travis Street and east of Baring Street. Grassed area. Historical maps indicate that a garage was historically present, and obstructions (thought to be the garage slab) were encountered during the GIP 2009 GI. Well cover present from GIP 2009 GI. (Photograph 3)
- Area to the north of former Mayfield Station building:
    - Western side: Star and Garter pub, still in use – listed building. Tarmac car park to the east (access via Neild Street). GIP 2009 borehole cover present in car park. (Photograph 4)
    - Row of 1 storey units present against the Mayfield Station building. Uses include a garage, storage, substation. (Photograph 5)
- Temperance Street: Series of arches on both sides of the road, however only the southern set are onSite.
    - Arch 6: U+I security offices
    - Arch 7: Art exhibition company
    - Arch 8: Theatre set manufacturer
- Upper level of old Mayfield Station building (Photograph 6):
    - Cobbled ramp up to the upper station platform level behind Star and Garter pub.
    - Platform is open air with majority of steel roof removed (some sections remaining in the northern area of the platform).
    - Dilapidated old station buildings in western corner of platform. Heras fenced off. (Photograph 7)
    - 2 No. tracks with stoppers at western end. Overgrown.
    - Track leading eastwards on upper level, eventually joining onto live railway to the east of the Site. Brick building present at eastern end, apparently disused. Railway sleepers and sections of rail/track stored in the area.
- Area immediately south of Mayfield Station:
    - Adjacent to Baring Street:

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        - Compound where U+I temporary offices are currently under construction (wooden frame up at time of walkover). (Photograph 8)
        - Temporary landscaped area in southern portion of compound, surfaced with wood chips directly on top of Made Ground. 2 No. trees in poor health (brown leaves). (Photograph 9)
        - Made Ground material has been stripped and piled up along the northern edge of the compound against the Mayfield Station building.
        - Suspended metal/wooden walkway at the upper station level is joined onto the station building.
        - Compound is surrounded by wooden hoarding.
        - Portaloos, food cabins and outdoor seating area present in north of compound.
    - Through gate in wooden hoarding to the east: Narrow overgrown walkway between the station building and a brick retaining wall to the lower level where the TFGM building is situated. Metal disused building at the eastern end.
    - Through a gate to the south of the compound: Heavily overgrown area adjacent to the River Medlock, which is at a lower level. Fly tipping (old tyres, brick and concrete rubble) present. River wall in poor state of disrepair. Knotweed present on riverbank but not noted on upper level. (Photograph 10)
- Building adjacent to Baring Street Bridge (#58), historic clothing factory. Disused. Car park/yard area to the side and rear of the building.
- Area between Hoyle Street, the River Medlock and Mayfield Station:
    - Western area: Former scrapyard, now vacated. Metal structures, ~2 m high, present around the edge of the Site, filled with Made Ground/fly tipping. (Photograph 11) Vacant industrial building in west of yard, joined onto Mayfield Station.
    - Eastern area: Yard with small 2 storey brick structure, metal containers, and numerous car parts/engines on the ground. Large metal weighbridge present (Photograph 12), Large quantities of knotweed in river channel, but appears not to have encroached into the yard.

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Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6

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Photograph 7



Photograph 8



Photograph 9



Photograph 10



Photograph 11



Photograph 12

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2.2.3 River Zone

- Transport for Greater Manchester (TFGM) building area
    - River Medlock is culverted under the car park area.
    - 1 storey brick/steel industrial building (Photograph 13). River Medlock is culverted under the building (Photograph 14). Multiple units:
        - Northernmost unit = TFGM.
        - Middle unit = formerly FedEx, now vacant.
    - Southern unit = Hilclare (electronic component manufacturer); JS advised that they are vacating on 28th September 2017.
    - External exit from former FedEx unit: External area bordering the river to the north. Overgrown grassed area with mature trees. Knotweed in river channel; river wall in poor state of disrepair. Metal footbridge present leading to yard/warehouse south of the river.
- TFGM car park (east of Baring Street)
    - Very overgrown in northern portion of car park adjacent to River Medlock. (Photograph 15)
    - Car park surfaced with tarmac.
    - Void recently opened up in car park outside Unit 4 (Section 3.5 refers). Cordoned off by barriers at time of walkover. (Photograph 16)
- Area north of Chapelfield Road and east/south of Hoyle Street: Yard with vehicles parked (including tracked excavators). Sign outside advertising 'Free tipping of clean hardcore'. River culverted under this yard. (Photograph 17)



Photograph 13



Photograph 14

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Photograph 15



Photograph 16



Photograph 17

2.2.4 Southern Zone

- West of Baring Street: Row of buildings and concrete yards (not currently owned by U+I) (Photograph 18)
    - Southernmost building = Mayfield Works (disused); formerly clothing works. Yard/car park area to north of building.
    - Northernmost building = disused, former use unknown. Another yard/car park area to the north.
    - Both yards have borehole well covers in them, this ground investigation is not known to BuroHappold and has not been reviewed as part of this report.
- Area between Baring Street and Nether Street:
    - 3 No. conjoined buildings (west to east): Tow bar and trailer shop; Historic church (with basement – advised by JS); sock factory (still in use; JS advised that it has been there for >20 years). Concrete yard present to south of buildings. (Photograph 19)
- East of Nether Street: Hilclare building and car park beyond to the east/south.
- South of Bond Street, adjacent to Mancunian Way: Grass verge with advertising boards.

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- Square warehouse building, north of Hilclare car park and surrounded by meandering River Medlock: (Photograph 20)
    - JS advised that the building is to be vacated in mid-July 2017. Mixed boxes stored. Current tenant has occupied the building for ~1 year.
    - Around edges of building: Concrete yard. Pallets of food produce (coconut milk, ketchup, tinned tomatoes etc).
    - Disused footbridge across River Medlock to NW of building
    - N and E of building: Overgrown. Fly tipping and evidence of burning (ashes, charred material). Brick/concrete walls border the plot in the eastern area; poor state of disrepair. (Photographs 21 and 22)
- East of square warehouse: Unoccupied yard with piles of demolition rubble and brick walls of historic buildings. (Photograph 23)
- South of square warehouse: Concrete retaining wall with Hilclare car park and skips beyond.
- East of Manor Street: Wooded area with large amount of fly tipping (Photograph 24)
- East of Hilclare car park and west of Hoyle Street: 'Delaney' Site. Yard area, hoarded off. Material stockpiles ~3 to 5 m high comprising both apparently screened and unscreened material, demolition rubble, piles of whole bricks (Photograph 25)
- Between Hoyle Street, Chapelfield Road, River Street and Rachel Street
    - Former morgue. Extremely overgrown; no access. Fenced off. (Photograph 26)
    - Brick walls of derelict building visible
    - JS advised high risk of sharps, needles etc. in the area, and presence of drug users and prostitutes
- Hoyle Street Industrial Estate (Photograph 27)
    - Unit 1: Florist
    - Unit 2: Security systems
    - Unit 3: Vacant
    - Unit 4: Unknown
    - Unit 5: Asian wedding company
    - Unit 6 and 7: MOT centre
    - Unit 8: Photographer
    - South of industrial estate adjacent to Mancunian Way: Grassed area with mature trees
- East of River Street and southwest of Temperance Street:

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- Timber yard and car depot
- Western portion of yard full with timber, old vehicles (Photograph 28)
- Eastern portion of yard piled up with doors, oil drums, fridges, rubble, insulation etc. (Photograph 29)



Photograph 18



Photograph 19



Photograph 20



Photograph 21

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Photograph 22



Photograph 23



Photograph 24



Photograph 25

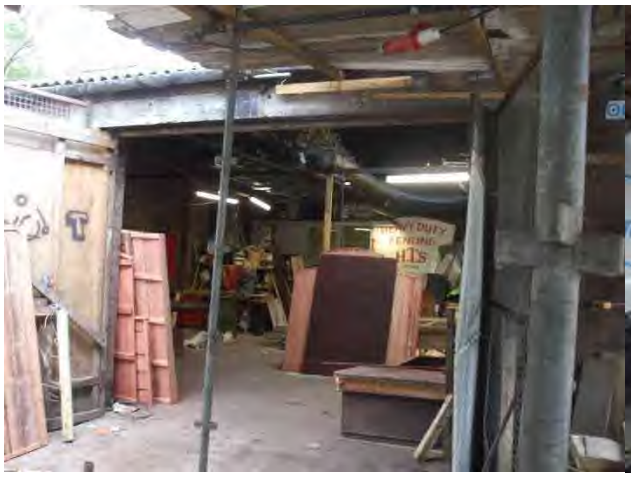


Photograph 26



Photograph 27

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Photograph 28



Photograph 29

2.3 Current Activities in the Surrounding Area

The area is situated in Manchester City Centre with a mixture of residential, commercial and industrial land uses in the surrounding area. Neighbouring the Site is Manchester Piccadilly station to the northwest, a railway viaduct to the north, the Mancunian Way (A57M/A635) to the south and high rise residential buildings including student accommodation to the west. To the south beyond Mancunian Way, there is an industrial estate and terraced housing. To the north, west and east, typical city centre land uses including shops, restaurants, offices, bars and flats are present.

2.4 Proposed Development

The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock.

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3 Environmental Setting

3.1 Geology

The Site geology is described below and summarised in Table 3-1. This has been determined with reference to the relevant 1:50,000 scale BGS Geological Maps, (British Geological Survey, 2006); the Groundsure report Appendix B) and available historic Site investigation data (GIP 2009 GI – see Section 5).

Given the urban setting and development history of the Site, including numerous buildings of different ages and reprofiling of the Site to create terraced levels for car parking, a reasonable thickness of Made Ground is anticipated, and thicknesses of up to 3.20 m were recorded in historic boreholes. Made Ground material due to its nature is likely to be very variable in both composition and characteristics.

The underlying natural geology comprises superficial Glacial Till (absent beneath much of the Site) underlain by the Chester Pebble Beds Formation (Sherwood Sandstone Group), except the western portion where no Glacial Till is recorded on the maps. The geology maps record Alluvial Deposits adjacent to the River Medlock which meanders east to west across the Site.

Table 3-1 - Summary of Anticipated Geology

Strata	Description	Depth to top [Thickness] (m)	Aquifer status
Made Ground	Heterogeneous material consisting of sand / gravel / clay with ash, brick, concrete, timber, slate. Likely to be some reworked natural material.	GL [3.20 m max. recorded]	N/A
Glacial Till	Gravelly clay / stiff clay / sand and clay. Present sporadically.	0.60 m [<1.80 m]	Secondary Aquifer (Undifferentiated)
Chester Pebble Beds Formation	Orange / brown / red brown sand.	2.30 to 3.20 m [0.10 - >3.00 m]	Principal Aquifer
	Red sandstone.	1.52 to 3.40 m [>8.54 m, thickness unproven]	

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3.2 Hydrogeology and Hydrology

The nearest surface water feature to the Site is the River Medlock, which flows east to west across the Site to its confluence with the River Irwell on the south side of Manchester Victoria Railway Station. The River Medlock is culverted beneath the railway line and the transport for Greater Manchester building in the centre of the Site.

The southwest corner of the Site, adjacent to the River Medlock, is indicated to be within a 'Zone 2 Floodplain' as presented in the Groundsure Report, based on the relevant Environment Agency information and reproduced in Appendix B. The centre of the Site, adjacent to the River Medlock, is indicated to be within either a 'Zone 2' or 'Zone 3' Floodplain.

The Environment Agency Groundwater Vulnerability Map Sheet 17 (Derbyshire and North Staffordshire) indicates that the Site is underlain by a '*Major Aquifer*' with '*Soils of High Leaching Potential (U)*' (Appendix B). It should be noted that the Site is labelled 'U' for urban and a note is normally included on the maps explaining that such a classification means that '*Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) is assumed until proved otherwise*'.

The Chester Pebble Beds Formation is a Principal Aquifer, defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability capable of supporting water supply and/or river base flow on a strategic scale. The Site is not recorded to be within a Source Protection Zone (SPZ).

The Groundsure Report records one historic groundwater abstraction from within the Site boundary licenced to Moseley Rubber Co Ltd (eastern part of the Site, adjacent to the River Medlock) this has now lapsed. No active water abstractions are recorded within 500m of the Site. There are two No. abstractions locations within 1 km of the Site including: G T Energy UK Limited (778m SE) and Manchester Metropolitan University (870m SW). The Site is not within a groundwater source protection zone.

3.2.1 Groundwater

Examination of the general topography and hydrology of the Site, based on the current and historic OS maps indicates that the prevailing direction of groundwater flow is likely to be to the southwest, towards and in the direction of flow of the River Medlock.

It is considered likely that groundwater underlying the Site will be in hydraulic continuity with the River Medlock due to the presence of this watercourse on the Site and poor condition of the channel walls. Localized groundwater may be encountered in the Made Ground deposits perched on underlying low permeability Glacial Till, if present. Deeper groundwater conditions within the weathered and intact sandstone bedrock are likely to be controlled by the hydraulic conductivity of the sandstone (degree of cementation, degree of fissuring, faults etc.).

Groundwater was not recorded / encountered within any of the historic BGS boreholes, or in any exploratory hole from the GIP 2009 GI.

3.3 Ecology

The Groundsure Report records no SSSIs, nature reserves or environmentally sensitive areas within 2 km of the Site. The Site is not within a Nitrate Vulnerable Zone.

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3.4 Japanese Knotweed

An initial ecological assessment on site was carried out during 2009 by BuroHappold which details the following:

'Japanese knotweed was recorded along the River Medlock on the silt banks where river flow is low. No Japanese knotweed was recorded within the Colourgates Yard section; however it was not possible to carry out a full walkover survey of this area due to the density of the vegetation, so the presence of this species within this small area cannot be completely discounted at this stage'.

Large quantities of Japanese Knotweed were identified on the banks of the River Medlock within the river channel during the Site walkover (Section 2.2 refers). There was no visual evidence that knotweed had migrated onto adjacent areas of the Site, however. It is understood that a full survey of the river will be undertaken in the near future, which will fully characterise the extent of knotweed present.

3.5 Geological and Geotechnical hazards

According to the information presented in the Groundsure report, the following ground hazard ratings are applicable:

- Very Low hazard rating for shrinking or swelling clay;
- Very Low hazard rating for Landslides;
- Negligible hazard rating for Soluble Rocks;
- Moderate hazard rating for Compressible Ground;
- Very Low hazard rating for Collapsible Rocks;
- Low hazard rating for Running Sand.

The maximum potential for ground instability due to compressibility is stated as 'Moderate' within the Groundsure report. However, the 'Compressible Deposits Legend' within the report (Appendix B refers) indicates the majority of the Site to be situated within a 'Negligible' hazard rating zone, with a band of 'Moderate' hazard bordering the Site to the south, underlying an area of Mancunian Way to the south of Bond Street. As such the potential for encountering compressible ground within the Site is considered low.

It is worthy of note that during August 2015 a large hole appeared in the Mancunian Way after a period of heavy rain. A leaking water pipe is reported to have been the cause of the incident. The road has since been repaired and fully reopened.

In June 2017, a void (~1.50 m diameter x ~5.00 m deep) appeared in the car park of the Transport for Greater Manchester (TFGM) building (Unit 4), close to the culverted River Medlock. The cause is currently unknown and is under investigation. The void appears to be connected to existing drainage, and there may have historically been a chamber in the locality. Further assessment, including a CCTV survey, is currently being undertaken, and appropriate repair/remediation measures will be undertaken once better understood. Bulging and cracking to the nearby car park retaining wall was also noted, with a depression to the tarmac adjacent to the wall. A Design Note has been prepared by BuroHappold and is included as Appendix C.

3.6 Radon

Less than 1% of homes are affected by radon, therefore, radon protection measures are not considered necessary in the design of new dwellings or extensions on this Site.

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3.7 Mining Activity

The Groundsure Report states that the Site is *'located within the specified search distance of an identified mining area'*. A Coal Authority (CA) Report (Coal Authority , September 2015)has been obtained for the proposed development as the Site overlies coal bearing strata and, as such, further assessment in respect of previous coal mining activity was considered necessary.

The CA Report states that:

- The Site is within the likely zone of influence from workings in 2 No. seams of coal at 1050 m to 1100 m depth which were last worked in 1958. Furthermore, reserves of coal do exist in the locality which could be worked in the future subject to feasibility, licences and planning consents.
- There are no recorded mine entries on Site or within 20 m of the Site boundary.
- In respect of opencast mining, the Site is not within the boundary of any past or present workings. In addition, there is no licence to extract or proposed licence to extract coal by opencast methods within the immediate vicinity of the Site.
- No subsidence, in respect of the Coal Mining Subsidence Act 1991, has been recorded in respect of the immediate Site area.

Given the published and unpublished geology of the Site, the Site history and the CA Report information it is considered that the risk arising from former coal mining operations can be considered to be low.

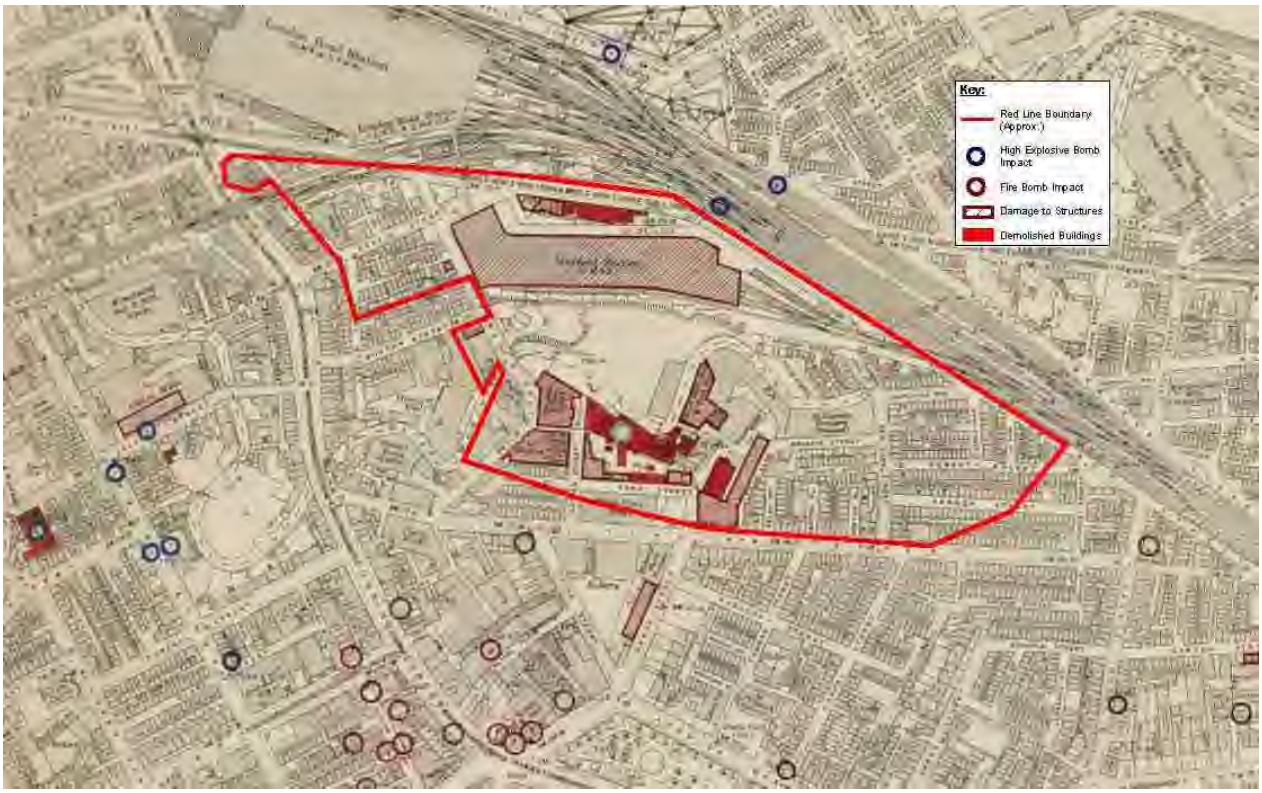
3.8 Unexploded Ordnance

The Manchester bomb map records a number of high explosive and fire bomb impacts in close proximity to the Site, as well as damage to several buildings within the Site (**Error! Reference source not found.** refers). Some buildings, i ncluding the Mayfield station building itself, have not been developed since the war and remain on Site.

A Preliminary UXO Risk Assessment has been carried out by Planit in accordance with CIRIA C681 (CIRIA, 2009) and is included in Appendix A. In addition to the consideration of the potential for aerial delivered UXO, consideration has also been given to mitigation factors, namely: (i) the extent of post-war development); (ii) the extent of proposed intrusive works. The assessment concluded on the basis of Site setting, historical land usage, record of bombing, post war development and proposed intrusive work that the risks associated with UXO on site are Medium. Considering the findings of this assessment, a UXO Threat Mitigation Strategy is required to be in place prior to intrusive works at the Site. A review of these recommendations must be undertaken considering any additional, relevant information being provided (i.e. significant changes to the masterplan that require significant ground excavations).

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Figure 3-1 Manchester bomb map



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4 Site Setting

4.1 Site History

The Site history and that for the surrounding area has been completed using historic maps from 1873 to 2015. This history is summarised in Table 4-1 below and a selection of the maps reproduced in full Appendix B Map Record.

Table 4-1 - Summary of Site history and history of the surrounding area

Date	Site History	History of the Surrounding Area
1851	**North-**Mayfield Works (Dye & Print) & associated Reservoirs/Filtering Pools and tanks, Timber Yard, Hotel (later known as the Star & Garter Public House), northeast corner of Hanover Mill (cotton), various roads and residential housing. Public house and residential housing in the north east corner, north of the railway line. **South-** Chapelfield Dye Works, Ardwick Dye Works, Britannia Brewery, Tipping Street Chapel, a Tannery and various roads and residential housing. **East-**A Timber Yard is recorded to the north of Chapelfield Road. Residential housing, open land and various roads are recorded across the rest of the Site. **West-**Railway lines, residential housing, Timber Yard, Public House and various roads.	*London Road Station*, associated railway lines and *Goods Yard* to the immediate north of the Site, *Hanover Mill* & ancillary buildings to the immediate west of the Site, *Ardwick Saw Mill & Timber Yard* approximately 20 m to the northeast, *Maskrey Mill (Cotton)* approximately 70 m to the northeast and *Ardwick Bridge Chemical Works* approximately 45 m to the southwest. Residential housing dominates the surrounding area along with various smaller commercial/industrial facilities.
1893	**North-** Hotel & Police Station recorded to the north of Station Street. The Timber Yard is no longer recorded. **South-**Chapelfield Dye Works has expanded to the south and west, Ardwick Dye Works is no longer recorded, the Tannery is now recorded as Ardwick Tannery. Mayfield Baths and Water Meter Works are now recorded to the west and south of Ardwick Tannery respectively. An Ice Works is recorded to the south of Mayfield Baths. **East-** Timber Yard is no longer recorded and the rest of the land on Site is now covered in residential housing. **West-** A Timber Yard is recorded south of the railway lines at the end of Cross Street.	*Hanover Mills* has expanded, *Ardwick Saw Mill & Mill Yard* is no longer recorded and *Ardwick Bridge Chemical Works* is now recorded as 'Disused'. Tramlines are recorded along *Fairfield Street* and *London Road* and *Maskrey Mill (Cotton)* is now recorded as *Marlborough Mills (Cotton Waste)* (later recorded as a *Mill*).
1908	**North-** Mayfield Works (Dye & Print) & associated reservoirs no longer recorded but buildings/reservoir outlines remain. Police Station in the northwest area and residential housing to the north of Arthur Street are no longer recorded. The Hotel is now recorded as a Public House. **South-**Chapelfield Works (Indian Rubber) has expanded to the west and Ardwick Tannery is no longer recorded. **East-**Half the residential housing to the north of Chapelfield Road is no longer recorded. **West-** The Timber Yard is no longer recorded.	Chief Fire Engine Station (& ancillary buildings) approximately 50 m to the northwest of the Site (currently disused). The residential housing to the north is no longer recorded and a Police Station and Public House are recorded approximately 50 m and 60 m to the northeast of the Site.

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Date	Site History	History of the Surrounding Area
1922	**North-** Residential housing in the northwest is no longer recorded and Mayfield Station (L.M.S.B) and associated railway lines are recorded covering the majority of the north. **South-** Mayfield Baths is now recorded as Mayfield Public Baths and Public Wash House, Tipping Street Chapel is no longer recorded and Britannia Brewery is now recorded as 'Disused'. The Ice Works is now recorded as Ice Factory. **East-** No significant change **West-** A number of residential buildings are no longer recorded and an Engineering Works is recorded to the south of Carston Street.	*London Road Station* has expanded and the number of railway lines to the north has increased. The *Police Station* is no longer recorded and the land to the south/southwest of the Site now comprises predominantly commercial/industrial facilities (*Coachworks, Bakery, Dairy, various Mills/Warehouses*).
1948	**North-**Chapelfield Works (Indian Rubber) has expanded and is now recorded in between Mayfield Station and the River Medlock (culverted in part). Fairfield Street Garage is recorded on a small plot of land to the northwest of Mayfield Station. The northeast corner of Hanover Mill (cotton)is now recorded as a Printing Works. **South-** Mayfield Public Baths and Britannia Brewery (disused) are no longer recorded and the Public Wash House is now recorded as a Dairy. A Leather & Cloth Factory is recorded to the south of the dairy and the Ice Factory is now recorded as Mayfield Ice Factory. **East-** The majority of the residential properties are no longer recorded. **West-** A number of residential properties are no longer recorded in the north, central and southern areas.	A number of Works/Factory at Hanover Mills (Printing Machinery, Stationary, Motor Repair).
1950	**North-** Fairfield Street garage is no longer recorded. Ruins are recorded in between Mayfield Station and Temperance Street. **South-** Ruins are recorded at the former Mayfield Public Baths and the former Britannia Brewery. **East-** No significant change **West-** No significant change	Ruins approximately 100 m northeast of the Site, no other significant change.
1954-1936/64	**North-** The Ruins are no longer recorded. **South-** The Dairy is now recorded as Dairy (Disused), Mayfield Ice Factory is now recorded as Factory, Chapelfield Works (Indian Rubber) is now recorded as Works. The Ruins are no longer recorded. **East-** A Mortuary and a Depot are recorded in the central area. **West-** No significant change	By the mid-late 1950's, two *Garages* are recorded approximately 70 m and 75 m to the northeast respectively. The 1964 map records *London Road Station* as *Piccadilly Station,* two *Depots* are recorded approximately 50 m and 85 m to the west respectively, *Hanover Mills* is no longer recorded and the industry around the former *Hanover Mills* are all recorded as *Works/Factory*.

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Date	Site History	History of the Surrounding Area
1960-1977	**North-** Mayfield Station is now recorded as Mayfield Station (Goods) and the Printing Works is now recorded as Works. **South-** The Dairy (Disused) is now recorded as Works, the Leather & Cloth Factory is now recorded as Factory. **East-** No significant change **West-** Engineering Works is no longer recorded.	The 1970/71 map (1:2,500 scale) no longer records the Mill to the northeast, the larger Depot is now recorded as Estates & Engineering Depot, the Works/Factory are now recorded as Hanover Mills again, a Garage is recorded approximately 50 m to the south of the southwestern corner of the Site and Mancunian Way is now recorded to the immediate south of the Site.
1978-1986	**North-** The Works to the west of Baring Street is no longer recorded. **South-** The Works to the west of Baring Street is no longer recorded and the Factory to the south of the former Works is recorded as Mayfield Works. The Rubber & Plastic Works is now recorded as Works. **East-** Hoyle Street Industrial Estate is now recorded to the south of Rachel Street. **West-** The Car Park to the south of Travis Street is no longer recorded and the area of the land to the north of Travis Street is now recorded as a Car park.	The *Garage* to the southwest is no longer recorded by 1984 and the area around the former *Garage* is now recorded as *Downing Street Industrial Estate*.
1987-1991	**North-** A Scrap Yard is recorded to the south of Mayfield Station in the far east of the Plot. **South-** A tank is recorded to the west of the Works in the east of the Plot and another tank is recorded approximately 100 m to the northwest. **East-** No significant change **West-** No significant change	No significant change
1992 - 1994	**North-** No significant change **South-** No significant change **East-**No significant change **West-** No significant change	The *Garage* to the north of *Fairfield Street* as a *Depot*. There are no further major changes to the surrounding area.

4.2 Regulatory Data

Regulatory data relating to potentially contaminative uses is summarised in Table 4-2 below. This information was obtained from the Groundsure report, presented in full in Appendix B.

Table 4-2 Summary of Regulatory Data

Item	Location [on/off Site]	Information	Potential to Impact
Environmental Permits, Incidents and Registers			
Part A (2) and Part B Activities and Enforcements	2 [on Site]	2 x Part B Historical Permits, metal and other mineral processes	Yes
Licensed Discharge Consents	1 [~50m]	Effective 1995. Sewage discharge effluent, revoked from being received into the River Medlock.	No
National Incidents Recording System, List 2	2 [on Site] 3 [~50m]	Both unidentified pollutant sources occurred in 2001. 2001-2003, contaminated water from urban runoff, and diesel from oils and fuel.	Yes Yes

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Item	Location [on/off Site]	Information	Potential to Impact
No records within 550m of: Historic IPC Authorisations, Part A (1) and IPPC Authorised Activities, Red List Discharge Consents, List 1 and 2 Dangerous Substances Inventory Sites or Water Industry Referrals, Planning Hazardous Substance Consents and Enforcements, COMAH and NIHHS Sites, National Incidents Recording System, List 1, Sites Determined as Contaminated Land under Part 2A EPA 1990, Category 3 or 4 Radioactive Substances Authorisations.			
Landfill and Other Waste Sites			
Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	2 [on Site] 2 [51-250m]	2 x Scrap yards, 1991, 1994 Metal works, 1948	Yes No
EA Licensed Waste Sites	4 [on Site]	Waste treatment to product oil (issued 2015) Metal recycling Site (issued 1996) Inert and excavated waste treatment (issued 2015) Metal recycling Site (issued 1996)	Yes Yes Yes Yes
One historic landfill identified located 341m NE of the Site. Licenced to receive inert and industrial wastes, licence surrender July 1988.			No
Current Land Use			
Current Industrial Sites Data	14 [on Site] 3 [~50m]	Range of industrial works including vehicle repair and servicing, electricity sub stations and tanks. Range of industrial and repair and vehicle works.	Yes No
Records of Petrol and Fuel Sites	1 [51-250m]	85m NE, unbranded	No
No records within 250m of National Grid Underground Electricity Cables.			
Historical Industrial Sites			
Railway Building, including a goods station and Siding Features	On Site	1890 – present	Yes
Tanks	9 [on Site]	Unspecified Tanks present at various times between 1889-1994.	Yes
Other Industrial Buildings e.g. Police Station, Fire Station, Unspecified Mills, Cotton Mills, Iron Works	On Site	1890-1990's	Yes
Historical Garage and Motor Vehicle Repair Database	1 [on Site]	Garage on Site from 1948	Yes
No historical petrol and fuel Sites were recorded within 500m of the Site.			

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5 Previous Site Investigations

Exploratory hole logs from the Ground Investigation & Piling Ltd. (GIP) ground investigation (GI) for the Site have been reviewed. The GI works were undertaken during April 2009 and comprised 7 No. window sample boreholes with associated monitoring and testing. Historic borehole logs from the BGS Geoscience Database have also been reviewed. The data from the ground investigation and the BGS boreholes is summarised in Section 3.1 and logs are included within Appendix D.

It is understood that further ground investigation works have been undertaken on Site, however no information has been made available to BuroHappold at time of writing.

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6 Preliminary Geoenvironmental Risk Assessment

6.1 General Approach

In the UK, the assessment of risk from contamination follows the source-pathway-receptor approach. If one of these three elements is absent, it is considered that there is no risk of harm. If, however, there is considered to be a linkage between any given source and any given receptor, then a risk-based approach is used to assess the significance or impact of any such linkage.

Risks are defined as the probability of an event occurring combined with the severity of the consequence of that event. Particularly, to assess the risks to Site end users posed by any given source, the sensitivity of each receptor is considered. For example, the concentration of contamination acceptable at a Site to be developed as a residential property with a garden used to grow vegetables and accessible to young children is set lower than that for a commercial Site where soil is exposed only in minor areas of landscaping and the only long-term users of the Site are adults. Similarly, a Site overlying a Principal Aquifer supplying potable water to a large population will be considered more stringently than a Site overlying an impermeable geology with only minor seepages of groundwater.

6.2 Sources, Receptors and Pathways

Potential contamination sources have been identified and are summarised in Table 6-1 below. The 'Contaminants of Concern' in this risk assessment are based primarily on information from the review of historical information, reference to DEFRA R&D Publication CLR 8 'Priority Contaminants for the Assessment of Land' and relevant Industry Profile reports published by the Department of Environment. Site specific pathway-receptor linkages have been identified in Table 6.2 with respect to the sources outlined in Table 6-1.

Table 6-1 - Summary of Potential Contamination Sources

Location	Potential Source	Likely Age	Potential Contaminants of Concern
On Site	Infilled land / Made Ground	>100 years	Ground gases / vapours
	Historical Site uses: *Works, printing works, mills, garage, tannery, scrap yard, brewery, iron works, waste tank / reservoirs, mortuary, various depots, smaller commercial/industrial facilities* **Current Site Uses:** *Works / factories, a scrap yard, a depot, Industrial Estate, derelict land and car parking. Garages, tanks, scrap yards, fly tipped material, sub station*	>100 years - current	Heavy metals, organic and inorganic compounds, acids, asbestos, fuel oils, lubricating oils, PAHs, effluent treatment chemicals Heavy metals, organic and inorganic compounds, acids, asbestos, fuel oils, PAHs, solvents.

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Location	Potential Source	Likely Age	Potential Contaminants of Concern
Off Site	**Historical Industrial Uses:** *Saw Mill, Timber Yard, Railway Lines, Cotton Mill, Chemical Works, Dairy, Printing Works.*	>200 years - current	Fuel oils, lubricating oils, PAHs, ethylene glycol, creosote, herbicides, ash, sulphates, heavy metals, organic and inorganic compounds, acids, asbestos, dyes

Table 6-2 - Summary of Receptors and Pathways

Receptor		**Pathway**
Human Health	Construction / Maintenance Workers	Direct contact, ingestion, inhalation
	Future Site Occupants	Direct contact, ingestion, inhalation
	Site Neighbours	Inhalation
Controlled Waters	Principal Aquifer (Sherwood Sandstone	Migration through granular strata
	River Medlock	Leaching and migration via permeable strata. Surface water runoff. Potential could be realised during current use and during restoration earthworks.
Ecology	On Site flora and fauna	Root uptake
Built Environment	On-Site buildings, structures and services	Gas migration via permeable strata with potential for accumulation to hazardous concentrations. Direct contact with contaminated material / aggressive attack.

6.3 Physical Hazards

The Site walkover identified a significant number of needles and other sharps lying on the surface of the Site, this was noted as a particular problem in the area of the former Mortuary. These sharps and the illegal activities that are associated with them will pose a risk to future construction workers that will require mitigation. This risk is not set out in the below table but is taken forwards to the conclusion.

6.4 Results of Risk Assessment

The details of the Preliminary Risk Assessment are presented in Table 6-3 overleaf and the results discussed in Section 8.1.

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Table 6-3 Preliminary Risk Assessment

		Pollutant Linkage	Risk Assessment (following CIRIA C552)			Comment on hazard realisation
Source	**Contaminants of Concern**	**Receptor / Pathway**	**Consequence**	**Probability**	**Risk**	
On site Made Ground	Ground Gas/vapour	**Description of source: Historical maps and data show a number of areas of infilling on Site. Potential for hazardous ground gas and vapours resulting from infilling with putrescible materials and significant depths of Made Ground. Nature of ground gas regime not proven. The relatively permeable Made Ground and limited glacial till are unlikely to limit the vertical and horizontal migration of gas and vapours.**				
		Construction/ Maintenance Workers Gas and vapour migration via permeable strata with potential for accumulation in hazardous concentrations potentially leading to explosion, fire and/or asphyxiation	Severe	Unlikely	**Moderate/ Low**	Limited potential for hazardous gases to impact construction and maintenance workers, possible for gases to build up in enclosed below ground excavations, good ventilation and health and safety practices can mitigate this risk.
		Future site users Gas and vapour migration via permeable strata with potential for accumulation in hazardous concentrations potentially leading to explosion, fire and/or asphyxiation	Severe	Low	**Moderate**	Potential for build-up of hazardous gases in buildings. Capable of mitigation by Site investigation to classify the ground gas regime followed by installation of appropriate gas protection measures.
		On- Site buildings and structures Gas and vapour migration via permeable strata with potential for accumulation in hazardous concentrations potentially leading to explosion and fire	Severe	Low	**Moderate**	Potential for build-up of hazardous gases in buildings. Capable of mitigation by Site investigation to classify the ground gas regime followed by installation of appropriate gas protection measures.
On site historic and current site Uses.	Heavy metals, organic and inorganic compounds, acids, asbestos, fuel oils, lubricating oils, PAHs, effluent treatment chemicals, solvents.	**Description of Source: Historic construction and demolition activities over the years will likely have resulted in the presence of infilled / Made Ground. A timber yard was recorded on Site from 1851 to 1893. A tannery, brewery, and print works were present from 1851 until 1922. A cotton mill was recorded on Site from 1851 – 1948. Ice works and Baths have been recorded on Site from 1893 – 1850. The Mortuary and Depot were present from 1954-1963. Tanks were recorded between 1987-1991.** **Mayfield Station has been recorded in mapping since 1922. Hoyle Street Industrial Estate has been recorded since 1978 and various works and factories have been recorded since 1960 – 1977. Two scrap yards have been recorded; one since 1991, and the other since 1994. There are also two four licensed waste Sites (for metal recycling and waste treatment).** **Historical and recent Sites uses make it likely that contamination is present within site soils. The relatively permeable Made Ground and limited glacial till are unlikely to limit the vertical and horizontal migration of contamination.**				
		Construction and maintenance workers Dermal contact, soil and dust ingestion/ inhalation	Medium	Low	**Moderate / Low**	Potential for exposure during investigations/ earthworks. Period of exposure dependent on construction timescales. Standard Health and Safety precautions likely to be used by workers. Mitigation of potential risks can be achieved by appropriate investigation and adoption of standard good construction practice.
		Future site users Dermal contact, soil and dust ingestion/ inhalation	Medium	Low	**Moderate / Low**	Potential for dust generation, direct contact and ingestion. Exposure time is relatively limited. Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation / mitigation measures including encapsulation.
		Off Site occupiers / visitors of neighbouring land Soil and dust ingestion/ inhalation	Medium	Unlikely	**Low**	Large scale development, potential to impact surrounding visitors by dust generation. Increased potential during any earthworks. Mitigation of potential risks can be achieved by appropriate investigation and adoption of standard good construction practice.

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		Pollutant Linkage	Risk Assessment (following CIRIA C552)			Comment on hazard realisation
Source	**Contaminants of Concern**	**Receptor / Pathway**	**Consequence**	**Probability**	**Risk**	
		Degradation of water quality [Principle Aquifer] Migration via permeable strata, contaminated run off/ near surface soils	Medium	Low	**Moderate / Low**	Potential for increased infiltration and promotion of leaching during development works. Nearest active local abstraction over 700m from the Site. Site not within a groundwater protection zone. Quality of groundwater not known. Mitigation of potential risks can be achieved by appropriate investigation and remedial design. Good construction practice likely.
		River Medlock Migration via permeable strata, drainage pipes and surface run-off.	Medium	Low	**Moderate/ Low**	Potential for contaminated groundwater to migrate via drainage, permeable strata and surface run-off., River Medlock runs through the Site. River Medlock present on site. Mitigation of potential risks can be achieved by appropriate investigation and remedial design. Good construction practice likely.
		Flora Root uptake and contact with soil by invertebrates/fauna	Mild	Low	**Low**	Limited vegetation on Site, future vegetation likely to be within specific landscaped areas utilising imported soils. Mitigation of potential risks can be achieved by appropriate investigation and remedial design.
		Buildings structures and services Direct contact, permeation of water supply pipework. Direct contact/, aggressive attack	Medium	Unlikely	**Low**	Potential for direct contact on redeveloped Site. No record of degradation to water supply or evidence of structures damaged by contaminated soils currently. Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation.
Off site historical industrial uses	Fuel oils, lubricating oils, PAHs, ethylene glycol, creosote, herbicides, ash, sulphates, heavy metals, organic and inorganic compounds, acids, asbestos, dyes	**Description of source: Numerous potentially contaminating activities present on the site boundaries since development of the area. Nature and extent of any contamination that has migrated onto site not proven and unlikely to be gross.**				
		Construction and maintenance workers Dermal contact, soil and dust ingestion/ inhalation	Medium	Very Low	**Low**	Potential for exposure during investigations/ earthworks in site areas adjacent to the site boundary, source likely to be limited. Period of exposure dependent on construction timescales. Standard Health and Safety precautions likely to be used by workers. Mitigation of potential risks can be achieved by appropriate investigation and adoption of standard good construction practice.
		Future site users Dermal contact, soil and dust ingestion/ inhalation	Medium	Very Low	**Low**	Potential for dust generation, direct contact and ingestion in site areas adjacent to the site boundary, source likely to be limited. Exposure time is relatively limited. Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation / mitigation measures including encapsulation.

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7 Preliminary Geotechnical Assessment

7.1 General

On the basis of the desk study data, an outline of geotechnical recommendations for foundation, earthworks and associated risks are set out in the following section. The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock.

In due course, this section would need to be reviewed in the context of additional ground investigation and masterplan development, as there is currently limited data available for the geotechnical/geological characteristics of soil/rock present on Site.

7.2 Geological profile and geotechnical parameters

The geological succession is outlined in Section 3.1 and is thought to comprise a thickness of Made Ground overlying Glacial Till (sporadically present) overlying the Chester Pebble Beds Formation, increasing in competence with depth. Further Site investigation and laboratory testing is necessary for further soil/rock characterization and geotechnical design parameter derivation.

7.3 Excavation, Earthworks and Groundwater Control

Given the development history of the Site, significant thicknesses of Made Ground are anticipated in some areas. If this material is not self-supporting, temporary retaining works would be required for shallow footing and/or any excavations needed (to be established during Site specific ground investigation).

Re-profiling works may be required as part of the development works. It may be possible to re-use suitable material elsewhere on Site, however it is possible that some of the excavated material will be unsuitable for engineering purposes and will require disposal off Site. Material considered unsuitable for engineered fill may be used in non-engineered landscaped areas provided its engineering properties are suitable, and the material is tested for contamination in keeping with the end use of the development. A detailed cut/fill exercise will be required in order to ascertain the amount of surplus arisings that will need to be handled/placed/removed from Site as part of masterplan development.

Materials arising from the removal of any foundations/obstructions and any appropriate Made Ground could, if cost effective, be considered for re-use as hardcore/reprocessed stone if appropriately sorted, processed and treated. This process, if cost effective, has the advantage of minimising waste disposal requirements and reduction of import and use of raw materials in accordance with environmental guidelines and best practice.

The Chester Pebble Beds Formation is a Principal Aquifer, however there is currently no groundwater data available for the Site. Ground investigation is needed to establish the groundwater regime and characteristic soil permeability. From there, the requirement for any groundwater control measures for shallow excavations, and in the permanent case, can be established.

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7.4 Engineering Assessment and Foundation Methods

The foundation options that may be feasible for the proposed development comprise pad or strip footings, raft foundations or piled foundations. The selection of these options is influenced by a number of factors relating to the ground conditions and proposed development. These are generally associated with the ability of the ground to support the loads applied by the structure above and to the sensitivity of the structure to ground movement.

7.4.1 Shallow Foundations

Depending on the structural loads, shallow foundations may be feasible. The Glacial Till or Chester Pebble Beds are envisaged to provide a suitable founding strata for a shallow foundation option (pads/strip/raft) subject to detailed characterisation, although it should be noted that due to the Site history, significant thicknesses of Made Ground are likely to be present in localised areas which could make shallow foundations uneconomic due to required excavation depths.

7.4.2 Piled Foundations

Where shallow foundations are found to be impractical or uneconomical, then consideration will need to be given to piled foundations, particularly for any heavily loaded high rise structures. Rotary bored or continuous flight auger (CFA) are suitable from a technical perspective, with CFA piles socketed into the Chester Pebble Beds likely to be most feasible.

7.5 Buried Structures and Obstructions

Due to the rich development history of the Site, it is considered likely that localised obstructions, such as historic floor slabs, foundations or infilled basements, are present which are not recorded or have not been identified. Any such structures/obstructions/services encountered may require removal as part of any construction works and any excavations should be infilled with suitable structural fill where appropriate.

7.6 Void

A void (~1.50 m diameter x ~5.00 m deep) appeared in the car park of the Transport for Greater Manchester (TFGM) building (Unit 4), directly above the culverted River Medlock during the recent Site walkover. The cause is currently unknown. Further assessment, including a CCTV survey, is currently being undertaken, and appropriate repair/remediation measures will be undertaken once better understood. Bulging and cracking to the nearby car park retaining wall was also noted, with a depression to the tarmac adjacent to the wall. A Design Note has been prepared by Buro Happold and is included as Appendix C.

7.7 Preliminary Geotechnical Risk Register

The Geotechnical Risk Register developed below shows the degree of risk attached to various ground related aspects of the proposed development. The aim of this section is to provide an assessment of the risk to the project that rise from ground related problems (in relation to geotechnical issues and obstructions) and propose possible mitigation measures. The register risk is only an initial assessment and should be revised in the detailed design.

It has been developed in general accordance with the guidance presented in ICE/DETR Document 'Managing Geotechnical Risk' (2001). The degree of risk is determined by combining the assessment of probability of the hazard occurring with an assessment of the impact. The scale against which the probability and impact are measured and the resulting degree of risk determined are shown below.

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Table 7-1 – Risk scoring matrix

Probability	**(P)**		**Impact**	**(I)**		**Risk**	**(R)**
Very Likely	5		Very High	5		Severe	20 – 25
Likely	4		High	4		Substantial	15 – 19
Plausible	3	**X**	Medium	3	**=**	Moderate	10 – 14
Unlikely	2		Low	2		Minor	5 – 9
Very Unlikely	1		Very Low	1		Negligible	1 – 4

Table 7-2 - Risk Register

Site/Ground Conditions	**Hazard**	**Potential Impact**	**P**	**I**	**R**	**Mitigation**
Previous Site use	Contaminated Ground	Health and safety of ground workers, environmental damage	4	4	16	Ground Investigation to be undertaken. Vigilance throughout works. Seek advice of Environmental Engineer if any identified unusual odorous or visually contaminated materials encountered.
Historic buildings on Site	Obstructions / infilled basements	Obstructions to piling. Potential presence of poorly compacted backfill.	5	3	15	Enabling works may be required – to be established following ground investigation and when proposed development is at a more advance stage.
Gradient on Site	Earthworks or retaining walls required to accommodate layout	Increased cost of development	3	4	12	Cut and fill earthworks will be required to the Site to form suitable founding ground. Ground Investigation to confirm the ground model and quality of materials. Ground modelling and slope stability design assessments will be required to confirm designs at detailed design stages
Japanese Knotweed in River Medlock	Spread of invasive species	Damage to structures, illegal spreading of knotweed	4	4	16	Full survey to be undertaken. Appropriate treatment to be undertaken by a suitably qualified professional before construction commences.
Loose or soft, compressible soils at shallow depth	Ground unsuitable for conventional shallow footings	Excess settlement or alternative foundations	3	4	12	Ground investigation needed to confirm soil compressibility. Consolidation and compressibility parameters to be taken into account and allow for settlements.
Soft and compressible near surface soil	Ground unsuitable for conventional ground bearing slab	Alternative floor design	2	3	6	Ground investigation needed to confirm suitability of ground bearing slab.
Loose or unstable strata at shallow depth	Excavation Instability	Potential collapse – Health and safety	3	4	12	Support of excavations to be considered for temporary construction works if required.

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Shallow groundwater	Excavation Instability / Water ingress into excavations / Slab Uplift	Collapse of excavations. Difficulties in casting concrete e.g. for foundations. Damage to structure from slab uplift.	3	4	12	Groundwater monitoring to be undertaken as part of ground investigation. Groundwater control measures, e.g. sump pumping, may be required for shallow excavations. More substantial control measures (e.g. secant piled walls) may be required if permanent groundwater level is shallow, or for deep excavations / reductions in level below groundwater table.
Unexploded Ordnance	Encountering unexploded WWII bombs	Risk to human life, damage to structures	3	5	15	Detailed UXO risk assessment was undertaken by Planit UXB Ltd. UXO management is required during the GI / construction based on the findings.
Coal mining	Unstable ground	Voids in historic mine workings causing collapse; potential for soft ground / voids within historic mine shafts	1	5	5	Coal Authority report / records and geological maps indicate that the risk from historic coal mining is low.
Voids	Unstable ground	Potential harm to structures and human life. Cost of repairs.	4	4	16	Voids have opened up on / near Site (Section 3.5 refers). Investigation required to establish extent, cause and mitigation.
Live services	Diversions required, explosion, flooding, damage to utilities	Diversions may be required, increasing cost. Risk of injury if excavated through during GI / construction	5	3	15	GPR utilities survey to be undertaken before ground investigation. To be incorporated into design to minimise clashes / diversions.
River Medlock	Working near water	Construction or GI workers falling in, causing injury / death	3	4	12	Appropriate measures required for working in close proximity to River Medlock.
Needles and sharps	Needles and sharps	Harm to workers – diseases, cuts	4	4	16	Vigilance and appropriate PPE. Site to be cleared of sharps and other potentially harmful materials before construction starts.

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8 Conclusions and Recommendations

8.1 Summary of Contamination Risks

The identified potential risks above Low are summarised below:

- There is a Moderate risk to future Site users and future buildings due to release of ground gases from Made Ground underlying the Site;
- There is a Moderate/Low risk to Site workers due to the potential for inhalation of ground gas. This risk is likely to be mitigated by standard working practice assuming that no deep poorly ventilated excavations are required.
- There is a Moderate / Low risk to construction workers, future site users and controlled waters from historic and current site uses which are likely to have contaminated Site Made Ground.

A ground investigation over the whole Site area will be required to better understand the risks identified and allow the adoption of suitable remedial measures if required.

8.2 Geoenvironmental Conclusions

This site has a long industrial history which has continued until present day. It appears likely that significant thicknesses of Made Ground are present on site as some areas appears to have been filled and there has been significant redevelopment over the years. This industrial legacy is likely to have contaminated shallow soils to some extent and a ground investigation is required to define the extent of contamination and determine the need for remedial measures as part of development work.

8.3 Geotechnical Conclusions

The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock. A range of foundation options are possible for the development based on a desk based study of available information, however there is currently insufficient information to create a detailed ground model. A ground investigation will be required to produce a detailed ground model to allow geotechnical design.

8.4 UXO Conclusions

An Explosive Ordnance Threat Assessment (EOTA) has been undertaken by PLANIT UXB Limited (Appendix A). The EOTA states that a "Medium" Ordnance Threat Level applies across the Site, and that "a UXO threat management strategy is required to be in place prior to intrusive engineering works". Further liaison with PLANIT is ongoing to establish the extent of the mitigation measures required, and whether the Site can be 'zoned' in terms of risk level.

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8.5 Recommendations

8.5.1 Ground Investigation

A combined geotechnical and geoenvironmental ground investigation is required to better understand the potential contamination risks identified and to produce a detailed ground model to allow geotechnical design.

8.5.2 Physical Hazards

Sharps and Needles were identified on Site during the Site walkover. It is recommended that a sharps and needle disposal specialist is consulted with regards to identifying the extent of and appropriate measures for Site management and/or removal of these items prior to the start of any construction works. It is also recommended that the site is secured prior to any such removal to prevent further sharps beings dumped on site.

8.5.3 Japanese Knotweed

Large quantities of Japanese Knotweed were identified on the banks of the River Medlock within the channel during the Site walkover. There was no visual evidence that knotweed had migrated out of the channel onto surrounding areas of the Site, however it is quite possible this has occurred. It is understood that a full survey of the river will be undertaken in the near future, which will fully characterise the extent of knotweed present. It is recommended that a Japanese Knotweed specialist is consulted with regards to identifying the extent of the infestation and recommending appropriate measures for Site management and/or removal of Japanese Knotweed impacted material.

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Deloitte.
Real Estate

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Appendix 2.2: EIA Scoping Opinion

MANCHESTER CITY COUNCIL

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16th August 2019

FAO Michael Percival
Deloitte LLP
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Spinningfields
Manchester
M3 3HF

Dear Sir / Madam

Environmental Impact Assessment Regulations, the Town and Country Planning (EIA) (England) Regulations 2017 (as amended) (the "EIA Regulations").

Opinion on Scope of an Environmental Statement under Section (paragraph 1)

Further to your request in respect of the above dated 24th January 2019 and subsequent request dated 24th July 2019.

It is noted that the site is bounded by **Mayfield Phase 1 site bounded by Fairfield Street to the north; Temperance Street to the north-east; the Mancunian Way Ring Road (A635) to the south; and Baring Street / London Road (A6) to the west**.

It is located immediately within the Mayfield SRF (2018) and Masterplan area and to the north of the North Campus SRF area. The area surrounding the site is occupied by a variety of uses typically found in the City Centre including the major Rail and Metrolink Transport Hub at Piccadilly Station, the Mancunian Way / Inner Ring Road, offices, hotel, residential and light industrial uses. The site is currently accessed by pedestrians from Hoyle Street, Baring Street, Temperance Street and Bond Street.

The Proposed Development would comprise

Mayfield Park: Circa 6.5 acres (2.63 ha) of public park, including hard and soft landscaping to be delivered in phases with indicative zone for a new bridge to be identified**;**

Plot N (MSCP): Ground plus 10 storey MSCP for circa 600 car parking spaces, cycle storage and energy infrastructure;

Plot O (Office): Ground plus 8 storey office-led circa 90,000 sq. ft. (GIA) or 9,000 sq. m. with active ground floor uses, public realm and riverside walkway;

Plot M (Office): 13 storey (including ground and mezzanine) office block located north of Bond Street and east of Nether Street at the south of the Mayfield SRF at circa 29,000 sq. m. with associated access, amenity, public realm and back of house facilities

Highways and Infrastructure Works: creation of new junction from the Mancunian Way, creation of new access road to the southern boundary of Mayfield servicing Plots O, N, G and H, flood alleviation and re-profiling of the River Medlock.

Proposed Heights (approximate)

Plot O – up to 72m AOD (30m AGL) including roof level;
Plot N – up to 72m AOD (30m AGL) including roof level;
Plot M – up to 85.5m AOD (50 AGL); including ground, mezzanine and plant
600 car parking spaces within the proposed MSCP

In coming to a formal opinion on the scope of the Environmental Impact Assessment (EIA), Manchester City Council, as Local Planning Authority, has taken into account the supporting information contained within your Scoping Report.

I have now had a chance to consider your scoping request and I outline my response below. This scoping report has been the subject of consultation in accordance with the EIA Regulations.

Overall I can confirm that the content of the submitted 'Formal Scoping Opinion Request' is considered to be appropriate and will form a generally appropriate structure for the Environmental Statement. This is also reflected in the nature of the consultation responses. You should note the specific points which have been made and therefore particularly regard must be given to these.

The following consultees were asked to comment on your request and full copies of the comments are attached from those who responded.

- **Greater Manchester Archaeological Unit**
- **Head of Regulatory and Enforcement Services (Contaminated Land Section)**
- **Head of Regulatory and Enforcement Services (Pollution Services)**
- **Head of Engineering Services**
- **MCC Flood Risk Management Team**
- **Environment Agency**

- **Greater Manchester Ecology Unit**
- **Transport for Greater Manchester.**
- **Network Rail.**
- **Natural England**
- **The Wildlife Trust for Lancashire, Manchester and North Merseyside.**

Scoping Report

I have the following specific comments to make in respect of the scoping report:

Items to be included as Technical Chapters and scoped in

Townscape and Visual Impact

The comments within your scoping report are noted and are acceptable in terms of their consideration in the ES. I would like to agree the extent of view points which will be assessed as part of the townscape and visual impact assessment as detailed within your scoping report. It is essential that kinetic views of the arrival into Piccadilly Station are shown in any visual assessment in order to understand any impacts on the wider cityscape, along with any inter-visibility with the nearby grade II listed buildings and surrounding Conservation Areas.

Transport and traffic

With regards to transport and traffic, the comments within your scoping report are noted are acceptable in terms of their consideration in the ES subject to consideration of the following:

Mitigation Measures

Impacts of the development should be identified through the above assessment work. Appropriate mitigation to accommodate any increases in traffic generation and increased pedestrian and cyclist movements should be provided within the EIA.

The EIA should consider the impact of the development on the existing public transport networks in terms of extension of bus services, additional person trips. Mitigation measures should be considered where appropriate.

There will also be the requirement to consider the impact of the development on the public realm and infrastructure in the Portugal Street SRF and Piccadilly HS2 SRF as well as the need to improve linkages to the heart of the City Centre.

Ground conditions

The comments within your scoping report are noted and are acceptable in terms of their consideration in the ES.

Air Quality and Dust

The comments within your scoping report are noted and are acceptable in terms of their consideration in the ES.

Noise and Vibration

The comments within your scoping report are noted and are broadly acceptable in terms of their consideration in the ES.

Ecology and Biodiversity

The comments within your scoping report are noted and are acceptable in terms of their consideration in the ES.

Wind and microclimate

The comments within your scoping report are noted and are acceptable in terms of their consideration in the ES.

Socio-economic impacts

The comments within your scoping report are noted and are acceptable in terms of their consideration in the ES.

Daylight and sunlight and overshadowing

The comments within your scoping report are noted and are acceptable in terms of their consideration in the ES

In addition, as the development site is located within a regeneration area, where other sites are likely to come forward for redevelopment in the near future, conclusions should be drawn that there are no overshadowing or overlooking impacts that could impact on the viability of other sites coming forward at a later stage.

Water Resources (including Drainage and Flood Risk)

The comments within your scoping report are noted and are generally acceptable in terms of their consideration in the ES. However the following should be noted and addressed within the ES:

It is recommended as a key element of the site is the River Medlock, and an important aquatic habitat that supports existing fishery; impacts and opportunities on the river's aquatic fauna is also considered in Environmental Statement.

It is recommended as the River Medlock waterbody (WFD Ref: GB112069061152) is currently failing it's statutory ecological objectives under North West River Basin Management Plan (https://www.gov.uk/government/publications/north-west-river-basin-district-river-basinmanagement- plan) is one of the main ecological receptors within the Mayfield site that the ability to design and create a high quality river restoration project along the River Medlock corridor at Mayfield, Manchester provides an important step to improving the ecological potential of this waterbody.

The Environment Agency have stated in their response that they are aware that the wider area has been subject to prolonged industrial use. They therefore disagree with the assessment of risk in that they consider with the length of use, diversity of use and likely

industrial practices that the risk to the water environment is moderate to high and in some places very high.

We note that the range of industrial activities is such that we would advise against a generic analysis suite and would suggest, alternatively, a suite per parcel of land or area of land a suite based on the history of land use (e.g. contaminants arising from a dye and printing works is much different to those produced by a Tannery – both of which are recorded as being present on this site).

Linked to this is stated desire to remove some or all of the current river bank configuration. They believe that the current hard architecture of the river banks is likely to be acting a break to potential pollutant linkages to the river and the large scale hard standing is likely to be reducing the possible mobilisation potential of pollutants laterally and/or vertically. In brief therefore we believe that the industrial legacy at this site is complicated and will, potentially, produce a series of technically demanding challenges now and in the future which should be addressed carefully and with support from the Environment Agency and other relevant organisations.

To this end, therefore, you are advised you should include a section in the proposed Environmental Impact Assessment which covers water resources and geo-environmental ground conditions where a standard Phase 1 desk study can be included as a technical appendices or signposted to as a necessary future piece of work that all future work (ground investigation, risk assessment and possibly remediation) will be based upon.

Please also note the Model Procedures and good practice measures detailed within the Environmental Agency's response (attached).

The area is situated within the Conurbation Core Critical Drainage Area and in accordance with the Manchester City Council SFRA at least a 50% reduction in surface water runoff should be provided through SUDS as part of any brownfield development with the aim of reducing to the Greenfield runoff rates.

Surface water should be managed to ensure there is no increased surface water from the proposed development and runoff from extreme events should be retained within the site such that the adjacent third party land is not affected.

The Government has strengthened planning policy on the provision of sustainable drainage systems (Suds) for ‘major’ planning applications which was introduced on 6 April 2015 (Paragraph 103 of National Planning Policy Framework and Ministerial Statement on Suds). As per the guidance issued by the Department of Communities and Local Government (DCLG), all ‘major’ planning applications being determined from 6 April 2015, must consider sustainable drainage systems.

The suitability of sustainable drainage systems should be assessed in accordance with paragraphs 051, 079 and 080 of the revised NPPF Planning Practice Guidance for Flood Risk and Coastal Change (http://planningguidance.planningportal.gov.uk/blog/ guidance/flood-risk- and-coastal-change/).

Sustainable drainage systems should be designed in line with national Non-Statutory Technical Standards for SuDS (https://www.gov.uk/government/uploads/system/uploads/attachment_data

/file/415773/sustainable-drainage-technical-standards.pdf) and local policies EN08, EN14 and EN17 of the Core Strategy.

Hydraulic calculations and drawings to support the design need to be provided along with proposed standards of operation and maintenance in accordance with paragraph 081 of NPPF Planning Practice Guidance.

If a new surface water outfall is proposed into the River Medlock a Land Drainage Consent from Manchester City Council is required. Consent forms can be obtained on the website at:

http://www.manchester.gov.uk/downloads/download/5567/land_drainage_consent_and_guidance.com

If surface water is to be discharged into a United Utilities sewer this should be agreed in principle with them.

Cumulative impacts

The list of cumulative sites for assessment has been considered in order to assess any cumulative impacts of developments in this part of the City Centre this should include consideration of Land at Ducie Street (app ref no 120149), 27 Dale Street (app ref no 116401), Red Lion Street (app ref 113713), Brownsfield Mill (App ref 115401).

Matters which should be scoped in

Within your scoping opinion, you have identified Climate Change, Human Health, Electronic Interference / TV and Telecommunications, Archaeology and Built Heritage as items to be scoped out of the EIA.

Matters which can be scoped out

The City Council has considered the remaining matters which you have scoped out of the EIA:

Climate Change, Human Health, Electronic Interference / TV and Telecommunications, Archaeology and Built Heritage

The comments within your scoping report and addendum are noted and are acceptable and the City Council is in agreement that these matters can be scoped out of the EIA. This is provided that the applications are supported by the appropriate documentation as detailed within your scoping report and addendum including details of any mitigation to minimise any effects as a result of the development.

As a result of consultation with statutory consultees at this time additional areas of work are not expected to form part of any EIA. However, the Local Planning Authority would also reserve the right to seek further information in connection with the Environmental Statement as matters arise. This letter also confirms the matters within part I of Schedule 4 to the to the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 that need to be covered within the Environmental Statement.

If you wish to discuss the above please contact Angela Leckie on the above number.

Yours sincerely

Julie Roscoe

For the Head of Planning (attachments sent by e-mail)

Appendix 5.1: Construction Management Plan Park and Highways

Mayfield Park, Public Realm & Highways

Outline Construction Management Plan

26 September 2019

Notice

This document and its contents have been prepared and are intended solely for the Client's information and use in relation to Mayfield Development (General Partner) Limited.

Faithful+Gould assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 24 pages including the cover.

Document history

Revision	Purpose description	Origin-ated	Checked	Reviewed	Author-ised	Date
Rev 1.0	First Issue	AP	CS	MP		26/09/2019

Client signoff

Client	Mayfield Development (General Partner) Limited
Project	Mayfield Park, Public Realm & Highways
Job number	5161138-014
Client signature / date	

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1.0 Introduction

The purpose of this Construction Management Plan (CMP) at this planning stage is to outline our approach to managing the construction of the Mayfield park, public realm and highways works which will be delivered as part of the first phase of delivery works for the scheme. This document should be read in conjunction with both the Office and MSCP Construction Management Plan (Appendix 5.1) and ES Volume 1 Construction Management and Phasing Chapter (Chapter 5).

This document includes comment on the envisaged construction operations comprising: site establishment, logistics and the process of managing the overall local environment. It seeks to ensure that the works cause the minimum practicable disruption to residents including by achieving a safe working and living environment.

Once contactors have been appointed and prior to development of each Phase (B to H) starting on site, an updated CMP will be submitted pertinent to that Phase. This CMP covers Phases B, C, D, F, G and H. We expect a pre-commencement condition to be attached to any planning permission requiring submission of updated CMPs.

To the extent that this project execution requires third party regulatory approvals, this Plan will be reviewed to bring it into line with such requirements of the same. Liaison with the neighbours and interested parties will continue throughout project execution and as information is updated. Neighbours will be kept informed of progress and anticipated works.

The Plan provides an overview of the key project activities. Generic statements will be updated at the appropriate stage of the project execution together with relevant procedures and detailed method statements. This Plan will be used as the template for developing the construction phase health and safety plan, in tandem with the Construction Method Statement. In selecting the appropriate constructors, we shall assess their project track record and management procedures to ensure capability to deliver a project safely and with minimum practicable disruption and inconvenience to local residents. Throughout the works the constructors will be required to provide relevant method statements and risk assessments for the works.

Benchmarking against relevant Key Performance Indicators will be used to monitor the constructor's performance against the qualities in this plan.

2.0 Project Overview

2.1 The Mayfield Development (General Partner) Limited

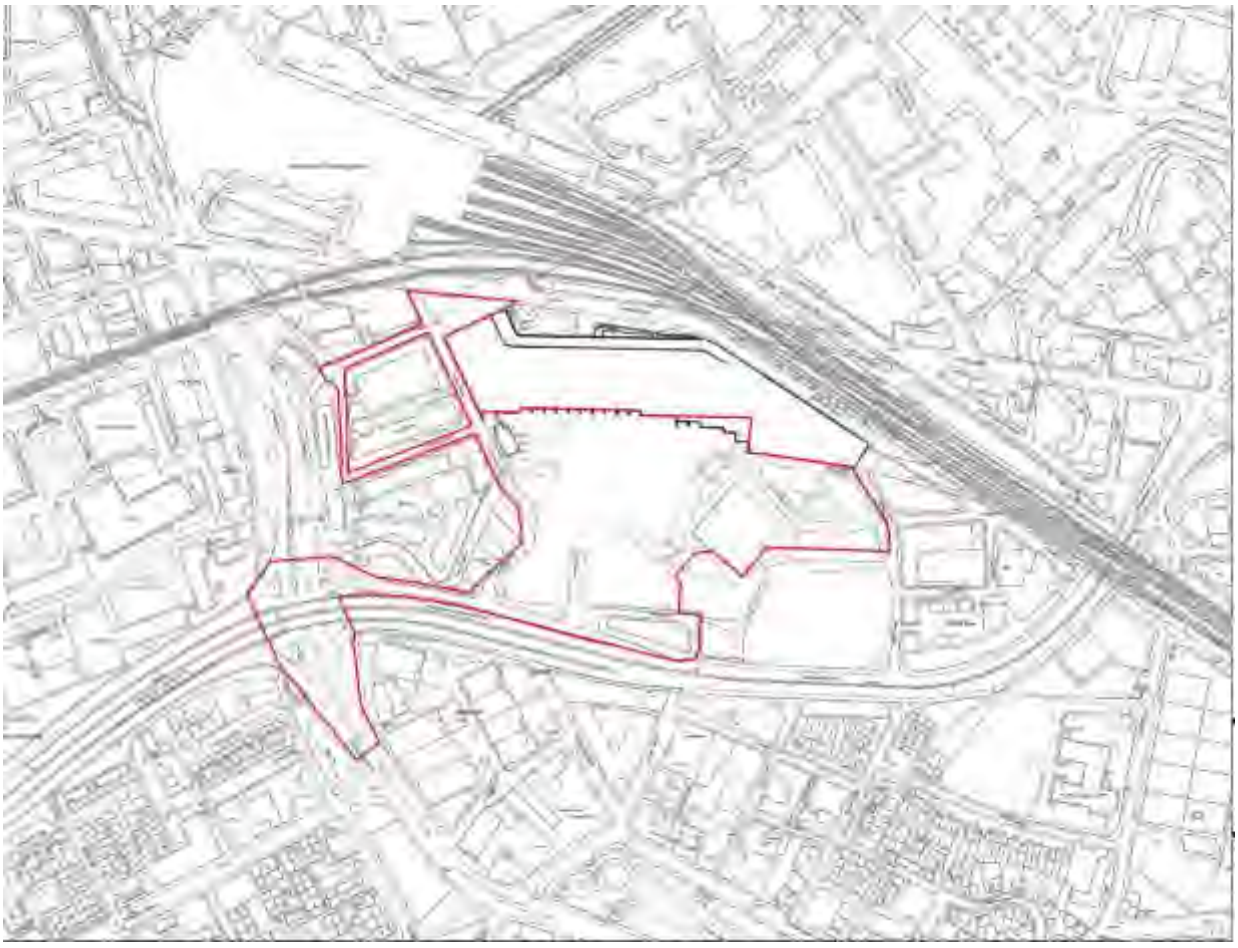
Mayfield will be delivered by The Mayfield Partnership, a public private joint venture partnership between LCR, Manchester City Council, Transport for Greater Manchester and regeneration specialist U+I Group. Together, they have a vision for a bustling, buzzing, inclusive world-class urban neighborhood that's like nowhere else in the city. They want to create an area with soul that's a magnet for families, businesses and visitors. The long-term plan for Mayfield is to create an iconic, £1bn mixed-use community over the next 10 years, including a 6-acre public park, outstanding office space, and unique shopping and leisure experiences.

2.2 Phase 1 EIA Boundary

A 6-acre Mayfield Park, Public Realm proposals to the space immediately north of The Mayfield Building as well as public realm proposals along Baring Street, and the new southern access route that runs along the southern edge of the site immediately north of the Mancunian Way and improvements to the site access from London Road.

The plan underneath shows the Phase 1, Application 1, EIA Boundary (Red Line Boundary) of the site.

Site Red Line Boundary



2.2.1. Phase 1

The area highlighted in the underneath plan reflects the park, public realm and highways works which will be delivered as part of the first phase of delivery works for the scheme. These elements support the development of plot schemes Baring Street Multi Storey Car Park (MSCP) and Baring Street Office 1. It is noted that an element of the river will be opened up in advance of the delivery of the park phase F, G and H (see phasing plan below), along with the completion of reprofiling to elements of the river banks to meet the Environment Agency's requirements.

Phasing Plan



3.0 Scope of Work

3.1 Site Description

The proposed development site is located on the south side of Fairfield Street next to Manchester Piccadilly Station. The site is also bounded by the Mancunian way to the south and Baring Street to the west (and associated streets), which forms part of the public realm. The River Medlock runs across the Site from the eastern boundary to the western boundary. The Site is largely cleared, save for Unit 5 that will be demolished as part of a later phase of works.

4.0 A Description of the Main Works

4.1 Park

The Park will deliver 6 acres of space, including hard and soft landscaping and is to be delivered in phases.

Key construction activities of the proposed phase 1 scheme are:

- Bulk Earthworks & Remediation
- Removal of river culvert
- Flood alleviation compensation areas and re-profiling of the River Medlock banks.
- Construction of River Walls and Engineering Structures
- Bridge Construction
- Infrastructure works

Detailed scope of works:

- Construction of foundations for subsequent bridges across the River Medlock.
- Development of the sequence of spaces and the transition between each of them.
- Baring Street Terrace – to sculpt the level change and access route into the park.
- Baring Street seating area.
- Hierarchy of access routes across the park.

4.2 Public Realm – Baring Street

Key construction activities of the proposed phase 1 scheme are:

- Improvement of pavement on Baring Street as well as on the triangle formed between Baring Street, Fairfield Street and Travis Street.
- Installation of high-quality mobile planters throughout Baring Street.

Detailed scope of works:

- Introduction of green swales to support SUDS (sustainable urban drainage solutions) or planters phase 1.
- Improved pedestrian and cyclist experiences through the space.
- Ultimate reduction of traffic speeds, and creation of a one-way traffic system.

4.3 Highways

Key construction activities of the proposed phase 1 scheme are:

- Improvements to London Road junction and the opening up of the on slip from London Road into the Mayfield site.
- Southern boundary approach road between London Road and the Hoyle St junction.
- Movement strategy for the whole site including associated stopping up and rerouting of existing roads.

Detailed scope of works:

- Improved pedestrian crossing points on site boundaries i.e Fairfield street.
- TROs and Stopping ups
- Baring Street site specific Highway improvement for plot accesses.

4.4 Construction Activities

The main construction activities:

- Site set-up
- Removal of existing concrete ground slabs.
- Vegetation clearance and topsoil stripping.
- Site establishment.
- Earthworks construction, including movement of materials for site reprofiling.
- Open up of culverted river.
- Construction works for the Park (including construction of bridge, foundations retaining walls), Public Realm and Highways.
- Realignment works associated with creation of new turning lane at London road junction
- Improvement of drainage and surface finished to both pavements and roads.
- Re lining of routes to indicate traffic flows.

4.5 Construction Programme and Hours of site opening / operation

4.5.1 Construction Programme

Subject to completion of the RIBA Stage 2 and 3, mobilisation to site and construction phase will commence Q2 2020 with a completion target date for the Park & Public Realm and Highways Q4 2023. Indicative construction programme for the Park and Highways is set out in the table below:

Park Indicative Construction Programme

Description	Duration
Site clearance Creation haul roads and compound including hoarding installation. Slabs and structures removed	2 months
Removal of culvert lid (not walls)	1 month
Reduced level dig To create alleviation areas	12 months
Retaining structure installation	6 months
Creation of plots at correct level.	2 months
Removal of river walls	2 months
Reprofiling of river banks	2 months
Creation of park – finishes and planting	6 months

Highways Indicative Construction Programme

Description	Duration
London road works to create turning lane (both ways)	6 months
Mancunian slip works	3 months

Description	Duration
Baring street amendments	4 months
TROs / stopping up – notice period elsewhere – physical on site works	1 months
Fairfield square	4 months

4.5.2 Hours of site opening / operation

Working hours at the site will be according to the standard hours of operation for Manchester, as stated in the 'Environmental Protection Information for Developers' by Manchester City Council (MCC). Therefore, hours of operation will be according to MCC's guidelines, which state that construction work should normally take place only between the following hours:

- Monday – Friday*: 7.30am – 6pm
- Saturday*: 8.30am – 2pm
- Sunday / Bank holidays: No work

*Workforce may arrive on site 30 minutes prior but no working outside these times, unless changed by prior agreement. Noise to be kept to a minimum in the first hour.

If it is required to work outside these hours, this will only be done following consultation with Manchester City Council's Environmental Health officers.

4.6 Equipment and Plant

The Contractor will identify the equipment and plant to be used, including type, size and expected number. All plant will be selected to conform to the environmental noise limits set out in the Noise and Vibration chapter (please see chapter 6).

5.0 Structure and Responsibilities

A management structure that includes an organisational chart encompassing all staff responsible for environmental work is to be included within the CMP. This will set out the respective roles and responsibilities with regards to the environment and identify the nominated Construction Environmental Manager. Illustrative key roles and responsibilities are set out in Table 1 below.

Table 1 – Key Roles and Responsibilities

Role	Responsibility
Construction Manager	Responsible for management of the construction phase of the project. Has overall responsibility for the environmental performance of the project.
Site Materials & Waste Manager	Responsible for implementing the Site Waste Management Plan during the construction phase to ensure that waste is disposed of legally, economically and safely.
Construction Environmental Manager	Compliance with environmental legislation, consents, objectives, targets and other environmental commitments, including those arising from the Environmental Statement.

Site Staff	To receive general environmental awareness training, and undertake work in accordance with Method Statement Briefings and toolbox talks. Trained personnel to manage particular tasks such as refuelling plant and equipment, managing the stores, water quality monitoring and supervising the segregation and collection of waste.
Client Project Manager	To ensure that the Contractor complies with all the relevant legal requirements, commitments and targets agreed for the scheme.
Designer	To provide information relevant to construction that may assist the Contractor to manage environmental aspects of the scheme.
Community Liaison Officer	Communications with the public and interested parties, outreach and education, where appropriate.

6.0 Communication

The CMP will be distributed to the project team, including sub-contractors, to ensure that the environmental requirements are communicated effectively. Key activities and environmentally sensitive operations will also be briefed to staff and Contractors. Project, client and company environmental policies, where available, should be displayed on site. In addition, key contacts during the construction phase will be made available at the entrance of the site.

The Contractor will define procedures for internal and external communication. The client may require that any communication with external parties such as environmental regulators or the public is undertaken through a nominated client representative.

The agreed CMP will be published on the project website.

During the construction phase, internal communication will include regular progress meetings, which should cover:

- Training undertaken
- Progress reports
- Inspections, audits and non-conformance
- Complaints received
- Visits by external bodies and the outcome or feedback from such visits
- Objective / target achievement, including reporting on environmental performance.

External communication, including letter drops or meetings, and liaison with statutory authorities will be overseen by the Client Project Manager.

7.0 Complaints, Compliments and Inquires

- A Community Liaison Officer will be available on site and a telephone number will be published for use by members of the public wishing to complain, provide other feedback, or make enquiries.
- All complaints or information requests will be made aware to the Client Project Manager and will be logged promptly.

- Noise may be a key subject of complaint where construction works take place close to residential areas. Working hours, plant types, construction methods and noise mitigation measures are likely to be subject to Section 61 consent, under the Control of Pollution Act which is granted by the local authority. Close liaison with the local authority environmental health team is likely to be necessary to develop mitigation measures.
- Liaison will also be undertaken with local councillors and town/parish councils as representatives of the local community to discuss and address any issues.
- The local authority environmental heath team may also be the first to be contacted by residents affected by noise and will require to be kept appraised of progress, programme and upcoming phases of works that may give rise to disturbance in order that they can respond to complainants.
- Careful monitoring of complaints received, including recording details of the location of the affected party, time of the disturbance and nature of the noise can assist with managing the works to reduce the likelihood of further complaint.

7.1 Checking

- Environmental monitoring will be undertaken in order to provide information to be taken into account during construction and to feed back into the CMP and method statements, and to evaluate the environmental effects of the construction process.
- The Contractor's Environmental Advisor is responsible for establishing a programme of environmental monitoring. This will include monitoring against any consent requirements and objectives and targets. The ES should be referred to in establishing baseline conditions.

7.2 Evaluation of Compliance

The Contractor will define procedures for regular site surveillance to evaluate performance against legal requirements and the requirements of the CMP.

Procedures for addressing non-conformance and corrective actions are to be provided. These may include, for example:

- A Non-Conformance Report (NCR) that will be raised to record an environmental incident and work that has not been carried out in accordance with the CMP or Method Statement.
- A Corrective Action Report (CAR) that will be raised where a deficiency is identified as a result of monitoring, inspection, surveillance and valid complaints.

Any actions identified shall nominate an owner to follow through the action to be taken, along with a specified timescale for it to be closed out.

7.3 Control of Records

Environmental records, including waste management records, will be maintained in accordance with the respective company procedure and legal requirements. The records are to be maintained, in either hard copy or electronic format as required by the individual procedure that the records relate to, in such a way that they are readily identifiable, retrievable and protected against damage, deterioration or loss. The procedure that the records relate to also specifies the retention time for the records and who has the authority to dispose of them.

7.4 Management Review

The outputs from section 7.1 Checking, will be reviewed on an on-going basis at progress meetings to ensure continual improvement in accordance with the BS EN ISO 14001 model.

Review of the CMP will be carried out at each project phase and where changes are made that affect the scope of the works to ensure its continuing relevance and accuracy.

8.0 Legal and Other Requirements

A schedule of appropriate environmental legislation and good practice that will be adhered to is to be included within the CMP. A register of permissions and consents that may be required, with responsibilities allocated and a programme for obtaining them is to be developed by the Contractor. Environmental consents and licenses that may be required to enable the construction works are given in Table 2.

Table 2: Environmental Consents & Licences

Legislation	License / permission requirement
Planning Act 2008	Consent for the scheme. Any requirements attached to the consent will need to be adhered to.
Control of Pollution Act 1974	Prior consent to carry out construction works from the Local Authority under Section 61.
Badgers Act 1992	A license is required from Natural England for works within 30 m of a badger sett.
Conservation (Natural Habitats & c.) Regulations 1994	A license may be required if protected species are disturbed by a development e.g. bats
Environmental Permitting Regulations 2007	It is not anticipated that a waste management permit will be required as part of the works. However certain activities are exempt from waste management licensing and must be notified to the Environment Agency in advance.

There will be a number of permits required from the Environment Agency for working within and adjacent to the River Medlock. These will be applied for in conjunction with the local Environment Agency delivery team.

9.0 Operational Control Procedures

9.1 General

Specific management proposals to be included in the CMP are to be developed relating to the following topics:

- Site establishment
- Boundary fencing
- Protection of existing environmental features
- Loading and unloading of plant and materials
- Site housekeeping
- Site water management plan
- Measures to control Noise and Vibration during construction
- Air Quality Plan

- Archaeology and Cultural Heritage
- Soils
- Contaminated Land
- Waste
- Energy
- Materials
- Transport
- Road Clearing Regime and Wheel Washing Facilities
- Parking of Vehicles of Site Operatives and Visitors

Outline management proposals for each of these topics are described below.

9.1.1 Site Establishment

Facilities will be established to minimise risk to the environment and promote efficient use of resources. This will include:

- Temporary protective fencing will be erected to delineate the working areas, site boundaries and protect sensitive features from disturbance.
- Temporary offices, welfare facilities and secure storage of equipment.
- Any necessary fuel and oil will be stored in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001. Refuelling will only be undertaken in a designated area, designed to contain contaminated runoff, and by trained personnel. Emergency spill kits are to be readily available.
- Materials storage areas will be set up and managed.
- Waste segregation areas will be established utilising containers of an appropriate design to ensure that no waste can escape.
- Sewerage effluent from the site office and welfare facilities will be removed from site using a vacuum tanker, if no sewer connection is available.
- Temporary lighting will be designed to minimise spillage of light, and oriented away from residential properties.

9.1.2 Boundary Fencing

The site boundary will be fenced as necessary for security, to prevent windblown litter or waste from polluting the wider environment and to exclude species such as badgers that may be trapped or harmed in excavations or around plant or materials.

9.1.3 Protection of Environmental Features

Temporary fencing will be provided to protect existing environmental features to be retained, including existing trees which will be protected in accordance with BS5837 2012 - ‘Trees in relation to design, demolition and construction - Recommendations’. The fencing will be established prior to the start of the construction works. The location will be agreed on site with the Construction Environmental Manager and client. The fencing will be of sufficient durability to be in place for the duration of the works.

9.1.4 Loading and unloading of plant and materials

The Contractor will define the method of delivery / removal of materials and plant from the site, including the identification of access routes for deliveries and personnel. In general, access will be maintained at all times.

9.1.5 Site Housekeeping

A 'good housekeeping' policy will be adopted across the site. This will include the following requirements:

- No fires on site
- Considerate behaviour of all site staff.
- Removal of food waste and other rubbish at frequent intervals.
- Maintenance of road cleanliness surrounding the site.
- Maintenance of road cleanliness surrounding the site.

9.1.6 Site Water Management Plan

The Contractor shall adopt good construction management practices that will reduce the risks of accidental discharge of pollutants into streams, rivers or ponds, or contamination of groundwater. Such practices shall be incorporated into the CMP and as per the water resources and flood risk chapter, in relation to management of construction activities to groundwater pollutants and pathway linkages.

- A pollution control and contingency plan will be prepared to set out the requirements for pollution prevention during the works.
- Drainage during the construction phase will use the permanent drainage system where possible.
- The Contractor is required to give consideration to minimisation of water use during the construction phase.
- The Contractor shall identify or verify the extent and status of all ground waters below land used for the works, including any temporary works and land used for the extraction of materials or tipping. The Contractor shall identify or verify the extent and categories of any source protection zones for abstraction sources for public potable water supplies within this land.
- The works shall comply with the "Policy and Practice for the Protection of Groundwater. Environment Agency; TSO 1998 ISBN 0-11-310145-7".
- Authorisations for the use in earthworks of borrowed or waste materials may be required under The Groundwater Regulations 1998, or under other relevant legislation. The Contractor shall consult the Environment Agency and shall apply for and comply with such authorisations as they advise are necessary.
- The Contractor shall consult the Environment Agency and agree with them any special measures to be taken within source protection zones (if present) in respect of the excavation and tipping of materials, the siting of Contractor's facilities and measures to prevent the spillage of potential pollutants.

9.1.7 Measures to control Noise and Vibration during construction

The Contractor shall prepare a Management Plan for the control and monitoring of noise and vibration (see also related Chapter of the ES). All plant will be selected to conform to the environmental noise limits set out in the Noise and Vibration chapter (please see chapter 6).

- The Contractor shall make any necessary separate application(s) to all relevant Local Authorities, under Section 61 of the Control of Pollution Act 1974, and obtain consent(s) to undertake the works. Application(s) shall be made at least 28 days before commencement of any activity or works, which may cause noise and vibration disturbance.

- The application(s) shall include the Contractor's proposals for minimising noise from the construction works to the level(s) agreed with the Local Authority. The Contractor shall comply with the terms of the consent(s) so obtained.
- Notwithstanding the terms of any consent obtained under Section 61 of the Control of Pollution Act 1974, the Contractor is required to comply with the provisions of the statutory code of practice BS5228: Noise Control on Open and Construction Sites. The Contractor shall provide a draft copy of the Section 61 Agreement to the Client Project Manager for comments and a copy of the final agreement.
- Noise and vibration will be controlled and limited so far as reasonably practicable so that sensitive receptors are protected from excessive noise and vibration arising from construction.
- Certain activities may extend outside normal working hours to enable safe working or as a result of unforeseen events. The Environmental Health Team will be contacted to agree the activities required. The principles of Best Practicable Means will be employed to minimise noise levels during construction. Recommendations for the control of noise and vibration on construction sites are set out in BS 5228.

9.1.8 Air Quality Plan

The Contractor shall conform to the Air Quality chapter (please see chapter 8) and comply to the air quality mitigation measures set out in the chapter during the construction phase of works.

The Contractor shall prepare a Management Plan for the control and monitoring of dust, smoke and any other airborne pollutants (see also related Chapter of the ES).The Contractor shall, prior to the commencement of the works on site, make any necessary application(s) for authorisation to the relevant Pollution Control Authority (Local Authorities and the Environment Agency) under the terms of the Environmental Protection Act 1990 and the Pollution Prevention and Control Act 1999. Emissions to the air including dust and exhaust fumes can be caused from certain construction activities, including: Earthworks / excavations.

All necessary and practicable measures to control dust emissions through good housekeeping and site operational practices shall be carried out including:

- Sheeting of vehicles: all HGVs carrying loose material capable of spillage or which has the potential to give rise to dusty emissions from the vehicles during transit shall be sheeted.
- This requirement shall be enforced by the Contractor and any transgressions shall be recorded in a log book by the Contractor with details of measures to be taken to prevent further occurrences. The log book shall be available for inspection by the Client Project Manager and local authority at any time during working hours.
- Compound: an area of hard standing of reasonable size shall be provided by the Contractor around site offices and over vehicle management areas, so that dust will be kept to a minimum by appropriate control methods.
- Drainage arrangements will be included where necessary. The area will be swept at least once every two days or more frequently as the Client Project Manager considers appropriate.
- Water bowsers/sprays: Water sprays shall be applied to all demolition operations as the Client Project Manager considers appropriate. Prevention of wind-blown dust arising from storage mounds: storage mounds shall be profiled to reduce erosion where the nature of the material could lead to it being rain washed or windblown.
- Mound surfaces shall be kept sufficiently damp to prevent windblow unless and until the surface is sprayed, sealed or stabilised by means of vegetation. Materials that have the potential to give rise to dust emissions shall be stored as far away from the site boundaries as is reasonably practicable.
- Dust collection during cutting and grinding works: if this is not carried out in an enclosure, tools shall be used that are fitted with dust collection devices (excluding small tools which require a continuously wet working surface).
- Fires: these will be prohibited on site.

- Compliance by construction vehicles with emissions legislation, servicing and MOT requirements: all vehicles regularly used on site shall comply with the relevant emissions standards and shall be serviced in accordance with the manufacturer's recommendations. MOT and service documentation shall be produced for the local authority's inspection. The Contractor is encouraged to use vehicles and plant that meet the latest emissions regulations.
- Engine idling time: No construction plant or vehicle shall leave its engine running when not directly in use, except where the Client Project Manager considers that there are operational or other reasons to justify an exception.

The Contractor shall keep a log book available for inspection by the local authorities, in order to record the following matters:

- Any complaint relating to emissions alleged to be due to construction activity received from a local resident or business, including date and nature of the complaint and any measures taken as a result of that complaint;
- The date and location of cleaning of paved areas and off-site roads; and
- The date and vehicle registration number of any construction vehicle that is observed carrying material that has the potential to release dust during transit and is not covered.

Details of measures taken to prevent further occurrence shall be included.

9.1.9 Archaeology and Cultural Heritage

Salford Archaeology carried out a desk-based assessment of the Phase 1 development site which was intended to establish, as far as possible, the nature and significance of the sub-surface archaeological resource within the site, and to establish the impact of any future development on this resource. Research has revealed that the site lay outside the medieval core of Manchester.

Little evidence of prehistoric, Roman or Medieval occupation has been identified and it is likely that the site remained undeveloped until the late 18th century, when the area experienced the first phase of the rapid industrial development and associated expansion of population which continued into the 19th century. A diverse range of industrial businesses were based on the site, attracted by the location on the edge of Manchester as well as easy access to the River Medlock.

One of the earliest, and certainly most famous of these businesses was the Mayfield Printworks, which grew from humble beginnings in 1782 to become the largest textile finishing business in the country during the 19th century. The changing fortunes of the industry meant however that by 1897 the company had gone into voluntary liquidation. None of the sub-surface archaeological assets within the boundary of the proposed development are afforded statutory designation that would necessarily warrant their preservation in-situ.

However, the assessment has identified areas of potential buried archaeological interest across the site. These potential remains include the former Mayfield Print Works as well as a diverse range of remains dating from the 18th and 19th centuries, including the former Chapelfield dye works, the Ardwick dye works, the Ardwick tannery, the Britannia Brewery and the Mayfield Ice Factory. Remains of the dense network of 19thcentury worker's housing that occupied other parts of the site are also likely to survive, as well as the remains of a number of public buildings such as Mayfield Baths and the Corporation Inn public house.

The requirement for any further archaeological investigation in advance of, or during, development works will be decided by the Greater Manchester Archaeological Advisory Service, in their capacity as archaeological advisor to Manchester City Council.

In the first instance, however, it may be anticipated that the presence or absence of the potential remains identified by this assessment will require verification through a programme of archaeological trial trenching prior to development and, pending the extent and significance of any surviving remains, further archaeological excavation may be required to mitigate the loss of buried remains during the proposed construction programme.

It is also anticipated that an archaeological survey of the historic retaining walls on the River Medlock within the site will be required prior to any enabling works or construction works taking place.

9.1.10 Soils

CL:AIRE (Contaminated Land: Applications in Real Environments) is the current management organisation for the Definition of Waste: Development Industry Code of Practice (DoWCoP). CL:AIRE will be used in the construction of the scheme and in order to maximise the potential resource available on site and minimise waste needing to be disposed, careful handling of soils is critical.

This Code of Practice sets out good practice for the development industry to use when assessing whether excavated materials are classified as waste or not. It also allows the determination, on a site-specific basis, when treated excavated waste can cease to be waste for a particular use. Further it describes an auditable system to demonstrate that this Code of Practice has been adhered to.

If materials are dealt with in accordance with this Code of Practice the Environment Agency (EA) considers that those materials are unlikely to be waste if they are used for the purpose of land development. This may be because the materials were never discarded in the first place, or because they have been submitted to a recovery operation which has been completed successfully so that they have ceased to be waste.

The next three basic steps are to be used:

1. Ensuring that an adequate Materials Management Plan (MMP) is in place, covering the use of materials on a specific site;
2. Ensuring that the MMP is based on an appropriate risk assessment, that underpins the Remediation Strategy or Design Statement, concluding that the objectives of preventing harm to human health and pollution of the environment will be met if materials are used in the proposed manner; and
3. Ensuring that materials are actually treated and used as set out in the MMP and that this is subsequently demonstrated in a Verification Report.

The Code of Practise relates to excavated material, which includes:

- Soil, both top soil and sub-soil, parent material and underlying geology;
- Soil and mineral based dredgings (only if appropriate dewatering has taken place);
- Ground based infrastructure that is capable of reuse within earthworks projects, e.g. road base, concrete floors (permitted controls may apply);
- Made ground;
- Source segregated aggregate material arising from demolition activities, such as crushed brick and concrete, to be reused on the site of production within earthworks projects or as sub-base or drainage materials; and
- Stockpiled excavated materials that include the above.

More detail with regards to construction phase mitigation measures are provided under ES Chapter 10, Ground Conditions.

9.1.11 Contaminated Land

The Code of Practice (CL:AIRE) applies to both uncontaminated and contaminated material from man-made and natural sources excavated:

- For use on the site from which it has been excavated, either without treatment or after on-site treatment (required treatment is an indication a material is a waste) as part of the development of that land (i.e. Site of Origin scenario);
- For use directly without treatment at another development site subject to the material meeting the Requirements of the Code of Practice (i.e. Direct Transfer scenario);
- For the use in the development of land other than the site from which the material has been excavated, following treatment at a Hub site which is covered by an Environmental Permit including a fixed Soil Treatment Facility (STF) acting in this capacity (i.e. Cluster Project scenario); or
- Combination thereof.

Depending on the sites involved and the nature of the projects other options may be more appropriate than using this Code of Practice in excavating and reusing those materials, for example:

- Waste Exemption – small volumes, non-hazardous waste classification, recovery only;
- Standard Rules Environmental Permit – replaces the traditionally used Waste Exemptions;
- Bespoke Environmental Permit – greater volumes than standard rules, applicable to more waste streams but can take several months to obtain; and
- WRAP Aggregates Quality Protocol – allows for inert aggregate waste to be recovered and used at any site subject to meeting set standards.

Full liaison will occur with the Environment Agency regarding methodology for dealing with contaminated land. The overall principal to be followed will be to treat material on site and then reuse within the final design levels. Removal of materials off site will be minimised.

More detail with regards to construction phase mitigation measures are provided under ES Chapter 10, Ground Conditions.

9.1.12 Waste

The Materials Management Plan should set out the objectives relating to the use of the materials and should accompany a Remediation Strategy or Design Statement, which has been derived using an appropriate risk assessment. It should bring together all the relevant information to demonstrate that all four key factors will be

met and include a tracking system and contingency arrangements. The Materials Management Plan template is hosted on the CL:AIRE website and available as a separate downloadable document.

A Verification Plan has to be set out in the Materials Management Plan. It must identify how the placement of materials will be recorded and the quantity of material to be used. Further, it should contain a statement on how the use of the materials relate to the remediation or design objectives. Once the development has been completed a Verification Report must be produced that demonstrates that the materials have been located in the correct place within the development or dealt with appropriately.

9.1.13 Energy

In line with the UK Energy Efficiency Action Plan, energy efficiency measures and greener energy sources should be considered and implemented where possible. Using energy more efficiently assists with cutting carbon dioxide emissions:

- Energy consumption is to be minimised and energy use during construction monitored.
- Construction plant and equipment is to be maintained to maximise fuel efficiency.
- Utilise energy from renewable sources where practicable.

- Utilise energy from renewable sources where practicable.
- Ensure efficient materials handling / husbandry.
- Minimise workforce travel.
- Incorporate and source local materials to minimise associated transportation.

9.1.14 Materials

Reprofiling materials of the site will be used, including flood compensation area, which will provide soil material required for embankments required by the design for the park and highways.

Timber used in permanent and temporary works is to be from sustainably managed sources with recognised timber labelling or from re-use.

Local materials will be sourced to minimise associated transportation, where possible.

Material procurement procedures are to be employed that involve purchasing materials based on their environmental impact.

A materials register is to be provided to the Client Project Manager at hand-over that identifies the main material types to facilitate the development.

9.1.15 Transport

Road transport is a major source of local air and noise pollution and contributes to carbon dioxide emissions. Opportunities to minimise construction traffic are to be considered, measures may include for example, reducing the transport impacts of materials and construction staff.

More detail with regards to transport under the Transport in general and Transport Assessment under the ES Chapter 7: Traffic and Transport.

9.1.16 Road Cleaning Regime and Wheel Washing Facilities

The Contractor will ensure that pro-active measures are taken to prevent slurry/spoil from vehicles leaving site during the works being deposited on the public highway. The cleanliness of site roads will be inspected regularly by the Principal Contractor(s) who will provide wheel-washing apparatus (A sponge and Hose pipe) and will ensure that all exiting site traffic is thoroughly cleaned. Wagons carrying loose material will be covered before leaving site, additionally, damping down will be considered in windy weather conditions, depending on the materials being carried. Additional damping down and road sweeping will be introduced if required as the project progresses.

9.1.17 Parking of Vehicles of Site Operatives and Visitors

The new development allows room for site operative and visitor parking. Therefore, operatives and visitors will be able to park on site instead of using car parking spaces anywhere else.

10.0 Outline Pollution Control and Contingency Plan

A pollution control and contingency plan will be developed by the Contractor and included within the CMP to provide details of the measures to be implemented to prevent pollution of the aquifer and the actions to be taken in the event of an environmental incident or emergency.

An ‘environmental incident’ is defined as any event, activity or condition that causes, or has the potential to cause harm to people, or damage to property or the environment. ‘Pollution’ is defined as any harmful impact on the local atmospheric, aquatic or land environment caused by release of hazardous or nuisance-causing substances or excessive noise and vibration.

10.1 Pollution Prevention

Works will be taking place adjacent to River Medlock. The River Medlock runs through the site and will be significantly affected by the works. Potential pollutants from the works include:

Silt
Cement and concrete
Oils and fuels
Waste materials Effluent/waste water from site accommodation

Concrete and cement are very alkaline and can cause serious pollution. To minimise the risk of run-off entering any watercourse, concrete and cement mixing will be sited at least 10m away from any watercourse and plant cleaned within designated washout areas. Wash water from concrete and cement works must never be discharged into a watercourse.

To minimise the risk of pollution from oils on site, measures are required in relation to their storage, use and disposal. Environmentally considerate lubricants, such as synthetic, non-toxic biodegradable hydraulic fluids are available and may be used at sensitive locations.

Measures will be developed to control site runoff and prevent contamination. Account will be taken of the Environment Agency Pollution Prevention Guidelines.

Appropriate pollution prevention measures will be proposed by the principal Contractor and will be detailed in the CMP.

10.2 Fuel and Oil Handling

All fuel and oil will be stored in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001 and they will be handled in such a way that risk of pollution is minimised, this will include:

Fuel and oil storage tanks will comply with the Control of Pollution (Oil Storage) (England) Regulations 2001 and will be locked when not in use.

Storage areas will not be located within 10m of the watercourse or highway gully.

Mobile bowsers will be bunded and will comply with the Control of Pollution (Oil Storage) (England) Regulations 2001 and will be locked when not in use.

- Drums will be stored in bunded areas with a minimum capacity of 25% of the total volume contained within the bund, or 110% of the largest container, whichever is greater.
- Drums will be maintained in good condition, fitted with lids and labelled to indicate the contents.
- Trained operatives only will carry out refuelling of plant and equipment.
- Static combustion engine plant (e.g. compressors, lighting sets) will be integrally bunded or placed on drip trays.
- Plant will be regularly checked for leaks and will be regularly maintained.
- Spill kits will be provided within close proximity to fuel and oil storage areas and operatives will be trained in their use.

10.3 Maintenance of Plant

Any maintenance of plant and equipment will be carried out at least 10m away from any watercourse or drain. Spill kits will be available during all plant maintenance operations and drip trays used to contain any leakage of oil.

Any plant or equipment considered to be a pollution risk will either be repaired or removed from site.

A designated concrete washout area will be provided for washing out concrete delivery lorries, concrete pumps and grout lines. This will consist of a small skip lined with an impermeable membrane or similar arrangement.

10.4 Control of Sedimentation

Natural, local materials can present a pollution risk in some contexts. Disturbance and handling of soils, particularly in wet weather, can lead to particles being carried by running water into watercourses. The Brook, running through the site and being crossed by the route is particularly at risk from sedimentation. Measures to minimise the risk may include good soils management as well as:

- Locating activities likely to give rise to sediment away from watercourses. Ensuring vegetated areas are set aside to act as buffer zones along the top of each bank of a watercourse.
- The provision of silt fencing to remove suspended particles from running water.
- Settlement tanks or lagoons or the use of flocculants to treat water containing suspended particles prior to its release to any water body.

10.5 Notification Procedures

Procedures for reporting any spillages or pollution incidents are to be set out. The procedure will include recording all incidents in the project progress report and providing details to the Client Project Manager.

Contact details for key site and emergency response personnel with responsibilities relating to the protection of the environment will be kept and publicised in key locations on site. Key contacts will include:

- Contractor's Project Manager
- Construction Manager
- Construction Environmental Manager
- Client Project Manager
- Community Liaison Officer
- Fire, Police, Ambulance
- Environment Agency

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Appendix 5.2: Construction Management Plan Office and MSCP

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Member of the SNC-Lavalin Group

Mayfield Phase 1

Outline Construction Management Plan - Application 1 buildings

Mayfield Partnership

02 October 2019

Notice

This document and its contents have been prepared and are intended solely as information for Mayfield Partnership and use in relation to support the first Mayfield Phase 1 planning application.

Faithful+Gould Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

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Rev 1.0	Draft	AP	ND	-	AP	20/09/19
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1. Introduction

This Outline Construction Management Plan has been prepared on behalf of the Mayfield Partnership in support of a detailed planning application for a new commercial office (Baring Street Office 1) and multi storey car park (Baring Street multi storey car park) as part of the Mayfield Development. It should be read in conjunction with the main Construction Management and Phasing Chapter within the ES Volume 1 (Chapter 5).

The two buildings form part of a wider phase one planning application, which also includes the Mayfield Park, public realm and highway modifications. A separate Outline CMP has been prepared in relation to the Park and Highways works (ES Volume 2 - Appendix 5.1) to support the overarching ES Volume 1 Chapter 5.

This Outline Construction Management Plan provides a structure that will be developed by the appointed contractor(s) and aims to demonstrate what will be included as part of the detailed Construction Management Plan.

It is the appointed contractor(s) responsibility to identify all relevant regulations and statutory approvals within the detailed Construction Management Plan, ensuring all necessary permissions are obtained prior to commencing work.

It is proposed the detail of the final Construction Management Plan is controlled using planning conditions to allow details to be developed by the appointed contractor(s) in advance of works commencing on site. This will allow enough time to agree the contract specific requirements.

2. Site description

2.1. Phase 1 planning application site

The Phase 1 site is located entirely within the Mayfield Strategic Regeneration Framework (SRF) area, which lies to the south of Fairfield Street in Manchester City Centre, near Piccadilly mainline railway station. The Mayfield SRF area is bounded by Fairfield Street to the north; Temperance Street to the north-east; the Mancunian Way Ring Road (A635) to the south; and Baring Street / London Road (A6) to the west. The Phase 1, Application 1, site boundary is shown in SEW image '0343-SEW-ZZ-ZZ-DR-Z-0001200', that has been submitted as part of this application.

A large part of the northern side of the Mayfield area is occupied by the Mayfield Depot building and associated railway infrastructure, which was formerly in use as a passenger railway station, and latterly as a Royal Mail Depot. This is now in operation as a multi-cultural mixed-use leisure and entertainment venue, which will be in operation until 2024 as per the temporary Planning Permission granted.

The north-east of the Mayfield area is bounded by Temperance Street, where the arches of former railway infrastructure are occupied by various workshops, storage spaces and other meanwhile uses. Centrally and to the south of the Mayfield SRF area, low rise warehouses and industrial units have been demolished so that the site now comprises open land and surface car parking.

The western end of the Mayfield SRF area is bordered by Baring Street, beyond which the area is characterised by more recent residential-based development, including the Macdonald Hotel and purpose-built student accommodation.

2.2. Application 1 Baring Street Office 1 and Baring Street MSCP

As per the Proposed Development, the two buildings are proposed to be located to the south west of the Mayfield area bounded by Baring Street to the west, the Mancunian way to the south, the River Medlock and Mayfield Park to the north and the future development plot (Baring Street Office 2 – see Application 2 below) to the east.

Baring Street Office 1 (referred to as Plot O in the SRF) comprises 9 storeys (including ground and mezzanine), including active ground floor uses, public realm and riverside walkway.

Baring Street MSCP (referred to as Plot N in the SRF) comprises 10 storeys, with 543 car parking spaces, including disabled persons' parking bays and electric charging.

Full details of the Proposed Development are provided within the Planning Statement submitted with this application.

A separate project will be undertaken as part of the highway and park contracts to facilitate the office and MSCP. This will comprise:

- ground reprofiling to manage the flood compensation;
- opening up the river and forming the new river walls;
- service diversions / strip out of services;
- ground remediation;
- removal of buried obstructions;
- highway modifications to Baring Street and London Road junction; and
- various Traffic Regulatory Orders (TRO's).

2.3. Application 2 – Baring Street Office 2

Baring Street Office 2 (Plot M in the SRF) is located to the east of the Baring Street MSCP and will comprise of a 13-storey commercial office development, including ground and mezzanine floors, including active ground floor uses.

3. Operational control procedures

Specific management proposals will be developed within the detailed Construction Management Plan, including the following topics:

- Site establishment
  - Temporary offices, welfare, storage of materials and plant
  - Temporary boundary treatment
  - Security
  - Site opening / operative hours
- Health, safety and staff wellbeing
  - Construction Phase H&S plan
  - Risk identification and control
- Site logistics
  - Access / egress
  - Parking of vehicles for visitors and site operatives
  - Temporary traffic management strategy
  - Loading and unloading strategy
  - Crane strategy
  - Road cleaning regime and wheel washing facilities
  - Protection of existing environmental features
  - Waste management plan
  - Contamination
  - Fuel and oil handling procedures
  - Co-ordination of adjacent construction activities
- Contractors organisation structure / roles and responsibilities
- Site administration
- Quality management
- Environmental and sustainability management
- Community engagement
- Third party coordination and management

The information contained in the rest of this document is site-specific, but subject to change following appointment of the contractor(s) and development of the detailed Construction Management Plan.

3.1. Outline sequence of activities

To facilitate the delivery of the buildings, an enabling package will be required, which will be incorporated into the Mayfield Park contract. Before works can commence on the buildings, the following activities must be completed:

- ground re-profiling to manage flood compensation through an extensive cut and fill exercise;
- localised formation of river walls (within vicinity of Baring Street Office 1);
- service diversions / services strip out;
- removal of buried obstructions;
- ground remediation;
- modification to the highways, London Road and Baring Street; and
- Traffic Regulatory Orders.

The appointed contractor(s) will take possession of the site at formation level, post all enabling and demolition works, and it is assumed all three buildings will require a piled foundation solution with a steel frame superstructure. Subject to planning approval, the construction of Baring Street Office 2 may overlap with construction of the Application 1 buildings.

The assumed sequence of activities, which will need to be determined by appointed contractor(s), is:

- Weeks 1-4: Mobilisation and site establishment
- Weeks 5-17: Sub-structure to both buildings
- Weeks 18-38: Superstructure (including floors)
- Weeks 30-44: Façade and internal fit-out
- Week 44: MSCP complete
- Weeks 44-64: Continue Baring Street Office 1 internal fit out
- Week 64: Baring Street Office 1 complete

It is anticipated that two cranes will be required for the Application 1 buildings; one to the north of Baring Street Office 1 and the second to the east of Baring Street MSCP. However, the appointed contractor(s) will determine the construction methodology.

3.2. Site establishment

The establishment of the site will be agreed with MCC through the condition discharge process and requirement for the contractor to submit a detailed CMP. This will follow the general principles of site establishment set out as follows:

- For Baring Street Office 1 and Baring Street MSCP, it is likely the appointed contractor(s)s compound will be on an adjacent plot to the east of the sites, this will provide immediate access to the site, minimise the interface between the public and site operations and provide vehicular access directly from the Mancunian Way.
- Temporary protective fencing will be erected to delineate the working areas, site boundaries and protect sensitive features from disturbance.
- Temporary offices, welfare facilities and secure storage of plant and materials will be provided by the contractor.
- Any necessary fuel and oil will be stored in accordance with the appropriate regulations. Refuelling will only be undertaken in a designated area, designed to contain contaminated run-off, and by trained personnel.
- Emergency spill kits will be available.
- Material storage areas will be set up and managed.
- Waste segregation areas will be established utilising containers of an appropriate design to ensure the specific waste is contained.
- Sewerage effluent from the site office and welfare facilities will be removed from site using a vacuum tanker, if no sewer connection is available.
- Temporary lighting will be designed to minimise spillage of light, and oriented away from residential properties.
- The site boundary will be fenced as necessary to prevent unauthorized access and maintain a secure site perimeter.
- Appropriate measures will be taken to protect the river Medlock and other environmental features with regular dialogue with the Environment Agency and other statutory authorities / third parties.
- General hours of site opening / operation.

The anticipated normal working hours for the project are anticipated to be as follows:

Monday – Friday:	8:00 – 18:00
Saturday:	8:00 – 14:00
Sunday:	With prior arrangement and subject to proposed site activities

3.3. Health, safety and staff wellbeing

The Construction Phase Health and Safety Plan will describe the arrangements for the management of construction work and the monitoring of compliance with relevant statutory provisions, to ensure the effective management of health and safety throughout the construction period on site. This document fulfils the Principal Contractor's duty under regulation 12 of the Construction Design and Management Regulations 2015.

The appointed contractor(s) will have specific processes and documents in place through their own management system to ensure compliance with all regulations. These documents, which form an integral part of this plan, define and describe procedures which ensure, so far as is reasonably practicable, the health and safety of all persons on site, or others who may be affected by the construction works.

Key information on health and safety risks, including relevant parts of the construction phase health and safety plan, will be shared with contractors and discussed at the initial subcontractor health and safety meeting. It will also be communicated with workers through induction and worker engagement.

CDM Regulation 12(2) requires that the Construction Phase Plan must include specific measures concerning work which falls within the categories set out in Schedule 3 of the Regulations. The appointed contractor will be responsible for preparing and maintain this list of possible Schedule 3 activities, with appropriate control strategies applied.

Appropriate site safety rules will be implemented and regularly reviewed by the appointed contractor(s).

The appointed contractor(s), through their management systems, will implement measures to ensure the health and wellbeing of all site operatives.

3.4. Site logistics

A detailed logistics plan will be developed by the appointed contractor(s) as part of the detailed Construction Management Plan.

3.4.1. Site access/egress

The emphasis of our traffic management plan is to provide safe and efficient access and egress for personnel and vehicles in and around the site, minimising disruption to neighbours and existing user of the surrounding roads as well as public walking around the external of the project.

It is anticipated construction traffic will use the newly modified London Road junction to access the site via the Mancunian Way slip road located to the south of the MSCP (Plot N in the SRF), with site compounds located to the east. Egress will be via either Baring Street or utilising the existing slip road to access the Mancunian Way.

A detailed plan will be developed to define all vehicle movements, including operatives, visitors, deliveries, removal of materials, waste and plant.

3.4.2. Parking of vehicles for visitors and site operatives

It is anticipated parking for site visitors and site operatives will be restricted to the contractor's compound. Managers and the work force are encouraged to use public transport routes as there are ample public transport links with the Piccadilly train station less than 5 minutes' walk away. There are various car parks within a short distance to the site.

Contractor's vans shall only be permitted on the site following prior agreement with the logistics manager and will park in designated areas. Vans are only generally permitted if required to complete the contactor's works.

3.4.3. Temporary traffic management strategy

The appointed contractor(s) will liaise with the highway authority to implement a temporary traffic management strategy to ensure activities that impact the surrounding highways are managed in a safe manner. Where possible disruption to the local highways will be minimised but where this is unavoidable appropriate actions will be put in place and will be approved by the highway authority before works commence.

During the construction phase there are several road and footpath closures required which will need to be undertaken to facilitate the construction phase. This will include Baring Street and part of London Road and the exact timing of this will be detailed in a further CMP to be agreed with the City Council and Highways Authority prior to development commencing.

3.4.4. Loading and unloading strategy

As part of the detailed logistics plan, the appointed contractor(s) will establish a detailed loading and unloading plan to minimise disruption to the local highways and ensure co-ordination with other site activities. It is anticipated the access routes will be similar to that identified above regarding site access / egress.

Vehicles do not only create a risk upon arriving on and leaving our site but also during the approach to site. All delivery vehicles are required to be FORS registered minimum bronze heading towards gold standard.

The Logistics Manager will be responsible for the maintenance of the delivery system and will highlight any updates in the weekly coordination meetings with all Works Contractors planning deliveries. Materials will be managed on a Just in Time basis with storage kept to an absolute minimum within the site area. The Site Logistics Works Contractor will be responsible for all material movement and storage throughout the site.

Deliveries will need to be programmed with the Site Logistics Works Contractor with a minimum of 48hrs notice given and then only if there is time in the delivery programme. All deliveries will be coordinated with the Construction Manager daily who will have the overall authority on delivery priorities.

Access through Manchester City Centre to the site will be avoided, with traffic using larger arterial routes that allow easy access to the site.

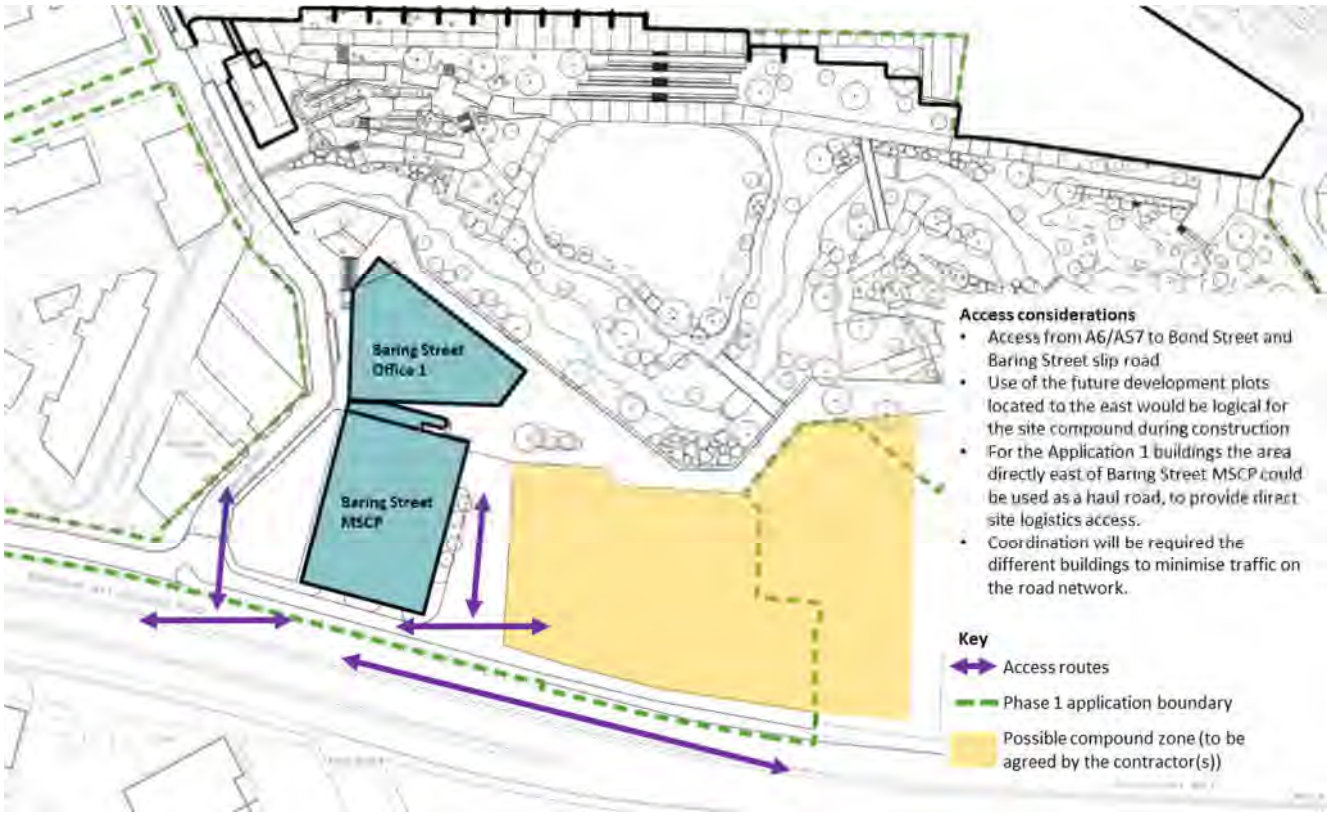


Figure 3-1 - Indicative vehicle movements across the site (to be confirmed)

3.4.5. Crane strategy

It has been assumed two cranes will be required to deliver both buildings within the planned programme, with likely set up north of the office and east of the MSCP, however, the appointed contractor(s) will have to establish their construction methodology and crane strategy. All required approvals will be in place prior to erection of any cranes used on the site.

3.4.6. Road cleaning regime and wheel washing facilities

The contractor(s) will ensure that pro-active measures are taken to prevent slurry/spoil from vehicles leaving site during the works being deposited on the public highway. The cleanliness of site roads will be inspected regularly by the Principal Contractor(s) who will provide wheel-washing apparatus and will ensure that all site vehicles are thoroughly cleaned.

Wagons carrying loose material will be covered before leaving site, additionally, damping down will be considered in windy weather conditions, depending on the materials being carried. Additional damping down and road sweeping will be introduced if required as the project progresses. The contractor(s) will implement additional procedures as required to manage the removal of any contaminated materials from site.

3.4.7. Waste management plan

The contractor(s) shall, in order to reduce the need for waste disposal, minimise the generation and environmental impacts of waste arising during the works and shall maximise opportunities for the re-use and recovery of wastes.

The management and disposal of waste generated by this contract will be managed in accordance with the contractor's Waste Management Procedure and recorded in the Site Waste Management Plan. The appointed contractor(s) shall make any necessary applications to the Local Authority and/or the Environment Agency for the storage, treatment or disposal of wastes.

Waste will be formulated initially as excavated material and be taken offsite as muck away from the sewer and utility diversion works and then the substructure works (piling, capping beam and bulk excavation). All arisings from these works will be removed from site by a licensed haulier/ contractor and will be taken to a licensed destination.

Other waste generated on the project will be taken offsite with skips managed by the contractor, who will seek to employ a local waste management company and they will be responsible for delivering, exchanging and removing skip containers from site when required.

Hazardous waste bins will also be present on site for items such as silicone, spray cans, paint and oily rags. The waste management contractor will hold a valid waste carriers license and waste destination facility permit.

3.4.8. Contamination

Measures will be put in place to minimise all forms of pollution arising from the works and will be managed via the appointed contractor(s) specific procedures within their management system. Environmental risks will be assessed, and mitigation measures established to reduce the impact. The contractor shall adopt good construction management practices that will reduce the risks of accidental discharge of pollutants into watercourses or groundwater. These practices will be incorporated into the detailed Construction Management Plan.

The appointed contractor(s) will request information from the Client on any ground investigations undertaken to identify whether the land is contaminated. If the land is contaminated works will be carried out in accordance in accordance with best practice.

A comprehensive programme of material testing will be required to demonstrate that earthworks materials are to the required standard and this testing programme should be extended to cover contamination testing of materials where appropriate.

3.4.9. Fuel and oil handling procedures

All fuel and oil will be stored in accordance with the relevant regulations and handled in such a way that minimises the risk of pollution.

3.4.10. Coordination of adjacent construction activities

The appointed contractor(s) will establish a process to ensure regular dialogue to manage the co-ordination of adjacent construction activities. This should consider key interfaces, timing of activities, deliveries, crane strategy, access/egress, loading and unloading, traffic management etc.

3.4.11. Contractor's organisation structure / roles and responsibilities

As part of the detailed Construction Management Plan, the appointed contractor(s) will establish their organisational structure, key points of contact and clearly defined roles and responsibilities, setting out who has responsibility for key roles on the project.

3.4.12. Site administration

This will include the following:

- monitoring of the site;
- site diary;
- correspondence;
- drawings and design management;
- management of subcontractors;
- instructions;
- change control; and
- contract records.

3.4.13. Quality management

The appointed contractor(s) will implement a quality management system in accordance with their internal procedures, considering:

- quality management systems;
- inspection and testing;
- material samples;
- quality inspections by subcontractors;
- quality inspection records; and
- quality audits.

3.4.14. Environmental and sustainability management

The appointed contractor(s) will implement environmental and sustainability procedures in accordance with their internal procedures, considering:

- water quality and drainage;
- pollution control;
- protection of the river Medlock and other environmental features;
- measures to control noise and vibration;
- measures to control air quality;
- soils;
- contaminated materials;
- waste;
- energy;
- management of materials;
  - procurement and sampling
  - storage and distribution
  - testing
- transport.

3.4.15. Noise pollution

In general, any isolated noisy or dusty works will be controlled by the works contractor and how this is done will be described within the safe systems of works. Noisy and dusty works will be minimised where possible and, where works must be undertaken, practicable measures will be adopted such as:

Noise:

- A Section 61 consent application will be approved for the project works prior to commencement of development.
- Works will be in accordance to the agreed site hours:
  - Monday – Friday 08:00 till 18:00.
  - Saturday 8:30 till 14:00.

- Sunday and Bank Holidays - no works, unless agreed prior.
- Bulk excavation only has been granted permission to commence from 07:00.

- The maximum noise limit which shall not be exceeded is 75db over a 10-hour (08:00 hrs to 18:00 hrs) period at the receptor. As the table shows below.
- The construction site noise is monitored using noise monitors which are positioned on neighbouring properties. If the noise limits are exceeded and noise monitors are triggered an alert will be sent to the contractor's site team and the works causing the disturbance will be ceased and re-planned.
- Hoarding will solid and a minimum of 2.4m high.
- Plant will be turned off when not in use.
- Acoustic screens / barriers will be used where required.
- Exclusion zones and maximising the distance away from nearby receptors where possible.
- Short duration works, within the agreed working hours.
- No noisy works will commence until after 8am.
- No noisy works at weekends.

Vibration:

- Vibration monitors (as below or similar) will be positioned and fixed in locations where sensitive receptors are identified. The main receptors include: Liberty Point and Unite Students.
- The vibration limit is to be determined by the receptor or 10mm/s otherwise.
- Any works that exceed the vibration limit will be ceased and re-planned.

Noise and vibration will be monitored where necessary and for works such as piling, bulk excavation (basement dig) and basement construction. During these works noise levels from the piling rig and bulk excavation plant (excavators) have a potential to exceed 75db at source so a section 61 will be applied for through MCC and appropriate measures and monitoring will be undertaken to mitigate any disruption. No other work will be likely to cause much noise or vibration concern.

3.4.16. Community engagement

In conjunction with the client the appointed contractor(s) will implement a community engagement strategy, taking consideration of the following:

- Neighbours / residents, including:
  - Programme and key activity updates.
  - Access into adjacent properties (including temporary uses).
- Local community.

Complaints Procedure – the appointed contractor will display site contact information on the site hoarding / gates for third parties to contact in case of a complaint or query. The contractor will log all the third-party complaints and interactions in a complaint register which will be held on site. The contractor will respond to each complaint as a matter of urgency and send monthly newsletter updates regarding the project.

3.4.17. Third party coordination and management

The appointed contractor(s) will implement a stakeholder management plan to establish a strategy engaging with relevant stakeholders, including:

- Statutory Authorities (including Highways);
- Environment Agency;
- emergency services;
- utility providers; and
- others, as identified.

This process of co-ordination and engagement will continue throughout the construction process and through the discharge of planning conditions.

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Mayfield Phase 1

Outline Construction Management Plan - Baring Street Office 2

Mayfield Partnership

04 October 2019

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The building forms part of the wider phase one development, which also includes another commercial office (Baring Street Office 1), a multi-storey car park (Baring Street MSCP), Mayfield Park, public realm and highway modifications. Separate Outline CMPs have been prepared in relation to the Park and Highways works (ES Volume 2 - Appendix 5.1) and Baring Street Office 1 and Baring Street MSCP (ES Volume 2 - Appendix 5.2), to support the overarching ES Volume 1 Chapter 5.

This Outline Construction Management Plan provides a structure that will be developed by the appointed contractor(s) and aims to demonstrate what will be included as part of the detailed Construction Management Plan.

It is the appointed contractor(s) responsibility to identify all relevant regulations and statutory approvals within the detailed Construction Management Plan, ensuring all necessary permissions are obtained prior to commencing work.

It is proposed the detail of the final Construction Management Plan is controlled using planning conditions to allow details to be developed by the appointed contractor(s) in advance of works commencing on site. This will allow enough time to agree the contract specific requirements.

2. Site description

2.1. Phase 1 planning application site

The Phase 1 site is located entirely within the Mayfield Strategic Regeneration Framework (SRF) area, which lies to the south of Fairfield Street in Manchester City Centre, near Piccadilly mainline railway station. The Mayfield SRF area is bounded by Fairfield Street to the north; Temperance Street to the north-east; the Mancunian Way Ring Road (A635) to the south; and Baring Street / London Road (A6) to the west. The Phase 1, Application 1, site boundary is shown in SEW image '0343-SEW-ZZ-ZZ-DR-Z-0001200', that has been submitted as part of this application.

A large part of the northern side of the Mayfield area is occupied by the Mayfield Depot building and associated railway infrastructure, which was formerly in use as a passenger railway station, and latterly as a Royal Mail Depot. This is now in operation as a multi-cultural mixed-use leisure and entertainment venue, which will be in operation until 2024 as per the temporary Planning Permission granted.

The north-east of the Mayfield area is bounded by Temperance Street, where the arches of former railway infrastructure are occupied by various workshops, storage spaces and other meanwhile uses. Centrally and to the south of the Mayfield SRF area, low rise warehouses and industrial units have been demolished so that the site now comprises open land and surface car parking.

The western end of the Mayfield SRF area is bordered by Baring Street, beyond which the area is characterised by more recent residential-based development, including the Macdonald Hotel and purpose-built student accommodation.

2.2. Application 1 – Baring Street Office 1 and Baring Street MSCP

As per the Proposed Development, the two buildings are proposed to be located to the south west of the Mayfield area bounded by Baring Street to the west, the Mancunian way to the south, the River Medlock and Mayfield Park to the north and the future development plot (Baring Street Office 2) to the east.

Baring Street Office 1 (referred to as Plot O in the SRF) comprises 9 storeys (including ground and mezzanine), including active ground floor uses, public realm and riverside walkway. Baring Street MSCP (referred to as Plot N in the SRF) comprises 10 storeys, with 543 car parking spaces, including disabled persons' parking bays and electric charging.

Full details of the Proposed Development are provided within the Planning Statement submitted with Application 1.

2.3. Application 2 – Baring Street Office 2

Baring Street Office 2 (Plot M in the SRF) is located to the east of the Baring Street MSCP and will comprise of a 13-storey commercial office development, including ground and mezzanine floors, including active ground floor uses.

A separate project will be undertaken as part of the highway and park contracts to facilitate the development of the buildings. This will comprise:

- ground reprofiling to manage the flood compensation;
- opening up the river and forming the new river walls;
- service diversions / strip out of services;
- ground remediation;
- removal of buried obstructions;
- highway modifications to Baring Street and London Road junction; and
- various Traffic Regulatory Orders (TRO's).

Full details of the Proposed Development will be provided within the Planning Statement submitted with Application 2.

3. Operational control procedures

Specific management proposals will be developed within the detailed Construction Management Plan, including the following topics:

- Site establishment
  - Temporary offices, welfare, storage of materials and plant
  - Temporary boundary treatment
  - Security
  - Site opening / operative hours
- Health, safety and staff wellbeing
  - Construction Phase H&S plan
  - Risk identification and control
- Site logistics
  - Access / egress
  - Parking of vehicles for visitors and site operatives
  - Temporary traffic management strategy
  - Loading and unloading strategy
  - Crane strategy
  - Road cleaning regime and wheel washing facilities
  - Protection of existing environmental features
  - Waste management plan
  - Contamination
  - Fuel and oil handling procedures
  - Co-ordination of adjacent construction activities
- Contractors organisation structure / roles and responsibilities
- Site administration
- Quality management
- Environmental and sustainability management
- Community engagement
- Third party coordination and management

The information contained in the rest of this document is subject to change following appointment of the contractor(s) and development of the detailed Construction Management Plan.

3.1. Outline sequence of activities

To facilitate the delivery of the buildings, an enabling package will be required, which will be incorporated into the Mayfield Park contract. Before works can commence on the buildings, the following activities must be completed:

- ground re-profiling to manage flood compensation through an extensive cut and fill exercise;
- localised formation of river walls (within the vicinity of Baring Street Office 2);
- service diversions / services strip out;
- removal of buried obstructions;
- ground remediation;
- modification to the highways, London Road and Baring Street; and
- Traffic Regulatory Orders.

The appointed contractor(s) will take possession of the site at formation level, post all enabling and demolition works, and it is assumed all three buildings will require a piled foundation solution with a steel frame superstructure. Subject to planning approval, the construction of Baring Street Office 2 may overlap with construction of the Application 1 buildings.

The assumed sequence of activities, which will need to be determined by appointed contractor(s), is:

- Weeks 1-6: Mobilisation and site establishment
- Weeks 7-22: Sub-structure
- Weeks 23-59: Superstructure (including floors)
- Weeks 51-104: Façade and internal fit-out
- Week 104: Baring Street Office 2 complete

It is anticipated that up to two cranes will be required for Baring Street Office 2, which may be located to the east of the building. However, the appointed contractor(s) will determine the construction methodology.

3.2. Site establishment

The establishment of the site will be agreed with the City Council through the condition discharge process and requirement for the contractor to submit a detailed CMP. This will follow the general principles of site establishment set out as follows:

- For Baring Street Office 1 and Baring Street MSCP, it is likely the appointed contractor(s)s compound will be on an adjacent plot to the east of the sites. This will provide immediate access to the site, minimise the interface between the public and site operations and provide vehicular access directly from the Mancunian Way. As the construction of these plots continues, this compound may reduce in size, to facilitate the construction of Baring Street Office 2. For Baring Street Office 2, the compound will also likely be on an adjacent easterly plot, which could act as a shared site compound, if required and accepted by the contractor(s).
- Temporary protective fencing will be erected to delineate the working areas, site boundaries and protect sensitive features from disturbance.
- Temporary offices, welfare facilities and secure storage of plant and materials will be provided by the contractor.
- Any necessary fuel and oil will be stored in accordance with the appropriate regulations. Refuelling will only be undertaken in a designated area, designed to contain contaminated run-off, and by trained personnel.
- Emergency spill kits will be available.
- Material storage areas will be set up and managed.
- Waste segregation areas will be established utilising containers of an appropriate design to ensure the specific waste is contained.
- Sewerage effluent from the site office and welfare facilities will be removed from site using a vacuum tanker, if no sewer connection is available.
- Temporary lighting will be designed to minimise spillage of light, and oriented away from residential properties.
- The site boundary will be fenced as necessary to prevent unauthorized access and maintain a secure site perimeter.
- Appropriate measures will be taken to protect the river Medlock and other environmental features with regular dialogue with the Environment Agency and other statutory authorities / third parties.
- General hours of site opening / operation.

The anticipated normal working hours for the project are anticipated to be as follows:

Monday – Friday:	8:00 – 18:00
Saturday:	8:00 – 14:00
Sunday:	With prior arrangement and subject to proposed site activities

3.3. Health, safety and staff wellbeing

The Construction Phase Health and Safety Plan will describe the arrangements for the management of construction work and the monitoring of compliance with relevant statutory provisions, to ensure the effective management of health and safety throughout the construction period on site. This document fulfils the Principal Contractor's duty under regulation 12 of the Construction Design and Management Regulations 2015.

The appointed contractor(s) will have specific processes and documents in place through their own management system to ensure compliance with all regulations. These documents, which form an integral part of this plan, define and describe procedures which ensure, so far as is reasonably practicable, the health and safety of all persons on site, or others who may be affected by the construction works.

Key information on health and safety risks, including relevant parts of the construction phase health and safety plan, will be shared with contractors and discussed at the initial subcontractor health and safety meeting. It will also be communicated with workers through induction and worker engagement.

CDM Regulation 12(2) requires that the Construction Phase Plan must include specific measures concerning work which falls within the categories set out in Schedule 3 of the Regulations. The appointed contractor will be responsible for preparing and maintain this list of possible Schedule 3 activities, with appropriate control strategies applied.

Appropriate site safety rules will be implemented and regularly reviewed by the appointed contractor(s).

The appointed contractor(s), through their management systems, will implement measures to ensure the health and wellbeing of all site operatives.

3.4. Site logistics

A detailed logistics plan will be developed by the appointed contractor(s) as part of the detailed Construction Management Plan.

3.4.1. Site access/egress

A traffic management plan is required to provide safe and efficient access and egress for personnel and vehicles in and around the site, minimising disruption to neighbours and existing user of the surrounding roads as well as public walking around the external of the project.

It is anticipated construction traffic will use the newly modified London Road junction to access the site via the Mancunian Way slip road located to the south of Baring Street Office 2, with site compounds located to the east. Access to this compound is anticipated to be from Bond Street.

Egress will be via either Baring Street or utilising the existing slip road to access the Mancunian Way.

A detailed plan will be developed to define all vehicle movements, including operatives, visitors, deliveries, removal of materials, waste and plant.

3.4.2. Parking of vehicles for visitors and site operatives

It is anticipated parking for site visitors and site operatives will be restricted to the contractor's compound. Managers and the work force are encouraged to use public transport routes as there are ample public transport links with the Piccadilly train station less than 5 minutes' walk away. There are various car parks within a short distance to the site.

Contractor's vans shall only be permitted on the site following prior agreement with the logistics manager and will park in designated areas. Vans are only generally permitted if required to complete the contactor's works.

3.4.3. Temporary traffic management strategy

The appointed contractor(s) will liaise with the highway authority to implement a temporary traffic management strategy to ensure activities that impact the surrounding highways are managed in a safe manner. Where possible, disruption to the local highways will be minimised but where this is unavoidable, appropriate actions will be put in place and will be approved by the highway authority before works commence.

During the construction phase there are several road and footpath closures required which will need to be undertaken to facilitate the construction phase. This will include Baring Street and part of London Road and the exact timing of this will be detailed in a further CMP to be agreed with the City Council and Highways Authority, prior to development commencing.

3.4.4. Loading and unloading strategy

As part of the detailed logistics plan, the appointed contractor(s) will establish a detailed loading and unloading plan to minimise disruption to the local highways and ensure co-ordination with other site activities. It is anticipated the access routes will be similar to that identified above regarding site access / egress.

Vehicles do not only create a risk upon arriving on and leaving our site but also during the approach to site. All delivery vehicles are required to be FORS registered minimum bronze heading towards gold standard.

The Logistics Manager will be responsible for the maintenance of the delivery system and will highlight any updates in the weekly coordination meetings with all Works Contractors planning deliveries. Materials will be managed on a Just in Time basis with storage kept to an absolute minimum within the site area. The Site Logistics Works Contractor will be responsible for all material movement and storage throughout the site.

Deliveries will need to be programmed with the Site Logistics Works Contractor with a minimum of 48hrs notice given, except where agreed otherwise due to programme constraints. All deliveries will be coordinated with the Construction Manager daily who will have the overall authority on delivery priorities.

Access through Manchester City Centre to the site will be avoided, with traffic using larger arterial routes that allow easy access to the site.

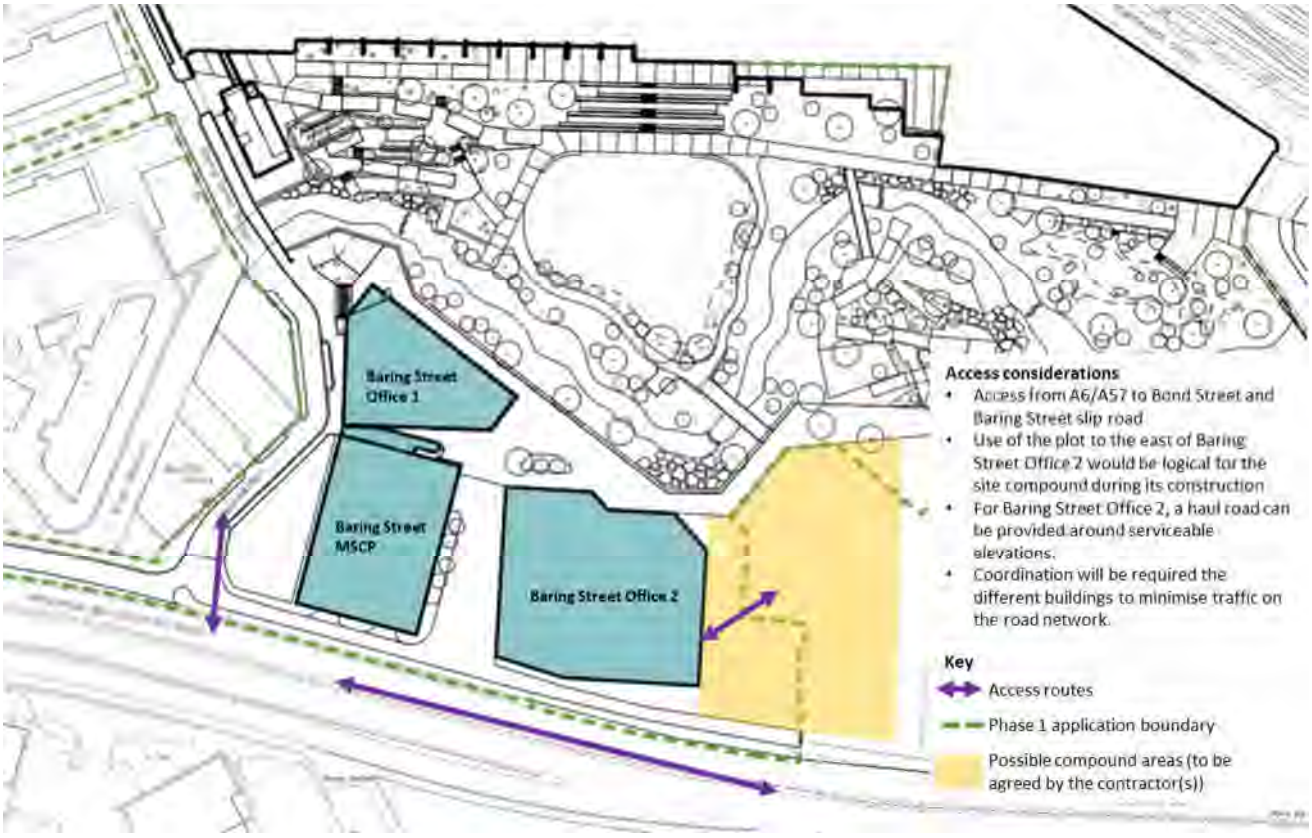


Figure 3-1 - Indicative vehicle movements across the site (to be confirmed)

3.4.5. Crane strategy

It has been assumed that up to two cranes will be required to deliver Baring Street Office 2, which may be located to the east of the building. However, the appointed contractor(s) will have to establish their construction methodology and crane strategy. All required approvals will be in place prior to erection of any cranes used on the site.

3.4.6. Road cleaning regime and wheel washing facilities

The contractor(s) will ensure that pro-active measures are taken to prevent slurry/spoil from vehicles leaving site during the works being deposited on the public highway. The cleanliness of site roads will be inspected regularly by the Principal Contractor(s) who will provide wheel-washing apparatus and will ensure that all site vehicles are thoroughly cleaned.

Wagons carrying loose material will be covered before leaving site, additionally, damping down will be considered in windy weather conditions, depending on the materials being carried. Additional damping down and road sweeping will be introduced if required as the project progresses. The contractor(s) will implement additional procedures as required to manage the removal of any contaminated materials from site.

3.4.7. Waste management plan

The contractor(s) shall, in order to reduce the need for waste disposal, minimise the generation and environmental impacts of waste arising during the works and shall maximise opportunities for the re-use and recovery of wastes.

The management and disposal of waste generated by this contract will be managed in accordance with the contractor's Waste Management Procedure and recorded in the Site Waste Management Plan. The appointed contractor(s) shall make any necessary applications to the Local Authority and/or the Environment Agency for the storage, treatment or disposal of wastes.

Waste will be formulated initially as excavated material and be taken offsite as muck away from the sewer and utility diversion works and then the substructure works (piling, capping beam and bulk excavation). All arisings from these works will be removed from site by a licensed haulier/ contractor and will be taken to a licensed destination.

Other waste generated on the project will be taken offsite with skips managed by the contractor, who will seek to employ a local waste management company and they will be responsible for delivering, exchanging and removing skip containers from site when required.

Hazardous waste bins will also be present on site for items such as silicone, spray cans, paint and oily rags. The waste management contractor will hold a valid waste carriers license and waste destination facility permit.

3.4.8. Contamination

Measures will be put in place to minimise all forms of pollution arising from the works and will be managed via the appointed contractor(s) specific procedures within their management system. Environmental risks will be assessed, and mitigation measures established to reduce the impact. The contractor shall adopt good construction management practices that will reduce the risks of accidental discharge of pollutants into watercourses or groundwater. These practices will be incorporated into the detailed Construction Management Plan.

The appointed contractor(s) will request information from the Client on any ground investigations undertaken to identify whether the land is contaminated. If the land is contaminated, works will be carried out in accordance in accordance with best practice.

A comprehensive programme of material testing will be required to demonstrate that earthworks materials are to the required standard and this testing programme should be extended to cover contamination testing of materials where appropriate.

3.4.9. Fuel and oil handling procedures

All fuel and oil will be stored in accordance with the relevant regulations and handled in such a way that minimises the risk of pollution.

3.4.10. Coordination of adjacent construction activities

The appointed contractor(s) will establish a process to ensure regular dialogue to manage the co-ordination of adjacent construction activities. This should consider key interfaces, timing of activities, deliveries, crane strategy, access/egress, loading and unloading, traffic management etc.

3.4.11. Contractor's organisation structure / roles and responsibilities

As part of the detailed Construction Management Plan, the appointed contractor(s) will establish their organisational structure, key points of contact and clearly defined roles and responsibilities, setting out who has responsibility for key roles on the project.

3.4.12. Site administration

This will include the following:

- monitoring of the site;
- site diary;
- correspondence;
- drawings and design management;
- management of subcontractors;
- instructions;
- change control; and
- contract records.

3.4.13. Quality management

The appointed contractor(s) will implement a quality management system in accordance with their internal procedures, considering:

- quality management systems;
- inspection and testing;
- material samples;
- quality inspections by subcontractors;
- quality inspection records; and
- quality audits.

3.4.14. Environmental and sustainability management

The appointed contractor(s) will implement environmental and sustainability procedures in accordance with their internal procedures, considering:

- water quality and drainage;
- pollution control;
- protection of the river Medlock and other environmental features;
- measures to control noise and vibration;
- measures to control air quality;
- soils;
- contaminated materials;
- waste;
- energy;
- management of materials;
  - procurement and sampling
  - storage and distribution
  - testing
- transport.

3.4.15. Noise pollution

In general, any isolated noisy or dusty works will be controlled by the works contractor and how this is done will be described within the safe systems of works. Noisy and dusty works will be minimised where possible and, where works must be undertaken, practicable measures will be adopted such as:

Noise:

- A Section 61 consent application will be approved for the project works prior to commencement of development.
- Works will be in accordance to the agreed site hours:
  - Monday – Friday 08:00 till 18:00.
  - Saturday 8:30 till 14:00.

  - Sunday and Bank Holidays - no works, unless agreed prior.
  - Bulk excavation only has been granted permission to commence from 07:00.
- The maximum noise limit which shall not be exceeded is 75db over a 10-hour (08:00 hrs to 18:00 hrs) period at the receptor. As the table shows below.
- The construction site noise is to be monitored using noise monitors. If the noise limits are exceeded and noise monitors are triggered, an alert should be sent to the contractor's site team and the works causing the disturbance will be ceased and re-planned.
- Hoarding will solid and a minimum of 2.4m high.
- Plant will be turned off when not in use.
- Acoustic screens / barriers will be used where required.
- Exclusion zones and maximising the distance away from nearby receptors where possible.
- Short duration works, within the agreed working hours.
- No noisy works will commence until after 8am.
- No noisy works at weekends.

Vibration:

- Vibration monitors (as below or similar) will be positioned and fixed in locations where sensitive receptors are identified. The main receptors include: Liberty Point and Unite Students.
- The vibration limit is to be determined by the receptor or 10mm/s otherwise.
- Any works that exceed the vibration limit will be ceased and re-planned.

Noise and vibration will be monitored where necessary and for works such as piling, bulk excavation (basement dig) and basement construction. During these works noise levels from the piling rig and bulk excavation plant (excavators) have a potential to exceed 75db at source so a section 61 will be applied for through the City Council and appropriate measures and monitoring will be undertaken to mitigate any disruption. No other work will be likely to cause much noise or vibration concern.

3.4.16. Community engagement

In conjunction with the client the appointed contractor(s) will implement a community engagement strategy, taking consideration of the following:

- Neighbours / residents, including:
  - Programme and key activity updates.
  - Access into adjacent properties (including temporary uses).
- Local community.

Complaints Procedure – the appointed contractor will display site contact information on the site hoarding / gates for third parties to contact in case of a complaint or query. The contractor will log all the third-party complaints and interactions in a complaint register which will be held on site. The contractor will respond to each complaint as a matter of urgency and send monthly newsletter updates regarding the project.

3.4.17. Third party coordination and management

The appointed contractor(s) will implement a stakeholder management plan to establish a strategy engaging with relevant stakeholders, including:

- Statutory Authorities (including Highways);
- Environment Agency;
- emergency services;
- utility providers; and
- others, as identified.

This process of co-ordination and engagement will continue throughout the construction process and through the discharge of planning conditions.

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Appendix 6.1 Acoustic Glossary

Appendix 6-1 Glossary

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2x10^{-5}$ N/m^2. The sound pressure level existing when microphone measured pressure is $2x10^{-5}$ N/m^2 is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in Hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.

Appendix 6.2 Legislation and Policy Summary

Appendix 6-2 Legislation and Planning Policy

Control of Pollution Act 1974

Section 60 of the Control of Pollution Act (COPA) states that Local Authorities can serve a notice imposing requirements on how the works are to be carried out, and if it deems necessary specify the following:

- the plant or machinery which is, or is not, to be used;
- the hours during which the works may be carried out;
- the level of noise which may be emitted from the premises in question, or at any specified point on those premises, or which may be so emitted during specified hours; and
- provide for any change of circumstances.

If the notice is not complied with, the Act includes the power to prosecute the person who "without reasonable excuse contravenes any requirement of the notice".

Environmental Protection Act 1990

Where it is it deemed that a site is generating unnecessary and objectionable noise, the Environmental Protection Act provides the powers for a Local Authority to a serve a Noise Abatement Notice.

The site which has been served with the abatement notice can claim that they use 'Best Practicable Means' (BPM) in order to control noise emitted from site, and that no further remedial works can be practically undertaken.

National Planning Policy Framework (NPPF), 2019

National planning policies are detailed in the National Planning Policy Framework (NPPF), published by the Ministry of Housing, Communities & Local Government in April 2018.

This document provides little mention of planning policies relating to noise, with the exception of those detailed below (only relevant parts have been reproduced);

Paragraph 170 - "Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability"

Paragraph 180 – "Planning policies and decisions should also ensure that new development is appropriate for its location, taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate, and reduce to a minimum, potential adverse impacts resulting from noise from new development, and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."

Noise Policy Statement for England (NPSE), 2010

The terms 'significant adverse' and 'adverse' above are referenced to the Noise Policy Statement for England (NPSE), published by Department for Environment, Food and Rural Affairs (DEFRA) dated March 2010. One of the main aims of this policy is to avoid significant adverse effects on health and quality of life.

With respect to the two terms above, the explanatory note for the NSPE introduces two concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation (WHO). They are:

- NOEL – No Observed Effect Level - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

- SOAEL – Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur. "

National Planning Practice Guidance (NPPG), 2012 revised July 2018

NPPG brings together the aims of the NPPG and NPSE and tries to indicate how the likely perception and average response to noise relates to the effect levels. This is summarised in Table A11.2.1, below, replicated from the NPPG.

Table A6.2.1: National Planning Policy Guidance - Noise

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, eg turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, eg avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, eg regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, eg auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Effect Levels

None of the policy documents provide noise level values for the different effect levels, instead stating that "The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."

These factors include:

- The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features). The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.

There are more specific factors to consider when relevant:

- where applicable, the cumulative impacts of more than one source should be taken into account along with the extent to which the source of noise is intermittent and of limited duration;
- consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary.

Manchester City Council – Planning & Noise Technical Guidance (December 2015)

This document sets out Manchester City Council's requirements with regard to current guidance and policy, with the aspiration that new developments achieve the highest standards without compromising the health and wellbeing of residents. The guidance refers to the NPPF and NPSE as described below. The following requirements are considered relevant to this project;

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a BS 4142 rating level (see below) of 5 dB LAeq below the typical background LA90 level at the nearest noise sensitive location.

MCC offers no guidance on limits for noise intrusion to office buildings. As such, it is assumed that the design should control noise intrusion in line with BS 8233:2014, i.e. such that it is in the region of 35-50 dBLAeq,T.

Appendix 6.3 Environmental Noise Survey Results

Mayfield Development Partnership

PLOT M, BARING STREET, OFFICE 2

Environmental noise survey report



70059652-27B-R01
SEPTEMBER 2019

CONFIDENTIAL

Mayfield Development Partnership

PLOT M, BARING STREET, OFFICE 2

Environmental noise survey report

ENVIRONMENTAL NOISE SURVEY REPORT (FIRST ISSUE) CONFIDENTIAL

PROJECT NO. 70059652

OUR REF. NO. 70059652-27B-R01

DATE: SEPTEMBER 2019

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QUALITY CONTROL

Issue/revision		First issue	Revision 1	Revision 2	Revision 3
Remarks					
Date		10/09/2019			
Prepared by		Una Brown			
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1 INTRODUCTION

WSP has been appointed to provide acoustic advice in relation to Plot M Baring Street, Office 2 (herein referred to as Plot M), Mayfield, Manchester.

The scheme consists of 10 floors of speculative office space along with space at ground and mezzanine level for retail units, café and auditorium/exhibition space.

This report sets out the results of the environmental noise survey carried out at the site. It is to be read in conjunction with the Noise & Vibration Chapter of the EIA for the scheme (prepared by others).

2 SITE DESCRIPTION & PROPOSED DEVELOPMENT

Figure 2-1 shows the proposed location of Plot M.

The site is bounded by Mancunian Way to the south and the elevated train line leading into Piccadilly to the north. The site is undergoing redevelopment, with many of the existing buildings demolished.

Figure 2-1 - Site plan showing noise survey measurment locations



An outdoor food market 'GRUB' operates on the site between 12:00 hrs and 22:00 hrs on Fridays and Saturdays and 12:00 hrs and 18:00 hrs on Sunday to the North of the site, close to the Gatehouse building (Position L1). It is accessed from Baring Street.

The nearest noise sensitive receptors are considered to be the apartments and student accommodation to the west of the site on Baring Street and the houses and apartments on Potter Street and Cotter Street to the south, highlighted in blue in Figure 2-1.

3 CRITERIA

3.1 MANCHESTER CITY COUNCIL CRITERIA

EXTERNAL PLANT NOISE LIMITS

Manchester City Council's *Planning & Noise Technical Guidance (December 2015)* requires that:

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.

It notes that the rating level is to be determined based on the methodology set out in BS 4142:2014.

EMERGENCY PLANT NOISE LIMITS

For emergency plant items, that will only operate outside an emergency for short periods to be tested, a higher noise limit is typically permitted. It is understood that MCC permit a level 10 dB above the existing background sound level (L_{A90}) at the nearest noise sensitive location.

MAXIMUM OPERATIONAL NOISE LIMITS

MCC specifies that:

Entertainment noise (L_{Aeq}) should be controlled to 10 dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location.

VIBRATION CRITERIA

MCC guidance requires that where developments are <75 m from a train or tram line, a vibration assessment is carried out.

Plot M is approximately 200 m from the elevated train line leading to Piccadilly Station and, therefore, MCC may not require a vibration survey to be undertaken.

3.2 BS4142:2014 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND (+A1:2019)

BS 4142:2014 *Methods for rating and assessing industrial and commercial* sound (+A1:2019, herein referred to as BS4142:2014) provides typical guidance for assessing noise emissions from new items of building services plant against the existing background noise level at the nearest noise sensitive receptors.

It suggests that if the noise rating level is ≥10 dB higher than the existing background noise level (L_{A90} dB), it provides a likely indication of a significant adverse impact. If the level is 5 dB above the existing background noise level, it provides a likely indication of an adverse impact. Where the level doesn't exceed the background noise level it is an indication of having a low impact.

It also identifies that where noise contains 'attention catching features' such as bangs, whistles, etc or is intermittent, penalties should be applied in the noise assessment.

4 ENVIRONMENTAL NOISE SURVEY

4.1 OVERVIEW

An environmental noise survey was carried out between Friday 16 August and Tuesday 20 August 2019, comprising of attended and unattended measurements.

The existing site and measurement locations are shown on Figure 2-1.

UNATTENDED MEASUREMENTS

Unattended noise monitoring equipment was left to continually record noise from 10:00 hrs on Friday 16 August 2019 until 11:55 hrs on Tuesday 20 August 2019.

Two meters were installed on opposite sides of the building in first floor meeting rooms of The Gatehouse. The microphones of both extended approximately 1 m from the façade and were approximately 10 m above ground level. These are shown as locations L1 and L2 on Figure 2-1.

Position L1 was to the north-east of the site, screened from Baring Street but with a line of sight to the elevated train line leading into Piccadilly and Mancunian Way.

Position L1 also overlooks the outdoor food market, GRUB. The results of the noise monitoring at Position 1 show that the $L_{A90,1hr}$ during these periods is 3-13 dB higher than the $L_{A90,1hr}$ recorded in the daytime before GRUB opens.

On Saturday 17th August, a stage for Manchester Pride was erected along the eastern boundary of the Mayfield site and measurements at Position L1 may have also been affected by this.

Position L2 was facing Baring Street, opposite the Unite Student Accommodation building. It was completely screened from GRUB and the location where the Manchester Pride Stage was erected. The results of the measurements at L2 were reasonably consistent throughout the duration survey and are considered representative of the existing background levels at the student accommodation building opposite.

ATTENDED MEASUREMENTS

Attended measurements were taken at strategic locations around the site, shown as positions P1-P5 on Saturday 17 August 2019, Sunday 18 August 2019 and Tuesday 20 August 2019.

Night-time measurements were carried out at positions P1-P5 between 23:50 hrs on Saturday 17 August and 01:50 hrs on Sunday 18 August.

Day-time measurements were carried out at Positions P1-P3 between 11:12 hrs and 13:10 hrs on Tuesday 20 August 2019.

4.2 WEATHER CONDITIONS

There was heavy rainfall on Friday daytime and night and so the results from the unattended measurements for the 16 August 2019 have been omitted from the assessment.

Weather for the remainder of the noise survey was clear, with only intermittent rainfall on Monday 19 August 2019.

Weather reports for the area during the unattended measurements noted that the temperature ranged from 10◦C to 16◦C at night, and 13◦C to 22◦C during the day. Wind speeds were ≤3 m/s for the duration of the survey, with occasional gusts of up to 5 m/s.

Weather during the attended night-time measurements on Saturday 17 August through to Sunday 18 August 2019 was clear and dry. Temperature was 14◦C and windspeeds were ≤2 m/s for the duration of the survey, with occasional gusts of up to 3 m/s. No rainfall occurred.

Weather during the attended daytime measurements on Tuesday 20 August 2019 was clear and dry. Temperature was 16◦C and windspeeds were <2 m/s for the duration of the survey, with occasional gusts of up to 3 m/s. No rainfall occurred.

Other than the periods where rain occurred, which have been excluded from the assessment, the weather was considered suitable for obtaining representative noise data.

4.3 MEASUREMENT EQUIPMENT & PERSONNEL

Details of the measurement equipment is provided in Appendix B.

Unattended noise monitoring equipment was installed and collected by Ed Taylor.

Attended measurements were carried out by Ed Taylor and Aisha Ben Kahla on Saturday 17 and Sunday 18 August 2019, and by Ed Taylor on Tuesday 20 August 2019.

4.4 MEASUREMENT RESULTS

A summary of the measurement results is provided below.

UNATTENDED MEASUREMENTS

A summary of the ambient noise levels during the unattended measurements is provided in Table 4-1.

Table 4-1 – Summary of ambient & maximum noise levels at unattended positions L1 & L2

Position	Date	$L_{Aeq,16hrs}$ (dB) Daytime (07:00-23:00)	$L_{Aeq,8hrs}$ (dB) Night-time (23:00-07:00)	L_{AFmax} (dB)** Daytime (07:00-23:00)	Night-time L_{AFmax} (dB)** Night-time (23:00-07:00)
L1	17/8/19	66.5	54.0	82.9	65.3
	18/8/19	61.2	54.0	81.5	68.7
	19/8/19	63.0	52.5	84.1	64.4
	20/8/19*	64.7	-	83.1	-
L2	17/8/19	61.5	59.2	82.1	70.6
	18/8/19	58.4	58.9	82.7	72.9
	19/8/19	60.0	57.7	78.3	70.6
	20/8/19*	66.9	-	82.6	-

*Not over entire 16-hour due to measurement start & finish times

**L_{AFmax} not normally exceeded determined as 90th percentile of $L_{AFmax,5mins}$

The representative background sound levels ($L_{A90,T}$, dB) have been determined based the guidance in MCC's *Planning & Noise Technical Guidance (December 2015)* and are summarised in Table 4-2.

The arithmetic average of each octave band, for each time period over the duration of the survey has been calculated. The minimum of the averages has then been used to determine the representative background sound level. Full details of the measured L90s during each 15 minute period at night and 1 hour period during the day are provided in Appendix A.

Table 4-2 – Summary of representative background sound level (L90, dB)

		Representative background noise level ($L_{90,T}$ dB) at each octave band centre frequency (Hz)								
Position	**Period**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Overall A-weighted level (dB)**
L1	Daytime 07:00-23:00	53.0	46.0	46.0	46.0	49.0	42.0	32.0	22.0	51.0 ($L_{A90,1hr}$)
	Night-time 23:00-07:00	48.0	42.0	41.0	41.0	42.0	37.0	28.0	19.0	45.0 ($L_{A90,15mins}$)
L2	Daytime 07:00-23:00	56.0	53.0	52.0	52.0	54.0	47.0	37.0	26.0	56.0 ($L_{A90,1hr}$)
	Night-time 23:00-07:00	51.0	50.0	48.0	46.0	47.0	41.0	30.0	19.0	50.0 ($L_{A90,15mins}$)

ATTENDED MEASUREMENTS

A summary of the sound pressure levels measured during the attended surveys at Positions P1-P5 is provided in Table 4-3

Table 4-3 – Sound pressure levels from attended measurements at Positions P1-P5

Position	Date	Start time	$L_{Aeq,5\ mins}$ (dB)	$L_{AFmax,5\ mins}$ (dB)	$L_{A90,5\ mins}$ (dB)	Comments
P5	17/8/19	23:52	57.4	64.5	54.1	Dominant noise source is traffic along Mancunian Way. Two sirens audible. Occasional rattle from light weight fencing. No music audible from Star & Garter.
		23:57	59.5	77.4	55.8	
	18/8/19	00:02	58.4	65.7	54.9	
P4	18/8/19	00:16	64.1	74.7	55.0	No music audible from Star & Garter. Busy outside the pub with people talking. Trains are audible pulling in and out of Piccadilly. Traffic along Fairfield Street is fairly busy but not constant.
		00:21	63.6	75.8	55.5	
		00:26	64.9	87.5	53.5	
P2	18/8/19	00:44	71.1	80.0	56.1	Constant traffic along Mancunian Way is dominant noise source throughout.
		00:49	72.1	84.4	58.8	
P2	18/8/19	00:54	72.7	85.1	58.2	
P3	18/8/19	01:06	72.9	83.5	62.1	As position P2
		01:11	74.4	85.1	63.5	
		01:16	73.7	85.0	61.7	
P1	18/8/19	01:23	72.4	84.6	60.0	As position P2, traffic along Mancunian Way dominates. Train movements into and out of Piccadilly are just audible.
		01:26	72.6	86.1	53.3	
		01:33	72.1	87.5	54.7	
P2	20/8/19	11:12	75.7	83.0	71.1	Constant traffic along Mancunian Way. From 11:16-11:27 noise from demolition activities taking place to the north of the site. Traffic noise still dominates.
		11:17	76.2	82.3	70.6	
		11:22	76.1	82.1	71.0	
P3	20/8/19	12:12	77.1	93.5	69.9	As P2.
		12:17	77.5	92.4	69.7	Siren along Mancunian Way at 12:16 and 12:20. A train was visible at 12:20 but not audible.
		12:22	75.7	85.6	70.7	
P1	20/8/19	12:39	77.1	86.0	69.7	Constant traffic along Mancunian Way dominates throughout. At 13:00 there is a lull in traffic and a train passby is audible.
		12:44	75.9	86.8	68.9	
		12:49	76.4	86.5	68.4	
		12:54	76.4	87.1	68.7	
		12:59	76.1	84.5	67.8	
		13:04	76.3	87.0	67.6	

5 EXTERNAL PLANT

5.1 PLANT NOISE LIMITS

As noted previously, MCC requires that:

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.

It notes that the rating level is to be determined based on the methodology set out in BS 4142:2014, taking account of any penalties due to tonality, intermittency etc.

Based on the representative background noise level in Table 4-2, the resultant rating level from building services plant associated with the development should not exceed the limits in Table 5-1 at the nearest noise sensitive receptors.

The nearest noise sensitive receptors are considered to be the apartments to the west of the site on Baring Street. The representative background sound level from monitoring position L2 have been used to determine the rating level.

These limits are cumulative and include contribution from any tenant plant associated with the commercial units. Limits for individual tenancies shall be determined as the design progresses.

Once details of the plant selections and locations are known an assessment of the resultant rating level at the nearest noise sensitive receptor will be carried out. If required, attenuation measures will be provided to meet the limits in Table 5-1.

Table 5-1 - Maximum noise rating level $L_{Ar,Tr}$ (dB) from external plant, 1m from receptor

Period	Maximum rating noise level from external plant, 1 m from nearest noise sensitive receptor $L_{Ar,Tr}$ (dB)
Daytime (07:00-23:00)	51
Night-time (23:00-07:00)	45

EMERGENCY PLANT

Subject to approval by MCC, noise from emergency plant should be limited to no more than 15 dB higher than the criteria in Table 5-1, 1m from the nearest noise sensitive receptors. This equates to a level 10 dB above the existing representative background sound level.

To minimise the risk of disturbance, it is recommended that the testing of emergency plant only occurs during normal working hours, Monday-Friday (09:00-17:000). There shall be no testing of emergency plant on Sundays or public holidays.

6 OPERATIONAL NOISE

EXTERNAL LIMITS

As noted previously, MCC requires that:

Entertainment noise (L_{Aeq}) should be controlled to 10 dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location.

This criterion applies to any operational noise (e.g. background music) associated with the development, for example; background music or amplified sound in the proposed retail, café and auditorium.

Based on the representative background noise levels in Table 4-2 for Position L2, operational noise associated with the development should not exceed the levels in Table 6-1, 1m from the nearest noise sensitive receptors.

Table 6-1 – Maximum operational noise limits 1 m from the nearest noise sensitive receptors

	Maximum operation noise level (L_{eq} dB) at nearest noise sensitive receptor at each octave band centre frequency (Hz)							
Period	63	125	250	500	1k	2k	4k	8k
Daytime 07:00-23:00	46.0	43.0	42.0	42.0	44.0	37.0	27.0	16.0
Night-time 23:00-07:00	41.0	40.0	38.0	36.0	37.0	31.0	20.0	9.0

As the façade design develops, maximum internal operational noise limits for individual tenancies shall be determined based on the sound insulation performance such that noise egress from the development does not exceed these criteria.

Appendix A

SUMMARY OF UNATTENDED NOISE MONITORING TO DETERMINE REPRESENTATIVE BACKGROUND

Confidential

Table A-1 – Position L1, measured $L_{90,1hr}$ levels during daytime (07:00-23:00)

Date	Time	Measured $L_{90,1hr}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
17/08/19	07:00	53	45.9	47.1	48.3	50.1	44	35.5	26.8	52.6
	08:00	57.6	47.7	48.6	48.8	51.5	46	36.4	24.7	54.0
	09:00	57.5	46.7	47.7	47.5	50.6	44.5	35	23.2	52.9
	10:00	59.4	54.6	52.9	52	54.1	48.6	41.6	29.8	56.8
	11:00	59.4	54.8	52.8	52.5	53.8	47.8	39.9	30.4	56.6
	12:00	58.6	53.5	53.5	53.6	54.6	48.4	40.8	31.4	57.3
	13:00	60.2	57.2	57.6	59.7	58.7	53.1	46.5	36.5	62.1
	14:00	62.2	60.7	60.1	63	61.7	56.9	49.8	38.8	65.3
	15:00	64.4	60.9	61.4	64.3	62.8	57.8	51.1	39.1	66.4
	16:00	60	60.8	62.4	66.4	64.5	59.8	53	41.7	68.3
	17:00	60.1	61	63	67.9	66.6	62.1	55	43	70.2
	18:00	59.6	59.5	62.1	67.3	65.6	61.2	53.8	42.7	69.3
	19:00	58.6	56.7	61.3	66.9	64.8	60	52.6	41.1	68.5
	20:00	58.2	55.9	61	66.7	64.1	59.2	52.2	40.8	68.0
	21:00	58.2	58.4	59.8	63.7	61.9	57.1	50.2	40.3	65.6
	22:00	57.4	48.3	48.3	49.4	51.7	44.8	34.8	26.1	53.9
18/8/19	07:00	55.9	44.1	44.3	43.8	46.6	39.7	28.6	19.1	48.8
	08:00	57.1	46.4	47.5	48.7	50.1	44	35.4	27.3	52.7
	09:00	57.6	49.5	50	50	52.5	46.8	39	28.9	55
	10:00	62.7	59.8	57.3	54.3	55	50.7	42.2	33.1	58.6
	11:00	62.6	59.5	58	55.1	56	51	42	32.7	59.3
	12:00	62.8	59.9	58.8	56.4	56.5	51.4	43.4	34.7	60.0
	13:00	62.2	60.3	59.5	58.9	58	53	45.2	35.6	61.6
	14:00	61.7	60.1	59.4	60.4	58.8	53.8	46	36.5	62.5
	15:00	61.2	60.4	59.7	60.2	58.9	54.1	46.8	36.8	62.6
	16:00	60.9	60	59	59	57.9	53	45.2	36	61.6
	17:00	60.6	59.8	58.3	58	57.2	52.2	44.3	35.2	60.8
	18:00	55.3	49	48.9	49.6	52.9	46.5	36.1	26.2	55.0
	19:00	53.7	47.5	46.9	47.4	50.8	43.8	32.2	20.5	52.8
	20:00	53.5	46.1	45.8	45.9	49.6	42.5	30.2	18.2	51.5
	21:00	51.5	45.1	45.1	45	48.8	41.7	29.3	17.3	50.7
	22:00	50.8	44	45	45.4	47.4	40.6	29.7	17.5	49.7
19/8/19	07:00	55.2	47.6	48.7	49.5	54.1	47.5	34.4	19.6	55.9
	08:00	58.9	53	53.3	53	55.2	49.2	38.1	25.6	57.6
	09:00	64.1	59.9	59	56.8	56.7	53	45.8	35.9	60.6
	10:00	63.3	59.2	57.1	55	55.1	50.9	43	32.1	58.8
	11:00	63.5	59.3	57.8	56	55.4	51.1	43	31.9	59.3
	12:00	64.5	60.3	59.1	57.4	57	53.1	46.6	36.3	60.9
	13:00	63.2	59.3	57.2	55.5	55.9	51.9	44.5	34.2	59.5
	14:00	65.1	58.7	58	58.3	58.5	54.8	47.9	38	62.1
	15:00	65.4	60.7	60.2	59	58.2	54.1	47.3	36.7	62.1
	16:00	64.9	56.9	56	53.7	54.1	49.3	39.6	28.7	57.5
	17:00	64.8	57.2	56.5	53.6	53.7	49.4	40.1	29.4	57.4
	18:00	56.1	49.6	50.3	51.2	53.6	48.1	36.4	25.9	56
Excluded rain	19:00	52.7	46.9	47.6	48.4	50.8	46.2	37.5	26.8	53.5
	20:00	51.3	45.2	46.1	46.6	50.3	44.5	34.4	25.8	52.5
	21:00	51	44.9	45.5	46	49.9	43.8	32.5	23.4	51.9
	22:00	51.1	44.1	43.8	44	47.2	40.9	31	22.8	49.4
20/08/19	07:00	56.5	48.4	50.1	51.3	55.1	48.8	37.2	25.4	**57.1**
	08:00	65.2	60.7	58.1	56.7	57.6	53.3	45.7	35	**61.0**
	09:00	64.5	60.5	58.4	56.8	57	53	45.5	35	**60.7**
	10:00	64.5	61.6	61.1	56.5	56.9	53.2	46.3	35.6	**61.0**
	11:00	64.8	59.9	58.8	56.9	56.8	52.6	45.1	34	**60.5**

Table A-2 – Arithmetic average measured $L_{90,1hr}$ levels during daytime (07:00-23:00) L1

	Time	Arithmetic average of $L_{90,1hr}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
	07:00	55.2	46.5	47.6	48.2	51.5	45.0	33.9	22.7	53.6
	08:00	59.7	52.0	51.9	51.8	53.6	48.1	38.9	28.2	56.3
	09:00	60.9	54.2	53.8	52.8	54.2	49.3	41.3	30.8	57.2
	10:00	62.5	58.8	57.1	54.5	55.3	50.9	43.3	32.7	58.8
	11:00	62.6	58.4	56.9	55.1	55.5	50.6	42.5	32.3	58.9
	12:00	62.0	57.9	57.1	55.8	56.0	51.0	43.6	34.1	59.4
	13:00	61.9	58.9	58.1	58.0	57.5	52.7	45.4	35.4	61.0
	14:00	63.0	59.8	59.2	60.6	59.7	55.2	47.9	37.8	63.3
	15:00	63.7	60.7	60.4	61.2	60.0	55.3	48.4	37.5	63.7
	16:00	61.9	59.2	59.1	59.7	58.8	54.0	45.9	35.5	62.4
	17:00	61.8	59.3	59.3	59.8	59.2	54.6	46.5	35.9	62.7
	18:00	57.0	52.7	53.8	56.0	57.4	51.9	42.1	31.6	60.0
	19:00	56.2	52.1	54.1	57.2	57.8	51.9	42.4	30.8	60.5
	20:00	54.3	49.1	51.0	53.1	54.7	48.7	38.9	28.3	57.1
	21:00	53.6	49.5	50.1	51.6	53.5	47.5	37.3	27.0	55.9
	22:00	53.1	45.5	45.7	46.3	48.8	42.1	31.8	22.1	51.0
	Minimum	53.1	45.5	45.7	46.3	48.8	42.1	31.8	22.1	51.0

Table A-3 – Position L2, measured $L_{90,1hr}$ levels during daytime (07:00-23:00)

Date	Time	Measured $L_{90,1hr}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
17/08/19	07:00	56.8	54.7	52.9	53.8	55	48.2	39.1	30.6	57.5
	08:00	56.7	52.8	52.4	51.9	55.4	48.4	36.6	23	57.4
	09:00	56.5	53	52.6	52.2	55.5	47.8	35.8	22.2	57.4
	10:00	58.9	55.8	54.8	54.1	56.9	49.3	37.9	25.1	59
	11:00	58.9	55.3	55.1	54.7	57.2	49.5	38.2	25.2	59.3
	12:00	59.4	56.7	56.4	56.2	58.3	50.4	39.9	29.6	60.4
	13:00	60.2	57.2	57.6	58.1	59.3	51.5	41.6	31.9	61.6
	14:00	61.5	59.4	58.7	59.7	60.5	53.1	43.5	33.3	63
	15:00	61.4	58.9	59.2	60.4	61.5	54	44.4	33.5	63.9
	16:00	60.3	58.8	59.3	61.5	61.6	54.5	45	34.1	64.3
	17:00	61.2	58.9	59.7	63	62.8	56.7	47.8	36.3	65.7
	18:00	59.8	58.6	58.9	62	61.6	55.1	45.7	34.5	64.5
	19:00	58.9	57.2	58.8	62.1	61.8	54.9	45.2	33.9	64.6
	20:00	57.8	56.4	58	61.7	60.5	53.9	45.2	33.9	63.6
	21:00	57.8	58	58	59.8	59.6	52.8	43.2	32.8	62.4
	22:00	57.1	55.7	53.5	54.3	56	48.8	38.8	30.9	58.3
18/8/19	07:00	53.2	50.9	49	48.1	50.8	43.3	31.6	19.8	52.9
	08:00	55.6	54.7	52.2	53.1	53.4	46.5	37.8	30.9	56.2
	09:00	56	52.9	51.8	51.2	54.3	46.8	36.3	25.8	56.3
	10:00	59.3	55.6	54.6	54.1	56.3	48.5	37.3	26.6	58.5
	11:00	59.8	56.6	55.8	55.3	57.6	49.5	38.3	27.8	59.7
	12:00	60.2	56.7	56.6	56.2	57.8	49.7	38.8	27.9	60.1
	13:00	60.6	57.2	56.8	57.3	58.4	50.7	40.3	31	60.8
	14:00	60.4	56.8	56.7	57.3	58.8	51	40	29	61
	15:00	59.9	57.1	56.8	57.5	57.8	50.4	40.7	31.3	60.5
	16:00	59.9	57.4	56.9	57.6	58.4	50.8	40.7	31.7	60.9
	17:00	60.2	56.9	56.1	56.7	58.1	50.4	39.8	30.3	60.4
	18:00	59.4	53.9	54.5	54.4	57.4	50.2	39	28.2	59.4

Date	Time	Measured $L_{90,1hr}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
	19:00	59	52.8	53.4	53.7	56.7	49.9	39.2	27.8	58.8
	20:00	57.5	52.3	52.2	52.3	55.8	48.8	37	26.2	57.8
	21:00	55.8	51.9	51.1	50.8	54	46.7	35	23.2	56
	22:00	55.5	51.8	50.8	50.9	52.5	45.6	36.2	25	54.9
19/8/19	07:00	57.8	54.1	55	55.1	59.7	52.7	40.1	24.8	61.5
	08:00	59.5	55.8	56.3	56.2	59.6	52.6	41	26.3	61.6
	09:00	60.4	56.8	56.5	56.2	58.6	52	41.4	27.8	60.9
	10:00	61.2	56.6	55.9	55.5	57.6	51	40.6	27.6	60
	11:00	62.2	57.1	56.9	56.8	58.7	51.8	42.9	32.9	61.1
	12:00	62.3	57.6	57.6	57.4	58.3	52.2	42.9	32.9	61.1
	13:00	60.4	56.6	56.2	56.3	58.2	52.8	43.7	32.6	60.9
	14:00	60.4	56.2	56.1	56.1	58.5	51.3	40.2	26.3	60.7
	15:00	61.4	57.3	57.1	56.7	58.9	51.2	39.7	25.9	61
	16:00	60	55.3	55.6	55.2	58	49.9	37.5	23.7	59.9
	17:00	61	55.9	55.9	56.1	57.2	50.4	40.5	28.5	59.8
	18:00	60.8	54.8	55.6	56.2	58.5	50.9	40	30	60.6
Excluded rain	19:00	56.4	53.5	53.5	54	56.2	50.5	40.8	28.4	58.7
	20:00	54.7	52.3	51.9	51.8	55.2	48.7	36.9	22.3	57.3
	21:00	55.5	52.8	52	52.1	55.2	48.6	36.6	21.4	57.3
	22:00	55.3	52	50.8	50.7	53.4	47	36	21.8	55.7
20/08/19	07:00	59.6	55.9	56.3	56.7	60.2	53.4	41.8	30.4	62.2
	08:00	62.6	57.8	58.1	58.4	61.1	54.6	44.8	33.8	63.3
	09:00	62.1	57.2	57.4	57.1	59.6	52.7	41.8	28.5	61.8
	10:00	63	57.7	57.5	57	59.7	53.3	44	32.4	62
	11:00	65	57.5	57.7	57.9	59.8	53.5	44.9	34.2	62.3

Table A-4 – Arithmetic average measured $L_{90,1hr}$ levels during daytime (07:00-23:00) L2

Time	Arithmetic average of $L_{90,1hr}$ (dB) at each octave band centre frequency								
	63	125	250	500	1k	2k	4k	8k	dBA
07:00	56.9	53.9	53.3	53.4	56.4	49.4	38.2	26.4	58.5
08:00	58.6	55.3	54.8	54.9	57.4	50.5	40.1	28.5	59.6
09:00	58.8	55.0	54.6	54.2	57.0	49.8	38.8	26.1	59.1
10:00	60.6	56.4	55.7	55.2	57.6	50.5	40.0	27.9	59.8
11:00	61.5	56.6	56.4	56.2	58.3	51.1	41.1	30.0	60.6
12:00	60.6	57.0	56.9	56.6	58.1	50.8	40.5	30.1	60.5
13:00	60.4	57.0	56.9	57.2	58.6	51.7	41.9	31.8	61.1
14:00	60.8	57.5	57.2	57.7	59.3	51.8	41.2	29.5	61.6
15:00	60.9	57.8	57.7	58.2	59.4	51.9	41.6	30.2	61.8
16:00	60.1	57.2	57.3	58.1	59.3	51.7	41.1	29.8	61.7
17:00	60.8	57.2	57.2	58.6	59.4	52.5	42.7	31.7	61.9
18:00	60.0	55.8	56.3	57.5	59.2	52.1	41.6	30.9	61.5
19:00	59.0	55.0	56.1	57.9	59.3	52.4	42.2	30.9	61.6
20:00	56.7	53.7	54.0	55.3	57.2	50.5	39.7	27.5	59.5
21:00	56.4	54.2	53.7	54.2	56.3	49.4	38.3	25.8	58.5
22:00	56.0	53.2	51.7	52.0	54.0	47.1	37.0	25.9	56.3
Minimum	56.0	53.2	51.7	52.0	54.0	47.1	37.0	25.8	56.3

Table A-5 – Position L1, measured $L_{90,15\ min}$ levels during night-time (23:00-07:00)

Date	Time	Measured $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
17/08/19	00:00	48.9	43.7	44.8	44.1	47.1	41.4	33.4	26.2	49.5
	00:15	48.5	43.5	43.5	43.4	46.5	40.6	33	26	48.8
	00:30	48.4	43.2	43.3	43.4	46.3	40.6	33.1	26	48.7
	00:45	50.3	43.6	45.5	47.1	47.4	41.8	35.7	28.3	50.4
	01:00	49.7	43.3	45.1	46.7	47.1	41.1	35.3	27.7	50.0
	01:15	51.6	44	44.8	46.3	45.9	40.5	34.8	27.1	49.2
	01:30	55.6	43.9	44.6	46.4	46.1	40.3	34.5	26.9	49.3
	01:45	47.3	43	42.6	42.8	45.3	39.8	31.8	23.1	47.8
	02:00	46.2	42.5	42.1	42	44.8	39.1	30.8	22.4	47.2
	02:15	46	42.4	41.6	41.4	43.7	38	30.1	22	46.3
	02:30	46.7	42.6	42.2	42.5	44.4	38.6	30.1	21.7	47.0
	02:45	46.3	42.6	41.6	41.3	43.2	37.4	29.6	21.4	45.8
	03:00	46.5	43	41.6	41.4	42.9	37.1	29.5	21.3	45.6
	03:15	47.2	44.7	42.3	42.1	44.2	38.5	29.8	21.4	46.8
	03:30	47.6	43.8	42.2	41.9	43.8	38	29.4	21.2	46.4
	03:45	47.8	44.2	42.8	42.1	43.9	38	29.7	21.4	46.6
	04:00	47.6	43.8	42.9	42	43.7	37.6	29.7	21.5	46.4
	04:15	47	43.4	43.1	42.8	44.9	38.7	30	21.4	47.4
	04:30	48.5	44.6	44.4	44.7	48.2	41.9	30.9	21.6	50.3
	04:45	51	44.6	45.1	45	48.3	41.9	31.3	21.9	50.4
	05:00	51.6	45.1	45.1	44.1	47	40.9	31	21.7	49.3
	05:15	50.5	44.4	45.4	45.4	48.6	42.1	31.3	21.5	50.7
	05:30	51.6	45.6	46.6	47.1	50.4	44.1	32.8	21.9	52.5
	05:45	53	45.6	47.4	48.8	50.1	44.1	36	27.5	52.7
	06:00	49.2	44.1	44.6	45.1	48.6	42.8	34	26.7	50.8
	06:15	51	43.9	44.3	44.4	47.7	44.4	35.3	26.8	50.7
	06:30	51.2	45.1	45.4	45.1	48.5	42.6	34.1	26.8	50.8
	06:45	53.3	44.1	45	44.6	47.7	41.8	33.7	26.4	50.0
18/08/19	23:00	56.8	47	47.2	47.3	50.3	43.6	32.2	22.3	52.4
	23:15	56.5	46.4	46.9	47	50.3	43.1	31.2	21.1	52.3
	23:30	56.5	46.4	46.6	46.4	49.7	42.1	29.7	19.6	51.6
	23:45	56.3	46.3	46.4	45.9	49.1	42.4	30	19.6	51.2
	00:00	56.4	45.8	46.3	46.2	49.3	42.6	30.2	19.5	51.4
	00:15	56.3	45.7	45.4	45	48.1	41	29.1	19	50.2
	00:30	56.3	46	45.5	44.9	48.2	41.2	29.4	19.4	50.3
	00:45	56.2	45.5	44.9	44.5	47.3	40	28.5	19.2	49.4
	01:00	56	45	44.5	43.9	46.6	39.4	28.2	18.8	48.8
	01:15	55.5	44.8	44.4	44	46.5	39.7	28.8	19.6	48.8
	01:30	55.5	44.5	43.6	43.3	46	38.8	27.8	18.6	48.2
	01:45	55.5	44.8	43.3	42.9	45.7	38.6	27.9	19	47.9
	02:00	55.5	45.1	44.2	43.9	47.3	40.1	28.6	19.4	49.3
	02:15	55.4	43.8	43	42.5	45.2	38.3	27.6	18.7	47.4
	02:30	55.4	43.9	43.1	42.8	45.3	41.7	31	19.3	48.3
	02:45	55.2	43.9	42.6	42	44.3	37.3	27.6	19	46.6
	03:00	55.7	43.9	45	47.2	45.8	39.5	34.3	27.4	49.2
	03:15	55.5	44.5	45	46.5	46.8	40.4	33.8	26.6	49.7
	03:30	55.6	44.3	44.6	46	46.2	39.7	33.2	26.2	49.1
	03:45	55.6	44.4	44.3	45.5	45.2	38.7	32.9	25.8	48.3
	04:00	55.1	44.1	43.2	44.1	44.4	38	29.5	21.1	47.3
	04:15	55	42.7	42.1	41.9	44	37.3	27.5	18.9	46.4
	04:30	55	42.9	41.9	41.3	42.9	36.3	27.5	19.1	45.5
	04:45	54.9	42.6	41.3	40.9	42.2	35.8	27	18.9	44.9
	05:00	54.8	43.1	41.8	40.9	42.5	36	27.5	19.1	45.2
	05:15	55.2	43.5	42.1	41.2	43.3	36.7	27.4	18.8	45.8
	05:30	55.2	43.5	42.7	42.4	45.4	38.7	28.1	19.1	47.6
	05:45	55	43.6	43.2	42.6	45.6	38.7	28.2	19	47.8

Date	Time	Measured $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
	06:00	55	43.2	42.2	41.5	44.1	37.4	27.5	19	46.4
	06:15	55.3	44.3	43.3	42.7	45.1	38.3	27.8	19	47.4
	06:30	56.1	45.7	45.3	44.4	47.1	40.1	28.7	19.3	49.3
	06:45	55.8	44.1	43.4	42.4	44.1	37.8	28.3	19.3	46.8
19/08/19	23:00	50.3	43.7	45.3	46.3	47.3	40.8	33.2	25.6	49.9
	23:15	49.7	43.4	44.6	45.8	45.9	39.7	33	25.7	48.8
	23:30	49.4	42.6	44.2	45.4	45.7	39.3	32.5	25.1	48.5
	23:45	49.3	42.4	43.8	45.1	44.8	38.5	32.4	25.1	47.9
	00:00	48.5	42.3	43.8	45.2	44.2	38.1	32.5	25.2	47.5
	00:15	46.9	41.9	41.2	40.7	42.4	35.9	25	15.4	44.9
	00:30	46.1	41.1	40.4	40.2	42	35.5	24.5	15.1	44.4
	00:45	45.1	41.5	40.5	39.6	41.1	34.7	24.2	15	43.7
	01:00	44.6	41	40.1	39.5	41.2	34.7	24.4	15	43.7
	01:15	46	41.1	39.9	38.9	39.6	34.2	24.5	15.2	42.7
	01:30	43.9	40.3	39.3	38.7	39.7	33.2	23.8	14.8	42.4
	01:45	45.6	40.5	41	39.6	39.3	33	23.7	14.5	42.5
	02:00	46.4	40.4	40.3	39.2	38.8	32.7	23.8	14.7	42.1
	02:15	49.1	40.5	39.5	39.2	39.4	33	23.8	14.7	42.4
	02:30	47.8	40.2	39	38.8	39.4	33.3	24.1	14.9	42.3
	02:45	42.8	39.7	38.3	37.6	37.9	32.6	23.5	14.6	41.1
	03:00	43.3	40	38.2	37.4	37.7	32.3	23.4	14.6	40.9
	03:15	53.7	39.7	37.9	37.2	36.8	31.5	23.3	14.8	40.4
Excluded rain	03:30	48.5	41	39.3	38.7	39.9	34	23.7	14.5	42.7
Excluded rain	03:45	42.6	41	39.5	39.2	39.5	35.5	27.4	17.1	43
Excluded rain	04:00	43.8	43.3	41.2	42.5	43.1	41.3	38.6	33.9	47.7
Excluded rain	04:15	47.7	42.9	43.1	45.6	42.9	39.6	37	31.1	47.7
Excluded rain	04:30	47.9	42.4	43.3	45.7	44.3	39.5	35.5	29.2	48.1
Excluded rain	04:45	47.3	41.4	43.1	45.6	43.4	38.3	34.6	28.3	47.4
Excluded rain	05:00	49.2	42	43.7	45.9	44.5	39.2	34.4	27.8	48.1
Excluded rain	05:15	48.4	42	42.3	42.5	44.6	38.9	30.7	22.8	47.2
Excluded rain	05:30	48.3	43.2	43.9	44.9	48.6	42.3	31.5	20.8	50.6
	05:45	49.5	44.2	45	46	50.2	43.9	32.1	19.5	52.1
	06:00	50.6	44.7	44.7	45	49.1	43.2	31.1	18.8	51.2
	06:15	50.6	45.5	47.1	48.1	52.6	46.2	33.4	19.6	54.5
	06:30	52.6	46.6	47.9	48.7	53.2	46.9	34.1	19.8	55.1
	06:45	53.5	47.3	48.4	49.1	53.5	47.3	34.4	19.4	55.4

Table A-6 – Arithmetic average measured $L_{90,15mins}$ levels during night-time (23:00-07:00) L1

	Time	Arithmetic average of $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
	00:00	53.6	45.4	46.3	46.8	48.8	42.2	32.7	24.0	51.1
	00:15	53.1	44.9	45.8	46.4	48.1	41.4	32.1	23.4	50.5
	00:30	53.0	44.5	45.4	45.9	47.7	40.7	31.1	22.4	50.0
	00:45	52.8	44.4	45.1	45.5	47.0	40.5	31.2	22.4	49.5
	01:00	51.4	44.1	44.9	45.5	47.4	41.2	32.2	23.8	49.8
	01:15	51.4	43.8	43.6	43.4	46.1	40.4	29.8	20.4	48.5
	01:30	51.2	44.1	43.8	43.4	46.2	39.8	29.3	20.4	48.5
	01:45	51.5	43.7	43.5	42.9	45.4	38.8	28.8	20.2	47.7
	02:00	49.8	43.2	43.1	42.5	45.0	38.5	28.7	20.0	47.3
	02:15	50.0	43.1	42.6	42.1	44.2	38.2	28.8	20.3	46.7
	02:30	49.3	42.7	42.1	41.8	44.0	37.5	28.2	19.8	46.4
	02:45	50.5	43.0	43.3	43.2	44.1	37.8	29.1	20.6	46.9
	03:00	50.5	42.9	43.2	43.3	44.4	38.0	29.2	20.6	47.0
	03:15	52.0	42.8	42.4	42.7	43.5	37.3	28.7	20.2	46.3
	03:30	52.9	42.7	42.2	42.7	43.6	38.4	29.9	20.4	46.6
	03:45	48.4	42.2	41.2	40.8	42.5	36.6	27.6	18.9	45.1

	Time	Arithmetic average of $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
	04:00	48.4	42.1	41.8	42.2	42.8	37.0	29.5	21.5	45.7
	04:15	51.7	42.2	41.5	41.7	42.4	36.6	29.1	21.1	45.4
	04:30	51.2	43.5	43.4	44.3	45.3	39.2	31.7	24.0	48.0
	04:45	51.0	43.5	43.0	43.4	44.2	38.1	31.3	23.6	47.0
	05:00	50.8	43.6	42.4	42.8	43.7	37.6	29.5	21.2	46.4
	05:15	51.1	43.7	42.2	42.0	44.1	37.9	28.7	20.2	46.6
	05:30	51.3	43.4	42.1	41.6	43.4	37.2	28.5	20.2	45.9
	05:45	51.4	43.4	42.1	41.5	43.1	36.9	28.4	20.2	45.7
	06:00	51.2	43.5	42.4	41.5	43.1	36.8	28.6	20.3	45.7
	06:15	51.1	43.5	42.6	42.0	44.1	37.7	28.7	20.1	46.6
	06:30	51.9	44.1	43.6	43.6	46.8	40.3	29.5	20.4	48.9
	06:45	51.8	44.1	44.4	44.5	48.0	41.5	30.5	20.1	50.1
	Minimum	48.4	42.1	41.2	40.8	42.4	36.6	27.6	18.9	45.1

Table A-7 – Position L2, measured $L_{90,15\ min}$ levels during night-time (23:00-07:00)

Date	Time	Measured $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
17/08/19	00:00	54.4	51.3	50.9	50.3	53.5	46.7	35.2	22.7	55.6
	00:15	54.4	51.2	50.3	49.2	52	46.2	35	22.5	54.4
	00:30	54.6	51.6	50.4	49.5	52.3	45.5	34.5	23	54.5
	00:45	55.4	51.6	50.5	49.4	51.9	45.3	34.5	22.8	54.2
	01:00	53.4	51.3	50.3	49	51.5	44.9	34.2	22.5	53.8
	01:15	53.7	51.3	50	48.9	51.4	44.6	34.1	22.6	53.7
	01:30	53.5	51.4	50	48.8	51.1	44.5	34.2	22.2	53.5
	01:45	54.1	54.9	52.3	53.2	51.9	45.5	38.4	30.9	55.3
	02:00	54.6	55.1	52.1	53	52.4	45.6	38.3	30.5	55.5
	02:15	55.8	54.8	51.8	52.2	51.1	44.7	37.7	29.9	54.5
	02:30	63.8	55.3	52.6	53.7	52.4	45.4	37.9	29.9	55.8
	02:45	54.3	51.6	49.6	48.3	50.3	43.6	34.2	23.7	52.8
	03:00	51.3	51	48.9	47.5	49.5	42.8	32.6	21.3	52.0
	03:15	51.3	51.1	48.8	47.2	48.5	42	32.4	21.1	51.2
	03:30	51.7	51.1	48.9	47.4	48.6	42	32.2	20.7	51.3
	03:45	51.2	51.2	48.7	47.2	48.3	41.7	32.2	20.9	51.1
	04:00	51.3	51.1	48.9	47.9	49	41.9	32	20.5	51.6
	04:15	52	51.1	49.1	48.5	49.6	42.8	32.4	21	52.2
	04:30	52.6	50.4	49.1	48.3	49.5	42.6	32.6	21.7	52.1
	04:45	52.7	50.7	49	47.7	48.8	41.8	32.1	20.9	51.5
	05:00	52.3	50.8	48.8	47.3	48	41.3	31.9	20.9	50.9
	05:15	52.4	51	49.1	47.9	49.5	42.5	32.8	21.8	52.0
	05:30	52.9	51.2	49.7	48.9	51.8	44.7	32.8	21.1	53.9
	05:45	54.2	50.9	50.4	49.6	52.7	45.6	33.9	21.8	54.8
	06:00	55.5	51.2	50.5	49.4	51.2	44.3	33.5	22.1	53.6
	06:15	54.2	50.8	50.5	50	53.2	46.1	34	21.6	55.2
	06:30	56.3	52.2	52.7	52.9	55.7	49	38.1	24.4	57.8
	06:45	56.9	56.2	53.7	54.8	55.3	48.8	41.3	32.3	58.1

Date	Time	Measured $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
18/08/19	23:00	55.6	53.3	51.9	51.6	54.8	47.4	35.5	23.9	56.8
	23:15	55	52.8	52.3	51.9	54.9	47.3	34.4	21.8	56.9
	23:30	55.3	52.7	51.3	50.7	53.8	46.1	33.1	21	55.8
	23:45	55.1	52.4	51.3	50.7	53.6	46.3	33.8	21.3	55.7
	00:00	55.1	52.6	51.1	50.4	53.2	45.7	33.6	21.5	55.3
	00:15	54.9	52.5	50.3	49.7	52.5	44.7	32	19.9	54.5
	00:30	54.9	52.4	50.3	49.4	51.9	44.3	32.3	20.9	54.0
	00:45	54.1	52.2	50	49.1	51.9	44	31.2	19.2	53.9
	01:00	53.1	51.9	49.8	48.8	51.1	43.3	30.5	17.4	53.3
	01:15	53.5	52.1	49.8	49.1	51.4	43.9	32.1	21.5	53.6
	01:30	52.4	51.7	49.4	48.4	50.9	42.9	30.3	17.7	53.0
	01:45	52.4	51.8	49	47.8	50.3	42.6	30.7	19.1	52.5
	02:00	52.5	52.1	49.8	49.1	52	44.3	31.8	19.3	54.0
	02:15	51.1	51.3	48.4	47.2	49.2	41.8	29.7	17.6	51.5
	02:30	51.7	51.3	48.9	47.8	49.7	43.1	31.5	19.3	52.2
	02:45	51.2	50.8	48.3	47	48.6	41.2	29.7	18.5	51.1
	03:00	53.2	54.4	51.8	53.5	51.2	44.1	37.7	32	54.9
	03:15	53	54.3	51.1	52.6	51.7	44.5	37	31	54.8
	03:30	53.1	54.2	50.9	52.1	51.2	44.3	36.5	30.6	54.4
	03:45	52.7	53.9	50.6	51.6	50.1	43.1	36.2	30.2	53.5
	04:00	51.7	51	49.4	48.8	49.8	42.7	33.2	24	52.4
	04:15	50.7	50.2	47.6	46.5	48.3	41.2	29.6	18.2	50.7
	04:30	50.9	50.1	47.2	45.9	47.4	40.1	28.8	17.1	49.9
	04:45	50.3	50	47.1	45.7	46.8	39.5	29	18.7	49.5
	05:00	50	50.1	47	45.6	46.7	39.6	28.6	17.1	49.4
	05:15	50.5	50.3	47.4	45.8	47.4	40.1	29.2	18.1	49.9
	05:30	50.4	50.6	47.9	46.8	49.5	42.2	30.1	18.7	51.7
	05:45	51.2	50.6	48.2	47.4	49.9	42.5	30.6	18.9	52.1
	06:00	50.4	50	47.9	46.5	48.8	41.2	29.5	17.9	51
	06:15	52.2	50.8	48.4	46.9	48.8	41.5	29.9	18.6	51.2
	06:30	53.8	51.5	49.5	48.2	50.7	42.9	30.6	18.2	52.8
	06:45	52.9	50.5	47.9	46.6	48	40.9	30.7	18.7	50.6
19/08/19	23:00	54.4	52.5	50.9	52.5	51.8	44.7	36.8	30.5	54.8
	23:15	53.8	52.3	50.6	52.3	50.5	43.7	36.7	30.6	54
	23:30	53.6	52.1	50.4	51.9	51	43.9	36.3	30	54.1
	23:45	53.6	52.1	50	51.7	50	43.2	36.2	29.9	53.5
	00:00	52.4	52.3	50	51.8	49.3	42.5	36.2	30	53.1
	00:15	51.9	50.4	47.9	46.5	47.8	40.6	29.3	16.7	50.4
	00:30	50.6	50.3	47.4	45.6	46.7	39.5	28.4	16.6	49.4
	00:45	50.5	50.1	47	45.1	46.4	39.4	28.4	16.4	49.1
	01:00	49.7	49.9	46.9	45	45.9	38.7	28.3	16.3	48.7
	01:15	50.5	50	46.8	44.4	44.2	37.9	28.2	17.3	47.6
	01:30	48.5	49.5	46.6	44.5	44.7	37.6	28.2	16.5	47.8
	01:45	49.1	49.3	46.1	44	43.9	37.1	27.6	15.9	47.2
	02:00	49.1	49.1	46	44.1	43.5	36.8	27.4	16	46.9
	02:15	56.6	49.9	49.7	49.4	48.2	39.5	28.8	16	51.4
	02:30	50.7	49.7	46.5	45.1	45.2	38.3	28.2	16.3	48.3
	02:45	47.7	49.1	45.5	43.4	43	36.7	27.2	15.4	46.5
	03:00	48.3	49	45.7	43.4	43.1	36.4	26.9	15.5	46.5
	03:15	57.5	49.2	45.4	43.2	42.1	35.9	27	16	46
Excluded rain	03:30	49.9	49.7	46.3	44.2	44.8	37.7	27.2	15.8	47.8
Excluded rain	03:45	47.5	49.4	46.2	44.6	44.2	39.1	31.6	21.5	47.8
Excluded rain	04:00	48.4	50.9	47.2	47.3	48.5	44.3	39.2	32.8	51.8
Excluded rain	04:15	51.6	51.5	50.2	51.5	48.6	42.8	37.6	31.2	52.8
Excluded rain	04:30	51.9	51.7	50.2	51.6	49.8	43.3	36.8	30.3	53.4
Excluded rain	04:45	51.9	51.2	49.8	51.5	49.2	42.7	36.5	30.5	53.0

Date	Time	Measured $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
Excluded rain	05:00	52.3	50.8	50.3	51.6	49.4	42.9	36.7	30.7	53.1
Excluded rain	05:15	51.4	50.4	48.4	47.8	49.6	42.7	32.2	19.4	52.0
Excluded rain	05:30	51.7	50.8	49.3	49.2	52.8	46	34	19.6	54.8
	05:45	53.1	51.1	50.2	50.6	55	48	35.3	20.9	56.8
	06:00	53.9	51.6	50.6	50.7	54.5	47.8	35.4	20.5	56.5
	06:15	54.6	52.1	52.7	53.2	57.7	50.9	38.3	22.3	59.5
	06:30	56.1	53.3	54.2	54.2	58.6	51.8	39.3	23.9	60.4
	06:45	56.5	53.7	54.6	54.7	59.2	52.5	39.5	23.7	61.0

Table A-8 – Arithmetic average measured $L_{90,15mins}$ levels during night-time (23:00-07:00) L2

	Time	Arithmetic average of $L_{90,15min}$ (dB) at each octave band centre frequency								
		63	125	250	500	1k	2k	4k	8k	dBA
	00:00	55.0	52.9	51.4	52.1	53.3	46.1	36.2	27.2	55.7
	00:15	54.4	52.6	51.5	52.1	52.7	45.5	35.6	26.2	55.3
	00:30	54.5	52.4	50.9	51.3	52.4	45.0	34.7	25.5	54.8
	00:45	54.4	52.3	50.7	51.2	51.8	44.8	35.0	25.6	54.4
	01:00	54.0	52.1	50.7	50.8	52.0	45.0	35.0	24.7	54.5
	01:15	53.7	51.4	49.5	48.5	50.8	43.8	32.1	19.7	53.1
	01:30	53.4	51.4	49.4	48.2	50.3	43.1	31.7	20.2	52.6
	01:45	53.3	51.3	49.2	47.9	50.1	42.9	31.4	19.5	52.4
	02:00	52.1	51.0	49.0	47.6	49.5	42.3	31.0	18.7	51.9
	02:15	52.6	51.1	48.9	47.5	49.0	42.1	31.5	20.5	51.6
	02:30	51.5	50.9	48.7	47.2	48.9	41.7	30.9	18.8	51.4
	02:45	51.9	52.0	49.1	48.3	48.7	41.7	32.2	22.0	51.6
	03:00	52.1	52.1	49.3	48.7	49.3	42.2	32.5	21.9	52.1
	03:15	54.5	52.0	50.0	49.6	49.5	42.0	32.1	21.2	52.4
	03:30	55.4	52.1	49.3	48.9	49.1	42.3	32.5	21.8	52.0
	03:45	51.1	50.5	47.8	46.2	47.3	40.5	30.4	19.2	50.1
	04:00	50.9	51.5	48.8	48.1	47.9	41.1	32.4	22.9	51.0
	04:15	53.9	51.5	48.4	47.7	47.4	40.8	32.1	22.7	50.6
	04:30	52.4	52.7	49.9	49.8	49.9	43.2	34.4	25.7	52.8
	04:45	52.0	52.6	49.7	49.4	49.2	42.4	34.2	25.6	52.3
	05:00	51.5	51.1	49.2	48.4	49.4	42.3	32.6	22.3	52.0
	05:15	51.4	50.7	48.4	47.5	49.0	42.0	31.0	19.6	51.5
	05:30	51.8	50.3	48.2	47.1	48.5	41.4	30.7	19.4	51.0
	05:45	51.5	50.4	48.1	46.7	47.8	40.7	30.6	19.8	50.5
	06:00	51.2	50.5	47.9	46.5	47.4	40.5	30.3	19.0	50.1
	06:15	51.5	50.7	48.3	46.9	48.5	41.3	31.0	20.0	51.0
	06:30	51.7	50.9	48.8	47.9	50.7	43.5	31.5	19.9	52.8
	06:45	52.8	50.9	49.6	49.2	52.5	45.4	33.3	20.5	54.5
	Minimum	50.9	50.3	47.8	46.2	47.3	40.5	30.3	18.7	50.1

Appendix B

SUMMARY OF EQUIPMENT USED FOR NOISE SURVEYS

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Table B-1 – Summary of noise monitoring equipment

Position	Equipment	Make/Model	Serial No.	Calibration due
L1	Sound Level Meter	01 dB CUBE	10629	07/03/20
	Pre-amplifier	Acoem PRE 22	10563	07/03/20
	Microphone	GRAS 40CD	161937	07/03/20
	Calibrator	01 dB-Metravib CAL 21	34344462	27/09/19
L2	Sound Level Meter	01 dB CUBE	10621	14/05/21
	Pre-amplifier	Acoem PRE 22	10635	14/05/21
	Microphone	GRAS 40CD	207269	14/05/21
	Calibrator	01 dB-Metravib CAL 21	34344463	24/9/19
P1-P5	Sound Level Meter	01 dB-Metravib Solo Master	65804	05/12/19
	Pre-amplifier	01 dB-Stell PRE 21 S	16471	05/12/19
	Microphone	Microtech Gefell GmBH MCE212	175391	05/12/19
	Calibrator	01 dB-Metravib Cal 21	35113823	12/12/19

Appendix C

GLOSSARY OF TERMS

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NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 2 - Range of sound levels commonly found in the environment

Sound levels	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 4 0dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of pain

ACOUSTIC TERMINOLOGY

Terminology	Meaning
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

Appendix D

LIMITATIONS OF REPORT

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The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations WSP UK Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

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Appendix 6.4 Traffic Data

All flows 18 Hour AAWT

		2018 Base		2023 Do Minimum		Percentage change		dB change	
Reference	Location	Daily Vehicles	Daily HGV	Daily Vehicles	Daily HGV	Daily Vehicles	Daily HGV	Daily Vehicles	Daily HGV
1	Mancunian Way (East of Hoyle St)	47258	1775	48884	1792	1.03	1.01	0.1	0.0
2	Mancunian Way (West of Hoyle St)	47258	1775	48884	1792	1.03	1.01	0.1	0.0
3	Fairfield Street (Between Temperance St and Manc. Way)	7812	44	7646	33	0.98	0.76	-0.1	-1.2
4	Fairfield Street (East of Travis Street)	7533	41	7461	33	0.99	0.80	0.0	-1.0
5	Fairfield Street (West of Travis Street)	12851	188	13093	198	1.02	1.05	0.1	0.2
6	Travis Street (South of Fairfield Street)	6121	133	6260	146	1.02	1.10	0.1	0.4
7	Travis Street (North of Fairfield Street)	7658	60	8371	53	1.09	0.88	0.4	-0.5
8	London Road (North of Travis Street)	14656	69	15479	61	1.06	0.88	0.2	-0.5
9	London Road (South of Travis Street)	17501	80	17341	65	0.99	0.81	0.0	-0.9
10	Downing Street (South of Manc. Way)	30292	1019	30850	1035	1.02	1.02	0.1	0.1
11	Mancunian Way (North of Fairfield Street)	31483	971	31968	954	1.02	0.98	0.1	-0.1
12	Fairfield Street (East of Mancunian Way)	24292	747	25054	769	1.03	1.03	0.1	0.1
13	Pill Mill Brow (North of Fairfield Street)	18181	147	19039	180	1.05	1.22	0.2	0.9
14	A665 Ring Road (North of Pill Mill Brow)	46334	1019	47456	994	1.02	0.97	0.1	-0.1
15	A665 Ring Road (south of Pollard St)	33868	669	34523	604	1.02	0.90	0.1	-0.4
16	Ashton Old Road (east of Fairfield Street)	24715	767	25370	777	1.03	1.01	0.1	0.1
17	Chancellor Lane (south of Fairfield Street)	19376	96	20706	128	1.07	1.33	0.3	1.2
18	London Road (north of Fairfield Street)	14105	108	13383	121	0.95	1.13	-0.2	0.5
19	Fairfield Street (west of London Road)	16014	224	17082	244	1.07	1.09	0.3	0.4
20	Whitworth Street (north of London Road)	6746	34	6657	30	0.99	0.87	-0.1	-0.6
21	Store Street (east of London Road)	635	0	422	0	0.66		-1.8	
22	London Road (north of Store Street)	8126	112	7578	127	0.93	1.13	-0.3	0.5
23	Whitworth Street (east of Sackville St)	19079	298	19872	350	1.04	1.17	0.2	0.7
24	Aytoun Street (north of Fairfield Street)	8973	112	8669	142	0.97	1.26	-0.2	1.0
25	Auburn Street (west of London Road)	6856	94	6593	123	0.96	1.31	-0.2	1.2
26	Ducie Street (east of London Road)	4114	9	3752	7	0.91	0.81	-0.4	-0.9
27	Piccadilly (north of Ducie Street)	8210	128	8369	147	1.02	1.15	0.1	0.6
28	Portland Street (west of Piccadilly)	2080	18	1948	19	0.94	1.01	-0.3	0.0
29	Newton Street (east of Piccadilly)	5555	87	5449	94	0.98	1.08	-0.1	0.3
30	Store Street (south of Ring Road)	2801	5	2824	2	1.01	0.50	0.0	-3.0
31	Ardwick Green (north of Hyde Road)	26175	1026	29197	1058	1.12	1.03	0.5	0.1
32	Devonshire Street (north of Hyde Road)	15299	62	15836	82	1.04	1.32	0.1	1.2
33	Hyde Road (east of Ardwick Green)	18372	671	19399	680	1.06	1.01	0.2	0.1
34	Hyde Road (east of Devonshire Street N)	25837	715	27120	744	1.05	1.04	0.2	0.2
35	Stockport Road (South of Ardwick Green)	16119	405	17523	427	1.09	1.05	0.4	0.2
36	Pollard Street (north of Ring Road)	5529	119	5537	105	1.00	0.88	0.0	-0.5
37	A665 Ring Road (north of Pollard Street)	41299	598	40965	533	0.99	0.89	0.0	-0.5
38	A665 Ring Road (north of Old Mill Street)	39293	547	38726	498	0.99	0.91	-0.1	-0.4
39	Old Mill Street (north of Store Street)	10706	367	10410	368	0.97	1.00	-0.1	0.0
40	Manunian Way (west of London Road)	44829	1510	46561	1511	1.04	1.00	0.2	0.0
41	Princess Street (north of Mancunian Way)	10983	243	11056	291	1.01	1.20	0.0	0.8
42	Upper Brook Street (south of Mancunian Way)	29638	637	30665	667	1.03	1.05	0.1	0.2
43	Upper Brook Street (south of Plymouth Grove)	32767	882	33285	884	1.02	1.00	0.1	0.0
44	Plymouth Grove (south of Upper Brock Grove)	11466	192	11367	232	0.99	1.21	0.0	0.8
45	Princess Street (north of Whitworth Street)	3384	0	3846	0	1.14		0.6	
46	Portland Street (east Princess Street)	11281	57	12308	68	1.09	1.19	0.4	0.8
47	Mancunian Way (west of Brook Street)	86037	2776	88696	2788	1.03	1.00	0.1	0.0
48	Oxford Road (north of Mancunian Way)	5846	9	6203	2	1.06	0.25	0.3	-6.0
49	Oxford Road (south of Mancunian Way)	3010	0	3153	0	1.05		0.2	
50	Oxford Road (south of Booth Street E)	2832	0	2878	0	1.02		0.1	
51	Cambridge Street (South of Mancunian Way)	21361	309	22636	336	1.06	1.09	0.3	0.4
52	Cambridge Street (north of Mancunian Way)	13313	137	13600	141	1.02	1.02	0.1	0.1
53	Manunian Way (east of Cambridge Street)	56164	1677	59330	1660	1.06	0.99	0.2	0.0
54	Whitworth Street (west of Oxford Road)	14809	330	15598	333	1.05	1.01	0.2	0.0
55	Whitworth Street (east of Oxford Road)	14902	346	15819	366	1.06	1.06	0.3	0.2
56	Oxford Road (north of Whitworth Street)	4090	21	4300	36	1.05	1.75	0.2	2.4
57	Whitworth Street (west of Cambridge Road)	13175	300	13446	323	1.02	1.08	0.1	0.3
58	Medlock Street (north of Mancunian Way)	21916	394	23533	375	1.07	0.95	0.3	-0.2
59	Medlock Street (south of Mancunian Way)	44261	1301	46261	1312	1.05	1.01	0.2	0.0
60	Manunian Way (west of Medlock Street)	74048	1816	78403	1823	1.06	1.00	0.2	0.0
61	Whitworth Street (west of Medlock Street)	13410	268	12800	270	0.95	1.01	-0.2	0.0
62	Chester Road (north of Mancunian Way)	19178	291	22254	245	1.16	0.84	0.6	-0.7
63	Chorlton Road (south of Mancunian Way)	9066	405	8707	371	0.96	0.92	-0.2	-0.4
64	Chester Road (west of Mancunian Way)	18323	1122	21685	661	1.18	0.59	0.7	-2.3
65	Deansgate (north of Whitworth Street)	18248	405	20208	349	1.11	0.86	0.4	-0.7
66	Great Bridgewater Street (east of Deansgate)	6311	55	6641	69	1.05	1.26	0.2	1.0
67	Great Bridgewater Street (east of Albion Street)	4226	0	4787	7	1.13		0.5	
68	Portland Street (east of Oxford Road)	11243	76	12203	79	1.09	1.05	0.4	0.2
69	Ducie Street (west of Ring Road)	2582	0	2651	0	1.03		0.1	
70	Laystall Street (west of Ring Road)	3154	11	4163	12	1.32	1.03	1.2	0.1
71	Ring Road (south of Newton Street)	37694	561	35308	498	0.94	0.89	-0.3	-0.5
72	Newton Street (west of Ring Road)	6077	69	5144	78	0.85	1.14	-0.7	0.6
73	Ring Road (north of Newton Street)	38455	582	37002	531	0.96	0.91	-0.2	-0.4
74	Ring Road (north of Oldham Road)	19254	550	18756	486	0.97	0.88	-0.1	-0.5
75	Oldham Road (north of Ring Road)	24048	231	24174	224	1.01	0.97	0.0	-0.1
76	Rochale Road (north of Ring Road)	14471	172	14398	152	0.99	0.89	0.0	-0.5
77	Ring Road (north of Rochdale Road)	20722	486	20534	447	0.99	0.92	0.0	-0.4
78	Cheetham Hill Road (north of Ring Road)	22240	763	22688	758	1.02	0.99	0.1	0.0
79	Ring Road (west of Cheetham Hill Road)	38427	1326	38519	1298	1.00	0.98	0.0	-0.1
80	Great Ducie Street (north of Ring Road)	19034	767	19475	764	1.02	1.00	0.1	0.0
81	Great Ducie Street (south of Ring Road)	18004	605	18443	626	1.02	1.04	0.1	0.2

Appendix 6.5 Construction Noise Data Calculations

Calculation 1

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Bulldozer	2	103	200	80%	-54.0	3.0	0	3	-0.97	54.0
Concrete crusher	2	110	200	80%	-54.0	3.0	0	3	-0.97	61.0
Concrete splitter	1	111	200	30%	-54.0	0.0	0	3	-5.23	54.8
Concrete saw	1	119	200	30%	-54.0	0.0	0	3	-5.23	62.8
Hand held tools	5	103	200	50%	-54.0	7.0	0	3	-3.01	56.0
Tracked excavators	1	103	200	80%	-54.0	0.0	0	3	-0.97	51.0
Breaker	1	111	200	30%	-54.0	0.0	0	3	-5.23	54.8
Diesel generators	2	88	200	100%	-54.0	3.0	0	3	0.00	40.0
Access platform	2	95	200	10%	-54.0	3.0	0	3	-10.00	37.0
HGV	1	108	200	10%	-54.0	0.0	0	3	-10.00	47.0
								Activity Noise Level		67

Calculation 2

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Atric dump truck	2	108	250	80%	-56.0	3.0	0	3	-0.97	57.1
Hydraulic tracked excavator	1	107	250	80%	-56.0	0.0	0	3	-0.97	53.1
Tracked loader lorry	1	105	250	80%	-56.0	0.0	0	3	-0.97	51.1
Generator	1	88	250	100%	-56.0	0.0	0	3	0.00	35.0
HGV	1	108	250	20%	-56.0	0.0	0	3	-6.99	48.1
								Activity Noise Level		60

Calculation 3

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Atric dump truck	2	108	130	80%	-50.3	3.0	0	3	-0.97	62.8
Hydraulic tracked excavator	1	107	130	80%	-50.3	0.0	0	3	-0.97	58.8
Tracked loader lorry	1	105	130	80%	-50.3	0.0	0	3	-0.97	56.8
Generator	1	88	130	100%	-50.3	0.0	0	3	0.00	40.7
HGV	1	108	130	20%	-50.3	0.0	0	3	-6.99	53.7
								Activity Noise Level		65

Calculation 4

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Atric dump truck	2	108	100	80%	-48.0	3.0	0	3	-0.97	65.0
Hydraulic tracked excavator	1	107	100	80%	-48.0	0.0	0	3	-0.97	61.0
Tracked loader lorry	1	105	100	80%	-48.0	0.0	0	3	-0.97	59.0
Generator	1	88	100	100%	-48.0	0.0	0	3	0.00	43.0
HGV	1	108	100	20%	-48.0	0.0	0	3	-6.99	56.0
								Activity Noise Level		68

Calculation 5

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Atric dump truck	2	108	200	80%	-54.0	3.0	0	3	-0.97	59.0
Hydraulic tracked excavator	1	107	200	80%	-54.0	0.0	0	3	-0.97	55.0
Tracked loader lorry	1	105	200	80%	-54.0	0.0	0	3	-0.97	53.0
Generator	1	88	200	100%	-54.0	0.0	0	3	0.00	37.0
HGV	1	108	200	20%	-54.0	0.0	0	3	-6.99	50.0
								Activity Noise Level		62

Calculation 6

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
CFA	1	105	250	50%	-56.0	0.0	0	3	-3.01	49.0
								Activity Noise Level		49

Calculation 7

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
CFA	1	105	130	50%	-50.3	0.0	0	3	-3.01	54.7
								Activity Noise Level		55

Calculation 8

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
CFA	1	105	100	50%	-48.0	0.0	0	3	-3.01	57.0
								Activity Noise Level		57

Calculation 9

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Concrete silo and ready mix lor	6	103	250	60%	-56.0	7.8	0	3	-2.22	55.6
Diesel generators	12	88	250	100%	-56.0	10.8	0	3	0.00	45.8
Concrete pumps	12	95	250	100%	-56.0	10.8	0	3	0.00	52.8
Hydraulic cutters	6	111	250	60%	-56.0	7.8	0	3	-2.22	63.6
Hydraulic access platrofm	6	95	250	60%	-56.0	7.8	0	3	-2.22	47.6
HGV	1	108	250	25%	-56.0	0.0	0	3	-6.02	49.0
								Activity Noise Level		65

Calculation 10

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Concrete silo and ready mix lor	6	103	130	60%	-50.3	7.8	0	3	-2.22	61.3
Diesel generators	12	88	130	100%	-50.3	10.8	0	3	0.00	51.5
Concrete pumps	12	95	130	100%	-50.3	10.8	0	3	0.00	58.5
Hydraulic cutters	6	111	130	60%	-50.3	7.8	0	3	-2.22	69.3
Hydraulic access platrofm	6	95	130	60%	-50.3	7.8	0	3	-2.22	53.3
HGV	1	108	130	25%	-50.3	0.0	0	3	-6.02	54.7
								Activity Noise Level		70

Calculation 11

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Concrete silo and ready mix lor	6	103	100	60%	-48.0	7.8	0	3	-2.22	63.6
Diesel generators	12	88	100	100%	-48.0	10.8	0	3	0.00	53.8
Concrete pumps	12	95	100	100%	-48.0	10.8	0	3	0.00	60.8
Hydraulic cutters	6	111	100	60%	-48.0	7.8	0	3	-2.22	71.6
Hydraulic access platrofm	6	95	100	60%	-48.0	7.8	0	3	-2.22	55.6
HGV	1	108	100	25%	-48.0	0.0	0	3	-6.02	57.0
								Activity Noise Level		73

Calculation 12

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Mobile crane	6	105	250	60%	-56.0	7.8	0	3	-2.22	57.6
Hand held tools	6	103	250	60%	-56.0	7.8	0	3	-2.22	55.6
Diesel generators	12	88	250	100%	-56.0	10.8	0	3	0.00	45.8
Hydraulic cutters	6	111	250	60%	-56.0	7.8	0	3	-2.22	63.6
Hydraulic access platrofm	6	95	250	60%	-56.0	7.8	0	3	-2.22	47.6
Concrete pumps	12	95	250	100%	-56.0	10.8	0	3	0.00	52.8
HGV	1	108	250	5%	-56.0	0.0	0	3	-13.01	42.0
								Activity Noise Level		65

Calculation 13

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Mobile crane	6	105	130	60%	-50.3	7.8	0	3	-2.22	63.3
Hand held tools	6	103	130	60%	-50.3	7.8	0	3	-2.22	61.3
Diesel generators	12	88	130	100%	-50.3	10.8	0	3	0.00	51.5
Hydraulic cutters	6	111	130	60%	-50.3	7.8	0	3	-2.22	69.3
Hydraulic access platrofm	6	95	130	60%	-50.3	7.8	0	3	-2.22	53.3
Concrete pumps	12	95	130	100%	-50.3	10.8	0	3	0.00	58.5
HGV	1	108	130	5%	-50.3	0.0	0	3	-13.01	47.7
								Activity Noise Level		71

Calculation 14

Description	No. of Plant	SWL [dB(A)]	Closest Distance [m]	Percentage on time (1.0 = 100%)	ADJUSTMENT (dB(A))					Resultant Noise Level dB(A)
					Distance Correction dB	No. of Plant Correction	Screening Correction dB	Reflection Correction dB	Duration Correction dB	
Mobile crane	6	105	100	60%	-48.0	7.8	0	3	-2.22	65.6
Hand held tools	6	103	100	60%	-48.0	7.8	0	3	-2.22	63.6
Diesel generators	12	88	100	100%	-48.0	10.8	0	3	0.00	53.8
Hydraulic cutters	6	111	100	60%	-48.0	7.8	0	3	-2.22	71.6
Hydraulic access platrofm	6	95	100	60%	-48.0	7.8	0	3	-2.22	55.6
Concrete pumps	12	95	100	100%	-48.0	10.8	0	3	0.00	60.8
HGV	1	108	100	5%	-48.0	0.0	0	3	-13.01	50.0
								Activity Noise Level		73

Appendix 7.1 Transport Assessment

BUROHAPPOLD ENGINEERING

Mayfield Phase 1, Manchester

Transport Assessment

0042917

4 October 2019

Revision 03

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Revision	Description	Issued by	Date	Checked
00	Draft for Comment	RE	06.09.2019	CM
01	Final Draft	RE	25.09.2019	CM
02	Final for Planning	RE	27.09.2019	CM
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author	**Richard Evans**
date	**04.10.2019**
approved	**Chris Mullett**
signature	
Date	**04.10.2019**

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1 Introduction

1.1 Preamble

1.1.1 This Transport Assessment (TA) has been prepared by BuroHappold on behalf of the Mayfield Development Partnership LP (the Applicant) in support of the planning application for Phase 1 of the Mayfield Strategic Regeneration Framework (SRF), the Site, for the regeneration of Mayfield in Manchester city centre. The planning application will be submitted to Manchester City Council (MCC).

1.2 Site Description

1.2.1 The Mayfield SRF site is located in the east of Manchester city centre, directly south of Manchester Piccadilly Station. The SRF is bounded to the north by Fairfield Street, to the south by A635 Mancunian Way, to the east by Temperance Street and to the west by the A6 London Road.

1.2.2 Phase 1 of the SRF is located in the south, adjacent to Baring Street and the A635 Mancunian Way eastbound slip road.

1.2.3 Figure 1.1 shows the planning application boundaries for the SRF and Phase 1 within the existing local context.

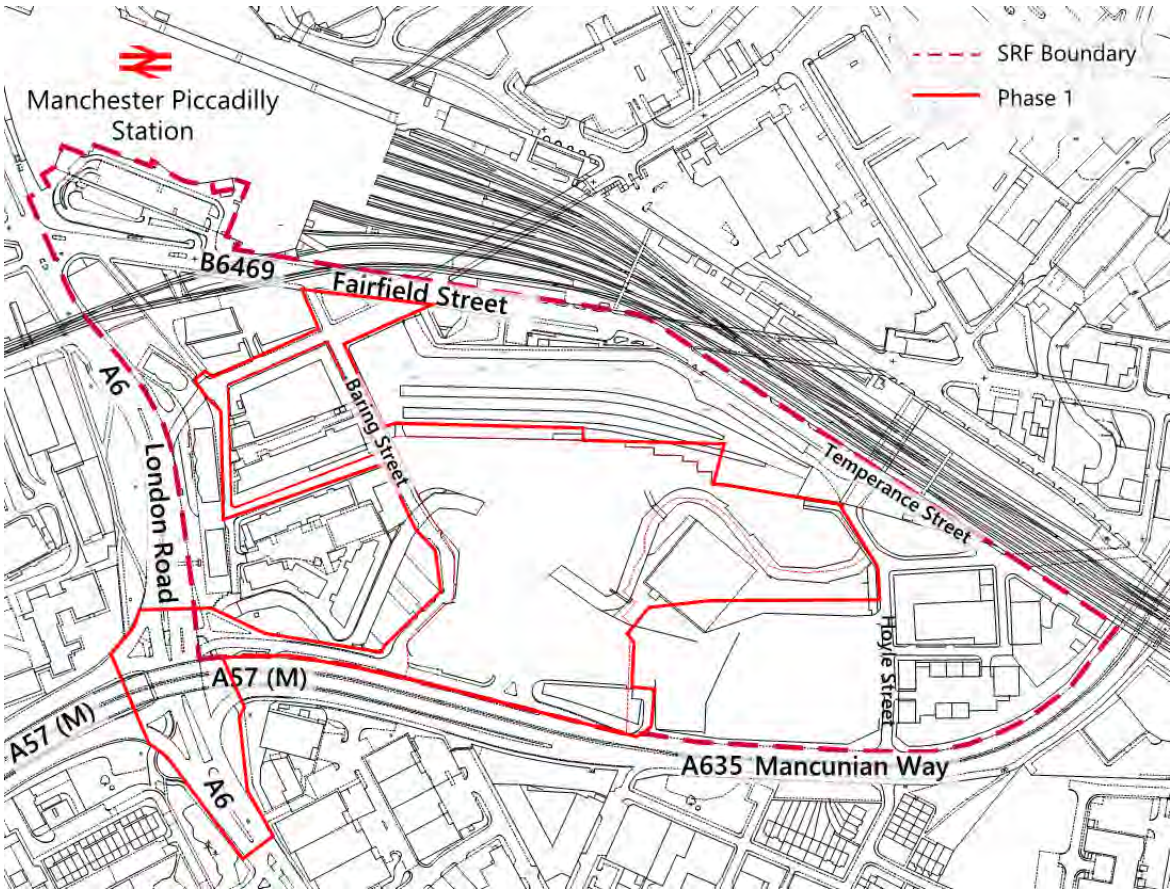


Figure 1.1 Site Location

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1.3 Development Proposals

1.3.1 The maximum parameters for the landuses of the Mayfield SRF are shown in Table 1.1.

Table 1.1 Mayfield SRF - Proposed Land Use Schedule

Land Use	Quantum
Commercial	154,800sqm GEA*
Retail / Leisure	32,300sqm GEA
Hotel	650 rooms
Residential	1,500 units
Parking	700 spaces

**Areas expressed as Gross External Area (GEA*)

1.3.2 The development plots proposed for Phase 1 include the Park, Plot O, Plot N and Plot M of the SRF; these plots are herein referred to as Mayfield Park, Baring Street 1, Baring Street Multi-Storey Car Park (MSCP) and Baring Street 2 respectively. The maximum landuse quanta for each plot are set out in Table 1.2.

Table 1.2 Mayfield Phase 1 - Proposed Land Use Schedule

Plot	Land Use	Quantum
Baring Street Office 1	B1 Office and ground floor commercial	9,987sqm GEA: comprising 9,651sqm GEA B1 use and 336sqm GEA ground floor commercial use.
Baring Street Multi-Storey Car Park	Multi-Storey Car Park	543 spaces
Baring Street Office 2	B1 Office and ground floor commercial / ancillary space	Up to 31,000 sqm GEA

1.4 Planning Application Description

1.4.1 The demolition of the majority of on-site structures is being carried out under a separate Prior Approval process. The planning applications for Phase 1 are described below.

Application 1

- Phased demolition and site clearance, earthworks including re-profiling and construction of retaining walls for the land bounded by the Mancunian Way to the south, Mayfield Depot to the north, Baring Street to the west and Hoyle Street to the east;
- Mayfield Park: provision of circa 6 acres (2.4 ha) of public park, including hard and soft landscaping to be delivered in phases with new bridges across the River Medlock;
- Baring Street Office (Block 1): nine-storey office development including ground, mezzanine and plant level comprising 9,987 sq. m. (GEA), including active ground floor uses (A1, A3, A4 or B1), public realm and riverside walkway;
- Baring Street MSCP: 10-storey including roof level MSCP for circa 543 car parking spaces; and associated

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- Highways and Infrastructure Works: creation of new junction from London Road with required access to the MSCP and works to Baring Street, which will be delivered prior to the MSCP becoming operational.

Application 2

- Baring Street Office (Block 2): 13-storey office development including ground and mezzanine floors comprising circa 31,000 sq. m. (GEA) with active ground floor uses, highways and associated access and public realm.

1.5 Planning History

1.5.1 The Site is the subject of a Strategic Regeneration Framework (SRF), which was adopted in May 2018 and sets out the key development and urban design principles at the Mayfield site. The principles described in the SRF are reflected and built upon within this planning application.

1.6 Pre-Application Consultation

1.6.1 The scope of this TA has been discussed with MCC and TfGM during the pre-application period and included agreements on the transport assessment scope and trip generation methodology. The key scoping documents and correspondence submitted to and received from MCC and TfGM are included in Appendix A.

1.7 Transport Assessment Scope

1.7.1 The scope of the TA reflects the output of the pre-application consultation process with MCC and TfGM, and has been prepared in accordance with relevant policy and current best practice guidance.

1.7.2 The TA assesses the transport impact of the SRF in outline and Phase 1 development in detail, with the exception of Baring Street Office 2, which will be the subject of a future detailed application. As discussed in more detail later in the TA, the transport impact of Application 1 and Application 1 + Application 2 is covered by assessing Phase 1 as a whole.

1.7.3 It is noted that the development proposed in Phase 1 is confined to the western edge of the SRF, and therefore the only transport proposals required to support the Phase 1 development plots will be brought forward at this time. Further elements of transport infrastructure identified in the SRF strategy will be brought forward at the appropriate time with the relevant future development phase and assessed then.

1.7.4 Furthermore, it has been agreed with MCC that the detail of the changes to transport infrastructure will be secured by planning condition following a consent, and the detailed agreed as part of the s278 design work in conjunction with MCC. This will also factor in construction phasing for Phase 1 and later elements of the SRF and other works that may affect Mayfield, such as Network Rail's proposals for Piccadilly.

1.7.5 The sections of this TA are structured as follows:

- **Policy Context** – the relevant National, Regional and Local Policy will be reviewed;
- **Existing Conditions** – the baseline transport conditions with regard to the pedestrian and cycle networks, public transport facilities and the highway network are described. An analysis of accidents occurring within the vicinity of the Site over the last five years has also been undertaken;

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- **Development Proposals** - including land use quantum and mix for the SRF and Phase 1 proposals; access proposals for all modes; cycle and vehicle parking; waste storage and provision; servicing and deliveries;
- **Trip Generation** – multi-modal trip generation assessment including walking, cycling, public transport, vehicular and servicing;
- **Committed Development** – a description of the additional developments that have been considered as part of the transport impact assessment;
- **Transport Impacts** - an assessment of the impacts of the SRF and Phase 1 development on all modes of transport;
- **Mitigation Measures** - the proposed measures to mitigate the anticipated transport impacts of the development are provided; and
- **Summary and Conclusions.**

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2 Policy Context

2.1 Policy and Guidance

2.1.1 The following policy documents have been reviewed as part of this TA. These policy and guidance documents can be categorised at the national, regional and local level, and outline the planning policy framework for the proposed development. The relevant policies to this development are outlined below and will be referred to throughout this TA:

- National Planning Policy Framework (NPPF) (2019);
- Transport for the North (TfN) Strategic Transport Plan (2019);
- Greater Manchester's Spatial Framework – Consultation Draft (2019);
- Greater Manchester's Transport Strategy 2040: Draft Delivery Plan 2020-2025 (2019);
- Made to Move: 15 Steps to transform Greater Manchester, by changing the way we get around (2017);
- Manchester City Council's Core Strategy Development Plan (2012);
- Manchester City Council's Unitary Development Plan – Saved Policies (1995);
- Manchester City Council's Supplementary Planning Guidance (SPG) Guide to Development in Manchester (2007); and
- Manchester City Council's Design for Access 2 (2003).

2.1.2 The relevant policies to this development are summarised below.

2.2 National Policy

National Planning Policy Framework (MHCLG, 2019)

2.2.1 This revised National Planning Policy Framework (NPPF) was published by Ministry of Housing, Communities & Local Government (MHCLG) in February 2019.

2.2.2 The 2019 revision replaces the preceding 2018 document. It follows a technical consultation on the 2018 update. The amendments includes minor changes to policy in relation to five year housing supply and housing and economic needs assessments.

2.2.3 Section 9 of the NPPF (para. 102 to 111) sets out the approach for promoting sustainable transport. It requires that all development generating significant amounts of movement should be supported by a TA so that the impacts of the proposal on the transport network and environment can be adequately addressed (para. 111). It also suggests that transport should be considered at the earliest stages of development proposals (para. 102) so that:

- *'Opportunities to connect to existing or proposed transport infrastructure and to promote sustainable patterns of movement are realised; and*

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- *Patterns of movement, streets, parking and other transport related components are integral elements of the design process and contribute to the creation of quality places*.'

2.2.4 When considering development proposals, the NPPF recommends that applications ensure that:

- *'appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;*
- *safe and suitable access to the site can be achieved for all users; and*
- *any significant impacts from the development on the transport network (in term of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.'*

2.2.5 Paragraph 109 states that development 'should only be prevented or refused on highways grounds if the residual cumulative impacts on the road network or road safety would be severe.'

2.2.6 Paragraph 110 states that applications for development should:

- *'give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use;*
- *address the needs of people with disabilities and reduced mobility in relation to all modes of transport;*
- *create places that are safe, secure and attractive – which minimise the scope for conflicts between pedestrians, cyclists and vehicles, avoid unnecessary street clutter, and respond to local character and design standards;*
- *allow for the efficient delivery of goods, and access by service and emergency vehicles; and*
- *be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations.'*

2.3 Regional Policy

Transport for the North's Strategic Transport Plan (TfN 2019)

2.3.1 Transport for the North (TfN) became England's first sub-national transport body in April 2018. As a partnership, TfN encompasses 20 local transport authorities in northern England, together with Network Rail and Highways England, to plan and prioritise long-term infrastructure investment in the North.

2.3.2 TfN's role is to add strategic value by ensuring that funding and strategy decisions about transport in the North are informed by local knowledge and requirements. TfN published its Strategic Transport Plan in 2019 setting out proposals for the northern transport network through to 2050.

2.3.3 The TfN's core vision is to have *'a thriving North of England, where world class transport supports sustainable economic growth, excellent quality of life and improved opportunities for all.'* Supporting this vision are the four pan-Northern transport objectives, which are:

- Transforming economic performance;

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- Increasing efficiency, reliability, integration, and resilience in the transport system;
- Improving inclusivity, health, and access to opportunities for all; and
- Promoting and enhancing the built, historic and natural environment.

Greater Manchester's Spatial Framework (GMSF): Plan for Homes, Jobs and the Environment – Draft (2019)

2.3.4 The Greater Manchester Combined Authority (GMCA) was established in 2011. It is formed of 10 local authorities, including Manchester City Council (MCC). It is an administrative body that sets out region-wide strategies, policies and objectives for housing, employment and industry and the environment.

2.3.5 Transport for Greater Manchester (TfGM) is the executive body of the GMCA.

2.3.6 In October 2016 GMCA released its second draft of the Greater Manchester Spatial Framework (GMSF) for consultation between January and March 2019.

2.3.7 The GMSF establishes GMCA's approach to the future development of Greater Manchester until 2037, setting out targets for both housing and jobs. Putting the environment front and centre, along with economic and social issues, a brownfield first approach has been adopted as part of the new spatial framework.

2.3.8 Policy GM-Strat 1 highlights a need for a strong focus of on growth in the Core Growth Area (CGA). The CGA includes Manchester's city centre, the Quays, Trafford Park and Salford Port. The policies seeks to protect the economic role of the CGA with new development supporting major growth in jobs. It also seeks to increase housing supply but not at the expense of economic functions. Additionally, emphasis is placed on the importance of infrastructure relative to the growth of the CGA, in line with the Transport Strategy 2040.

2.3.9 Moreover, this is further explored in policy GM-Strat 2. The policy prioritises investment in infrastructure in resolving capacity issues in Manchester's city centre, while also seeking the expansion of the rapid transit network, improvements to public realm, green infrastructure, and cycling and walking facilities.

2.3.10 Over the period of 2018 to 2037, GMSF identifies that there will be at least 1,500,000sqm of land of office floor space and nearly 50,000 new dwellings within the city centre. As a brownfield site, the development at Mayfield is likely to contribute to the delivery of this target.

Greater Manchester Transport Strategy 2040: Draft Delivery Plan 2020-2025 (2019)

2.3.11 The Greater Manchester Transport Strategy (GMTS) sets out the long-term proposals to 2040 to create a cleaner, greener, more prosperous city region through better transport connections and simpler travel. This includes the aspiration for 50% of all journeys in Greater Manchester to be made by walking, cycling and public transport by 2040.

2.3.12 In line with the GMS, the transport strategy aims to deliver "*World class connections that support long-term sustainable economic growth and access to opportunities for all*".

2.3.13 Integration is at the heart of the strategy with an ambition to create a high quality network for Greater Manchester that enables people to move efficiently and effortlessly between different modes of transport. Integrated land use and transport planning are recognised as key tools in realising this ambition.

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2.3.14 Policy 4 of GMTS sets out TfGM's approach to spatial planning, who seek to continue to work in collaboration with planning authorities and developers to:

- Reduce the need to travel by car, and the distance travelled;
- Maximise accessibility to new developments by sustainable modes;
- Maximise the best use of existing infrastructure, ensure that development close to public transport nodes are high density; and
- Developments are designed in a way that encourages and facilitates active travel.

2.3.15 Policy 17 explores the concept of streets as places, providing for sustainable modes, reducing congestion and balancing the needs of motorised traffic with cyclists, pedestrians, residents, shoppers and local businesses. It builds upon the 'Link and Place' concept that has been introduced in London and Birmingham.

Made to Move (2017)

2.3.16 The Made to Move Strategy document was published in 2017 and sets out the 15 steps required to make Greater Manchester into one of the best places in the world to walk and cycle. This vision was then followed up by the Beelines proposal to a comprehensive network of walking and cycling routes. The Beelines network proposes 279 new or upgraded crossings in Manchester enabling 94% of the population to use Beelines. In addition, three miles of Beelines on busy roads are proposed.

2.3.17 The Beeline Strategy proposes crossing and link improvements on highways surrounding the Mayfield SRF site, including on Fairfield Street, London Road and Mancunian Way.

2.4 Local Policy

Manchester City Council's Core Strategy (2012)

2.4.1 Manchester's Core Strategy, adopted in 2012, outlines MCC's vision for development of Manchester City up to 2027. Mayfield is identified as a prime location for the development of B1 uses (Policy CC1) as well as A1, A3, C3 and D2. This is further supported by Policy EC3 which supports the development of employment uses in city centre in locations that are well connected by sustainable transport to both the city centre and residential areas.

2.4.2 Policy CC5 sets out MCC's approach to transport in the city centre, requiring developers to work with public transport providers in ensuring that new developments are accessible by sustainable modes as well as by all users. Additionally, the policy seeks the adequate provision of parking for cars and bicycles, with the level of car parking reflecting the accessibility of the location. MCC's parking standards are set out in Appendix B of the Local Plan. The standards applicable to the development site are summarised in Table 2.1.

2.4.3 It should be noted that maximum standards for car parking are not applicable to new developments in the city centre and they are considered on a case-by-case basis. Cycle and disabled parking standards are applicable citywide.

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Table 2.1 MCC Parking Standards

Land use	Car Parking	Cycle Parking	Disabled Car Parking Spaces	
			Up 200 spaces	Over 200 spaces
A1 (Food retail)	Determined on a case by case basis in the city centre	1 space per 140sqm minimum 2 spaces	3 bays or 6% of total capacity	4 bays plus 4% of total capacity
A1 (Non-food retail)		1 space per 200sqm minimum 2 spaces	3 bays or 6% of total capacity	4 bays plus 4% of total capacity
A3, A5 (Restaurants, Cafes, Takeaways)		1 space 50sqm minimum 2 spaces	3 bays or 6% of total capacity	4 bays plus 4% of total capacity
B1 (Office)		1 space 200 m2	Individual bays for each disabled employee plus 2 bay or 5% of total capacity	6 bay plus 2% of total capacity
C1 (Hotel)		1 space per 10 guest rooms minimum 2 spaces	3 bays or 6% of total capacity	4 bays plus 4% of total capacity
D2 (Cinemas, Theatres and Conference Facilities)		1 space per 20 seats	3 bays or 6% of total capacity	4 bays plus 4% of total capacity
D2 (Other Leisure Facilities)		1 space per 140m 2	3 bays or 6% of total capacity	4 bays plus 4% of total capacity

2.4.4 It is noted that car, cycle and disabled parking standards for residential use are not included in the MCC's Core Strategy document. The strategy for providing car, cycle and disabled parking for residential use is described in Section 4.

2.4.5 Along with the policies described above, Strategic Objective 5 of the Local Plan primary focus is transport. The relevant policies attached to this objective are discussed below:

T1: Sustainable Transport

2.4.6 In line with the GMTS ambitions, Policy T1 seeks the delivery of a *'sustainable, high quality, integrated transport system'* that promotes the use of sustainable modes by developing alternatives to the car; improving pedestrian routes and the public realm; improving and developing Manchester's cycle network; and the provision of an efficient and reliable public transport network.

2.4.7 The policy supports proposals that:

- Promote regeneration and economic vitality by relieving traffic congestion and improving access to jobs and services, particularly for those most in need and for those without a car;
- Improve access to transport services and facilities in order to enable disabled people and people with mobility impairments to participate fully in public life;
- Contribute to improvements to the extent and reliability of the public transport network through safe and attractive waiting and interchange facilities, better priority, improved services and information provision;

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- Facilitate modes of transport that can reduce carbon emissions e.g. by incorporating charging points for electric vehicles, subject to their appropriate design and location; and
- Reduce the negative impacts of road traffic, for example, congestion, air pollution and road accident casualties.

2.4.8 Additionally the policy sets out a hierarchy of needs for road users that should be considered by developers. The hierarchy, in order of priority is as follows:

- Pedestrians and disabled people;
- Cyclists, public transport;
- Commercial access;
- General off peak traffic; and
- General peak time traffic.

T2: Accessible areas of opportunity and need

2.4.9 Policy T2 ensures that a good level of access to/from new developments to other parts of the city is established.

2.4.10 Reflecting Policy CC5, Policy T2 elaborates on the MCC parking policies stating that MCC will consider each development upon its own merits and expects that the level of car parking attached to new development located in the city centre will reflect the 'accessible nature of the location'.

T3: Strategic Integration

2.4.11 Policy T3 requires development to, where possible, contribute to the creation of a sustainable transport network that is both economically viable and environmentally friendly. It also states that any proposals that show any form of prejudice in the implementation of strategic transport schemes will be refused.

Mayfield Strategic Regeneration Framework

2.4.12 MCC originally endorsed a Strategic Regeneration Framework (SRF) for Mayfield in 2010 that set out a vision for a new mixed-use urban neighbourhood, including a new city centre park. The guiding principles of the SRF was to enhance connectivity within Mayfield / Piccadilly area and maximise the wider regeneration benefits. The SRF was revised in 2014 to capitalise on the benefits brought by Network Rail's Northern Hub.

2.4.13 A new SRF for Mayfield was produced in 2018, reflecting the refreshed vision and market changes. The updated proposals reflect the design principles of the 2010 and 2014 SRFs and ensure the current proposals are in line with MCC's strategic objectives and current context.

2.4.14 The document set out the transport principles for the SRF, including the provision for car and cycle parking and accessibility by sustainable modes including public transport, walking and cycling. Development at Mayfield should accord with the principles set out in the SRF document.

2.4.15 The 2018 Mayfield SRF has been developed alongside a revised 2018 Piccadilly SRF, to maximise the opportunity and linkages between the areas.

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Manchester City Council's Unitary Development Plan – Saved Policies (1995)

2.4.16 MCC's 1995 Unitary Development Plan (UDP) was superseded by the Core Strategy in 2012, however, a number of saved policies still have material weight in the determination of planning permissions.

2.4.17 Policy DC22.1 (Footpath Protection) ensures the protection of existing pedestrian footpaths, stating that developments resulting in unacceptable inconvenience to pedestrian movement will not normally be permitted.

2.4.18 Policy RC20 (City Centre Small Areas) divides the city centre into 31 small areas which are defined by their unique characteristics. The Site is located in area 14: Fairfield Street/Mancunian Way/London Road. The policy seeks to protect and enhance these areas by providing a framework for each area which sets out the main planning considerations that MCC intend to progress.

Supplementary Planning Guidance (SPG) Guide to Development in Manchester (2007)

2.4.19 MCC's SPG Guide to Development in Manchester adopted in 2007 provides guidance for developers including parking/servicing guidelines, design and travel plans.

2.4.20 The guidance emphasises that priority is to be given to pedestrians, disabled people and cyclists above the needs of the car, and that this should be taken into consideration in the location and design of any parking facilities. A Travel Plan will be required where appropriate to encourage and support walking, cycling and public transport use. It also provides detailed guidance on how the need for car parking can be accommodated in the context of ensuring that priority is still given to the non-car user.

Design for Access 2

2.4.21 MCC's Design for Access 2 provides best practice guidance for inclusive design and gives references for more detailed technical standards to be taken into account at the earliest possible stage in the design process. It includes guidance on public realm design, road infrastructure and parking layouts.

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3 Baseline Conditions

3.1 Site Description

3.1.1 Mayfield is located in the south-east of Manchester city centre, directly south of Manchester Piccadilly station. The Site is bounded to the north by Fairfield Street, to the south by A635 Mancunian Way, to the east by Temperance Street and to the west by the A6 London Road.

3.1.2 Phase 1 of the SRF is located in the south, adjacent to Baring Street and the A635 Mancunian Way eastbound slip road.

3.1.3 Figure 3.1 shows the planning application boundaries for the SRF and Phase 1 in the existing local context.

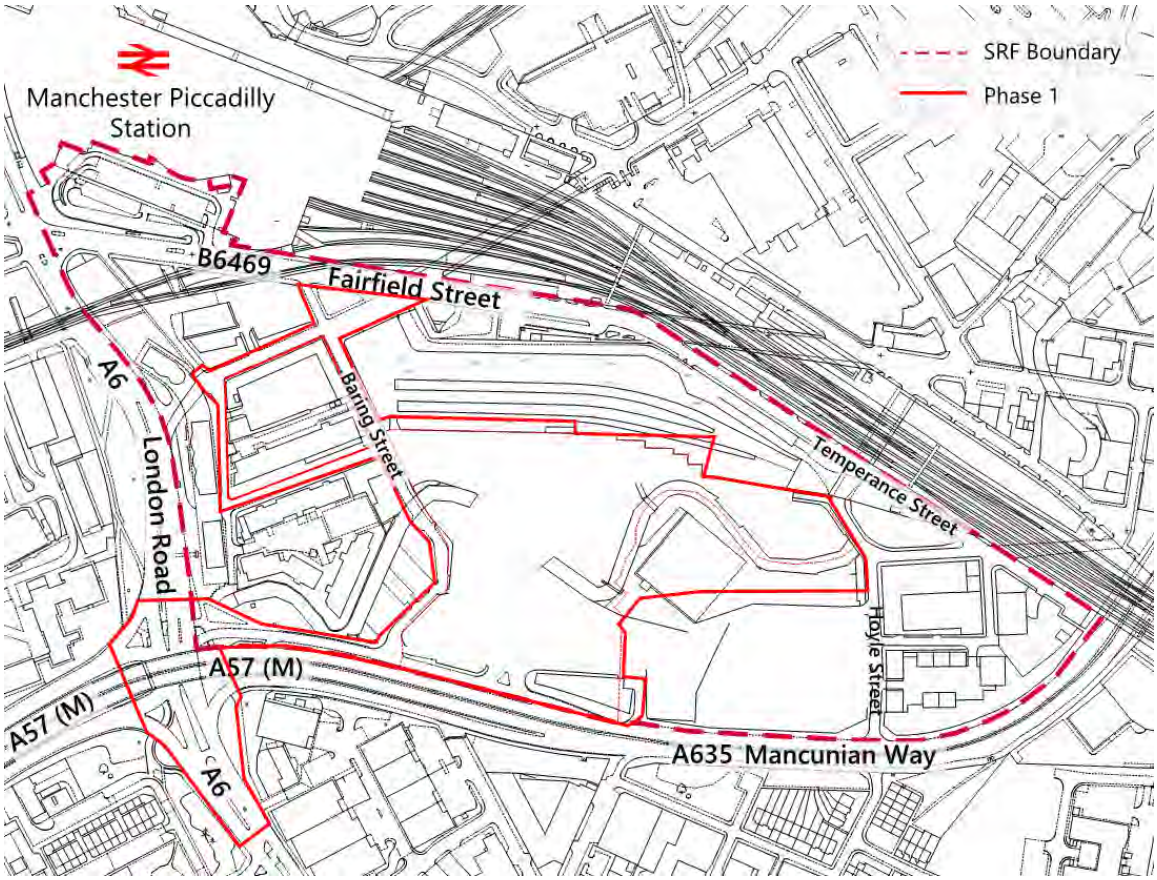


Figure 3.1 Site Location

3.1.4 The majority of the northern part of the Site is currently occupied by the Mayfield Depot building and the associated disused railway infrastructure and some meanwhile uses. The southern part of the Site is occupied by small industrial units and vacant warehouse buildings, many of which have been demolished and currently occupied by informal parking areas.

3.1.5 The River Medlock flows through the Mayfield area, rising from a culvert under Hoyle Street in the east. A section of the river is culverted beneath warehouses and surface car parking around Nether Street to the west.

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3.1.6 The Mayfield area has a varied topography with the lowest levels forming a valley along the meandering course of the River Medlock, with the land rising towards the periphery of the Site.

3.2 Walking Accessibility

3.2.1 There is an extensive provision of pedestrian footways within and around the Site, as illustrated on Figure 3.2.

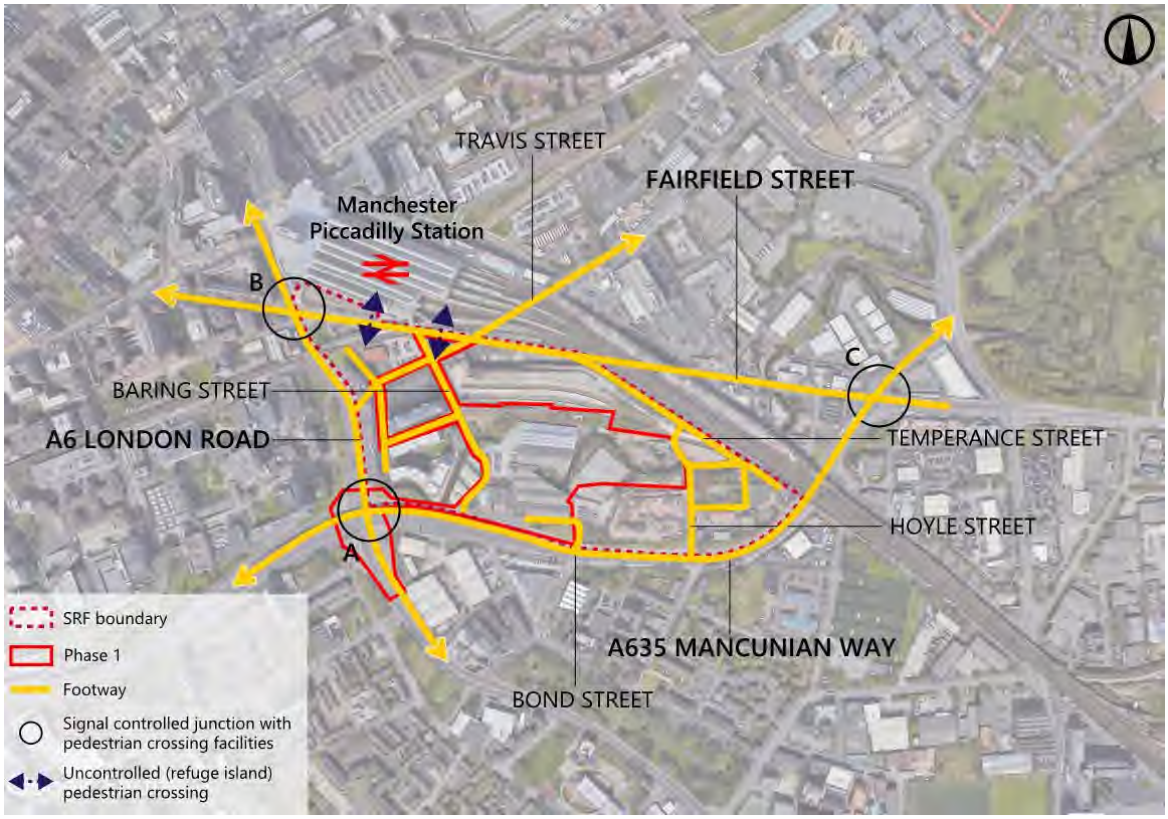


Figure 3.2 Pedestrian Infrastructure Surrounding the Site

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3.2.2 The Site can be accessed on foot via multiple locations and they are summarised in Table 3.1, along with its approximate footway width. Most of these locations are provided with pedestrian footways along both sides of the carriageway and are of good quality and are well-lit.

Table 3.1 Pedestrian access points to site

Direction	Location	Approximate width of footway
To / from the North	Fairfield Street / Baring Street	2.0m
	Fairfield Street / Cotswold Street	1.5m
	Fairfield Street / Wyre Street	1.5m
	Fairfield Street / Travis Street	3.0m
	Temperance Street / Hoyle Street	1.5m
	Temperance Street / Chapelfield Road	1.5m
	Temperance Street / Rachel Street	1.5m
To / from the South	A635 / Baring Street	1.5m
	A635 / Bond Street	1.5m
	A635 / Hoyle Street	2.0m
	A635 / Manor Street	2.0m
To / from the West	A6 London Road / Travis Street	3.0m

3.2.3 There are pedestrian crossing facilities at the A6 London Road/Fairfield Street junction and the junction with A635 Mancunian Way approximately 320m further south. Figure 3.3 illustrates the type of pedestrian signal at each of the three main junctions referenced in Figure 3.2.



Figure 3.3 Junctions in reference with the pedestrian infrastructure surrounding the Site

3.2.4 A pedestrian refuge is located on Fairfield Street adjacent to Piccadilly Station taxi rank entrance to assist pedestrians crossing the road. Another pedestrian crossing is located approximately 85m further to the east of the station on the western arm of the junction between Fairfield Street and Travis Street. This crossing has a pedestrian refuge.

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3.2.5 The Site is approximately a 4-minute walk from the station and it can be accessed via Fairfield Street and Baring Street. To the north-west, the city centre is approximately a 1.12km (15-minute) walk from the Site, via the A6 London Road.

3.2.6 Walking routes from other directions are all of similar quality. Pedestrians originating from the south and south-east can cross Mancunian Way via the pedestrian crossings on the London Road and Fairfield Street junctions.

3.2.7 Figure 3.4 shows the walking accessibility for the Site in 5, 10 and 15-minute walk catchments.

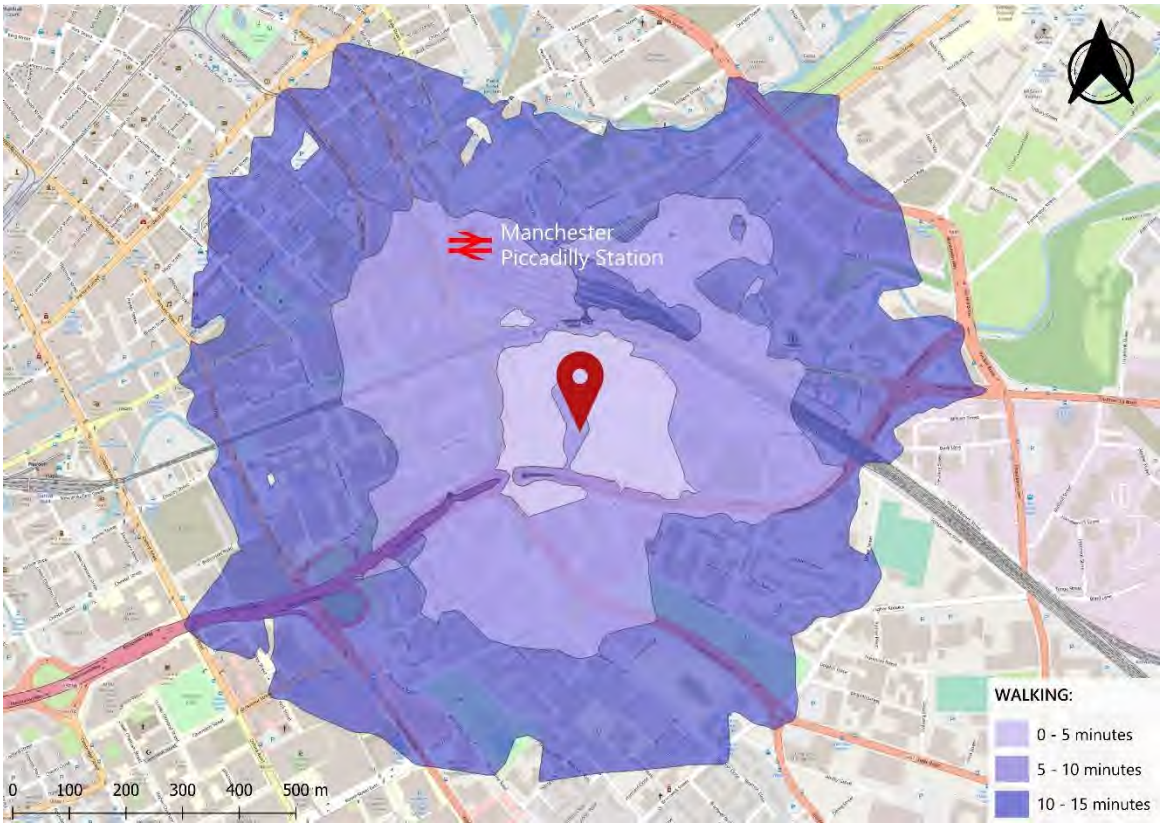


Figure 3.4 Walking Accessibility (Source: GIS Analysis)

3.3 Cycling Accessibility

Cycle Access

3.3.1 Route 66 of the National Cycle Network (NCN) runs to the north of the Site and to the west is the NCN 6. The NCN 6 connects Bury and Manchester as well as joining NCN 60 (Fallowfield Loop) at Chorlton-cum-Hardy. Regional Route 86 follows the River Medlock, which also connects to NCN 66.

3.3.2 Many of the roads surrounding the Site are recommended for cycling, and A6 London Road and Fairfield Street are designated as on-road cycle routes. Dedicated cycle lanes are provided along the A6 London Road in both directions and advanced cycle stop lines are provided on all arms of the A6 London Road signal junction with B6469 Fairfield Street.

3.3.3 The nearest cycle parking to the Site is at Piccadilly Station, where there are 43 spaces on Fairfield Street.

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3.3.4 On-street cycle facilities are available such as the "Bike Lockers User Club" (BLUC) which is a cycle parking scheme that allows members to access any locker in the club and use one's bicycle to travel to train stations, bus stops and Metrolink stations across Greater Manchester. However, it should be noted that Metrolink trams do not permit full-sized bicycles unless folded and fully covered.

3.3.5 The nearest cycle hub is located in Piccadilly Gardens, which is approximately 1.3 km north of the SRF.

3.3.6 Figure 3.5 illustrates the cycle routes surrounding the Site boundary.



Figure 3.5: Cycle Routes in the Vicinity of the Site (Source: Manchester City Council)

3.3.7 Figure 3.6 illustrates the cycling accessibility for the Site within 10, 20, and 30-minute cycle ride.

3.3.8 The city centre is within a 10-minute cycle, whereas other areas within Greater Manchester such as Salford can be reached within a 10 to 20-minute cycle and 20 to 30-minute cycle for Didsbury.

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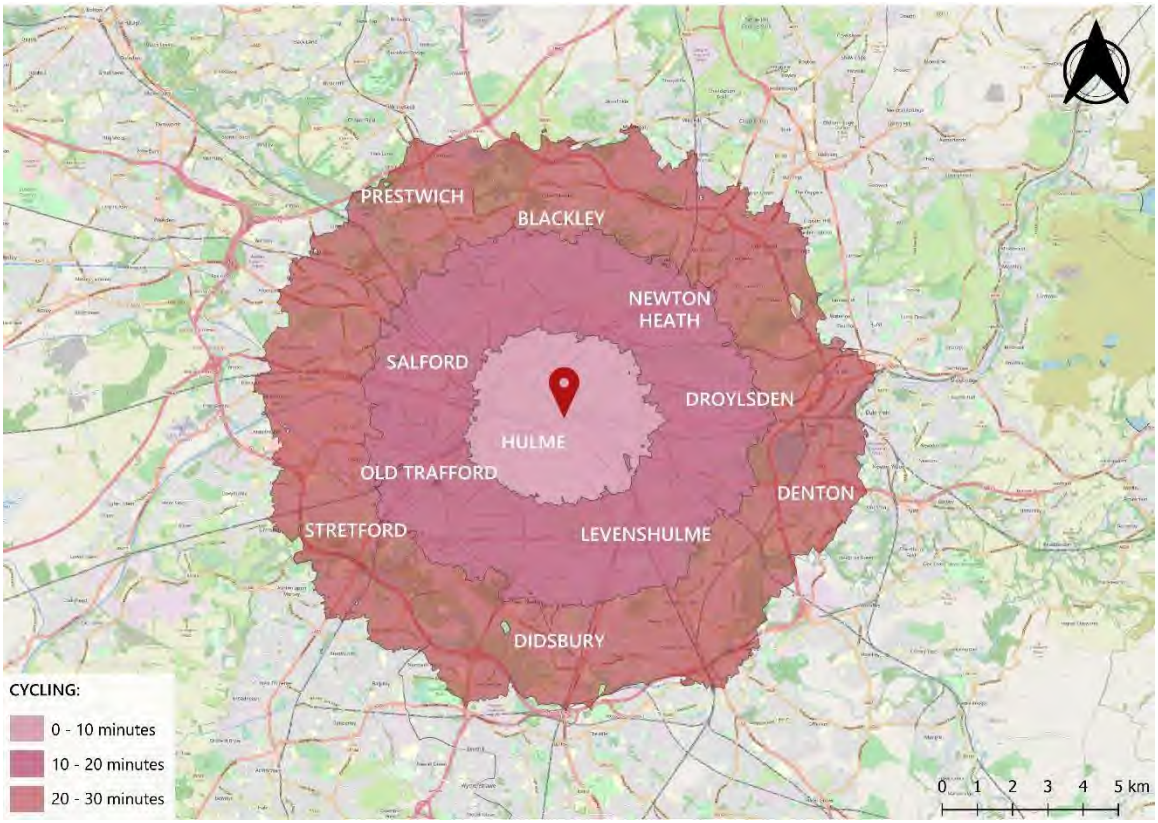


Figure 3.6 Cycling Accessibility (Source: GIS Analysis)

3.3.9 The Beelines strategy proposes cycle crossing and link improvements on highways surrounding Mayfield, including on Fairfield Street, London Road and Mancunian Way. It is currently estimated that the entire Beelines network could be completed as early as 2023.

3.3.10 Figure 3.7 shows the proposed Beeline network surrounding the Site. It shows that Beeways are proposed along London Road and along Hoyle Street; these routes will connect to other Beeways routes adjacent to the Site. Figure 3.7 also shows that Busy Beeways are proposed along Fairfield Street and London Road; Busy Beeways identify corridors or crossing points on busier roads that will require a higher level of design intervention to improve cycling and walking.

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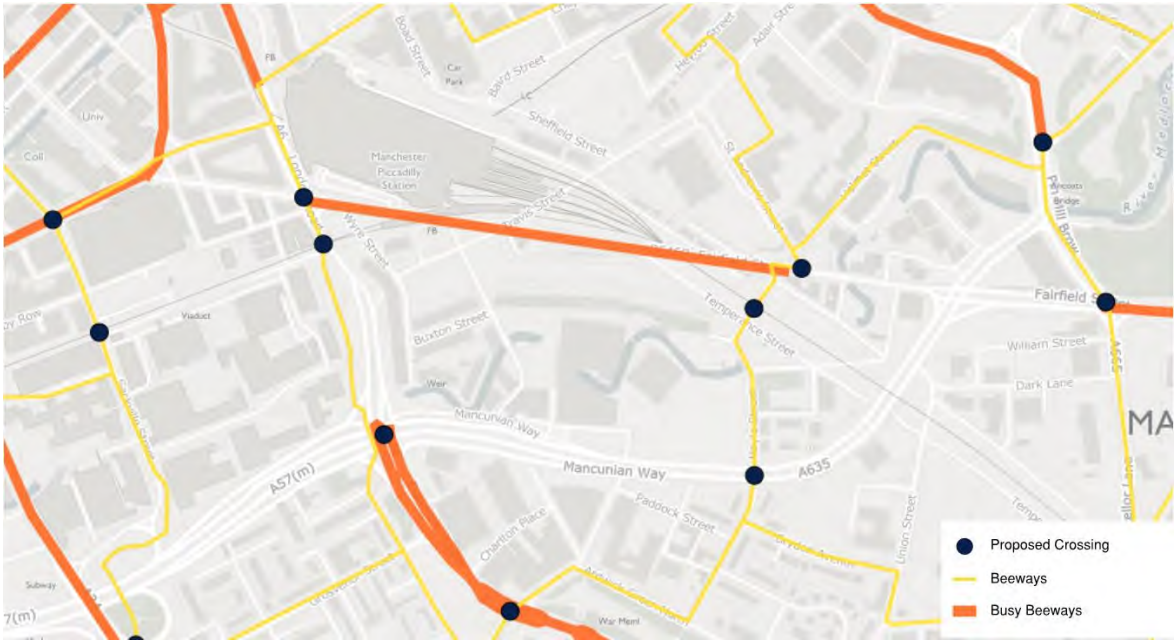


Figure 3.7 Proposed Beeline Network

3.4 Public Transport Accessibility

Bus

3.4.1 Greater Manchester has an extensive network of buses managed by TfGM and operated by companies including First Greater Manchester, Stagecoach Manchester and Arriva North West.

3.4.2 The Site is well connected by bus, with 12 bus routes available within a 400m (5-minute) walk of the Site. The location of the existing bus services operating in close proximity to the Site are shown in Figure 3.8.

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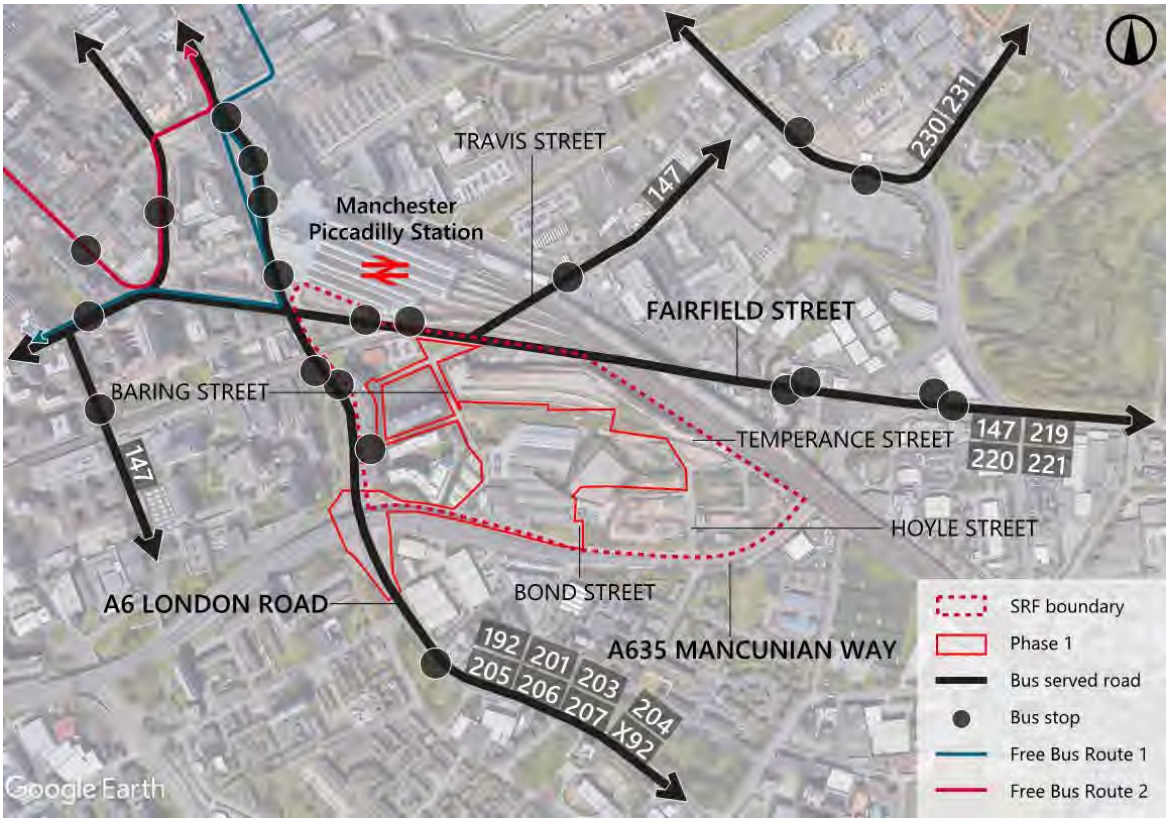


Figure 3.8 Existing Bus Services

3.4.1 Table 3.2 shows the frequency of buses on each bus route per hour per direction. It shows that during the weekday peak, there are 45 buses per hour per direction within close proximity to the Site.

Table 3.2: Local Bus Routes and Frequencies

Bus Service	Route	Peak Frequency (buses per hour per direction)		
		Weekday	Saturday	Sunday
192 / X92	Hazel Grove - Stockport - Levenshulme - Manchester	17	18	-
201	Hattersley - Hyde - Denton - Manchester	6	6	2
203	Stockport - Reddish - Belle Vue - Manchester	6	6	4
204	Hyde - Haughton Green - Denton - Belle Vue - Manchester	1	2*	2
205	Danton - Dane Bank - West Gorton - Manchester	2	2	1
206	Gee Cross - Hyde - Haughton Green - Denton - West Gorton - Manchester	2	2	-
219	Stalybridge - Ashton-under-Lyne - Guide Bridge - Audenshaw - Openshaw - Manchester	7	7	6
231	Ashton - Hartshead - Droylsden - Clayton - Manchester	3	-	-
TP	Derby - Matlock - Buxton - Stockport - Manchester	1	-	-
Total		45	43	15

** from 6pm onwards only*

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3.4.2 There is also a Free Bus service (formerly known as the Metroshuttle), which links the city's train stations, shops and businesses. There are two routes providing a wide range of connectivity around Manchester city centre, as shown on Figure 3.9. The frequency of these routes is summarised below in Table 3.3.

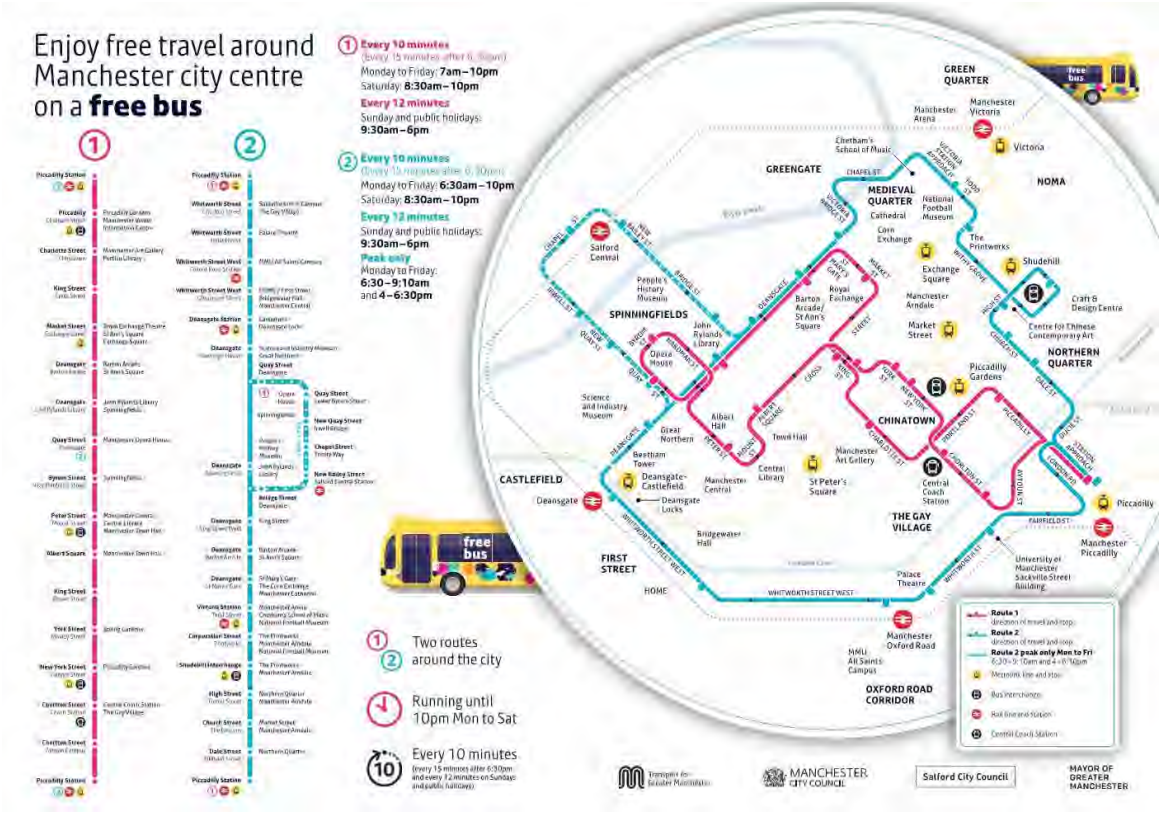


Figure 3.9: Free Bus Services in Manchester City (Source: TfGM)

Table 3.3 Summary of Free Bus Services

Route	Operating Hours	Frequency
1	Monday to Friday: 07:00-22:00 Saturday: 08:30-22:00	Every 10 minutes (Every 15 minutes after 18:30)
	Sunday and public holidays: 09:30-18:00	Every 12 minutes
2	Monday to Friday: 06:30-22:00 Saturday: 08:30-22:00	Every 10 minutes (Every 15 minutes after 18:30)
	Sunday and public holidays: 09:30-18:00	Every 12 minutes

National Rail

3.4.3 Manchester Piccadilly railway station is directly adjacent to the Site. Manchester Piccadilly provides inter-city and cross-country services as well as regional and local services around Northern England. The station is currently served by six train operators (summarised in Table 3.4).

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Table 3.4: Manchester Piccadilly Train Services and Frequencies

Destination	Operator	Weekday AM	Weekday PM	Saturday	Sunday
Hadfield	Northern	3	3	2	2
Glossop	Northern	3	3	2	2
Marple	Northern	3	2	2	1
Rose Hill Marple	Northern	2	2	2	-
New Mills Central	Northern	2	2	2	1
Sheffield	Northern	3	3	3	3
Hazel Grove	Northern	4	3	3	1
Buxton	Northern	2	2	2	1
Crewe	Northern	4	4	4	3
Stoke-on-Trent	Northern	5	5	5	2
Chester	Northern	3	3	2	1
Liverpool Lime Street	Northern	4	4	4	3
Preston	Northern	4	4	4	3
Manchester Airport	Northern	7	8	9	6
Blackpool North	Northern	3	2	2	1
Llandudno	Transport for Wales	-	1	1	-
Bournemouth	CrossCountry	1	1	1	-
Bristol Temple Meads	CrossCountry	1	1	1	1
Norwich	East Midlands Train	1	-	1	-
Newcastle	TransPennine Express	1	1	1	1
Middlesborough	TransPennine Express	1	1	1	1
Hull	TransPennine Express	1	1	1	1
Cleethorpes	TransPennine Express	1	1	1	1
Edinburgh Waverley	TransPennine Express	1	-	2	1
London Euston	Virgin Trains	3	3	3	3
Total		**63**	**60**	**61**	**39**

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3.4.4 The local rail and tramline network is illustrated in Figure 3.10.

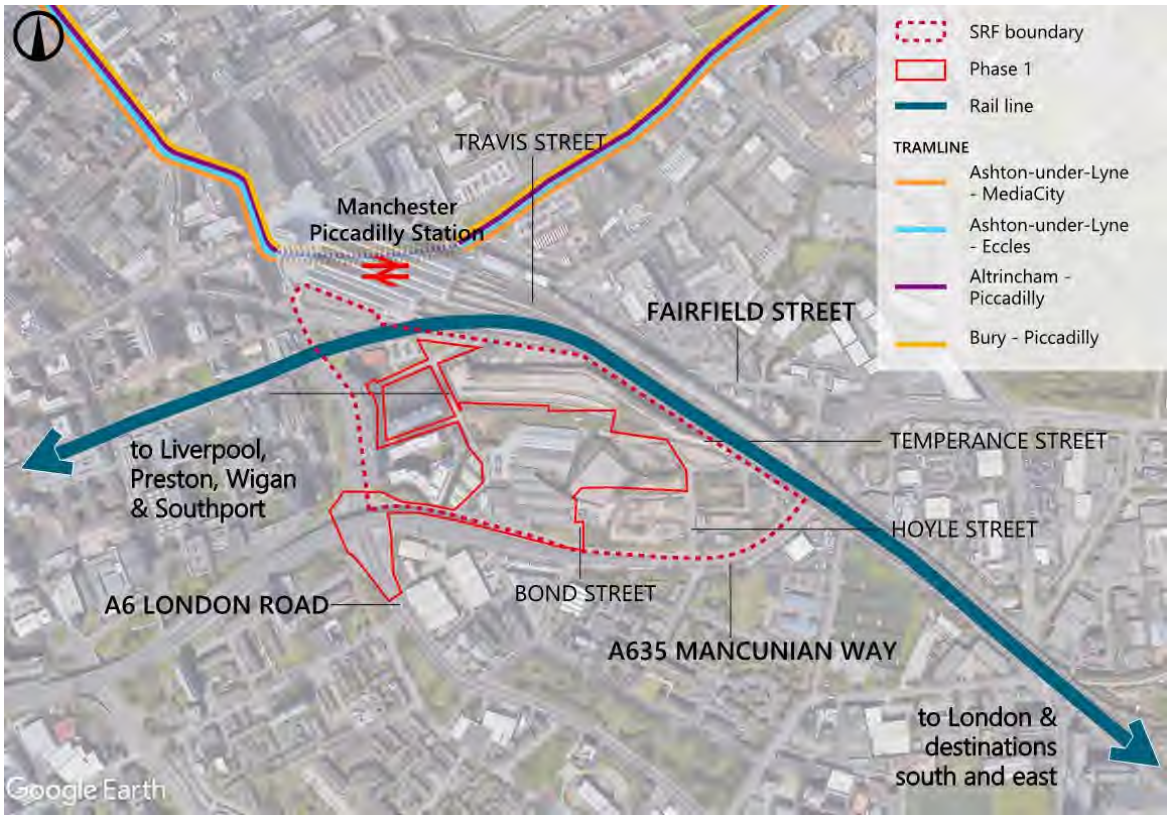


Figure 3.10 Local Rail and Tram Network

Manchester Metrolink

3.4.5 The Piccadilly Metrolink stop is one of nine stops serving Manchester city centre. It is also the terminus for Metrolink services to Bury and Altrincham and for through services between Eccles and MediaCityUK and Ashton-under-Lyne. Table 3.5 summarises the Metrolink services and peak hour frequencies at the Piccadilly stop.

Table 3.5: Summary of Tram Services Times, and Frequencies (Piccadilly Stop)

Reference	Service	Peak Hour Frequency (per hour per direction)
	Ashton-under-Lyne – MediaCity UK	5
	Ashton-under-Lyne – Eccles	5
	Altrincham - Piccadilly	5
	Bury – Piccadilly	5

3.4.6 The Metrolink trams and stops are accessible for all and each stop has access ramps or lifts, tactile paving, high visibility handrails, disabled boarding points and help points.

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Public Transport Improvements

Metrolink

3.4.7 It is noted that the Trafford Park line expansion to the Trafford Centre is currently under construction and due to open in 2020.

3.4.8 TfGM are currently considering further medium and long term solutions to expand and increase capacity on the Metrolink network. By 2025, TfGM are committed to delivering (subject to business case approval):

- Frequency improvements between Etihad and Ashton stops;
- Capacity improvements on the Shaw/Crompton – East Didsbury route;
- Capacity improvements between Bury and Altrincham;
- 27 new tram and associated infrastructure across the network.

High Speed 2

3.4.9 High Speed 2 (HS2) would stop at Manchester Piccadilly Station. HS2 is intended to link London and Birmingham to Manchester, the East Midlands and Leeds. As part of HS2, it is proposed to redevelop Manchester Piccadilly station and improve access to it. These proposals are identified as part of the Piccadilly Strategic Regeneration Framework Area.

3.4.10 The Manchester branch of HS2 forms part of Phase 2b of the project, which is due to open in 2033. HS2 will deliver high-frequency services from Manchester Piccadilly to destinations including Birmingham Interchange, Birmingham and London Euston.

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3.5 Highway Network Accessibility

3.5.1 The local highway network surrounding the development is shown in Figure 3.11 which also shows the vehicular access points to the Site.

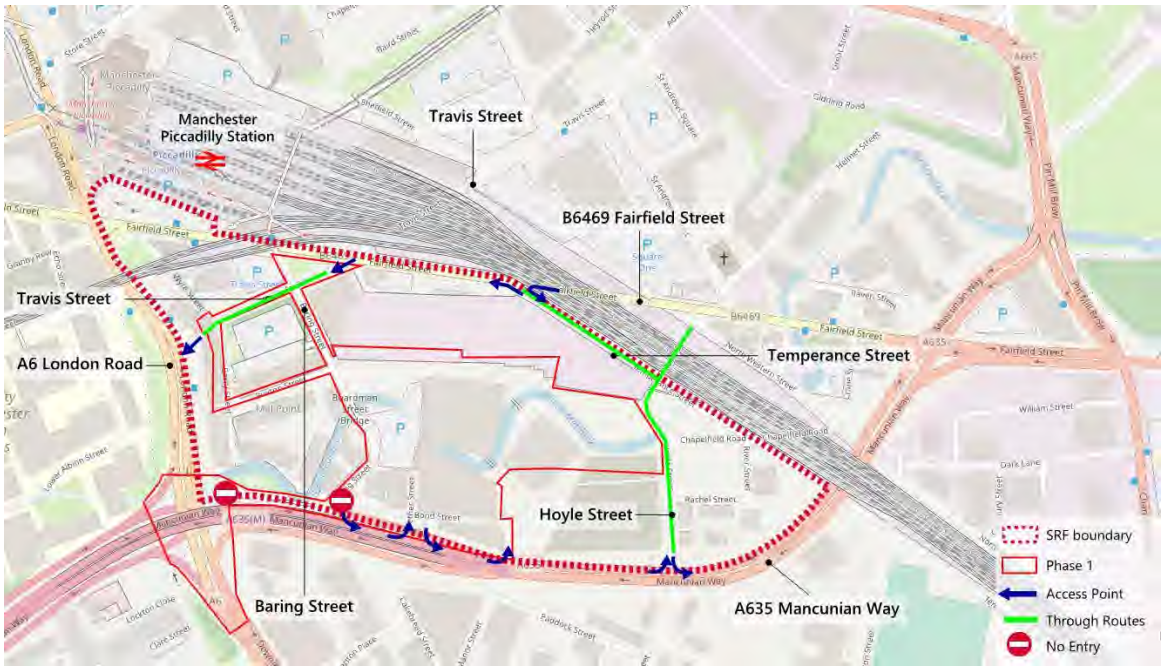


Figure 3.11 Local Highway Network

3.5.2 Access from the north is from Fairfield Street, which is a single carriageway road subject to a speed limit restriction of 30mph. From Fairfield Street, individual plots within the SRF can be accessed via Travis Street, Temperance Street, North Western Street, and Crane Street. The junction of Travis Street and Fairfield Street is signalised, but all the remaining junctions along Fairfield Street adjacent to the Site are priority junctions.

3.5.3 Travis Street, Temperance Street, North Western Street and Crane Street are all single carriageway roads with a 30mph speed limit, with the exception of Travis Street which has a 20mph speed limit.

3.5.4 Travis Street provides the principal access to the western part of the SRF from the north and also connects Fairfield Street to the A6 London Road. Travis Street is a two-way single carriageway until around 40m east of the A6 London Road, where it becomes one-way westbound, connecting to the A6 London Road.

3.5.5 Travis Street connects to Baring Street via an unsignalised crossroads around 60m south-west of the junction between Travis Street and Fairfield Street. North of the crossroads, Baring Street operates as one-way northbound, towards a junction with Fairfield Street. South of the crossroads, Baring Street is two-way until approximately 50m north of the A635 Mancunian Way eastbound slip road, where it is one-way southbound.

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3.5.6 The A635 (M) Mancunian Way runs parallel to the southern edge of the Site. Mancunian Way is a dual carriageway with two lanes per direction. At the south-western corner of the Site, the east and westbound slip roads from the A635 (M) Mancunian Way form a signalised junction with the A6 London Road. Approximately 800 metres north of this junction, the A6 London Road joins Fairfield Street at a four arm signalised junction. Mancunian Way is subject to a 50mph speed limit reducing to 40mph on the slip roads at-grade along the southern edge of the Site.

3.5.7 There are direct access points into the Site from the A635 Mancunian Way eastbound carriageway via priority junctions with Manor Street and Hoyle Street.

3.5.8 Manor Street is located 30m east of the eastbound slip road onto Mancunian Way, and provides only an exit from Mancunian Way into the Site. Manor Street connects to Bond Street around 35m north of Mancunian Way. Bond Street then loops back and provides access onto the Mancunian Way slip road around 80m to the west.

3.5.9 Mancunian Way's junction with Hoyle Street is located approximately 350m west of Mancunian Way's junction with Fairfield Street; the junction is a priority junction allowing access and egress onto Mancunian Way's eastbound carriageway. Hoyle Street has a single carriageway and a posted speed limit of 30mph. Hoyle Street connects to Temperance Street 180m north of Mancunian Way via a priority crossroads and also connects to North Western Street 60m further north via a priority junction. This priority junction is directly south of North Western Street's priority junction with Fairfield Street. Hoyle Street also provides access to Rachel Street and Chapelfield Road in the eastern part of the Site via priority junctions.

3.5.10 The A6 London Road is a dual carriageway with two lanes in each direction, subject to a speed limit of 30mph. Travis Street is located 140m north of the A6 London Road's junction with A635 Mancunian Way, which is one-way westbound providing access to the southbound carriageway of the A6 London Road from the western half of the Site. The signalised junction with Fairfield Street is located approximately 300m north of Travis Street.

3.5.11 The following signalised junctions are located at the corners of the Site and therefore have a significant influence on how traffic is currently distributed surrounding the Site:

- A6 London Road – A635 Mancunian Way: grade-separated signalised junction;
- A6 London Road – Fairfield Street: at-grade signalised junction; and
- A635 Mancunian Way – Fairfield Street: at-grade signalised junction.

A6 London Road – A635 Mancunian Way Junction

3.5.12 The A635 Mancunian Way - London Road junction is a grade-separated signalised junction adjacent to the south-west corner of the Site. The existing layout of the A6 London Road – A635 Mancunian Way junction is shown in Figure 3.12.

3.5.13 Access between Mancunian Way and London Road is via on and off slip roads in the eastbound and westbound directions. The northern arm of London Road has four approach lanes; two lanes southbound towards London Road and two right turn lanes onto Mancunian Way's westbound on-slip. It is noted that there is currently no left turn onto the Mancunian Way eastbound on-slip. The eastern arm of the junction is the Mancunian Way westbound off-slip; this arm has one lane and traffic can only turn left towards London Road south.

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3.5.14 The southern arm of London Road has four approach lanes; two lanes turning left onto the Mancunian Way westbound slip and two lanes northbound towards London Road north. It is noted that there is currently no right turn onto the Mancunian Way eastbound on-slip. The western arm of the junction is the Mancunian Way eastbound off-slip; this arm has one left turn lane onto London Road north and two right turn lanes towards London Road south. It is noted that all movements onto the Mancunian Way eastbound on-slip are prohibited except for authorised vehicles only.

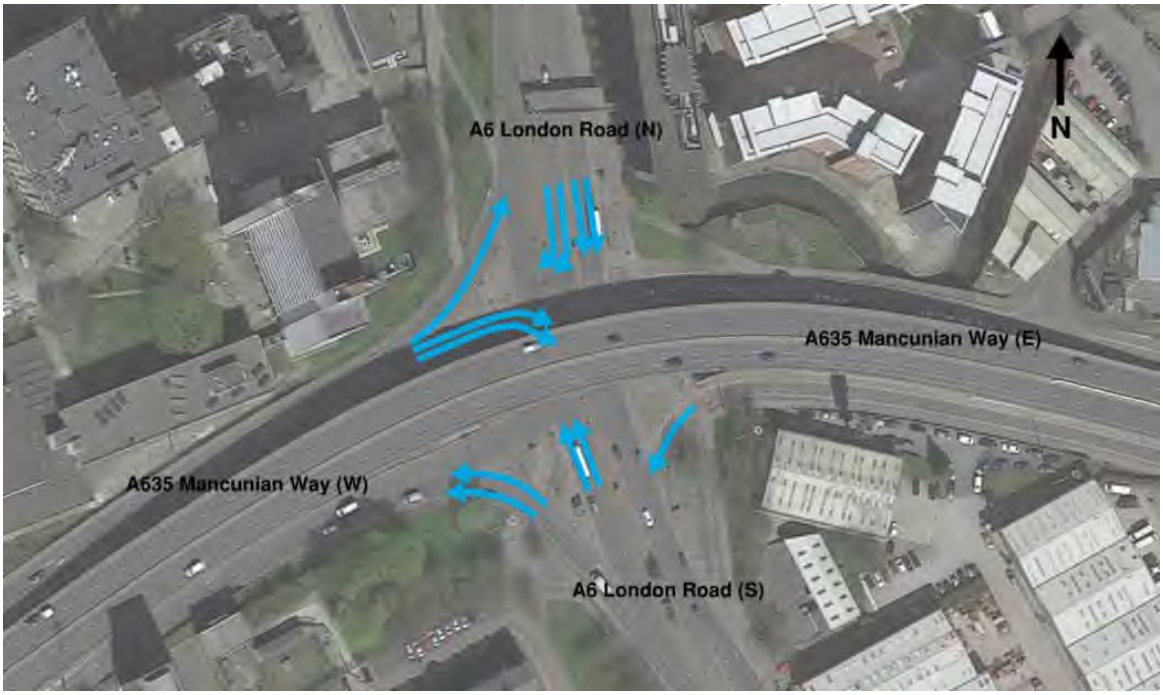


Figure 3.12 London Road – Mancunian Way Existing Junction Layout

3.5.15 Traffic surveys at the junction were undertaken on Wednesday 11 July 2018 and recorded traffic flows, queue lengths and saturation flows. The observed peak hour turning vehicles movements at this junction are shown in Figure 3.13 and Figure 3.14.

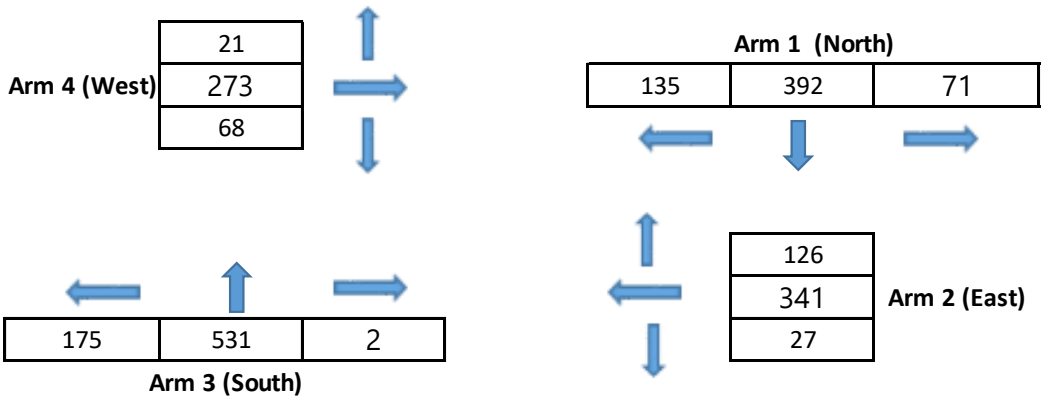


Figure 3.13 London Road – Mancunian Way AM Peak Turning Movement (08:00-09:00) - Vehicles

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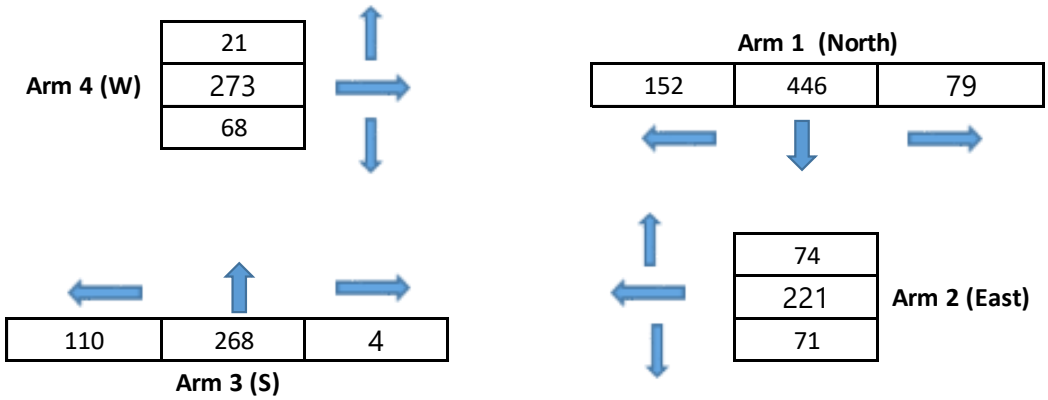


Figure 3.14 London Road – Mancunian Way PM Peak Turning Movements (17:00-18:00) - Vehicles

3.5.16 The observed maximum queue lengths suggest that this junction is busiest during the PM peak period. On the northern approach there are up to 40 vehicles queuing across the approach lanes in the PM peak compared to up to 31 during the AM peak. On the southern approach there are up to 21 vehicles queuing during the AM peak compared to 31 during the PM peak. On the western arm there are up to 30 vehicles queuing during the AM peak and up to 36 vehicles queuing during the PM peak period. The eastern arm shows few vehicles queuing in either peak period.

3.5.17 The traffic survey data for the London Road – Mancunian Way junction can be found in Appendix B.

3.5.18 The survey data was used by TfGM to validate their existing city centre Paramics model and the outputs from this model were subsequently used as inputs to detailed LINSIG modelling of the existing London Road – Mancunian Way junction. The junction modelling results show that the junction operates well within capacity, with a degree of saturation no greater than 45% on any arm during the AM peak and 41.4% during the PM peak. The LINSIG modelling outputs can be found in Appendix C.

3.5.19 Further discussion on the Paramics traffic modelling undertaken by TfGM can be found in Section 7.

A6 London Road – Fairfield Street Junction

3.5.20 The A6 London Road - Fairfield Street junction is an at-grade signalised junction adjacent to the north-west corner of the Site. The existing layout of the A6 London Road – Fairfield Street junction is shown in Figure 3.15.

3.5.21 The northern arm of London Road has three approach lanes giving access to each arm. The eastern arm of the junction is Fairfield Street; this arm has two approach lanes providing access to each arm. The southern arm of London Road has two approach lanes; one lane turning left onto Fairfield Street west and one lane north to London Road north. It is noted that there is no right turn to Fairfield Street east from London Road south. The western arm of the junction is Fairfield Street west, which has two approach lanes and allows movement to each arm of the junction.

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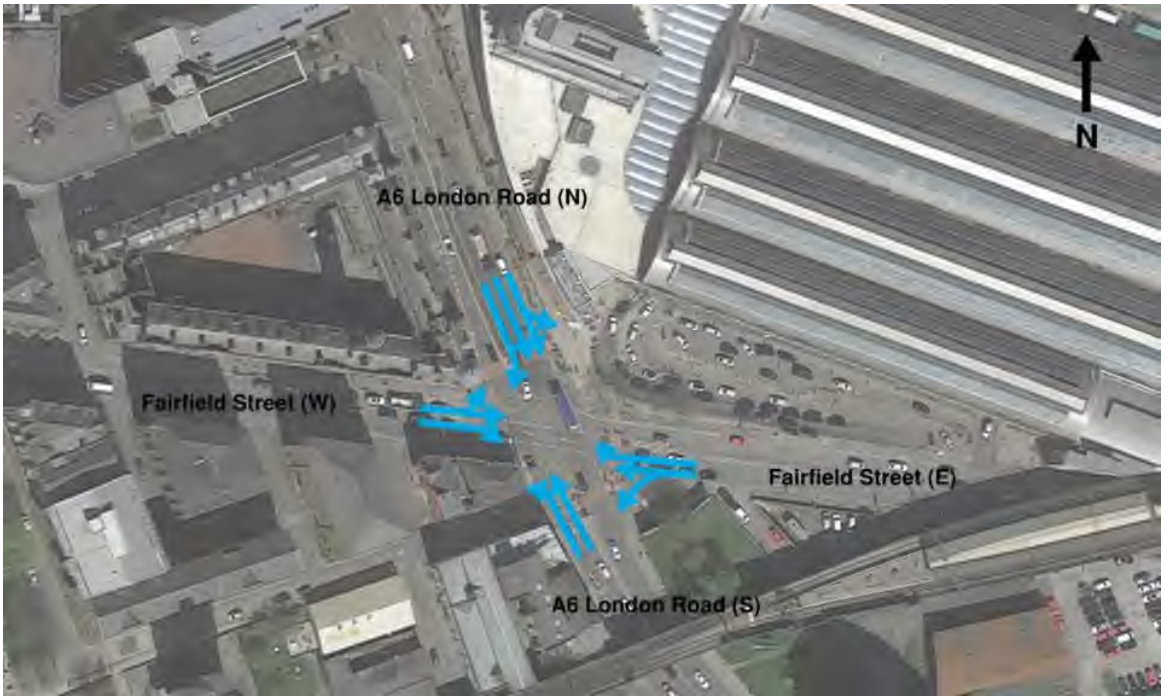


Figure 3.15 London Road – Fairfield Street Junction Layout

A635 Mancunian Way – Fairfield Street Junction

3.5.22 The A635 Mancunian Way - Fairfield Street junction is an at-grade signalised junction close to the eastern edge of the Site. The existing layout of the A635 Mancunian Way – Fairfield Street junction is shown in Figure 3.16.

3.5.23 The north arm of Mancunian Way has two approach lanes; one providing southbound movement towards Mancunian Way south, and another providing southbound movement and a right turn onto Fairfield Street west. It is noted that there is no left turn on to Fairfield Street east from this arm. The east arm of the junction is Fairfield Street east, which has two left turn lanes onto Mancunian Way south and one lane towards Fairfield Street west; it is noted that a right turn onto Mancunian Way north is prohibited. The Mancunian Way south arm has four approach lanes, with slip road providing access to Fairfield Street west. There are two lanes towards Mancunian Way north and two right turn lanes towards Fairfield Street east. Fairfield Street west arm has one approach lane, and allows movement to all other arms of the junction.

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Figure 3.16 Mancunian Way – Fairfield Street Junction Layout

3.6 Parking

3.6.1 Figure 3.17 shows the existing parking arrangements within the SRF site boundary.

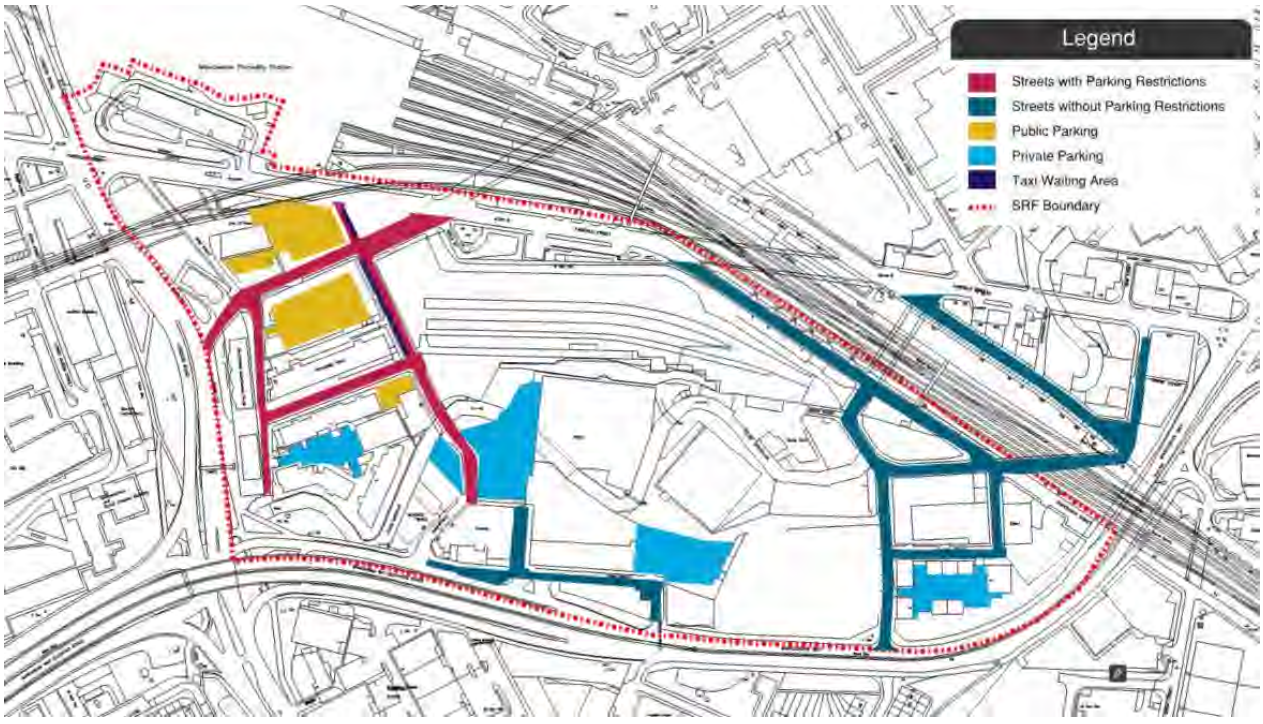


Figure 3.17 Existing Parking Arrangements

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On-Street

3.6.2 A Controlled Parking Zone in Manchester city centre is divided into four zones. Parking Zones 1 and 2 allow parking for up to two hours, whereas Parking Zone 3 allows up to three hours, and Parking Zone 4 up to ten-hours. Figure 3.18 illustrates the location of each parking zones within Manchester city centre, and it can be seen that Parking Zone 4 includes part of the north-west of the Site and incorporates Travis Street and part of Fairfield Street.

3.6.3 The parking charges in Zone 4 apply Monday to Sunday between 08:00 and 20:00, with no charge for parking on Bank Holiday. The maximum stay time is 10 hours with charges varying from £0.50 for up to 30 minutes and £7.50 for up to 10 hours.

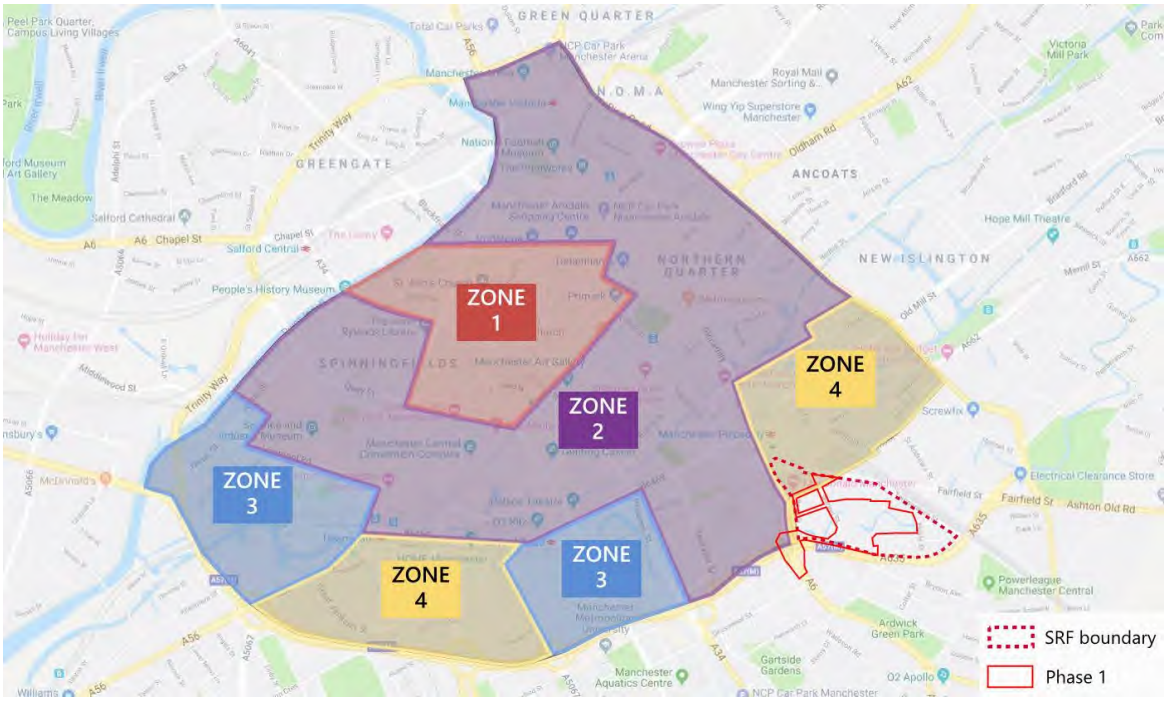


Figure 3.18 Controlled Parking Zones in Manchester (Manchester City Council)

3.6.4 A parking occupancy survey for internal local roads in the Mayfield area was undertaken on Tuesday 12 February 2019. The survey observed on-street parking on the roads shown in Figure 3.19 between 07:00 and 22:00 at three-hour intervals.

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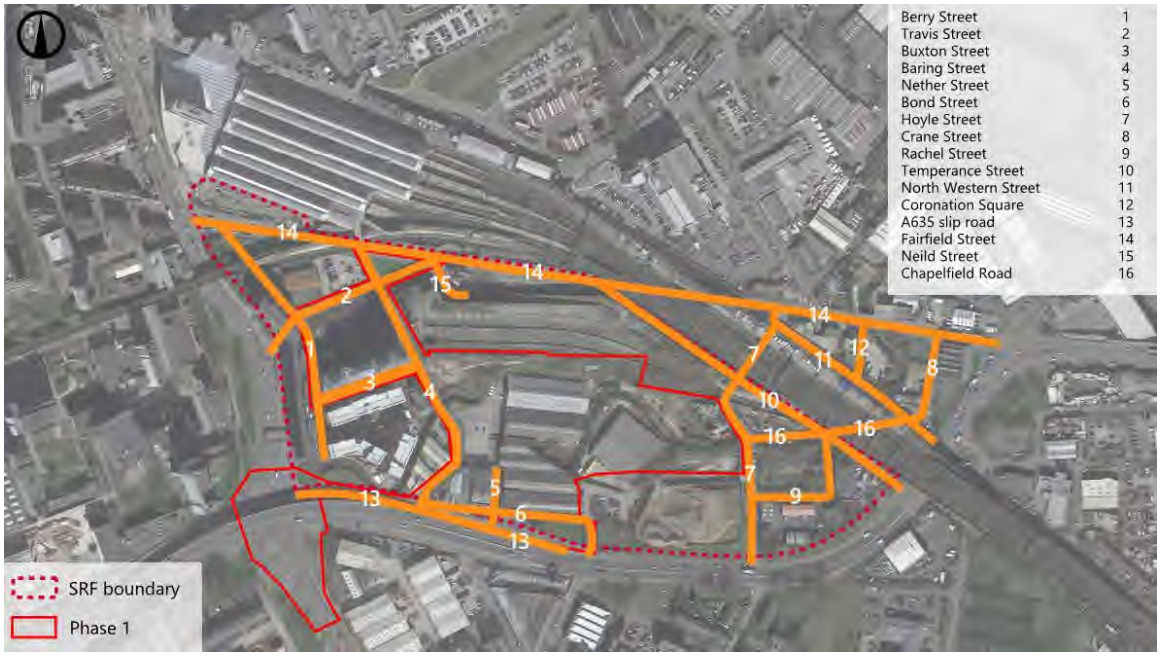
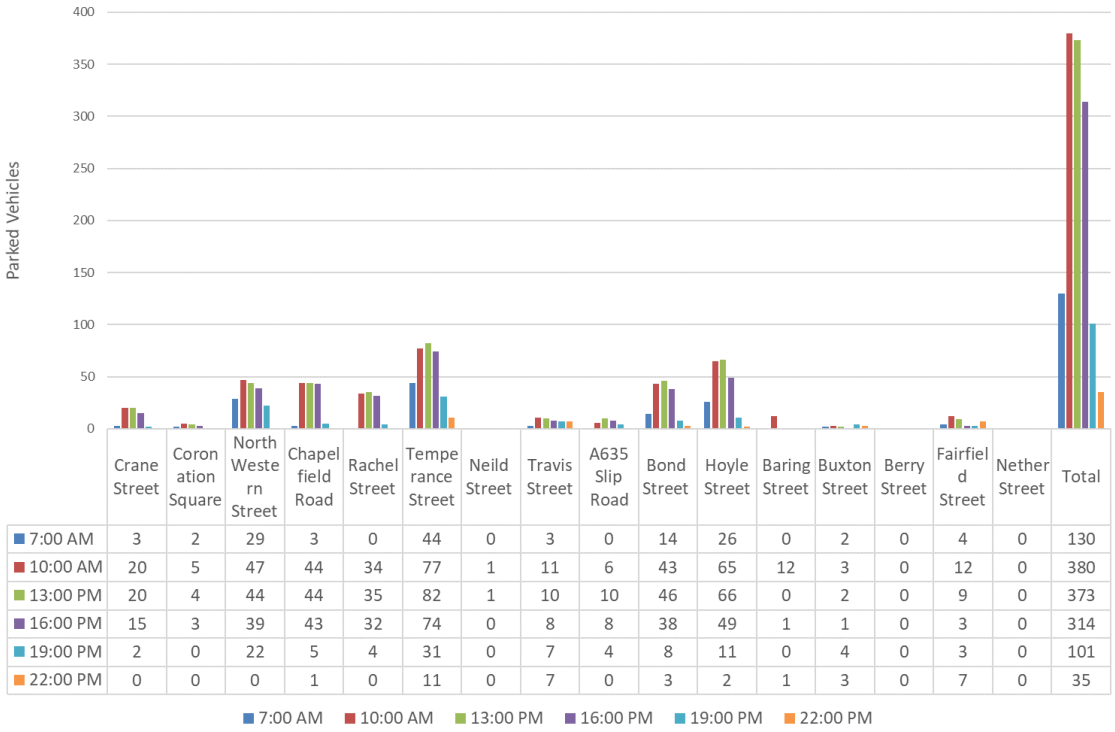


Figure 3.19 Location of Parking Surveys

3.6.5 The on-street parking observed on each road is shown in Figure 3.20.



	Crane Street	Coronation Square	North Western Street	Chapelfield Road	Rachel Street	Temperance Street	Neild Street	Travis Street	A635 Slip Road	Bond Street	Hoyle Street	Baring Street	Buxton Street	Berry Street	Fairfield Street	Nether Street	Total
7:00 AM	3	2	29	3	0	44	0	3	0	14	26	0	2	0	4	0	130
10:00 AM	20	5	47	44	34	77	1	11	6	43	65	12	3	0	12	0	380
13:00 PM	20	4	44	44	35	82	1	10	10	46	66	0	2	0	9	0	373
16:00 PM	15	3	39	43	32	74	0	8	8	38	49	1	1	0	3	0	314
19:00 PM	2	0	22	5	4	31	0	7	4	8	11	0	4	0	3	0	101
22:00 PM	0	0	0	1	0	11	0	7	0	3	2	1	3	0	7	0	35

Figure 3.20 Total On-street Parking Occupancy

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3.6.6 The parking survey shows that up to 380 cars are observed to park on-street during the day, with the peak being reached at 10:00. The survey data also shows that most of the on-street parking is observed on roads in the east of the Site, such as Temperance Street, North Western Street, Hoyle Street. The full on-street parking data can be found in Appendix D.

Off-Street

3.6.7 In accordance to 'Providing for Journeys on Foot' by the Institution of Highways and Transportation, the desirable walking distance to and from a car park is 400m, Figure 3.21 shows the location of public car parks (off-street parking) available within approximately a 400m radius from the Site. The parking capacity and opening hours are summarised in Table 3.6.

3.6.8 There are three public parking areas identified within the Site boundary; these are largely informal parking areas that currently occupy the areas of former industrial buildings and have a capacity of around 200 vehicles. The nearest publicly available car park is the Piccadilly Station short-stay car park which is approximately a 3-minute walk (160m) away. As for long-stay parking, the nearest is Piccadilly Place to the west of the Site, which is approximately a 5-minute walk (482m) away.

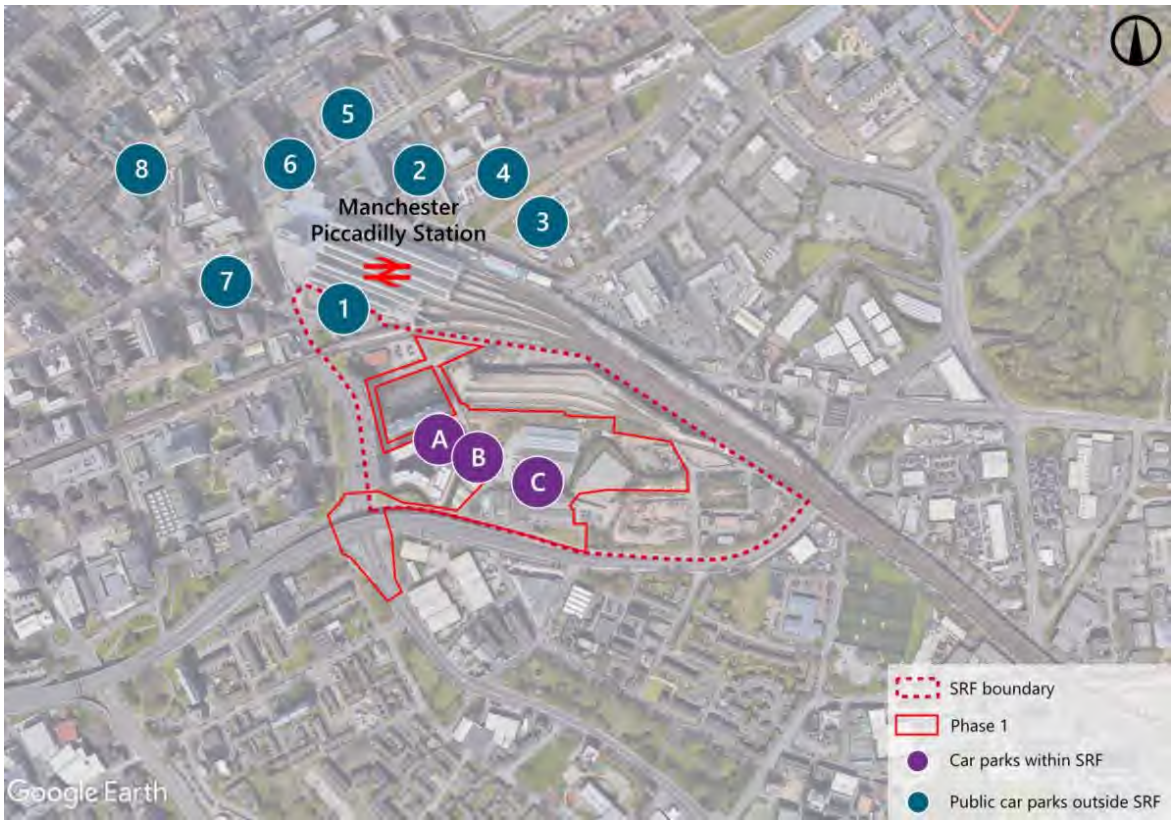


Figure 3.21: Location of Public Car Parks in Proximity to the SRF

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Table 3.6: Car Park Capacity and Opening Hours by Location

Reference	Location	Capacity	Opening Hours
A	Buxton Street Car Park	Informal	24 hours
B	Baring Street Car Park	Informal	24 hours
C	Former Warehouses	Informal	24 hours
1	Piccadilly Station (Short-stay)	55	24 hours
2	Piccadilly Station	711	24 hours
3	Sheffield Street	431	24 hours
4	Baird Street	80	24 hours
5	Store Street	406	24 hours
6	Gateway House	140	06:00-22:00
7	Piccadilly Place	583	24 hours
8	Aytoun Street	63	24 hours

3.6.9 There are therefore approximately 580 spaces within the Mayfield area, when considering the off-street and on-street parking together. It is noted that the number of parking spaces is constantly changing, in reality, as areas of the Site are demolished or come out of use, and organised or 'fly-parking' occurs.

Taxis

3.6.10 There are marked taxi bays provided on Baring Street within the Site. These taxi ranks act as holding areas for taxis waiting to enter the main Piccadilly Station taxi rank on the north side of Fairfield Street. The location of the taxi ranks south of Fairfield Street are shown in Figure 3.22.

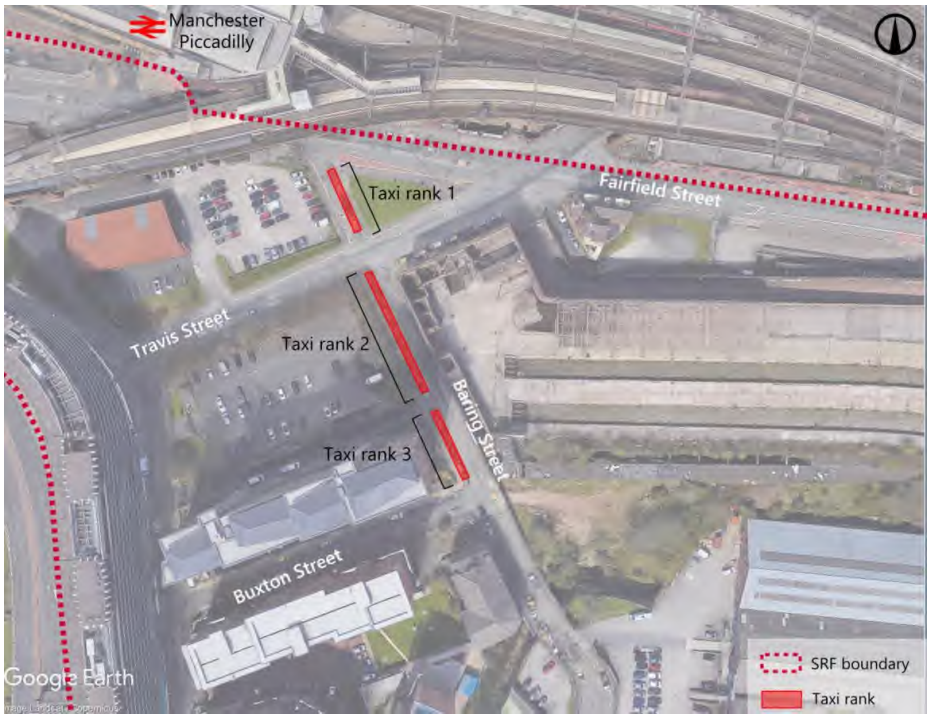


Figure 3.22 Taxi Rank Location

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3.6.11 The taxi ranks shown in Figure 3.22 can accommodate 14 taxis within the marked bays.

3.7 Base Traffic Flows

3.7.1 Classified turning count surveys for the junctions shown in Figure 3.23 were undertaken on Tuesday 10 and Wednesday 11 July 2018, with supplementary surveys undertaken on Wednesday 5 June 2019. The surveys recorded queue lengths and saturation flows, where appropriate. In addition to the classified turning counts, automatic traffic counts (ATC) were undertaken on A635 Mancunian Way and A6 London Road for seven days commencing Friday 13 July 2018.

3.7.2 Whilst July is not a neutral month, the flow data has been compared to a monthly flow profile available through the Highways England website for the M602. This data (dated 2017) showed that the average daily flow for the neutral months (April, May, June and September) was lower than the July flow. The July survey data is therefore considered to be representative and this has been agreed with TfGM/MCC as part of the TA Scoping discussions.

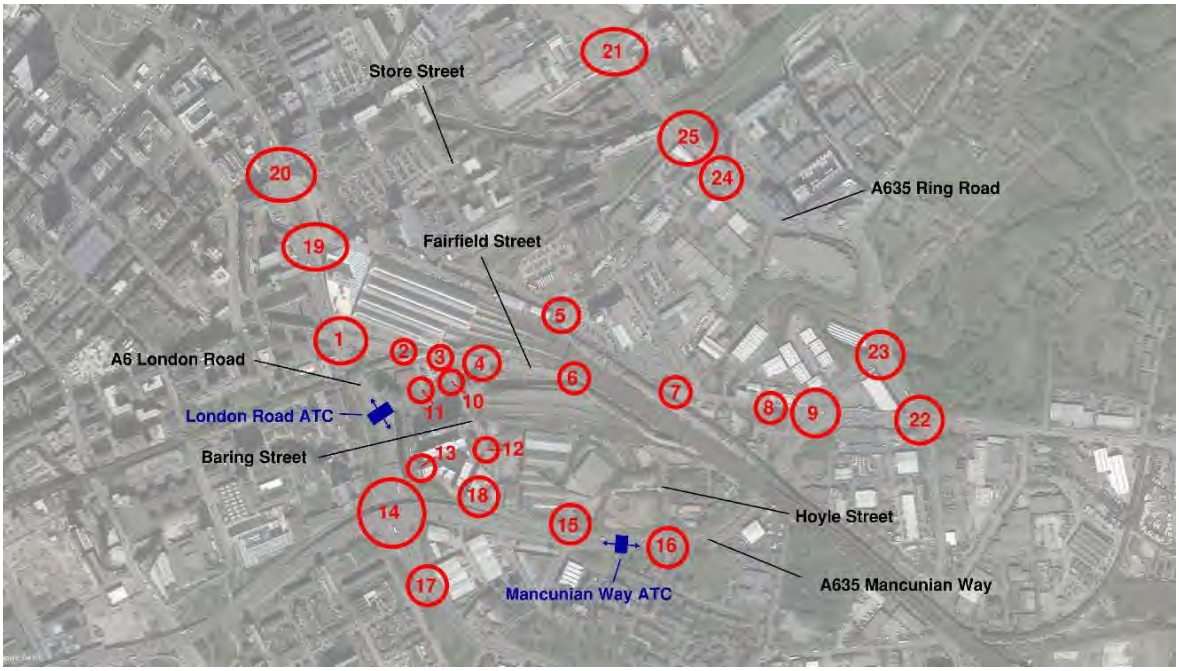


Figure 3.23 Traffic Survey Locations

3.7.3 The baseline traffic data was provided to TfGM for validating the baseline city centre Paramics model; the transport modelling methodology is described in further detail in Section 7.

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3.8 Collision Analysis

3.8.1 Road traffic collision statistics have been obtained from TfGM for the most recent five-year period. It is noted that this is the most up to date traffic collision information available at the time of writing this report.

3.8.2 The study area includes the following roads:

- A635 Mancunian Way;
- A57 (M);
- A6 London Road;
- A665 Ring Road; and
- B6469 Fairfield Street.

3.8.3 The full collision report can be found in Appendix E.

3.8.4 Collision statistics are reviewed in terms of numbers and severity to ascertain whether there are particular trends or patterns at a particular junction or section of road. If there is a trend or statistically high collision record that would require accident remedial works, then this could be considered as a 'significant'.

3.8.5 All collisions recorded within the study area during the five-year period are summarised in Table 3.7.

Table 3.7 Collision Data Summary for the Five-year period (May 2014 to April 2019)

Severity	May-Dec 2014	Jan-Dec 2015	Jan-Dec 2016	Jan-Dec 2017	Jan-Dec 2018	Jan-Apr 2019	Total
Fatal	0	0	0	0	0	0	**0**
Serious	4	3	4	4	5	1	**21**
Slight	15	19	12	18	17	1	**82**
Total	**19**	**22**	**16**	**22**	**22**	**2**	**103**

3.8.6 Table 3.7 shows that 103 collisions were recorded in the five-year period up to the end of April 2019 and that the majority of the collisions (82) in the study are resulted in slight injury with 21 collisions resulting in serious injury. No fatal collisions were recorded during this period.

3.8.7 Pedestrians, cyclists and motorcyclists were involved in 1%, 14%, and 7% of the collisions respectively, while 42% of collisions occurred in dark conditions and 11% for rain and 3% for windy conditions.

3.8.8 The data was analysed further by identifying clusters of collisions within the study area. This was done to ascertain whether there were any underlying patterns, trends or factors that may have contributed to the collision. Six key collision clusters were identified as shown in Figure 3.24.

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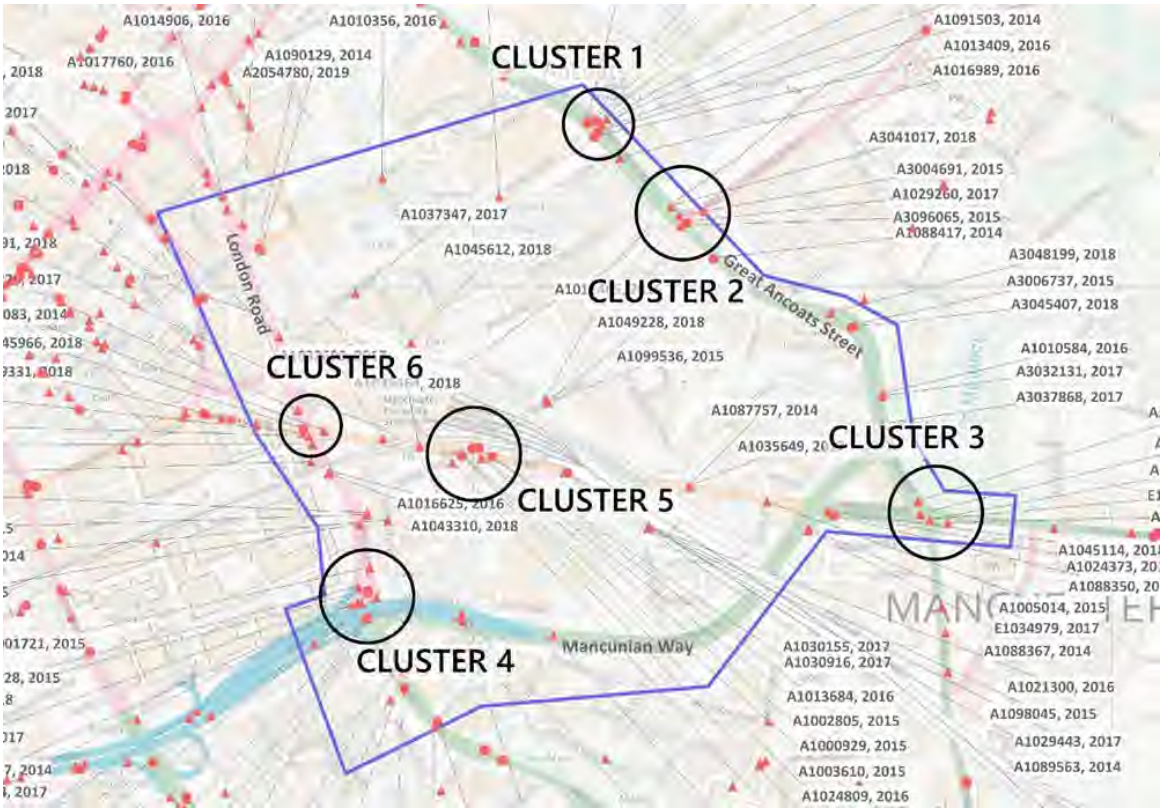


Figure 3.24 Location of Collision Clusters

Cluster 1 – Store Street/Old Mill St/A665 Ring Road Junction

3.8.9 There were a total of eight collisions in this location over the study period; six slight injury and two serious. The two serious collisions mainly involve a vehicle colliding with a pedestrian crossing the carriageway. Typical causes in this area include failing to judge other vehicles' path or speed and failing to look properly when changing lanes or turning.

Cluster 2 – A662 Pollard Street/A665 Ring Road Junction

3.8.10 Four collisions had occurred at this location over a five-year period of which comprises of three slight and one serious collision – primarily involving a pedestrian believed to be under influence colliding with a vehicle while crossing the junction. The collisions are mainly due to failure in judgment of other vehicles' path or speed and failure of looking properly when manoeuvring or changing lanes.

Cluster 3 – B6469 Fairfield Street/Ashton Old Road/Pin Mill Brow/Chancellor Lane Junction

3.8.11 A total of five collisions has been identified over the study period all involving slight injury. The typical causes in this area include sudden braking, failing to judge other vehicles' path or speed and failing to look properly when manoeuvring, turning or changing lanes.

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Cluster 4 – A635 Mancunian Way/A6 London Road Junction

3.8.12 Eight collisions had occurred at this location over a five-year period, including one serious and seven slight injury. The serious collision is believed to be a HGV approaching a turn whilst colliding with a pedestrian on a pedestrian crossing. The remaining seven collisions typically involved failure to judge other vehicles' path or speed and failing to look properly when manoeuvring, turning or changing lanes.

Cluster 5 – B6469 Fairfield Street/Travis Street Junction

3.8.13 There were a total of ten collisions over a five year period, four serious and six slight injury. Typical causes involve vehicles colliding with a cyclist when turning, failing to judge other vehicles' path or speed and failing to look properly when manoeuvring, turning or changing lanes.

Cluster 6 – B6469 Fairfield Street/A6 London Road

3.8.14 A total of five collisions in this location has been identified over the study period of which comprises of four slight and one serious collisions. The collisions are mainly due to sudden braking, failure in judgment of other vehicles' path or speed and failure of looking properly when manoeuvring, turning or changing lanes.

Collision Assessment Summary

3.8.15 The clusters of collisions identified have been shown to have no prevalent cause, with a variety of contributing factors. However, it is noted that the highway improvements proposed in the surrounding area, including improved accessibility for pedestrians and cyclists, will change how the highway performs in road safety terms and may also change current collision patterns. Further collision analysis would be undertaken as part of the Road Safety Audit procedures for the new and amended highway infrastructure, when it is completed, and by future Reserved Matters Applications for the Mayfield development.

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4 Development Proposals

4.1 Strategic Framework Principles

4.1.1 The Mayfield SRF was adopted in May 2018 and sets out the key development and urban design principles for Mayfield and this is provided for context below; the changes that will be delivered as part of the Phase 1 application are described later in this section. The maximum land use parameters for Mayfield SRF are shown in Table 4.1.

Table 4.1 Mayfield SRF - Proposed Land Use Schedule

Land Use	Quantum
Commercial	154,800sqm GEA
Retail / Leisure	32,300sqm GEA
Hotel	650 rooms
Residential	1,500 units
Parking	700 spaces

4.1.2 The masterplan SRF layout is shown in Figure 4.1. This application focusses on Phase 1 of the SRF which comprises Mayfield Park, Baring Street MSCP (Plot N), Baring Street Office 1 (Plot O) and Baring Street Office 2 (Plot M).



Figure 4.1 SRF Masterplan

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Pedestrian Access (SRF)

4.1.3 The SRF outlines the proposed pedestrian access arrangements for the whole site. The Mayfield Park and improved public realm throughout the masterplan will significantly enhance the east-west and north-south connections through the Site. The pedestrian strategy proposed in the SRF is shown in Figure 4.2.

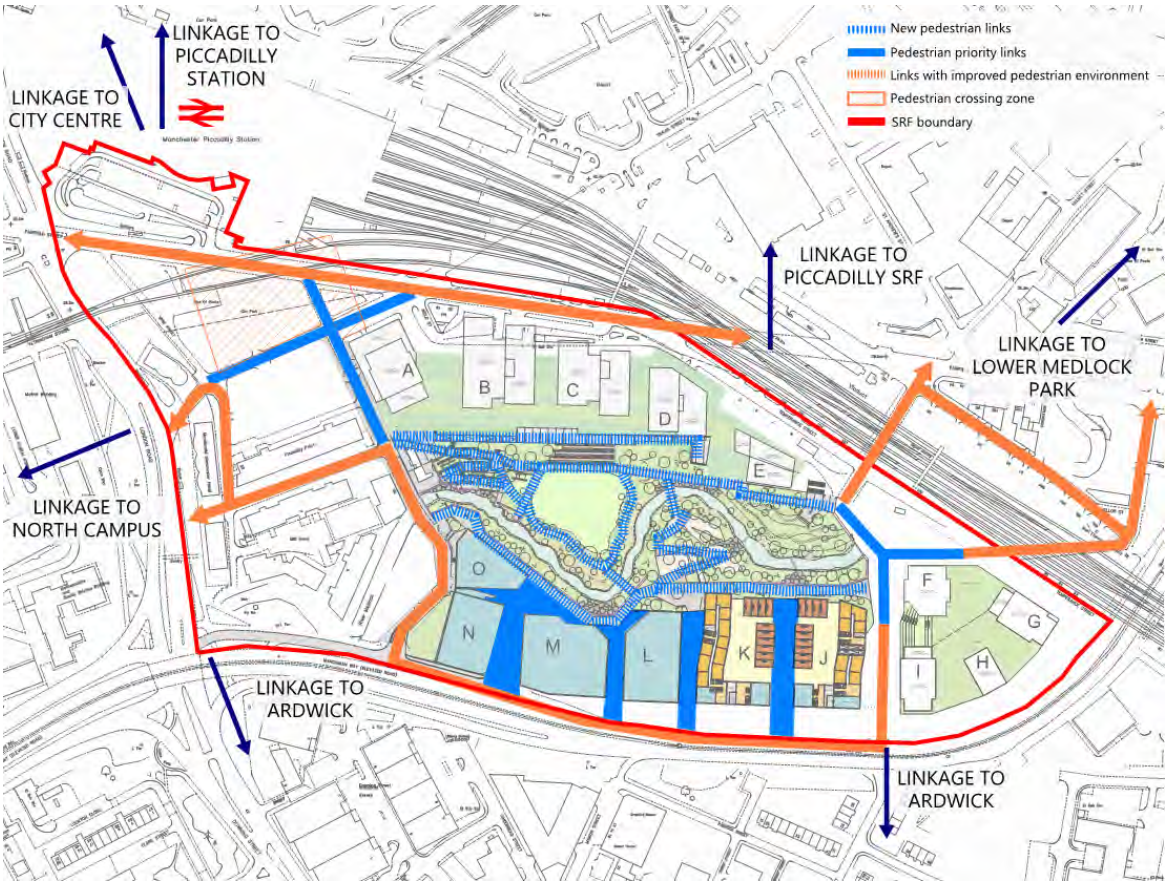


Figure 4.2 SRF Pedestrian Strategy

4.1.4 Pedestrian access to the Site from the north will be enhanced through a pedestrian crossing on Fairfield Street directly adjacent to Piccadilly station; this is in parallel to proposed improvements to the pedestrian environment on Fairfield Street in general. These improvements will enhance the Site's connections to Piccadilly Station and the existing pedestrian routes to the city centre.

4.1.5 Improvements are proposed to the pedestrian environments on Travis Street, which links to London Road, where a pedestrian crossing zone is proposed across London Road to enhance connectivity to the west towards the University of Manchester Campus. To the east, proposed alterations to the pedestrian environments on Temperance Street, North Western Street and Crane Street will result in improved connectivity and walking environment for pedestrians.

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4.1.6 The principle of a pedestrian crossing is shown on Mancunian Way adjacent to Hoyle Street, which will improve pedestrian connectivity to Ardwick and amenities to the south. The pedestrian crossing will connect to an internal perimeter road running parallel to Mancunian Way, which provides access to pedestrian links into the Site.

4.1.7 Details of the pedestrian access arrangements for the Phase 1 development plots can be found in Section 4.2.

Cycle Access and Parking (SRF)

Access

4.1.8 The SRF proposes improvements to the cycle connections to, from and through the Mayfield area. Three strategic cycle routes linking into the external network will be created, which it is envisaged will carry the majority of cyclists across Mayfield. These will be along Baring Street connecting the existing cycle routes on Fairfield Street to those on A6 London Road; along Hoyle Street, connecting Fairfield Street to Mancunian Way; and a route on the southern perimeter road parallel to Mancunian Way that will connect Baring Street to Hoyle Street.

4.1.9 It is envisaged that a network of internal routes within the Site connecting with the strategic routes will provide local access to the development plots and park, but these routes would be less busy with cyclists and shared with pedestrians.

4.1.10 The cycle strategy proposed by the SRF is shown in Figure 4.3.

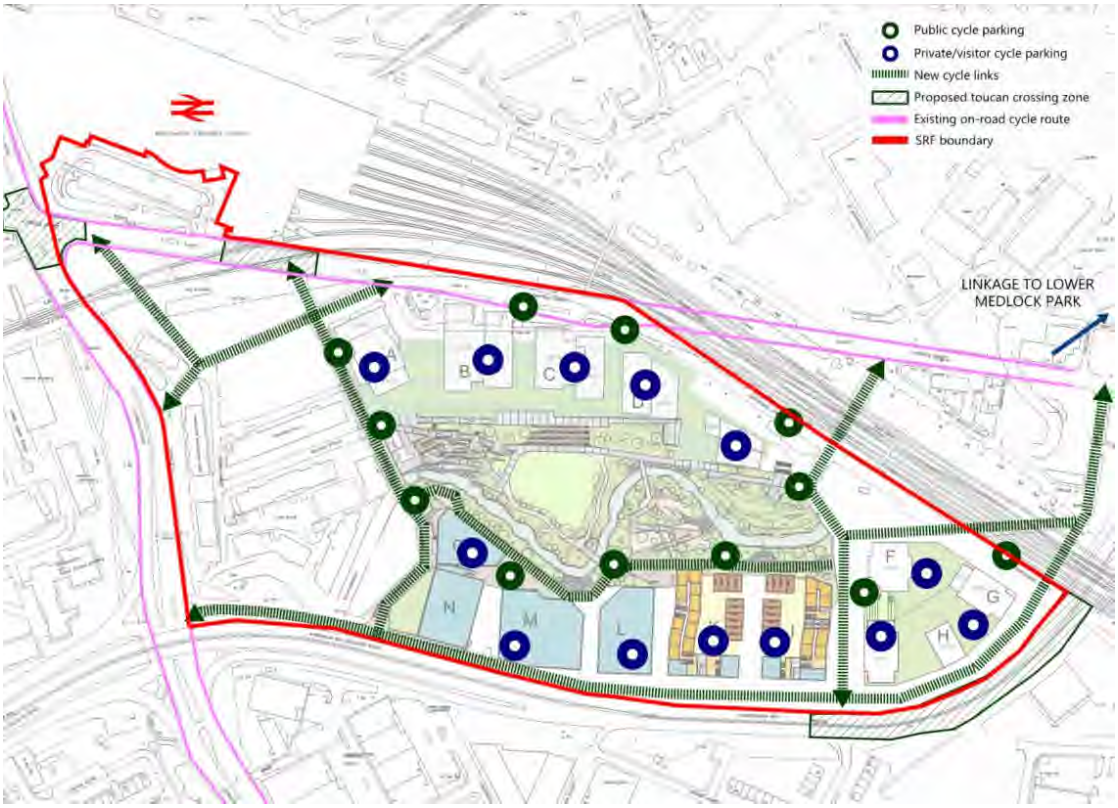


Figure 4.3 SRF Cycle Strategy

4.1.11 Details of the cycle access proposals for the Phase 1 can be found in Section 4.2.

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Cycle Parking

4.1.12 The cycle parking strategy for the SRF will seek to achieve the cycle parking standards set out in Manchester's Core Strategy. The design team will propose suitable cycle parking standards where MCC standards are not available, such as for residential use.

4.1.13 Long-stay cycle space will be provided in a location reserved for tenants / staff within or close to the curtilage of the development plot it serves. High quality parking will be provided and will be safe, secure and well-lit. Showers, changing rooms and lockers will be provided for employees where required.

4.1.14 Short-stay spaces for visitors will be located in the public realm in visible, well-lit places that have high levels of natural surveillance.

4.1.15 Details of the proposed cycle parking for Phase 1 can be found in Section 4.2.

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Highway Access and Car Parking (SRF)

Access

4.1.16 The SRF seeks to minimize the impact of vehicular traffic on Mayfield, whilst enhancing connections for non-motorised modes. Measures to achieve this include deliberately restricting vehicle access to the periphery of the Site from off Mancunian Way and Fairfield Street and changing traffic routing within Mayfield to discourage rat-running and through traffic. It is envisaged that a 20mph zone will be introduced across Mayfield and this will be enforced by design measures to reduce vehicle speeds and create quality spaces for pedestrians and cyclists. The site-wide highway access proposals for the SRF are shown in Figure 4.4.

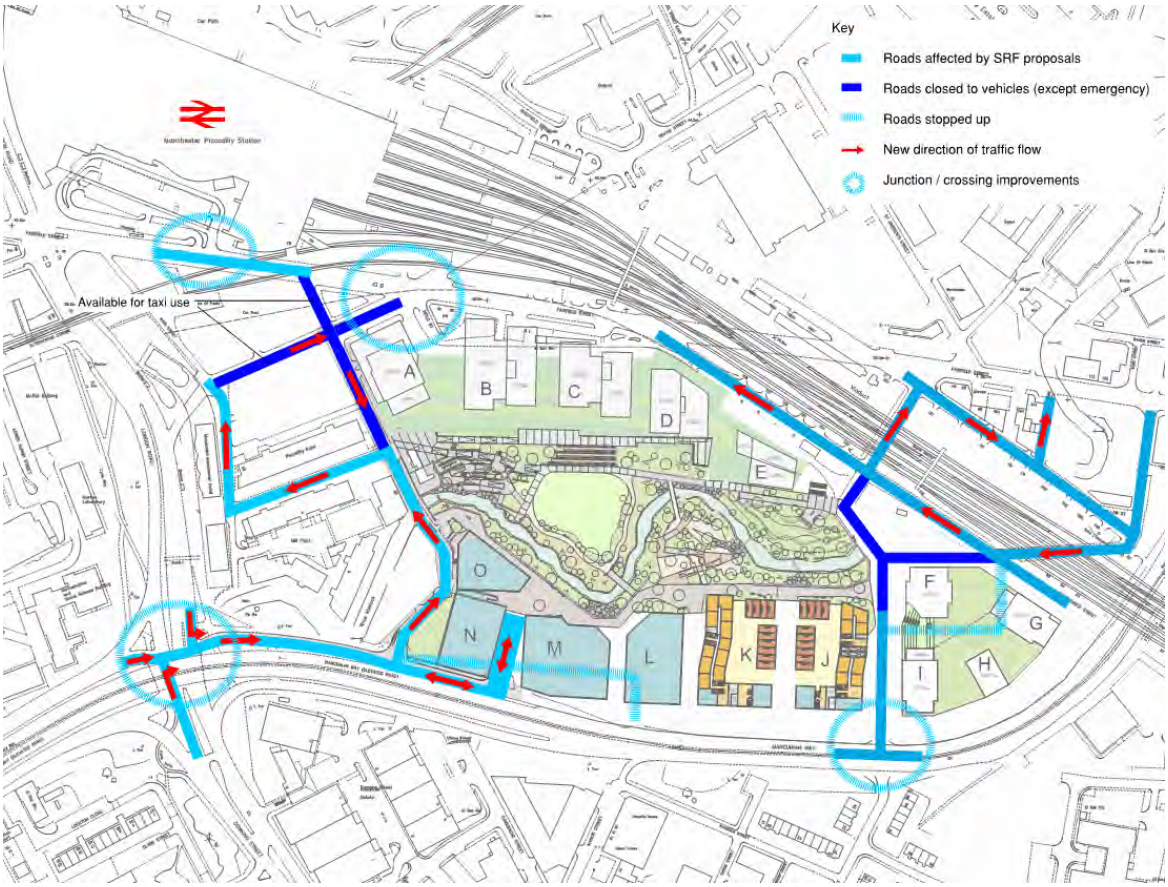


Figure 4.4 SRF Highway Proposals

4.1.17 These highways proposals have been subsequently developed and current highway access arrangements for Phase 1 can be found in Section 4.2.

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Parking

4.1.18 The site-wide car parking strategy for the SRF is shown in Figure 4.5.

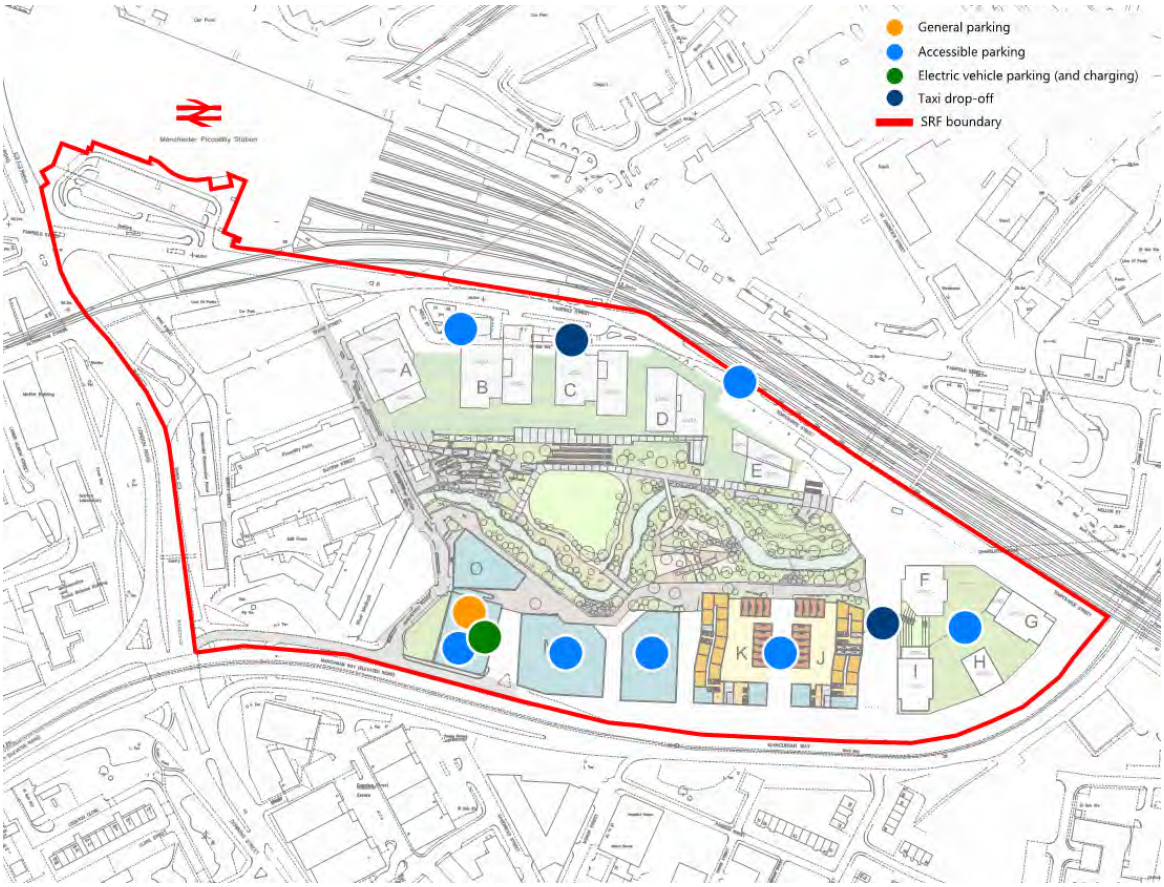


Figure 4.5 SRF Parking Strategy

4.1.19 The SRF proposes up to 700 spaces provided on-site. The majority of parking provision will be provided at a single location in the masterplan to ensure that streets and spaces are as car-free and pedestrian friendly as possible. This will be achieved by the provision of a MSCP in the south western corner of the masterplan area at the southern end of Baring Street.

4.1.20 The management and control of the car park will remain with the Mayfield Partnership although in the early stages of development it is possible that the day-to-day operation of the car park may be sub-contracted to a professional car park operator in order to fully utilise the surplus spaces effectively, until further development at Mayfield requires them. The car park will provide car parking provision for both commercial and residential occupiers.

4.1.21 Any additional modest parking provision that does fall within the curtilage of the building (e.g. back of house basement or undercroft areas or immediately in the streetscape of the buildings), will be managed as follows:

- As a priority, any spaces under / within a building will be provided as disabled spaces for Blue Badge holders;

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- As a residential building becomes fully occupied, if that provision is not fully utilised by disabled residents, the estate manager will then release those spaces to other residents of the building to ensure they are fully used; and
- Spaces released on this basis will be re-secured by the estate manager should it be needed at a later time for a new disabled resident.

4.1.22 This management protocol ensures that those spaces most conveniently and appropriately located have the benefit of being used by disabled residents as a primary objective but that such a policy does not result in an over provision of empty or under-utilised car parking spaces on-site.

4.1.23 Commercial buildings will not generally have any car parking provision within their footprint. However, there may be modest provision of spaces in future commercial buildings such as those over the Depot. These will be provided as disabled spaces given the distance from the Depot to the MSCP.

4.1.24 To keep the streetscape as car free as possible the intention will be to direct visitors to the commercial and residential buildings to park within the MSCP. This ensures that a way-finding and signage strategy for Mayfield can be adopted that is simple and clear, directing the vast majority of car movements to a single point in the masterplan.

4.1.25 As previously noted, provision for accessible spaces will be made close to the buildings as they come forward as part of the development programme. Twenty one accessible spaces will be provided on the lower and upper ground floor of the MSCP and up to a further three spaces for users of the park particularly, on the southern side of Buxton Street at the east end.

4.1.26 In terms of electric vehicle charging, it is proposed that all the spaces provided close to the buildings will be provided with charging points. In addition, at least 10% of the spaces in the MSCP will have charging points.

Servicing Arrangements and Management (SRF)

4.1.27 It is proposed that servicing and deliveries across the Site will take place on each plot; minimising the interaction between servicing vehicles, pedestrians and cyclists in the public realm. The SRF servicing strategy is show in Figure 4.6.

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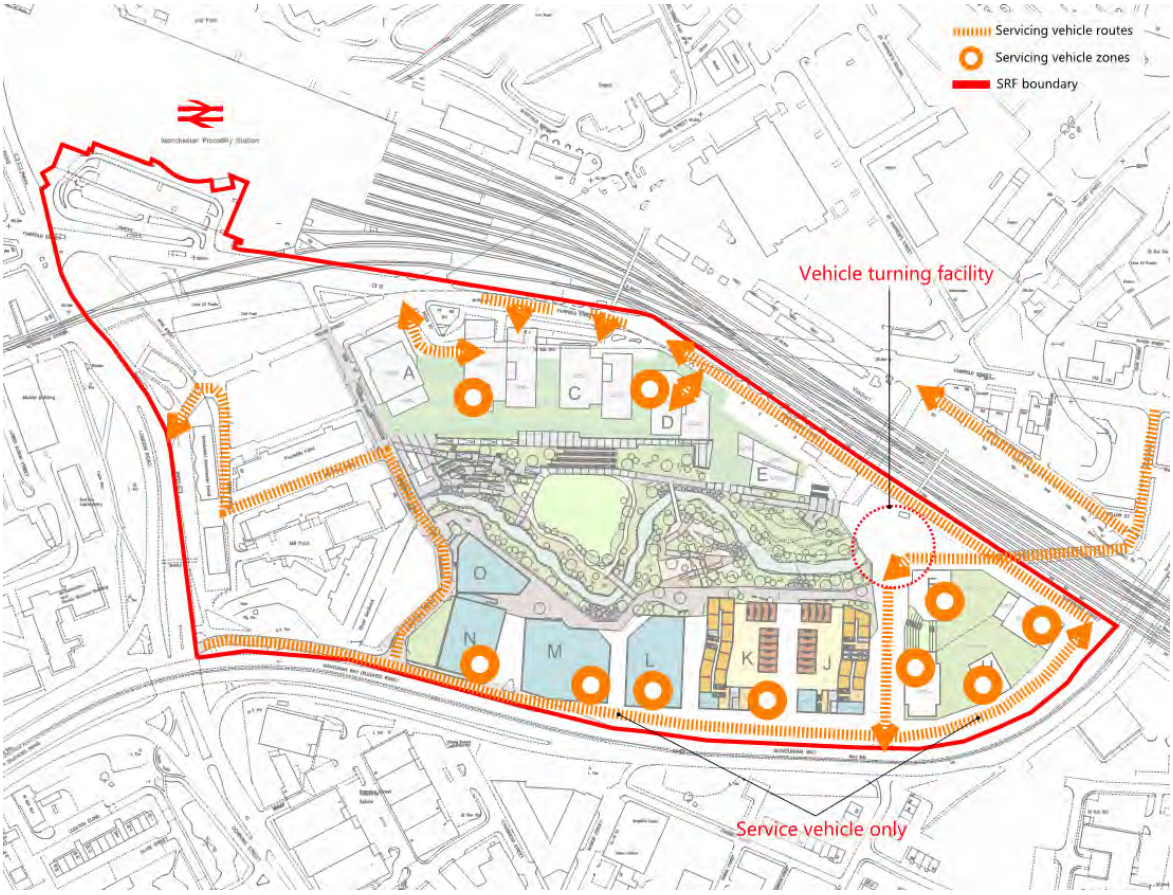


Figure 4.6 SRF Servicing Strategy

4.1.28 Details of the servicing arrangements for the Phase 1 development plots in more detail can be found in Section 4.2.

4.2 Proposed Development (Phase 1)

4.2.1 Phase 1 of Mayfield includes Mayfield Park, Baring Street Office 1, Baring Street MSCP and Baring Street Office 2. However, as previously stated, this TA focuses on the proposals for Mayfield Park, Baring Street Office 1 and Baring Street MSCP. The detail of Baring Street Office 2 and its associated public realm will be provided and assessed in a forthcoming separate application.

4.2.2 It is noted that the development proposed in Phase 1 is confined to the western edge of the SRF, and therefore the only transport proposals required to support the Phase 1 development plots will be brought forward at this time. Further elements of transport infrastructure identified in the SRF strategy will be brought forward at the appropriate time with the relevant future development phase.

4.2.3 Furthermore, it has been agreed with MCC that the detail of the changes to transport infrastructure will be secured by planning condition following a consent, and the detailed agreed as part of the s278 design work in conjunction with MCC. This will also factor in construction phasing for Phase 1 and later elements of the SRF and other works that may affect Mayfield, such as Network Rail's proposals for Piccadilly. Therefore the proposals described in the following sections identify the proposed intent for the planning application.

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4.2.4 The development schedule for Phase is shown in Table 4.2.

Table 4.2 Mayfield Phase 1 - Proposed Land Use Schedule

Plot	Land Use	Quantum
Baring Street Office 1	B1 Office and ground floor commercial	9,987sqm GEA: comprising 9,651sqm GEA B1 use and 336sqm GEA ground floor commercial use.
Baring Street Multi-Storey Car park	Multi-Storey Car Park	543 spaces
Baring Street Office 2	B1 Office and ground floor commercial / ancillary space	Up to 31,000 sqm GEA

4.2.5 The proposed illustrative plan for Mayfield Park is shown in Figure 4.7.



Figure 4.7 Mayfield Park Proposals

4.2.6 The ground floor plan for Baring Street Office 1 is shown in Figure 4.8.

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Figure 4.8 Baring Street Office 1 – Proposed Ground Floor Plan

4.2.7 The proposed ground floor plan for Baring Street MSCP is shown in Figure 4.9.

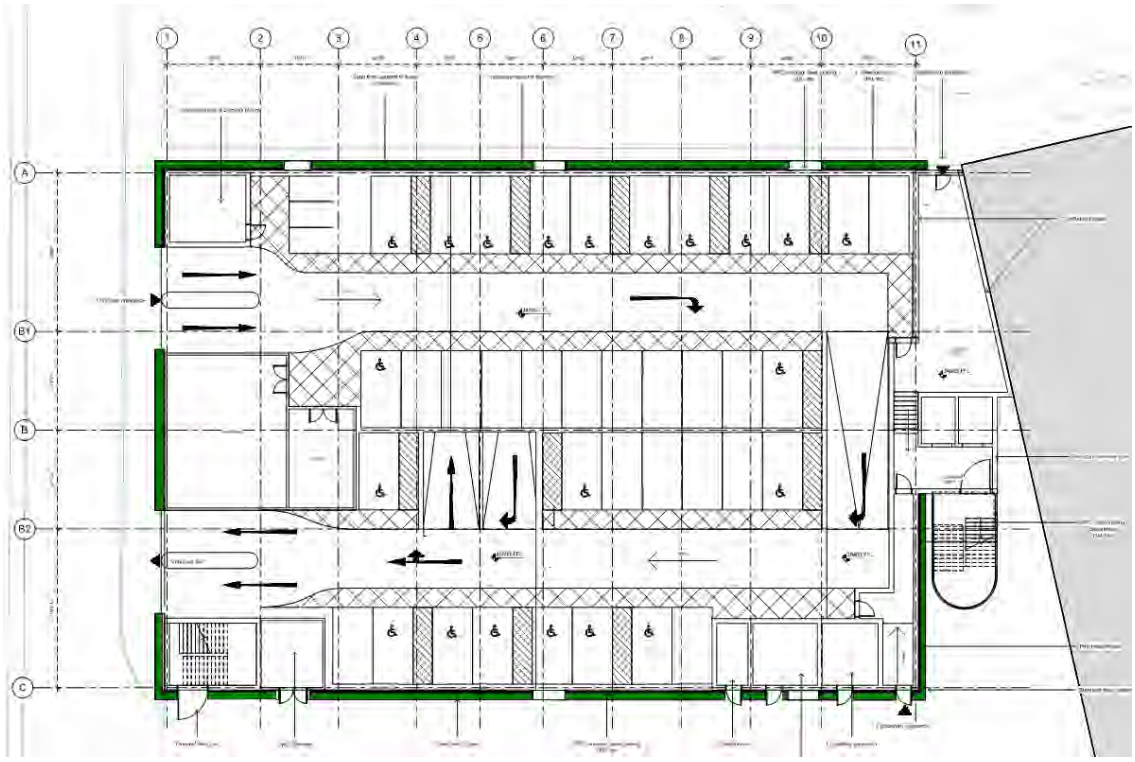


Figure 4.9 Baring Street MSCP – Proposed Ground Floor Plan

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4.2.8 The full architect's drawings for Mayfield Park and the ground floor plans for Baring Street Office 1 and Baring Street MSCP can be found in Appendix F.

Pedestrian Access (Phase 1)

4.2.9 The pedestrian access strategy for Phase 1 is shown in Figure 4.10. The strategy includes creating pedestrian priority links with environmental improvements on Travis Street and the northern section of Baring Street to enhance connections between the Site and the city centre. Further environmental improvements will be made to Baring Street (south of Buxton Street), Buxton Street and Berry Street, incorporating measures such as widened footways, improved surfacing materials and new planting.

4.2.10 Away from the carriageways, new traffic-free pedestrian routes will be created throughout Mayfield Park linking to the development plots; including a 5m-wide shared pedestrian cycle route along the northern edge of the Phase 1 development plots running past Baring Street Office 1 and 2, and connecting these buildings to Baring Street to the west and Mayfield Park to the east.

4.2.11 The proposed reconfiguration of the London Road / Mancunian Way junction, described in greater detail later, will now include pedestrian facilities on all arms.

4.2.12 Details of all these proposals will be progressed with MCC and TfGM during the s278 detailed design procedure secured by condition, following a consent.

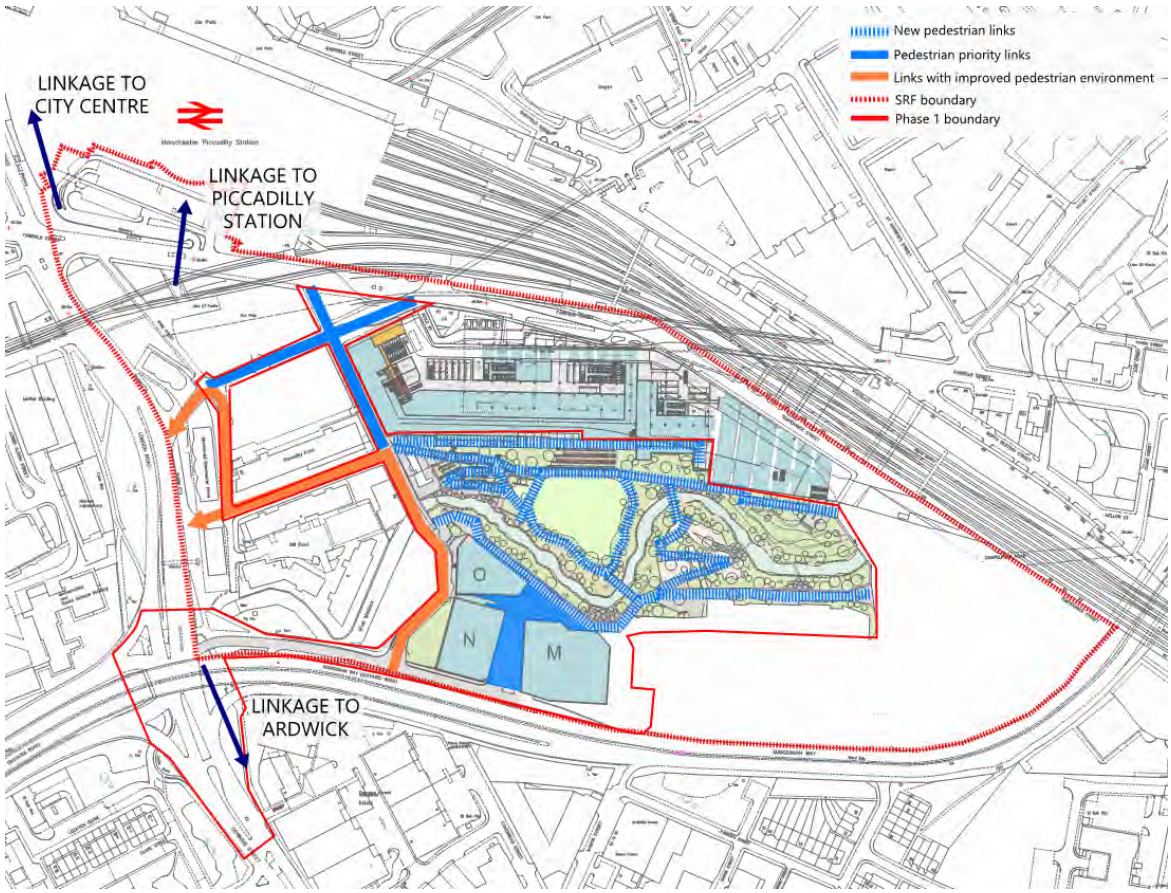


Figure 4.10 Phase 1 Pedestrian Access

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Cycle Parking and Access (Phase 1)

4.2.13 The cycle access strategy for Phase 1 is shown in Figure 4.11.

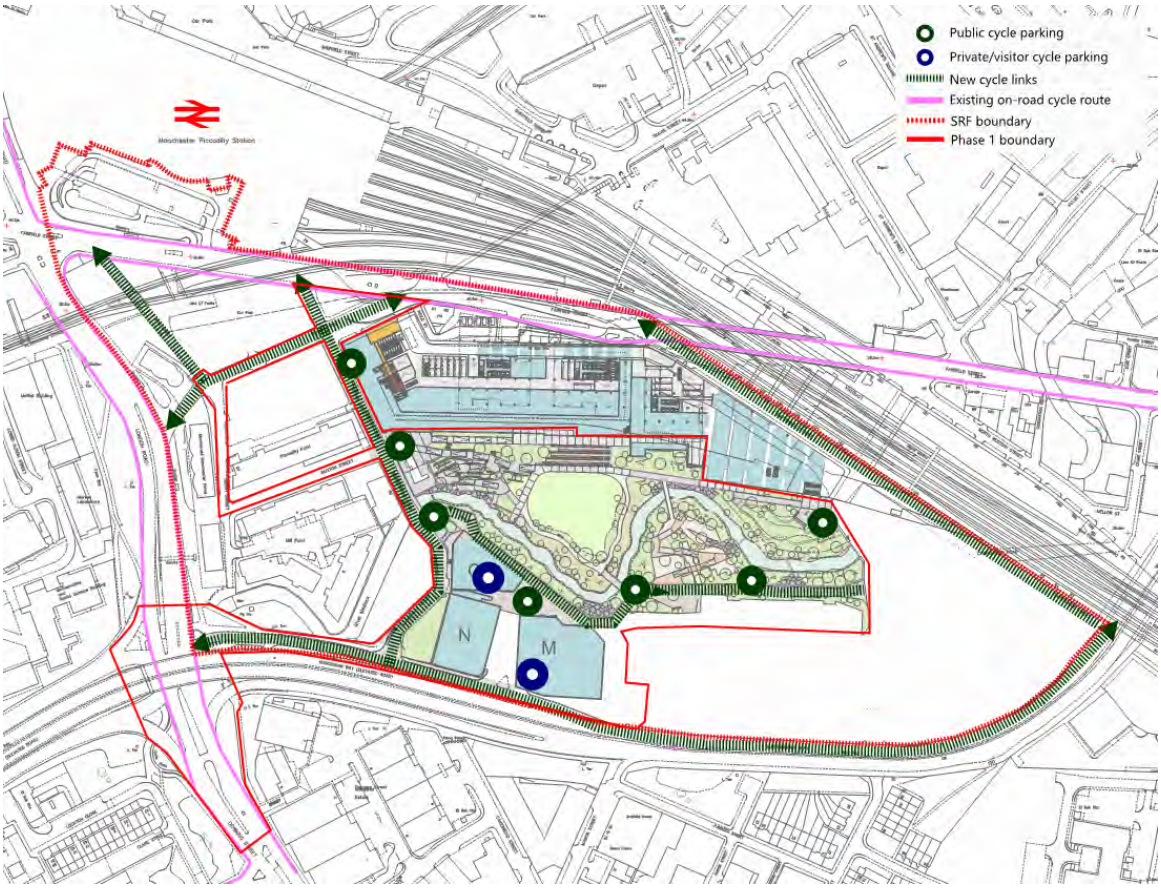


Figure 4.11 Phase 1 Cycle Access

4.2.14 As the Phase 1 development only focuses on the western edge of Mayfield, the strategic cycle route to be brought forward for Phase 1 is along Baring Street, linking the existing cycle route on Fairfield Street to London Road, where there are improved cycle crossings proposed. It is envisaged that the route will be a combination of a shared route with pedestrians and a segregated route on the carriageway, but this will be determined through detailed design discussions with MCC.

4.2.15 Local cycle access to the development plots in Phase 1 will be provided via Baring Street and by a 5m wide shared-use route connecting Baring Street and the southern edge of the park (north of the buildings), which will also connect to future development plots and the strategic cycle route proposed by the SRF along Hoyle Street.

4.2.16 Table 4.3 shows the proposed cycle parking provision for Mayfield Park, Baring Street Office 1, Baring Street MSCP and Baring Street Office 2. Between 6-10 short-stay public cycle parking spaces will be provided at each cycle parking location at the edge of the Park, including between Baring Street Office 1 and 2. It is noted that the cycle parking provision for Baring Street Office 2 will be set out in detail in a future application, but provision will aspire to meet MCC Core Strategy standards.

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Table 4.3 Proposed Cycle Parking Provision – Phase 1

Plot	Provision
Mayfield Park	6-10 spaces at each location
Baring Street Office 1	75
Baring Street MSCP	0
Baring Street Office 2	Aspire to meet MCC Core Strategy cycle standards

4.2.17 All long-stay spaces will be provided securely within each plot and short-stay spaces will be located in the public realm in visible, well-lit places close to building entrances that have high levels of natural surveillance.

4.2.18 The cycle parking for Baring Street Office 1 will be at ground floor level and provided using double stacked racks and folding cycle lockers. Principal access to the Baring Street Office 1 cycle parking will be from the shred route on the northern edge of the building; this route provides connection to the proposed cycle facilities on Baring Street.

4.2.19 Baring Street Office 1 and 2 will both provide showers, changing rooms and locker facilities for cyclists.

4.2.20 The short-stay cycle parking provided around the edge of the Park will be provided as Sheffield stands. Parking for non-standard cycles are to be provided with 5% of the overall provision be for larger cycles, such as cargo bikes or trikes, through suitably spaced Sheffield stands.

Highway Access (Phase 1)

Access

4.2.21 The proposed highway access proposals for Phase 1 are summarised in Figure 4.12 and Figure 4.13 with more detailed highways layout plans provided in the Appendix G.

4.2.22 As set out in the SRF, various changes are proposed to the highways in and immediately around Mayfield to facilitate the development, and for Phase 1 this will include a new access into Mayfield, new traffic routing, stopping-up of roads, access restrictions and changes to on-street parking. The roads affected by these proposals are shown in the following Figures, which include locations of proposed stopping-up and traffic Regulation Orders (TRO's) and new traffic routing.

4.2.23 It is also proposed that a 20mph zone be created throughout the Mayfield area as part of the Phase 1.

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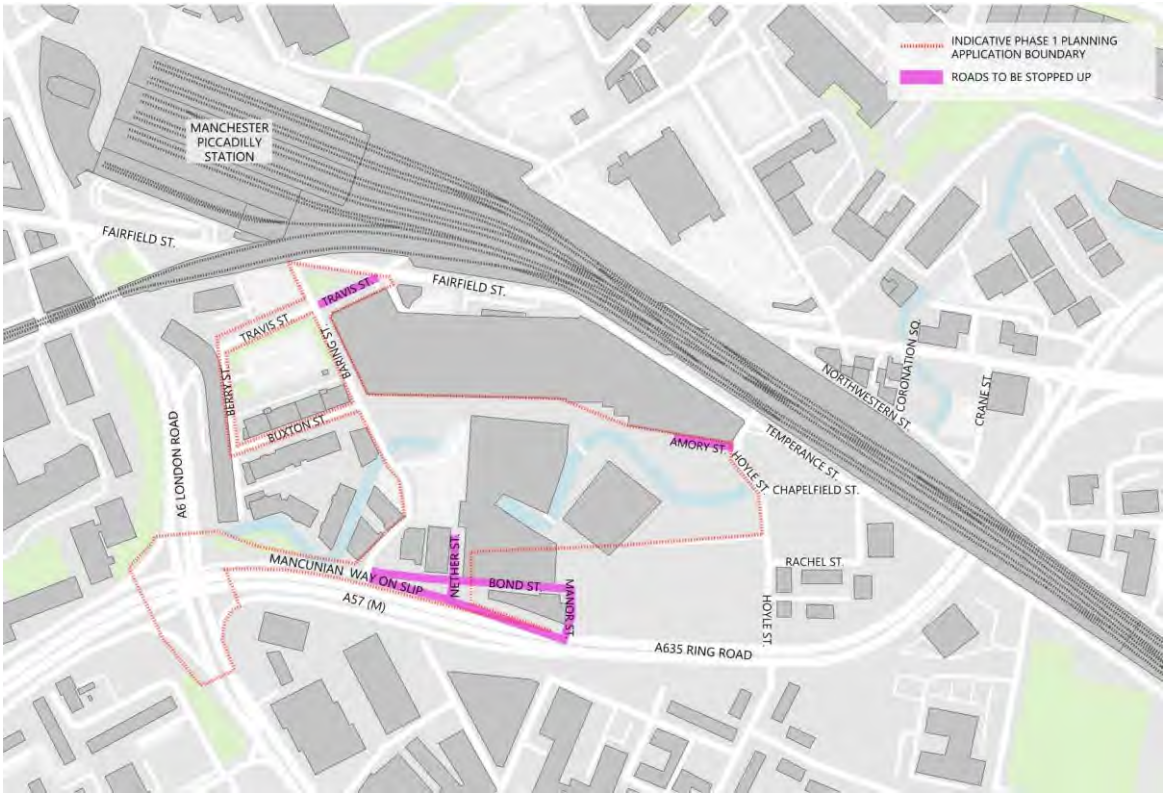


Figure 4.12 Phase 1 Highway Proposals – Stopping-Up

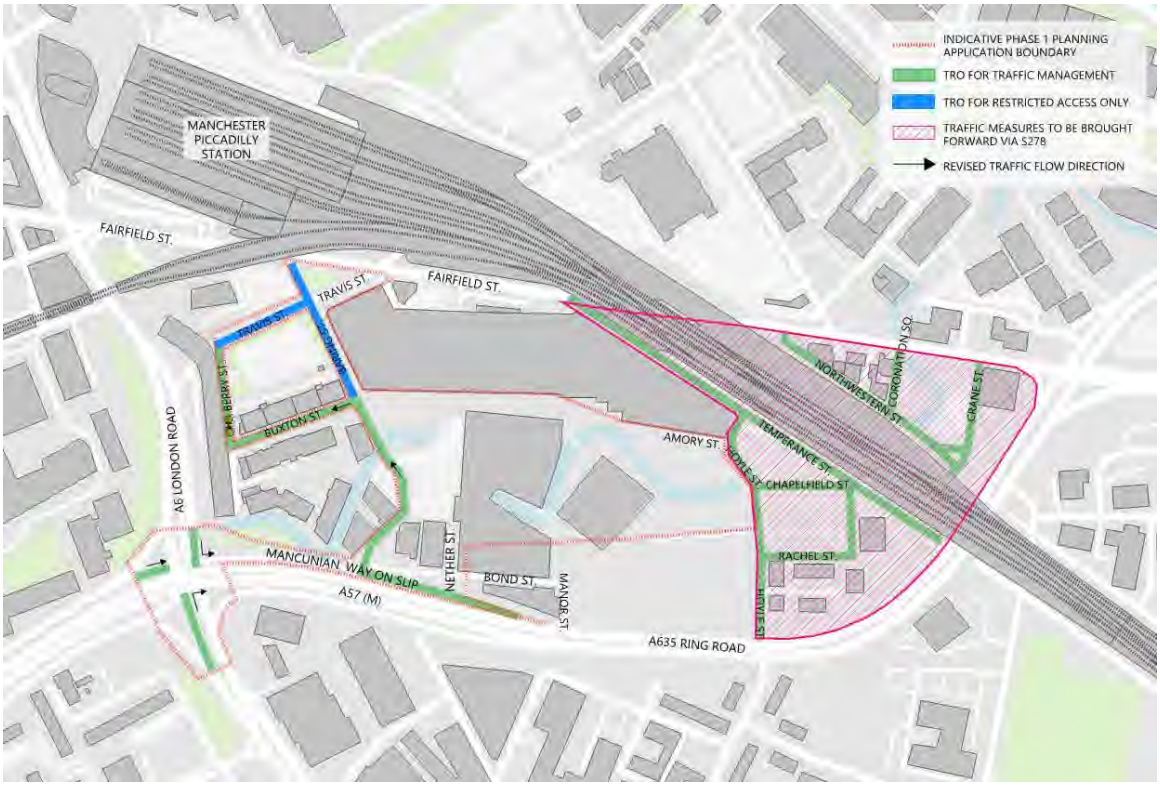


Figure 4.13 Phase 1 Highway Proposals – TRO's and Traffic Routing

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4.2.24 The principle highway access to Phase 1 will be via the eastbound Mancunian Way slip-road, via a re-configured London Road/Mancunian Way junction which will now allow direct access from all directions. The proposed layout allows a new left turn from London Road north, right turn from London Road south and an ahead movement from the eastbound Mancunian Way off-slip into the on-slip heading towards Baring Street. The proposed junction layout is shown in Appendix G.

4.2.25 Once within Mayfield arriving from London Road, the traffic routing strategy is as follows.

- Traffic will enter the Site eastbound via the Mancunian Way slip-road.
- East of Baring Street, two-way operation will be in place to allow access into and out of Baring Street MSCP and to/from Baring Street Office 2.
- It is proposed that Baring Street is changed to operate one-way in the northbound direction between the Mancunian Way slip-road and Buxton Street, providing access to Baring Street Office 1.
- Buxton Street will operate one-way westbound allowing traffic to exit the Site to the west via the existing Travis Street/London Road junction.
- It is proposed that Baring Street between Travis Street and Buxton Street, and Travis Street between Berry Street and Baring Street will have limited access controls, most likely enforced by removable bollards.

Taxis

4.2.26 The proposed reconfiguration and operational changes to Travis Street and Baring Street will require the existing taxi ranks on Baring Street south of Travis Street to be removed. A replacement taxi rank for the same number of vehicles as existing is proposed on Travis Street west, between Baring Street and Berry Street. Taxis would approach the relocated rank from London Road. The location of the existing and proposed taxi ranks are shown in Figure 4.14.



Figure 4.14 Existing and Proposed Taxi Ranks

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Car Parking (Phase 1)

4.2.27 The proposed car parking provision for Phase 1 is shown in Figure 4.15.

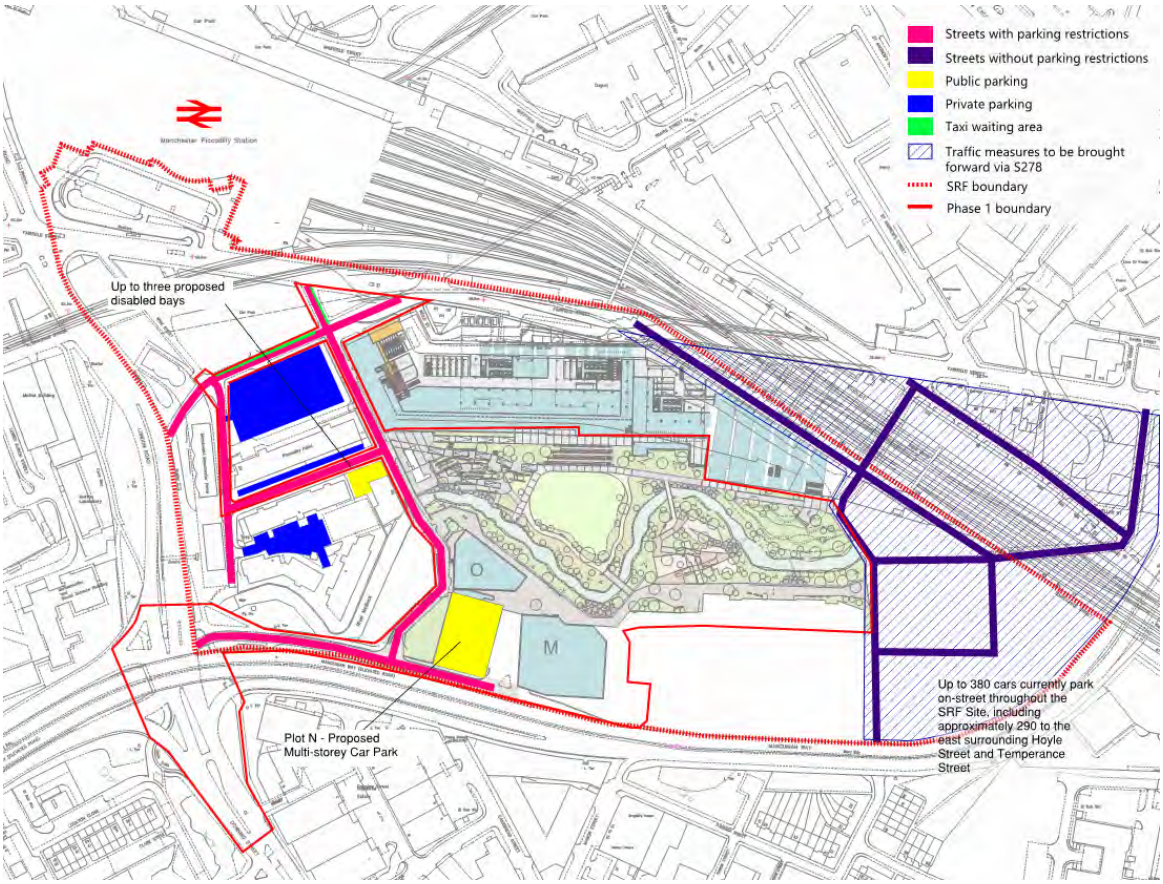


Figure 4.15 Phase 1 Car Parking Provision

Off-street Parking

4.2.28 Phase 1 proposes the construction of Baring Street MSCP in the south-west corner of the Site, which will provide 543 off-street parking spaces. In Phase 1, it is assumed that these will be used to provide spaces for occupants of the office buildings, users of the Mayfield Park and general commuters.

4.2.29 Within the MSCP, 21 of the total spaces will be designed as accessible and 10% of the total car parking provision will be provided with active electric vehicle charging facilities to encourage the use of electric vehicles on-site. There will also be provision for three motorcycle spaces.

4.2.30 No dedicated parking will be provided for Baring Street Office 1, due to its proximity to the MSCP.

4.2.31 The management and control of the car park will remain with the Mayfield Partnership although for the Phase 1 development it is possible that the day-to-day operation of the car park may be sub-contracted to a professional car park operator in order to fully utilise the spaces effectively, until future development at Mayfield requires them.

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On-street Parking

4.2.32 There is a variety of public parking types provided on-street within Phase 1 of Mayfield, such as limited stay parking bays on Buxton Street and Pay-and-Display bays on Travis Street. The traffic measures proposed by Phase 1 of Mayfield will require changes to these existing parking provisions and this has been discussed with MCC during pre-application discussions. The detail of the changes will be secured as part of the s278 agreement for highways works in Mayfield following a consent; however it is noted that the revised arrangements will seek to demonstrate 'no net loss' of existing Pay-and-Display bays.

4.2.33 One element of this is the proposed provision of three accessible spaces on the south side of Buxton Street at its eastern end, close to Mayfield Park. This will potentially require the removal of some of the short-stay free parking provision currently provided in this location. The provision of these accessible bays has been agreed with MCC in principle, but the detail will be worked up with MCC post-submission.

East Mayfield – Traffic Measures

4.2.34 As shown on Figure 4.13 it is proposed to introduce traffic measures in the streets to the east of Mayfield, in the area between the park and Fairfield Street, both sides of the railway viaduct. The purpose of these measures is as follows:

- To remove the existing 'fly-parking' which is largely related to commuters which blights the streets, to reduce traffic movement in the area and to improve safety for all road users;
- To provide dedicated parking facilities for permit holders within a possible 'permit zone' – i.e. for residents and businesses and visitors to these premises;
- To implement traffic management / routing measures to improve road safety and deter rat-running, whilst allowing easy access to existing premises; and
- To help facilitate safe access to the meanwhile uses for Mayfield in Temperance Street and Hoyle Street areas.

4.2.35 It is noted that this area is outside of the Phase 1 planning application boundary so these measures will be brought forward as part of a future s278 application made to MCC. The detail design of these measures will be worked up following a consent for Phase 1 by the Applicant working in conjunction with MCC.

Servicing Arrangements and Management

4.2.36 For Baring Street Office 1, servicing will be carried out from Baring Street. Waste will be collected at each floor level and transferred via the goods lift to the dedicated refuse and recycling store. The store is located on the lower ground floor with direct access to the proposed servicing lay-by on Baring Street.

4.2.37 The proposed refuse and recycling store includes Eurobin provision that has been sized based upon a twice-weekly collection frequency for both the office and amenity uses. As such a total of 14 bins are provided:

- 2no. 1100 litre bins for recycling glass, cans and plastic
- 4no. 1100 litre bins for recycling paper, card and cartons
- 4no. 1100 litre bins for residual waste
- 4no. 240 litre bins for food waste

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4.2.38 Further details on waste management can be found in the Waste Management Strategy submitted as part of this application.

4.2.39 The proposed lay-by will also provide servicing access to the building. Servicing access into the building will be via the dedicated servicing entrance and corridor to gain access to the goods lift, upper floors and foyer.

4.2.40 It is proposed that servicing for Baring Street Office 2 will largely mirror that of Baring Street Office 1 and take place on-street. The proposed servicing arrangements for Baring Street Office 2 will be described in detail in a separate future application.

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5 Trip Generation

5.1 Introduction

5.1.1 The proposed trip generation and mode split methodology was submitted to MCC / TfGM in June 2018. A copy of this is attached in Appendix A together with comments received from TfGM, which confirms that the proposed trip rates are agreed in principle, subject to some alterations to the assumed modal split. Additional comments on the trip generation methodology were received from TfGM on 11 June 2019, focussing on the methodology used to derive trips for the commercial, retail and hotel use. The trip generation methodology was resubmitted and was subsequently agreed with TfGM. The final scoping note describing the agreed trip generation methodology was presented in the TA scoping note which can be found in Appendix A.

5.1.2 The multi-modal trip generation assessment has been undertaken for all land uses included in the full build-out SRF, and for Phase 1 on its own.

5.1.3 To estimate the number of person trips generated by the proposed development, reference has been made to the Trip Rate Information Computer System (TRICS) database, which is the nationally recognised and accepted methodology for predicting traffic for developments.

5.2 Proposed Trip Generation (SRF)

Residential Use

5.2.1 A selection of Residential/Flats Privately Owned Uses in the TRICS database were made based on the following criteria:

5.2.2 Surveys undertaken since 2010:

- In Town Centre or Edge of Town Centre locations; and
- Outside London.

5.2.3 The TRICS selection has been reviewed since the June 2018 assessment to ensure consistency.

5.2.4 The derived residential person trip rate per dwelling and resulting total person trips for the full build out SRF are shown in Table 5.1.

Table 5.1 Site Wide Person Trips – Proposed Residential (1,500 dwellings)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Person trip rate per dwelling	0.116	0.49	0.606	0.496	0.257	0.753
Total Person trips	174	735	909	744	386	1,130

5.2.5 The full TRICS outputs can be found in Appendix H.

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5.2.6 To estimate the proposed mode split for the residential use, reference has been made to the Office for National Statistics (2011 Census data) travel to work patterns for people living in Middle Super Output Area (MSOA) - Area E02006912, where the Site is located. The resultant mode split is shown in Table 5.2.

5.2.7 Applying this mode split to the person trips in Table 5.1 gives the trips by mode shown in Table 5.2 for the morning and evening peak hours.

Table 5.2 Site Wide Trips by Mode – Proposed Residential (1,500 dwellings)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	18%	31	132	164	134	69	203
Car Passenger	1%	2	7	9	7	4	11
Taxi	0%	0	0	0	0	0	0
Bus	11%	19	81	100	82	42	124
Tram	12%	21	88	109	89	46	136
Rail	4%	7	29	36	30	15	45
Pedestrians	52%	90	382	473	387	200	587
Cycle	2%	3	15	18	15	8	23
Motorcycle	0%	0	0	0	0	0	0
TOTAL	**100%**	**174**	**735**	**909**	**744**	**386**	**1,130**

Commercial Use

5.2.8 For the purpose of the trip generation assessment, and in order to adopt a worst case assessment, it has been assumed that the proposed 154,800sqm GEA Commercial (Business) use would be B1 office use, which tends to give a higher trip generation when compared with other business uses such as industrial.

5.2.9 A selection of Office Uses in the TRICS database were made, based on the following criteria:

- Surveys undertaken since 2010;
- In Town Centre or Edge of Town Centre locations;
- No Council Office sites;
- Rather than use sites from across the UK, as was used to generate the previously accepted trip rates, only sites from Central Manchester were used. This was done to reflect the characteristics of the proposed development; and
- Sites with a floor area greater than 1,000sqm.

5.2.9.1 The derived person trip rates and resulting total person trips for 154,800sqm GEA office development are shown in Table 5.3.

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Table 5.3 Site Wide Person Trips – Proposed Office (154,800sqm GEA)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Person trip rate per 100sqm GEA	2.458	0.169	2.627	0.169	2.448	2.617
Revised Total Person trips	3,805	262	4,067	262	3,789	4,051

5.2.10 To estimate the proposed mode split for the office use reference has initially been made to the 2011 Census data travel to work patterns for people living/working in MSOA E02006912, where the Site is located.

5.2.11 The data for this area gives a Car Driver mode share of 34% but this would result in the maximum car parking accumulation exceeding 350 spaces, which is the number assumed to be allocated to the commercial use at full build out (50% of the total 700 spaces).

5.2.12 To ensure that car parking does not exceed capacity on-site, it was initially proposed as part of the consultation with MCC / TfGM in June 2018 that the Car Driver mode share would be reduced from 34% to 5%. However, TfGM suggested that this reduction was too high and that in reality, some office workers may still choose to drive their car to/from work and park elsewhere, despite the constrained parking provision on-site and the alternative transport modes available at this location.

5.2.13 It is not considered appropriate to use the 34% car mode share due to changes in transport infrastructure and behaviour that has taken place since the 2011 Census was undertaken. Since the 2011 Census data was collected, the Metrolink tram network has been expanded significantly to include the following extensions:

- Oldham, Rochdale, South and East Manchester (opened 2013);
- Ashton-under-Lyne, East Didsbury and Manchester Airport (opened 2014); and
- Second City Crossing (opened 2017).

5.2.14 These expansions are likely to have resulted in a significant shift in mode share away from cars. It is therefore considered that the mode share generated by the 2011 Census data does not reflect the current travel patterns in the city, not least in the year 2030 at full build-out.

5.2.15 To take account of TfGM's comments, a car mode share of 18.5% has been applied; this is the peak hour Car Driver mode share derived from the site selection in TRICS. Using this methodology, the same sites in TRICS have been used to generate the trips and the mode share. In addition, the sites selected have similar characteristics to the proposed development, being located in central Manchester.

5.2.16 Further research has been undertaken into the recent transport trends in Greater Manchester. TfGM have published the results of the TfGM Highways Forecasting and Analytical Services' (HFAS – formerly known as GMTU) key centre monitoring during the financial year. The data provided includes trends in modal split for trips entering town centres in Greater Manchester.

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5.2.17 The latest data set, published in June 2018, shows that for Manchester Key Centre, the morning peak hour car mode split has fallen from 30% to 23% between 2011 to 2017, an average decrease of more than 1% each year. This reflects the changes to public transport infrastructure in the city and therefore illustrates that a future car mode share of 18.5% is not unreasonable given the current trend in the city. This was agreed with TfGM during the consultation period.

5.2.18 The adopted mode split is shown in Table 5.4 together with the resulting total person office trips by mode.

Table 5.4 Site Wide Trips by Mode – Proposed Office (154,800sqm GEA)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	18.5%	704	48	752	48	701	749
Car Passenger	3.7%	141	10	151	10	140	150
Taxi	0.6%	23	2	25	2	23	25
Bus	27.2%	1,034	71	1,105	71	1,029	1,101
Tram	23.5%	893	61	954	61	889	950
Rail	7.4%	282	19	301	19	281	300
Pedestrians	14.2%	540	37	577	37	538	575
Cycle	3.7%	141	10	151	10	140	150
Motorcycle	1.2%	47	3	50	3	47	50
TOTAL	**100%**	**3,805**	**262**	**4,067**	**262**	**3789**	**4,051**

Retail/Leisure Uses

5.2.19 For the purpose of the trip generation assessment, it has been assumed that retail / leisure use (32,300sqm GEA) will be A1 (food retail) use, which tends to give higher trip rates compared to other uses included in this category.

5.2.20 A selection of A1 Retail Uses in the TRICS database were made, based on the following criteria:

- Surveys undertaken since 2010;
- In Town Centre or Edge of Town Centre locations; and
- Outside London.

5.2.21 It is noted that the A1 retail sites available in the TRICS database are typically standalone convenience stores, rather than being ancillary to a larger mixed use development, as would be the case for the proposed development i.e. retail/leisure trips would be linked to other uses at the Site. It would therefore be appropriate to apply a cross-visitation factor to the retail trip rates to take account of trips that will be linked to other uses at the Site and ensure the trip generation assessment best reflects the nature of the retail / leisure proposals.

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5.2.22 Given the development's central location in Manchester and proximity to the station, a cross-visitation (reduction) factor of 20% has been applied to take account of trips that will be linked to other uses at the Site.

5.2.23 The derived person trip rates and resulting total person trips for 32,300sqm GEA retail / leisure development are shown in Table 5.5.

Table 5.5 Site Wide Person Trips – Proposed Retail/Leisure (32,300sqm GEA)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Person trip rate per 100sqm GEA	22.140	20.890	43.03	33.559	34.195	67.754
Total Person trips	1,430	1,350	2,780	2,168	2,209	4,377

5.2.24 Given that the retail and leisure uses proposed at the Site would be car free (with the exception of accessible parking requirements) and are located in central Manchester, it is considered that the majority of trips would be on foot with very few car trips. To reflect this, a car mode share of 0.5% has been adopted, which is considered appropriate for a proposed development at this location where retail/leisure trips would be linked to other uses in the area.

5.2.25 To validate this methodology, research has been undertaken into similar applications in Greater Manchester to understand the approach adopted for retail trips. The application for the Salford Central masterplan, approved in 2010 (reference: 09/57950/EIAHYB), proposed land uses very similar to Mayfield with up to 197,010sqm offices / commercial use, up to 24,255sqm retail and leisure use, up to 390 hotel rooms and a maximum of 390 residential units. The TA submitted with the application assumed all retail and leisure trips are linked or pass-by trips; therefore not being considered in trip generation. More recently, the applications for Manchester Goods Yard (ref: 121511/FO/2018) and Manchester Central (ref: 115871/FO/2017) contain elements of retail use as part of the application, but have not included retail trips in the trip generation as these are considered ancillary. Therefore, the approach taken at Mayfield by including some external trips is robust and conservative.

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5.2.26 The proposed mode split is shown in Table 5.6 together with the resulting total person retail / leisure trips by mode.

Table 5.6 Site Wide Trips by Mode – Proposed Retail/Leisure (32,300sqm GEA)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	0.5%	7	7	14	11	11	22
Car Passenger	0.0%	0	0	0	0	0	0
Taxi	0.0%	0	0	0	0	0	0
Bus	8.0%	114	108	222	173	177	350
Tram	11.0%	157	148	306	238	243	481
Rail	4.0%	57	54	111	87	88	175
Pedestrians	75.5%	1,080	1,019	2,099	1,637	1,668	3,305
Cycle	1.0%	14	13	28	22	22	44
Motorcycle	0.0%	0	0	0	0	0	0
TOTAL	**100%**	**1,430**	**1,350**	**2,780**	**2,168**	**2,209**	**4,377**

Hotel Use

5.2.27 A selection of Hotels in the TRICS database were made, based on the following criteria:

- Surveys undertaken since 2010;
- In Town Centre or Edge of Town Centre locations;
- Outside London; and
- Little or no car parking.

5.2.28 It is noted that the Site selection from the criteria above includes a site located in Manchester (reference: GM-6-A-08). The derived person trip rates and resulting total person trips for the hotel development (650 rooms) are shown in Table 5.7.

Table 5.7 Site Wide Person Trips – Proposed Hotel (650 Rooms)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Person trip rate per room	0.145	0.328	0.473	0.245	0.189	0.434
Total Person trips	94	213	307	159	123	282

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5.2.29 From these sites used to generate the trip rates, a car driver mode share of 19% has been derived; this has been applied to the hotel use at the Mayfield development. A taxi mode share of 6% is proposed, which is based on previous experience of hotel sites in similar city centre locations.

5.2.30 The proposed mode split is shown in Table 5.8 together with the resulting total person hotel trips by mode. The hotel component of the development is car-free, with only accessible spaces being provided. Therefore, it is expected that the majority of the hotel car trips would not enter the development, but instead park elsewhere and enter the Mayfield development on foot.

Table 5.8 Site Wide Trips by Mode – Proposed Hotel (650 Rooms)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	19%	18	41	58	30	23	54
Car Passenger	10%	9	21	31	16	12	28
Taxi	6%	6	13	18	10	7	17
Bus	4%	4	9	12	6	5	11
Tram	5%	5	11	15	8	6	14
Rail	5%	5	11	15	8	6	14
Pedestrians	50%	47	107	154	80	61	141
Cycle	1%	1	2	3	2	1	3
Motorcycle	0%	0	0	0	0	0	0
TOTAL	**100%**	**94**	**213**	**307**	**159**	**123**	**282**

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Total SRF Trip Generation

5.2.31 Table 5.9 shows the total trip generation predicted for the Mayfield SRF as a whole, at full build out.

Table 5.9 Site Wide Trips by Mode – Total Development (Mayfield SRF as a whole)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	760	228	988	223	805	1028
Car Passenger	152	38	190	33	157	190
Taxi	29	14	44	11	31	42
Bus	1,171	268	1,439	333	1,254	1,586
Tram	1,076	309	1,384	397	1,184	1,582
Rail	351	113	464	144	391	535
Pedestrians	1,758	1,545	3,303	2,140	2,468	4,608
Cycle	160	40	200	48	171	219
Motorcycle	47	3	50	3	47	50
TOTAL	**5,503**	**2,559**	**8,063**	**3,333**	**6,507**	**9,840**

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5.3 Proposed Trip Generation (Phase 1)

5.3.1 As described in Section 4 of this TA, the Phase 1 development includes Mayfield Park, the construction of Baring Street MSCP and Baring Street Office 1 and Baring Street Office 2. This section describes the Phase 1 trip generation, based on the methodology set out in Section 5.2

Baring Street Office 1

5.3.2 Baring Street Office 1 comprises up to 9,987sqm GEA of commercial space. The ground floor is envisaged as publically accessible, but as a worst case, the whole plot is assessed as B1 office. Using the trip generation methodology described in Section 5.2, the peak hour trip generation for Baring Street Office 1 is shown in Table 5.10.

Table 5.10 Baring Street Office 1 – Trip Generation by Mode

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	45	3	48	3	45	48
Car Passenger	9	1	10	1	9	10
Taxi	2	0	2	0	1	2
Bus	66	5	71	5	66	70
Tram	57	4	61	4	57	61
Rail	18	1	19	1	18	19
Pedestrians	35	2	37	2	34	37
Cycle	9	1	10	1	9	10
Motorcycle	3	0	3	0	3	3
TOTAL	**243**	**17**	**260**	**17**	**242**	**259**

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Baring Street Office 2

5.3.3 Baring Street Office 2 comprises up to 31,000sqm GEA of commercial space. The plot has been assessed as B1 office. Using the trip generation methodology described in Section 5.2, the peak hour trip generation for Baring Street Office 2 is shown in Table 5.10.

Table 5.11 Baring Street Office 2 – Trip Generation by Mode

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	140	10	149	10	139	149
Car Passenger	28	2	30	2	28	30
Taxi	5	0	5	0	5	5
Bus	205	14	219	14	205	219
Tram	177	12	190	12	177	189
Rail	56	4	60	4	56	60
Pedestrians	107	7	115	7	107	114
Cycle	28	2	30	2	28	30
Motorcycle	9	1	10	1	9	10
TOTAL	**756**	**52**	**808**	**52**	**753**	**805**

Baring Street Multi-Storey Car Park

5.3.4 The MSCP will contain approximately 543 spaces. It is assumed that for Phase 1, 30% of the spaces will be allocated to commuters travelling to others areas in the city centre. The remaining spaces will be allocated to the commercial use on-site. It is envisaged that the MSCP will be solely by occupiers of the SRF when the SRF is built out as each phase/ building will include an allocation of car parking within the MSCP.

5.3.5 To determine an arrival / departure profile for commuter traffic using MSCP, a 24-hour car park survey was undertaken at a similar car park nearby (NCP Car Park on Store Street) on Tuesday 12 February 2019. The survey data was used to derive arrival and departure car trip rates for commuter parking. The resultant vehicle arrival / departure profile for the proposed MSCP is shown on Figure 5.1.

5.3.6 Figure 5.1 shows that the peak arrival for the MSCP occurs between 07:00 and 08:00 hours with the peak departure occurring between 16:00 and 17:00 hours. This suggests that commuters travelling to central Manchester tend to travel outside the typical network peak hours of 08:00-09:00 and 17:00-18:00. Anecdotally, this could be to avoid peak hour traffic in central Manchester or to ensure access to parking. This therefore suggests that the car trip generation proposed for commercial-use is conservative and provides a robust estimate because in reality, some commuters have been observed travelling outside network peak hours.

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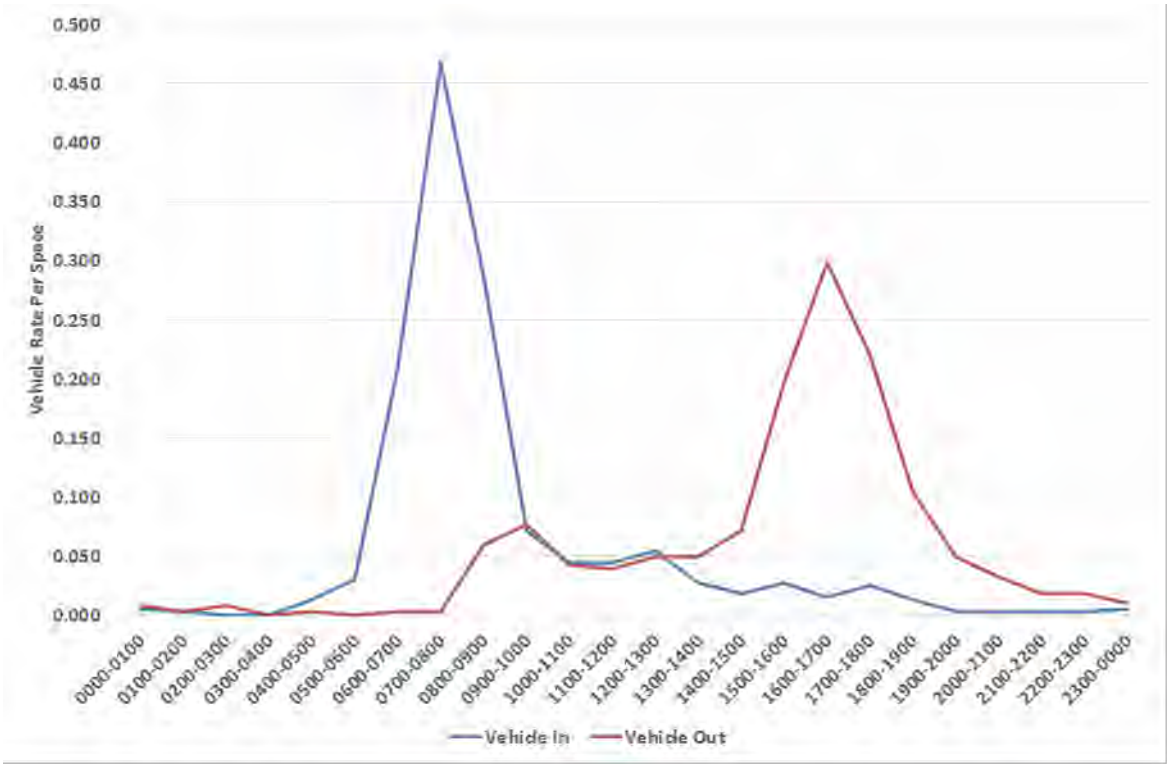


Figure 5.1 MSCP Arrival/Departure Profile

5.3.7 The peak hour car trip rates for the commuter parking and the car driver trips, are shown in Table 5.12.

Table 5.12 MSCP Car (Commuter) Trips – Phase 1

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver Trip Rate (per space)	0.468	0.002	0.002	0.015	0.298	0.313
Car Driver	46	9	55	4	35	39

5.3.8 The raw car park survey data and derivation of car park trip rates can be found in Appendix H.

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Mayfield Park

5.3.9 It is assumed that the Mayfield Park is an ancillary facility to the development, and will be used by those already on-site. It would therefore not generate trips in its own right, particularly during peak hours.

Total Phase 1 Trip Generation

5.3.10 The total multi-modal trip generation for Phase 1 is show in Table 5.13.

Table 5.13 Phase 1 Trips by Mode

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	231	22	253	17	219	236
Car Passenger	37	3	40	3	37	39
Taxi	6	0	7	0	6	7
Bus	271	19	290	19	270	289
Tram	234	16	250	16	233	250
Rail	74	5	79	5	74	79
Pedestrians	142	10	152	10	141	151
Cycle	37	3	40	3	37	39
Motorcycle	12	1	13	1	12	13
TOTAL	**1,045**	**78**	**1,123**	**73**	**1,030**	**1,103**

5.4 Servicing Trip Generation

5.4.1 For assessment purposes, the servicing trips are considered in addition to the trip generation described above. Typical service vehicle rates and profiles have been derived based on previously agreed rates that have been used for similar residential, retail, office and hotel uses. The approach was agreed with TfGM during the pre-application consultation period.

5.4.2 The daily service vehicle trip rates and peak hour proportions are shown in Table 5.14 below.

Table 5.14 Proposed Service Vehicle Trip Rates and Peak Hour Proportions

Land Use	Daily Servicing Rate	Percentage of Daily Servicing during the Peak Hours	AM Peak hour (%)	PM Peak hour (%)
Office	0.20 vehicles/100sqm	15%	5%	5%
Retail/Leisure	1.43 vehicles/100sqm	15%	10%	0%
Hotel	0.23 vehicles/100sqm	15%	10%	5%
Residential	0.14 trips per dwelling	20%	5%	15%

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5.4.3 The composition of servicing vehicles for each land use is shown in Table 5.15.

Table 5.15 Composition of Servicing Vehicles

	Office	Retail/Leisure	Hotel	Residential
Bicycle/Motorcycle	20%	5%	0%	5%
LGV	70%	85%	75%	85%
OGV	10%	10%	25%	10%

5.4.4 The service vehicle trip rate for A3 Retail (food and drink) is generally higher than other retail uses (1.43 daily trips per 100sqm compared to 0.34 daily trips per 100sqm for non-food (A1) retail). The upper limit has been applied for the purpose of this assessment and the resultant service vehicle trips for the Mayfield are shown in Table 5.16 below.

Table 5.16 Service Vehicle Trips – Total Development (Mayfield SRF as a whole)

Land Use	Daily (one-way vehicles)	Servicing Peak (one-way vehicles)	AM Peak hour (one-way vehicles)	PM Peak hour (one-way vehicles)
Office	310	46	15	15
Retail/Leisure	459	69	46	0
Hotel	63	9	6	4
Residential	210	42	11	32

5.4.5 The peak hour servicing trips by vehicle type for the SRF is shown in Table 5.19.

Table 5.17 SRF Servicing Trips by Vehicle Type

Vehicle	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Bicycle/Motorcycle	6	6	12	5	5	9
LGV	63	63	127	40	40	80
OGV	9	9	18	5	5	11
Total	**78**	**78**	**156**	**50**	**50**	**100**

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5.4.6 The service vehicle trips for Phase 1 are shown below in Table 5.18.

Table 5.18 Service Vehicle Trips – Phase 1 Development

Land Use	Daily (one-way vehicles)	Servicing Peak (one-way vehicles)	AM Peak hour (one-way vehicles)	PM Peak hour (one-way vehicles)
Office	81	12	4	4

5.4.7 The peak hour servicing trips by vehicle type for Phase 1 is shown in Table 5.19.

Table 5.19 Phase 1 Servicing Trips by Vehicle Type

Vehicle	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Bicycle/Motorcycle	1	1	2	1	1	2
LGV	3	3	6	3	3	6
OGV	0	0	0	0	0	0
Total	**4**	**4**	**8**	**4**	**4**	**8**

5.5 Total Vehicle Trip Generation

5.5.1 The total vehicle trips generated during the highway peak hours is shown in Table 5.20.

Table 5.20 Total Vehicle Trip Generation

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Full Build Out SRF						
Vehicles	915	324	1,238	288	933	1220
PCUs	923	334	1,257	298	941	1239
Phase 1						
Vehicles	253	28	281	22	242	264
PCUs	253	27	280	22	242	263

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6 Committed Development

6.1 Introduction

6.1.1 This section describes the committed applications considered as baseline and cumulative to inform the transport impact assessment.

6.2 Committed Developments

6.2.1 TfGM has confirmed that eight developments have been included in the future year traffic model for Manchester city centre. These developments are considered by TfGM to best represent the future baseline for traffic flows in the city centre and are summarised below:

- Deansgate Square on City Road East. Planning reference: 111719/FO/2016/C1;
- Circle Square on Oxford Road. Planning reference: 116450/FO/2017, 114863/FO/2016, 111027/FO/2016, 111025/FO/2016, 111028/FO/2016, 116450/FO/2017;
- Trinity Islands on Water Street. Planning reference: 115107/FO/2017;
- First Street South. Planning reference: 111170/FO/2016/C1;
- St. Michaels, Jackson's Row. Planning reference: 114664/FO/2016;
- St. John's, Quay Street. Planning reference: 118040/FO/2017;
- Ramada Hotel site on Deansgate (north) – SRF ; and
- Great Northern Warehouse, Peter Street/ Deansgate. Planning reference: 118568/FO/2017.

6.2.2 It is noted that other SRFs are located in Manchester city centre close to Mayfield. When these developments come forward for planning they will be robustly assessed at the appropriate time as part of their own application and therefore do not form part of this assessment, as agreed with TfGM and MCC.

6.2.3 The highway impact assessment methodology is described in greater detail in Section 7.

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7 Transport Impacts

7.1 Introduction

7.1.1 This TA has been produced in support of a planning application for the Phase 1 development of the Mayfield SRF. However, this section assesses the impacts of the proposed development on all transport modes for the SRF as well as the Phase 1 development. It is noted that assessing the Phase 1 impact as a whole also takes into consideration the impact of Application 1 and Application 1 + Application 2 separately. This is because trips generated by Baring Street Office 2 in Application 2 would be directly replaced by external commuter trips using the car park.

7.2 SRF Impact

SRF Pedestrian Impacts

7.2.1 The pedestrian trips generated by the proposed SRF development have been considered, and include both 'main mode' pedestrian trips as well as those using public transport or parking off-site, as walking will make up the final mode of their journey to and from the Site. The composition of walking trips generated by the SRF is shown in Table 7.1.

Table 7.1 Pedestrian Trips - SRF

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Walk	1,758	1,545	3,303	2,140	2,468	4,608
Walk (Public Transport)	2,597	691	3,288	874	2,829	3,702
Walk (Park Off-Site)	555	78	633	73	561	635
TOTAL	**4,910**	**2,313**	**7,223**	**3,087**	**5,858**	**8,945**

7.2.2 Table 7.1 shows that the SRF development will generate a total of 7,223 walking trips during the AM peak and 8,945 walking trips during the PM.

7.2.3 The SRF proposes a significant improvement to the pedestrian environment on-site and to connections to adjacent city areas; this will also be enhanced by Beelines network on surrounding streets proposed by TfGM. The number of pedestrian movements within Mayfield is also currently very low, and therefore the flows generated by the development are not combined with existing high volumes which would may create a capacity conflict.

7.2.4 It is therefore considered that the walking trips generated by the proposed development would be adequately accommodated on the local pedestrian network and the impact would not be significant.

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SRF Cycling Impacts

7.2.5 The proposed SRF development will generate a total of 200 cycling trips in the morning peak and 219 cycling trips in the evening peak.

7.2.6 The SRF development proposes a significant improvement to the cycle environment on-site and to connections to adjacent city areas. Connections to adjacent cycle infrastructure will also be enhanced by TfGM's proposed Beelines network. It is therefore considered that the cycle trips generated by the proposed development would be adequately accommodated on the local cycle network and the impact would not be significant.

SRF Public Transport Impacts

7.2.7 Table 7.2 shows the public transport trips by mode generated by the SRF development during the morning and evening peak hours.

Table 7.2 Public Transport Trips - SRF

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Bus	1,171	268	1,439	333	1,254	1,586
Tram	1,076	309	1,384	397	1,184	1,582
Train	351	113	464	144	391	535
Total	**2,597**	**691**	**3,288**	**874**	**2,829**	**3,702**

SRF Bus Impacts

7.2.8 The SRF development will generate a total of 1,439 bus trips during the AM peak and 1,586 bus trips during the PM peak.

7.2.9 Consideration has been given as to how the bus trips generated by the development would be distributed by direction to and from the Site.

7.2.10 To distribute the bus trips, the 2011 Journey to Work Census data has been used to estimate the distribution of bus trips during the peak hours. This is considered appropriate as the bus network would not have fundamentally changed since the census was undertaken. The fifteen districts generating the highest number of bus trips with their origin (trip start) and destination (trip end) in MSOA area E02006912, where the Site is located, were identified. The bus trips were then distributed by direction according to the geographical location of the destination. This distribution was then reversed to show a distribution of trip ends in the evening peak. The resultant distribution proportions is shown in Table 7.3. The methodology for deriving the distribution of the bus trips is shown in Appendix I.

Table 7.3 Peak Hour Proportional Distribution of Bus Trips

Direction	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	In	Out	In	Out
North	28%	23%	23%	28%
South	35%	43%	43%	35%

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East	23%	17%	17%	23%
West	14%	18%	18%	14%

7.2.11 The distribution of peak hour bus trips is shown in Table 7.4.

Table 7.4 Proposed Peak Hour Bus Trips by Direction

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
North	330	61	391	76	353	429
South	405	115	521	143	434	577
East	268	45	313	56	287	342
West	168	47	215	58	180	238
Total	**1,171**	**268**	**1,439**	**333**	**1,254**	**1,586**

7.2.12 Table 7.5 shows the maximum one-way bus demand per direction during the PM peak, as the worst case.

Table 7.5 Maximum One-Way Bus Trips

Direction	Bus trips
North	353
South	434
East	287
West	180

7.2.13 Given that bus trips would be distributed across the high number of bus services that are available within walking distance of the Site, the number of additional bus trips generated by the development are unlikely to have a significant impact on the local bus network.

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SRF Metrolink Impacts

7.2.1 The SRF development will generate 1,384 tram trips during the AM peak and 1,582 tram trips during the PM peak.

7.2.2 It is not considered appropriate to use the 2011 Census data to distribute the generated Metrolink trips, as the network has changed significantly since the 2011 Census was undertaken and would not be considered representative; network changes since the census include the opening of extensions to Rochdale, East Didsbury, Manchester Airport and Ashton. Therefore, it is assumed that generated tram trips are distributed evenly across the network. The resultant distribution of Metrolink trips generated by the proposed development are shown in Table 7.6 and Table 7.7.

Table 7.6 Peak Hour Proportional Distribution of Metrolink Trips

Direction	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	In	Out	In	Out
North	25%	25%	25%	25%
South	25%	25%	25%	25%
East	25%	25%	25%	25%
West	25%	25%	25%	25%

Table 7.7 Proposed Peak Hour Metrolink Trips by Direction

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	**Departures**	**Total**	**Arrivals**	**Departures**	**Total**
North	269	77	346	99	296	395
South	269	77	346	99	296	395
East	269	77	346	99	296	395
West	269	77	346	99	296	395
Total	**1,076**	**309**	**1,384**	**397**	**1,184**	**1,582**

7.2.3 From the Piccadilly stop, there is one route to the east, towards Ashton. The service frequency on this route is once every 6 minutes, giving 10 services per hour per direction. Therefore, the maximum increase per train on this route is 27 in the AM peak and 30 in the PM peak.

7.2.4 From the Piccadilly stop, there is one route to the north, terminating at Bury. The service frequency on this route is five services per hour per direction. Therefore, the maximum increase per train per direction on this route is 54 in the AM peak and 59 in the PM peak. It is noted that from the Victoria stop, passengers can interchange to a second northern route towards Rochdale, which will spread the demand of passengers travelling to the north.

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7.2.5 There are three routes towards the south and west from Piccadilly, giving a total service frequency of 15 trams per hour per direction. Therefore, the maximum increase in passengers per tram in this direction is 36 in the AM peak and 39 in the PM peak. Passengers can interchange at Cornbook or Deansgate-Castlefield to access the service needed to reach their destination.

7.2.1 As discussed in Section 3.4, TfGM are committed to delivering improvements to Metrolink over the next five years (subject to business case approval), including 27 new trams across the network and capacity improvements on the Ashton line, Shaw/Crompton – East Didsbury route and on the Bury – Altrincham route. These committed improvements would reduce the impact the development has on the Metrolink network.

SRF Rail Impacts

7.2.2 The SRF development will generate 464 rail trips during the AM peak and 535 train trips during the PM peak.

7.2.3 The 2011 Journey to Work Census data has been used to estimate the distribution of rail trips during the peak hours, using the same methodology used to determine the bus trip distribution. Given the rail network has not fundamentally changed since the 2011 Census was undertaken, it still provides a good estimate of the distribution of rail trips. The distribution of rail trips generated by the proposed development is shown in Table 7.8 and Table 7.9. The methodology for deriving the distribution of the rail trips is shown in Appendix I.

Table 7.8 Peak Hour Proportional Distribution of Rail Trips

Direction	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	In	Out	In	Out
North	12%	18%	18%	12%
South	47%	52%	52%	47%
East	16%	12%	12%	16%
West	25%	19%	19%	25%

Table 7.9 Proposed Peak Hour Rail Trips by Direction

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
North	40	20	60	25	45	70
South	166	59	226	75	185	260
East	55	13	68	17	61	78
West	89	21	110	27	99	126
Total	**351**	**113**	**464**	**144**	**391**	**535**

7.2.4 The rail trips generated by the site would be distributed across the high number of rail services that are available at Piccadilly station, therefore the number of additional rail trips generated by the development are unlikely to have a significant impact on the rail network.

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SRF Highway Network Impacts

7.2.5 The SRF development will generate 1,239 two-way vehicles trips during the AM peak and 1,220 two-way vehicle trips during the PM peak.

7.2.6 The highway assessment methodology has been discussed and agreed with TfGM during pre-application consultation discussions. The initial highway modelling has been undertaken by TfGM in-house, using their existing city centre Paramics traffic model.

7.2.7 Four modelling scenarios were agreed with TfGM:

- 2018 Baseline:
    - TfGM existing model was validated using the traffic survey data described in Section 3.7, to create a 2018 base model;
- 2023 Do-Minimum:
    - The 2018 baseline model incorporating eight major city centre developments, described in Section 6. These developments are considered by TfGM to best represent the future baseline for traffic flows in the city centre.
- 2023 with Mayfield:
    - Incorporates network changes proposed by the Mayfield development and traffic generated by the Phase 1 Mayfield trips. This scenario also includes a reduction in existing trips in the model that represent the development site - this is to account for the removal of existing uses and car parking; and
- 2030 with Mayfield:
    - The trips generated by the full Mayfield SRF have then been assessed, to consider the highway impacts of the completed development.

7.2.8 It is noted that at full build out, some of these vehicle trips use city centre car parks, as well as the on-site car parking. TfGM's city centre Paramics model was used to distribute the SRF development trips throughout the city centre.

7.2.9 The transport modelling outputs from the city centre Paramics model, undertaken by TfGM, can be found in Appendix J.

7.2.10 A more detailed LINSIG assessment was undertaken for the London Road – Mancunian Way junction, using the flows extracted from the 2030 Paramics model. The results show that at full build out, the junction operates well within capacity with a degree of saturation no larger than 55.7% on any arm during the AM peak and 63.0% during the PM peak; this is much less than a degree of saturation of 85%.

7.2.11 The LinSig outputs for the London Road – Mancunian Way junction for the full-build SRF scenario are shown in Appendix C.

7.2.12 The highway impact of the Phase 1 development is described in Section 7.3.

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7.3 Phase 1 Impact

7.3.1 This section assesses the transport impact of the Phase 1 for Mayfield – Baring Street MSCP, Baring Street Office 1 and Baring Street Office 2, the subject of this planning application.

Phase 1 Pedestrian Impacts

7.3.2 The pedestrian trips generated by the Phase 1 development are shown in Table 7.10.

Table 7.10 Pedestrian Trips – Phase 1

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Walk	142	10	152	10	141	151
Walk (Public Transport)	580	40	620	40	577	617
Walk (Park Off-Site)	0	0	0	0	0	0
TOTAL	**722**	**50**	**771**	**50**	**719**	**768**

7.3.3 Table 7.10 shows that the Phase 1 development will generate a total of 771 walking trips during the AM peak and 768 walking trips during the PM peak.

7.3.4 The Phase 1 development proposes significant improvements to the pedestrian infrastructure, including pedestrian priority links from Fairfield Street and throughout Mayfield Park. It is therefore considered that the walking trips generated by the Phase 1 development can be accommodated on the local pedestrian network and the impact would not be significant.

Phase 1 Cycling Impacts

7.3.5 The Phase 1 development will generate a total of 40 cycling trips in the AM peak and 39 cycling trips in the PM peak.

7.3.6 The Phase 1 development proposes a strategic cycle route connecting to the existing cycle infrastructure on Fairfield Street and London Road, as well as local cycle connections through Mayfield Park. It is therefore considered that the cycle trips generated by the proposed development can be accommodated on the local cycle network and the impact would not be significant.

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Phase 1 Public Transport Impacts

7.3.7 Table 7.11 shows the public transport trips generated by the Phase 1 development during the morning and evening peak hours.

Table 7.11 Public Transport Trips – Phase 1

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Bus	271	19	290	19	270	289
Tram	234	16	250	16	233	250
Train	74	5	79	5	74	79
Total	**580**	**40**	**620**	**40**	**577**	**617**

Phase 1 Bus Impacts

7.3.8 The Phase 1 development will generate 290 bus trips during the AM peak and 289 bus trips during the PM peak.

7.3.9 The bus trips have been distributed using the proportions shown in Table 7.3. The peak hour distribution of the Phase 1 bus trips is shown in Table 7.12.

Table 7.12 Proposed Peak Hour Bus Trips by Direction – Phase 1

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
North	76	4	81	4	76	80
South	94	8	102	8	94	102
East	62	3	65	3	62	65
West	39	3	42	3	39	42
Total	**271**	**19**	**290**	**19**	**270**	**289**

7.3.10 Table 7.13 shows the maximum one-way bus demand per direction.

Table 7.13 Maximum One-Way Bus Trips – Phase 1 Development

Direction	Bus trips
North	76
South	94
East	62
West	39

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7.3.11 Given the high number of bus services available surrounding the Site and in Manchester city centre with a high service frequency, it is concluded that the bus trips generated by the proposed Phase 1 development would be adequately accommodated on the local bus network and the impact would not be significant.

Phase 1 Metrolink Impacts

7.3.12 The Phase 1 development will generate 250 tram trips during the AM peak and 250 tram trips during the PM peak.

7.3.13 The Phase 1 Metrolink trips have been distributed as per the proportions shown in Table 7.6, and are shown in Table 7.14.

Table 7.14 Proposed Peak Hour Metrolink Trips by Direction – Phase 1

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
North	59	4	63	4	58	62
South	59	4	63	4	58	62
East	59	4	63	4	58	62
West	59	4	63	4	58	62
Total	**234**	**16**	**250**	**16**	**233**	**250**

7.3.14 From Piccadilly, there is one route to the east, towards Ashton. The service frequency on this route is once every 6 minutes, giving 10 services per hour per direction. Therefore, the maximum increase per train on this route is six in the AM peak and six in the PM peak.

7.3.15 From Piccadilly, there is one route to the north, terminating at Bury. The service frequency on this route is five services per hour per direction. Therefore, the maximum increase per train on this route is 12 in the AM peak and 12 in the PM peak. It is noted that north of the Victoria stop, passengers can interchange to a second northern route towards Rochdale, spreading demand and reducing its impact.

7.3.16 There are three routes towards the south and west from Piccadilly, giving a total service frequency of 15 trams per hour per direction. Therefore, the maximum increase in passengers per tram in this direction is four in the AM peak and four in the PM peak. Passengers can interchange at Cornbook or Deansgate-Castlefield to access the service needed to reach their destination.

7.3.17 It is therefore concluded that the trips generated by the proposed Phase 1 development can be accommodated on the Metrolink network and the impact would not be significant.

Phase 1 Rail Impacts

7.3.18 The Phase 1 development will generate 79 rail trips during the AM peak and 79 train trips during the PM peak.

7.3.19 The Phase 1 rail trips have been distributed using the proportions shown in Table 7.8; the trip distribution is subsequently shown in Table 7.15.

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Table 7.15 Proposed Peak Hour Rail Trips by Direction – Phase 1

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
North	9	1	9	1	9	9
South	35	3	38	3	35	38
East	12	1	12	1	12	12
West	19	1	20	1	19	20
Total	**74**	**5**	**79**	**5**	**74**	**79**

7.3.20 Table 7.15 shows that the number of rail trips during the AM and PM hours per direction are relatively low. Given the Site's proximity to Manchester Piccadilly station and the number of trains serving it, the rail demand generated by the Phase 1 development would be accommodated on the rail network and the impact would not be significant.

Phase 1 Highway Network Impacts

7.3.21 The Phase 1 development will generate 281 two-way vehicle trips in the AM peak hour and 264 two-way trips in the PM peak hour.

7.3.22 The number of vehicles generated by the Phase 1 development during the AM and PM peak hours is much less than the vehicle trips generated in the full-build SRF scenario. Therefore the SRF highway impact assessment set out in Section 7.2 represents a worst case scenario and the London Road – Mancunian Way junction would operate within capacity for the Phase 1 scenario.

7.4 Construction Impacts

7.4.1 At this stage, there are limited details available as to how the construction of the development would be carried out and therefore it has not been possible to fully assess the impacts of construction on the transport networks.

7.4.2 Construction work for the Phase 1 works is expected to commence in 2020 with completion at the end of 2022. The full build out of the SRF will be completed in approximately 2030.

7.4.3 It is expected that up to 57 vehicles will be generated by the Phase 1 development on a typical weekday during construction; this corresponds to around 5-6 vehicles per hour.

7.4.4 It is anticipated that construction hours will be between 07:30-18:00 on a weekday and 08:00-13:00 on a Saturday with no activity on Sundays or Bank Holidays. Therefore, construction worker trips would fall outside the network peak hours of 08:00-09:00 and 17:00-18:00.

7.4.5 An outline Construction Logistics Plan (CLP) has been submitted with this application and a detailed plan would be secured by an appropriate planning condition.

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7.4.6 The construction routes to deliver goods and material to and from the Site will be agreed with MCC and TfGM prior to construction starting. The Site is situated next to A6 London Road and A635 Mancunian Way; both are strategic roads and therefore it is envisaged that construction vehicles will be restricted to these routes to avoid passing through residential areas.

7.4.7 It is expected that construction traffic would access the Site via the A635 Mancunian Way slip road and Fairfield Street. Construction traffic would then exit the site via the Travis Street / A6 London Road junction and Fairfield Street. Traffic would be managed to minimise disruption to the local highway network. There are expected to be no long-term road closures, however, short-term closures may be necessary to deliver certain bulky goods. Agreement with relevant authorities such as MCC, TfGM and the Greater Manchester Police will be sought should short-term closures be required.

7.4.8 Detailed construction traffic estimates will be presented in a full CLP, setting out the maximum number of vehicles expected during each phase and the quantities of material required.

7.4.9 The effects of the additional traffic arising from construction will be mitigated by managing vehicle arrival and departure times. However, the scale of construction vehicle activity will be relatively low compared to the operational traffic, and could therefore be accommodated within the existing highway capacity.

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8 Mitigation Measures

8.1 Walking

8.1.1 The development proposes to improve the pedestrian infrastructure and access across the Site. These include enhanced streetscape designs on roads surrounding the development including new pedestrian priority links on Travis Street and the north section of Baring Street, environmental improvements and reduced traffic speeds. Mayfield Park will also include off-street pedestrian routes providing car-free pedestrian connections between the Phase 1 development and Fairfield Street. Connections to the wider pedestrian network will also be enhanced by TfGM's proposed Beeline network.

8.1.2 It is therefore felt that the proposed improvements to the pedestrian environment will mitigate the impacts of the development.

8.2 Cycling

8.2.1 The Phase 1 development proposes improvements to the cycle connections to, from and through the Mayfield area and will mitigate the impacts of the development. A new strategic cycle access route will be created along Baring Street, which will provide connections to the existing external cycle routes on Fairfield Street and A6 London Road. These proposed improvements include the reconfiguration of the London Road – Mancunian Way junction to connect the proposed cycle lane on the Mancunian Way slip road to the existing cycle infrastructure on London Road.

8.2.2 Cycle permeability through the Site will be improved via proposed cycle routes to the north and south of Mayfield Park.

8.2.3 Connections to the wider cycle network will also be enhanced by TfGM's proposed Beeline network, which the cycle improvements and infrastructure seeks to align with.

8.2.4 In addition, the development seeks to provide short and long-term cycle parking in line with MCC standards, including an appropriate level of cycle parking provision for Mayfield Park.

8.3 Public Transport

8.3.1 TfGM are committed to delivering improvements to Metrolink over the next five years (subject to business case approval), including 27 new trams across the network and capacity improvements on the Ashton line, Shaw/Crompton – East Didsbury route and on the Bury – Altrincham route. These committed improvements would reduce the impact the development has on the Metrolink network when fully built out. Travel Planning measures as set out in the Travel Plan submitted with this application aim to increase the number of walking and cycling trips that are currently made by public transport, and this would in-turn reduce the impact on public transport further.

8.3.2 It is noted that the Phase 1 public transport trips would not have a significant impact on the public transport network.

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Highways

8.3.3 The Phase 1 application proposes considerable improvements to the streetscape throughout the Mayfield area, including stopping up of part of Travis Street and Baring Street to create a more pedestrian and cycle-friendly environment. The improvements to the streetscape will be reinforced by the proposed 20mph zone across Mayfield.

8.3.4 The London Road – Mancunian Way junction will be reconfigured and enhanced to allow turning movements from all directions onto the Mancunian Way eastbound on-slip road.

8.3.5 In addition, the development's impact on the highway network will be mitigated through a series of measures described in the Framework Travel Plan submitted with the application, which seeks to minimise car use.

8.3.6 As part of the Framework Travel Plan, it is proposed that car club spaces will be provided at the development. The car club spaces will be provided as part of the overall parking allocation for the Site (not in addition to) and will be available to all users of the development. The scheme will have a 3-year free membership and a £50 voucher will be given to each resident to encourage them to use the car club scheme.

Parking

8.3.7 The traffic measures proposed by Phase 1 of Mayfield will require changes to these existing parking provisions notably in Travis Street and Buxton Street, and this has been discussed with MCC during pre-application discussions. The detail of the changes will be secured as part of the s278 agreement for highways works in Mayfield following a consent; however it is noted that the revised arrangements will seek to demonstrate 'no net loss' of existing Pay-and-Display bays, thereby mitigating the impact of the development on the existing parking provisions.

8.3.8 Further mitigation is proposed in terms of proposals to introduce traffic measures in the streets to the east of Mayfield, in the area between the park and Fairfield Street, both sides of the railway viaduct. The purpose of these measures is as follows:

- To remove the existing 'fly-parking' which is largely related to commuters which blights the streets, to reduce traffic movement in the area and to improve safety for all road users;
- To provide dedicated parking facilities for permit holders within a possible 'permit zone' – i.e. for residents and businesses and visitors to these premises;
- To implement traffic management / routing measures to improve road safety and deter rat-running, whilst allowing easy access to existing premises; and
- To help facilitate safe access to the meanwhile uses for Mayfield in Temperance Street and Hoyle Street areas.

8.3.9 It is noted that this area is outside of the Phase 1 planning application boundary so these measures will be brought forward as part of a future s278 application made to MCC. The detail design of these measures will be worked up following a consent for Phase 1 by the Applicant working in conjunction with MCC.

8.3.10 Strictly speaking these measures are not mitigation for Phase 1, but for the SRF as a whole including Phase 1. Bringing them forward early in terms of the overall build-out will however benefit a broad spectrum of visitors to Mayfield including those to Phase 1, and improve the pedestrian and cycling environment.

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8.4 Travel Planning

8.4.1 A Framework (site-wide) Travel Plan has been prepared for the Site (Appendix 7.2 of ES Volume II). The key aim is to inform residents, employees and visitors of the alternatives to driving their cars, to increase awareness of and promote greener, cleaner modes of travel, to reduce reliance on the private car and create sustainable communities consistent with the overarching aims of the NPPF.

8.4.2 Measures to encourage sustainable travel behaviour could include travel packs for employees and residents highlighting alternative travel modes, community notice boards showing walking and cycle routes, initiatives such as Bike Week to encourage cycle use and car sharing schemes.

8.5 Construction

8.5.1 An outline Construction Logistics Plan (CLP) has been produced for the application with measures to reduce the impact of the construction phase of the development. The outline CLP has been submitted as a standalone document with the application, and a full CLP will be secured by condition.

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9 Summary and Conclusions

9.1 Summary

9.1.1 This TA has been prepared by BuroHappold on behalf of The Mayfield Partnership Limited in support of the planning application for Phase 1 of the Mayfield SRF for the regeneration of Mayfield in Manchester City Centre. The planning application will be submitted to MCC.

9.1.2 The scope of this TA assesses the transport impact of the SRF and Phase 1 development. However, it is noted that this application largely focuses on the proposals for Phase 1, in particular Baring Street Office 1, Baring Street MSCP and Mayfield Park. Baring Street Office 2 and its associated public realm will be the subject of a future detailed application.

9.1.3 The SRF contains up to 154,800sqm GEA of commercial use, 32,300sqm GEA of retail / leisure use, 650 hotel rooms, 1,500 residential units, 700 parking spaces and Mayfield Park.

9.1.4 The plots to be built out for Phase 1, include Mayfield Park, Baring Street Office 1, Baring Street MSCP and Baring Street Office 2. Baring Street Office 1 proposals include 9,987sqm GEA of office and ground floor commercial use; Baring Street Office 2 proposes 31,000sqm GEA of office and ground floor commercial / ancillary space; and the Baring Street MSCP proposals comprise a 543 space MSCP.

9.1.5 It is noted that the development proposed in Phase 1 is confined to the western edge of the SRF, and therefore only the transport proposals required to support the Phase 1 development plots will be brought forward at this time. Further transport proposals outside of the planning application boundary, but being brought forward alongside Phase 1, will be dealt with through s278 applications. Furthermore it has been agreed with MCC that the detail of the changes to transport infrastructure will be secured by planning condition following a consent, and the detailed agreed as part of the s278 design work in conjunction with MCC.

9.1.6 As set out in the SRF, various changes are proposed to the highways in and immediately around Mayfield to facilitate the development, and for Phase 1 this will include a new access into Mayfield via a reconfigured junction at London Road / Mancunian Way, new traffic routing, stopping-up of roads, access restrictions and changes to on-street parking. These changes will help deliver a host of environmental benefits to visitors, residents and employees in Mayfield; notably to those travelling within it by cycle and foot.

9.1.7 The majority of parking provision for the SRF and therefore for Phase 1 will be provided at a single location in the masterplan to ensure that streets and spaces in Mayfield are as car-free and pedestrian friendly as possible. This will be achieved by the provision of a MSCP in the south-western corner of the masterplan area at the southern end of Baring Street. For Phase 1, it is envisaged that some of this parking will be used by commuters, prior to the full build out of the SRF.

9.1.8 The traffic measures proposed by Phase 1 will require changes to the existing on-street public parking provisions. Further changes within the SRF around Temperance Street are proposed to be brought forward through s278 agreement with MCC; bringing them forward early in terms of the overall build-out will benefit a broad spectrum of visitors to Mayfield including those to Phase 1 as well occupiers of existing buildings.

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9.1.9 In terms of servicing, an on-street layby will be provided on Baring Street adjacent to the Baring Street Office 1 building. This is likely to be the same type of provision for Baring Street Office 2. The transport 'infrastructure' proposals for Baring Street Office 2 will be the subject of a future detailed application, albeit the transport impact of this plot has been considered in detail in this TA.

9.1.10 The pedestrian and cycle access proposals for Phase 1 follow the principles of the strategy set out in the SRF, with improved connections throughout the Site and to adjacent developments. These users will benefit from environmental improvements across Phase 1 including reduced traffic speeds via a proposed 20mph zone and secured by improved infrastructure design provision. New internal strategic cycle routes along Baring Street, Mancunian Way slip-road and along the southern boundary of Mayfield Park will connect to the existing cycle network and new local routes. The London Road – Mancunian Way junction will be reconfigured to improve the pedestrian and cycle access to the development.

9.1.11 The SRF will seek to provide cycle parking in accordance with MCC standards set out in the Core Strategy. For Phase 1, a total of 75 cycle parking spaces will be provided for Baring Street Office 1 and around 6-10 short-stay cycle parking spaces will be at each visitor parking location on the edge of Mayfield Park, including at least six spaces adjacent to Baring Street Office 1 and 2.

9.1.12 A multi-modal trip generation assessment has been undertaken for the full build SRF and Phase 1 development which shows that the majority of trips will be undertaken by sustainable means such as walking, cycling and public transport.

9.1.13 The assessment concludes that the development would not have a significant impact on the pedestrian, cycle, bus and rail networks in the Phase 1 and SRF scenarios. Development impacts on the Metrolink network would be mitigated by TfGM's commitments to improving services and capacity and by Travel Planning. The highway modelling undertaken shows that the London Road – Mancunian Way junction operates within capacity for the worst-case SRF scenario.

9.1.14 A framework (site-wide) Travel Plan has been produced and has been submitted as an Appendix to the ES Chapter 7 Traffic and Transport (Appendix 7.2, ES Volume II). The key aim is to inform residents, employees and visitors of the alternatives to driving their cars, to increase awareness of and promote greener, cleaner modes of travel, to reduce reliance on the private car and create sustainable communities consistent with the overarching aims of the NPPF.

9.1.15 A framework CLP has also been submitted with the planning application and will help manage the impacts of construction on the transport network. A full Travel Plan and CLP will be subject to planning conditions.

9.2 Conclusion

9.2.1 Based on the assessment outlined in this report, it is concluded that the proposals accord fully with prevailing transport policy guidance and that the development proposals are appropriate for the location.

9.2.2 In conclusion, it is considered that there are no reasons in transport terms why the proposed development should not be granted planning permission.

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Appendix A Pre-Application Correspondence

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Mayfield Phase 1

Transport Scoping Study

0042917

25 June 2019

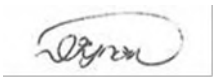
Revision 03

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Revision	Description	Issued by	Date	Checked
00	Draft issue	RE	19/03/19	NM
01	Issue to MCC and TfGM	RE	22/03/10	NM
02	Revised issue following feedback from TfGM	RE	06/06/19	NM
03	Revised issue following further feedback from TfGM	RE	25/06/19	NM

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1 Introduction

1.1 Context

1.1.1 This Scoping Study has been prepared by BuroHappold (BH) on behalf of U + I ('the Applicant') to agree the methodology of the Transport Assessment (TA) that will be presented for planning with the local highway authorities Manchester City Council (MCC) and Transport for Greater Manchester (TfGM).

1.1.2 This Scoping Study has been prepared in respect of the proposals for the development of Phase 1 of the Mayfield Strategic Regeneration Framework (SRF) Area, located on and adjacent to the south of the Mayfield Depot in Manchester City Centre (the 'Site'). It provides contextual information in relation to the proposed development and a proposed scope for approval.

1.1.3 The Mayfield SRF was adopted in May 2018 and sets out the key development and urban design principles at the Mayfield site, which is intended to provide a new high-quality urban neighbourhood in the heart of Manchester.

1.1.4 The majority of the northern part of the Mayfield site is currently occupied by the Mayfield Depot building and associated railway infrastructure, which was formerly in use as a passenger railway station, and latterly as a Royal Mail depot.

1.1.5 The River Medlock flows through the Mayfield area, rising from a culvert under Hoyle Street in the east. A further section of the River is culverted beneath warehouses and surface car parking around Nether Street to the west. The Mayfield area has a varied topography with the lowest levels forming a valley along the meandering course of the River Medlock, with the land rising towards the periphery of the site. A number of footbridges cross the River along its course.

1.1.6 Mancunian Way forms the southern boundary of the development and rises from east to west.

1.2 Proposed Development

1.2.1 The full build out Mayfield SRF includes the proposed land uses shown in Table 1.1.

Table 1.1 Mayfield SRF - Proposed Land Use Schedule

Land Use	Quantum
Commercial	c. 154,800sqm GEA
Retail / Leisure	c. 32,300sqm GEA
Hotel	650 rooms
Residential	1,500 units

1.2.2 The Mayfield SRF has been divided into Plots and these are shown on Figure 1.1.

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Figure 1.1 Mayfield Masterplan Plot Locations with References

1.2.3 The plots to be built out for Phase 1 and the maximum land use quanta are set out in Table 1.2.

Table 1.2 Phase 1 Proposals – Maximum Quanta

Land Use	Maximum Quantum
B1 Office (Plot O) and ground floor commercial	9,000sqm GIA
A1, A2, A3, A4, B1 or D2 Commercial (Plots G and H)	1,200sqm GIA
C3 Residential (Plots G and H)	650 units plus residential parking
B1 Office (Plot E)	11,150sqm GIA
B1 Office (Plot M)	29,000sqm GIA
Sui Generis Multi storey car park (Plot N)	700

1.2.4 The Phase 1 land use is broken down as follows:

Application 1

- Plot O (Office): Ground plus 7 storey and plant level office development comprising 8,900 sq. m. (GIA) with active ground floor uses (A1, A3, A4), public realm and riverside walkway;
- Plot N (MSCP): Ground plus 10 storey MSCP for circa 550 car parking spaces and management office; and associated
- Highways and Infrastructure Works: creation of new junction from the Mancunian Way and / or London Road, creation of new access road to the southern boundary of Mayfield and other associated highways works.

Application 2

- Plot E (Office): existing viaduct plus 7 storey office development comprising circa 11,150 sq. m. (GIA) with active ground floor uses and associated access and public realm.

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Application 3

- Plot M (Office): comprising 29,000sqm GIA, and associated public realm.

Application 4

- Plots G and H (Residential): G - ground and lower ground plus up to 40 storeys; H – ground plus up to 26 storeys containing a total of up to 650 units. This plot also includes ancillary amenity space, including external podium level for residents, ground floor active uses with circa 1,200 sq. m. commercial (A1, A2, A3, A4, B1 or D2), cycle parking (1:1) and disabled persons' car parking at ground level for residents;
- Mayfield Park: Circa 6.5 acres (2.63 ha) of public park, including hard and soft landscaping to be delivered in phases with new bridges across the River Medlock; and
- Highways and Infrastructure Works: highways works; demolition of any remaining structure; flood alleviation and re-profiling of the River Medlock and surrounding area.

1.2.5 The anticipated year of opening for Phase 1 is 2023 and for the full-build out SRF it is 2030. As previously stated, it is proposed to submit a detailed application for Phase 1 with all other phases reserved. However, it has previously been agreed with MCC / TfGM that the TA needed to support the application will assess the transport impact of the full build-out of the masterplan and then the Phase 1 development proposals in detail.

1.2.6 Following this Introduction, the proposed scope of the TA will be presented in the following sections:

- Section 2 Transport Policy
- Section 3 Existing Transport Network
- Section 4 Development Proposals
- Section 5 Trip Generation
- Section 6 Transport Impact Assessment

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2 Transport Policy

2.1.1 The TA will describe the development proposals in respect of national, regional and local transportation planning policies.

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3 Existing Transport Network

3.1 Transport Baseline - Access by all Transport Modes

3.1.1 The context of the development will be described with regard to the baseline transport conditions where relevant to the assessment of development transport impacts. The topics to be covered will include pedestrian and cycle access, public transport as well as the local highway network including servicing and parking.

3.2 Assessment of Collision Data

3.2.1 An assessment of existing collision statistics will also be undertaken for the surrounding roads based on data to be provided for the latest five-year period. A summary of these existing road traffic accident statistics will be included in the TA, which will be reviewed in terms of numbers and severity to ascertain whether or not there are particular accident trend or pattern at a particular junction or section of road.

3.2.2 If there is a trend or statistically high accident record that would require accident remedial works, then this could be considered as a 'significant' accident record and possible remedial works will be discussed.

3.3 Highway Network

3.3.1 Results from baseline traffic and parking surveys will also be described, along with any survey observations.

Study Area

3.3.2 The Study Area for the highway impact assessment was agreed with TfGM in June 2018 and includes the junctions shown on Figure 3.1 below.



Figure 3.1 Study Area

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3.3.3 The TA will include junction capacity assessments for a number of junctions within this Study Area and will be undertaken for the baseline assessment year and the assumed year of opening (discussed in more detail in later sections of this report).

Base Traffic Flows

3.3.4 Traffic surveys were undertaken in July 2018 to obtain turning movements and queue observations for all the junctions included in the Study Area.

3.3.5 Whilst July is not a neutral month, the flow data has been compared to a monthly flow profile available through the Highways England website for the M602. This data (dated 2017) showed that the average daily flow for the neutral months (April, May, June and September) was lower than the July flow. The July survey data is therefore considered to be representative.

3.3.6 The resultant highway peak hours will be determined from this data and used to represent the 2018 baseline traffic flows.

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4 Development Proposals

4.1.1 The TA will provide a description of the proposed development including the proposed access by all modes, the proposed car and cycle parking provision and on-site servicing arrangements.

4.1.2 The proposed changes to the highway network will be identified and preliminary design drawings with vehicle tracking provided. Notably the highway network changes being considered are at the Mancunian Way / Hoyle Street and Mancunian Way / Oxford Road junctions. These improvements are yet to be finalised but it is proposed that they will be discussed in due course with MCC / TfGM and agreed before any assessment work is undertaken in this respect.

4.1.3 In terms of parking, Manchester's Core Strategy Development Plan "Appendix B" sets out the car and cycle parking standards for new developments in Manchester. However, as discussed it does not include specific car and cycle parking standards for residential development.

4.1.4 The sections below sets out the proposed approach to car and cycle parking provision for Mayfield for agreement.

4.2 Cycle Parking

4.2.1 At this stage of design development, it is proposed that cycle parking for the proposed non-residential uses will be provided in line with the cycle parking standards set out in the Core Strategy. It is noted that these standards do not provide a distinction between long stay (employee) and short-stay (visitor) parking, and therefore reference will be made to standards in the London Plan to derive a suitable split between long stay and short-stay parking for Mayfield.

4.2.2 For residential uses, it is proposed to provide 1 long-stay cycle parking space per dwelling plus 10% visitor (short-stay) cycle parking. This is generally in line with cycle parking standards applied elsewhere in the UK, including London, Liverpool and Leeds.

4.2.3 The minimum cycle parking requirements for the land uses proposed as part of Mayfield Phase 1 are set out in Table 4.1. These will be confirmed through design development and will be discussed with MCC /TfGM further.

Table 4.1 Minimum Cycle Parking Requirements

Land Use	Total Cycle Parking Provision	% Long Stay	% Short Stay
A1 Food retail	1 space per 140sqm minimum of 2 spaces	10%	90%
A1 Non-food Retail	1 space per 200sqm minimum of 2 spaces	19%	81%
A3-A5 Retail	1 space per 50sqm minimum 2 spaces	10%	90%
B1 Office	1 space per 200sqm minimum of 2 spaces	87%	13%
C3 Residential		1 space per dwelling	10% of units
D2 Cinemas/Theatres/Conference Facilities	1 space per 20 seats, minimum of 2 spaces	10%	90%

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Land Use	Total Cycle Parking Provision	% Long Stay	% Short Stay
D2 Other Leisure Facilities	1 space per 140sqm minimum of 2 spaces	10%	90%

4.3 Car Parking

4.3.1 Manchester's Core Strategy Development Plan 2012-2027 states that, "Maximum standards for car parking do not apply to the city centre as each development in the city centre will be considered on a case by case basis". It is therefore proposed that car parking should be provided in line with the aspirations of the SRF in its city centre context.

4.3.2 The SRF suggested that up to 700 car parking spaces would be provided for Mayfield

4.3.3 It has been decided to propose a MSCP as part of Phase 1 in the south-western part of the site (Plot N), which is intended to provide car parking for the entire masterplan. The design proposals for the MSCP only provide some 550 spaces, but it is intended to assume a maximum parameter provision of 700 spaces as per the SRF, for the purpose of assessment in the TA.

4.3.4 The MSCP spaces will be unallocated, providing for residents of Mayfield, as required, and also for commuters/visitors. As future phases of Mayfield are built out, spaces used by commuters/visitors will be made available to residents on a demand basis to ensure all spaces are utilised.

4.3.5 In terms of non-residential parking, it is proposed that the retail and leisure uses proposed would be 'car-free' with the exception of accessible parking, given the city centre location and accessible public transport located close by. Some parking space may be offered to office tenants, but this again would be on a demand basis and be from within the maximum.

Accessible Spaces

4.3.6 In terms of accessible car parking, a starting point will be to reference the standards set out in the Core Strategy for non-residential uses. In terms of the residential development (where there are no standards set), BuroHappold's Inclusive Design Team will provide guidance on the level required and the location of spaces, which would then be subject to further discussion with MCC/TfGM.

Electric Vehicle Charging

4.3.7 There are no policy requirements related to parking for electric vehicle charging in Manchester. It is currently being considered that some 10% of the total car parking provision in each area of parking could be provided with active charging facilities, which is in line with provision recommended elsewhere in the UK. This will be considered further as the design progresses towards the planning application and in detailed design.

4.4 Servicing Arrangements

4.4.1 The TA will describe the servicing provision associated with Phase 1 development in detail including vehicle swept path analysis where appropriate.

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5 Trip Generation

5.1 Assessment Scenarios

5.1.1 The assessment years assumed for the TA are 2023 (Phase 1 opening year) and 2030 (completed SRF masterplan). The assessment scenarios proposed for the TA, which will be consistent for the EIA are as follows:

- **2018 Baseline (do minimum)** - based on 2018 traffic data obtained from the traffic surveys;
- **2019 Baseline (do minimum)** – local growth factors will be applied to the 2018 flows. For consistency with the EIA baseline, it is proposed that the trip generation associated with the existing uses at the site that are no longer in operation/being demolished will be synthesised using TRICS and netted off the 2019 baseline flows;
- **2023 Future Baseline (do minimum)** – local growth factors will be applied to the 2019 baseline flows. The trip generation associated with the existing uses at the site that are no longer in operation/being demolished will be synthesised using TRICS and netted off the 2023 baseline flows. Cumulative development trips and infrastructure changes will be assessed.
- **2023 Future Baseline + Development (do something)** – the trips generated by completion of Phase 1 of Mayfield will be added.
- **2030 Future Baseline (do minimum)** – local growth factors will be applied to the 2019 baseline flows. The trip generation associated with the existing uses at the site that are no longer in operation/being demolished will be synthesised using TRICS and netted off the 2030 baseline flows. Cumulative development trips and infrastructure changes will be assessed.
- **2030 Future Baseline + Development (do something)** – the trips generated by completion of the masterplan SRF will be added.

5.1.2 The following should also be noted:

- The cumulative development assessment will include a quantitative assessment of all known committed development as instructed by Deloitte, plus a qualitative assessment of neighbouring SRF development and infrastructure.
- Requirements for assessing intermediate and horizon year sub-scenarios and/or any particular traffic modelling requirements may be additionally required specified by MCC / TfGM.

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5.2 Trip Generation Methodology

5.2.1 The proposed trip generation, mode split and traffic distribution methodology was submitted to MCC / TfGM in June 2018. A copy of this is attached in Appendix A together with comments received from TfGM, which confirms that the proposed trip rates are agreed in principle, subject to some alterations to the assumed modal split and trip distribution. Another set of comments on the trip generation methodology were received from TfGM on 11th June 2019, focussing on the methodology used to derive trips for the commercial, retail and hotel use. This section addresses the comments raised in all responses received from TfGM to date.

5.2.2 The multi-modal trip generation assessment has been undertaken for all land uses included in the full build out SRF (including Phase 1).

5.2.3 To estimate the number of person trips generated by the proposed development, reference has been made to the TRICS database (Trip Rate Information Computer System), which is the nationally recognised and accepted methodology for predicting traffic for developments.

Residential Use

5.2.4 A selection of Residential/Flats Privately Owned Uses in the TRICS database were made based on the following criteria:

- Surveys undertaken since 2010;
- In Town Centre or Edge of Town Centre locations; and
- Outside London.

5.2.5 The TRICS selection has been reviewed since the June 2018 assessment to ensure consistency.

5.2.6 The derived residential person trip rate per dwelling and resulting total person trips for the full build out SRF are shown in Table 5.1. It is noted that these trip rates are slightly higher than those agreed in principle with TfGM in June 2018.

Table 5.1 Site Wide Person Trips – Proposed Residential (1,500 dwellings)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Person trip rate per dwelling	0.116	0.49	0.606	0.496	0.257	0.753
Total Person trips	174	735	909	744	386	1130

5.2.7 To estimate the proposed mode split for the residential use reference has been made has been to the Office for National Statistics (2011 Census data) travel to work patterns for people living in Middle Super Output Area (MSOA), Area E02006912, where the site is located. The resultant mode split is shown in Table 5.1, which was agreed in principle with TfGM in June 2018.

5.2.8 Applying this mode split to the trip rates in Table 5.1 gives the trips by mode shown in Table 5.2 for the morning and evening peak hours.

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Table 5.2 Site Wide Trips by Mode – Proposed Residential (1,500 dwellings)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	18%	31	132	164	134	69	203
Car Passenger	1%	2	7	9	7	4	11
Taxi	0%	0	0	0	0	0	0
Bus	11%	19	81	100	82	42	124
Tram	12%	21	88	109	89	46	136
Rail	4%	7	29	36	30	15	45
Pedestrians	52%	90	382	473	387	200	587
Cycle	2%	3	15	18	15	8	23
Motorcycle	0%	0	0	0	0	0	0
TOTAL	**100%**	**174**	**735**	**909**	**744**	**386**	**1,130**

Commercial Use

5.2.9 For the purpose of the trip generation assessment, and in order to adopt a worst case assessment, it has been assumed that the proposed 154,800sqm GEA Commercial (Business) use would be B1 office use, which tends to give higher a trip generation when compared with other business uses such as industrial.

5.2.10 The previously proposed trip rates for commercial use have previously been accepted by TfGM in their response in June 2018. However, to address recent feedback from TfGM received on 11th June 2019, trip rates have been revised to ensure a consistent approach to deriving trip rates and mode splits whilst making sure the sites selected in the database best reflect the proposed land use. A selection of Office Uses in the TRICS database were made, based on the following criteria:

- Surveys undertaken since 2010;
- In Town Centre or Edge of Town Centre locations;
- No Council Office sites;
- Rather than use sites from across the UK, as used to generate the previously accepted trip rates, only sites from Central Manchester were used, to reflect the characteristics of the proposed development; and
- Sites with a floor area greater than 1,000sqm.

5.2.11 The derived person trip rates and resulting total person trips for 154,800sqm GEA office development are shown in Table 5.3.

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Table 5.3 Site Wide Person Trips – Proposed Office (154,800sqm GEA)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Previous Person trip rate per 100sqm GEA	2.409	0.169	2.578	0.2	2.333	2.533
Revised Person trip rate per 100sqm GEA	2.458	0.169	2.627	0.169	2.448	2.617
Revised Total Person trips	3,805	262	4,067	262	3,789	4,051

5.2.12 Table 5.3 shows that using sites located in Central Manchester generates a slightly higher trip rate than previously agreed, showing that this methodology is robust.

5.2.13 To estimate the proposed mode split for the office use reference has initially been made to the 2011 Census data travel to work patterns for people living/working in MSOA E02006912, where the site is located.

5.2.14 The data for this area gives a Car Driver mode share of 34% but this would result in the maximum car parking accumulation exceeding 350 spaces, which is the number assumed to be allocated to the commercial use at full build out (50% of the total 700 spaces).

5.2.15 To ensure that car parking does not exceed capacity on-site, it was initially proposed as part of the methodology submitted to MCC / TfGM in June 2018 that the Car Driver mode share would be reduced from 34% to 5%. However, TfGM suggested that this reduction was too high and that in reality, some office workers may still choose to drive their car to/from work and park elsewhere, despite the constrained parking provision on-site and the alternative transport modes available at this location.

5.2.16 To take account of TfGM's comments, it is proposed to apply a car mode share of 18.5%; this is the peak hour Car Driver mode share derived from the site selection in TRICS. Using this methodology, the same sites in TRICS have been used to generate the trips and the mode share. In addition, the sites selected have similar characteristics to the proposed, being located in central Manchester. This approach satisfies the key concerns raised by TfGM in their feedback dated 6th June.

5.2.17 It is not considered appropriate to use the 34% car mode share due to changes in transport infrastructure and behaviour that has taken place since the 2011 Census was undertaken. Since the 2011 Census data was collected, the Metrolink tram network has been expanded significantly to include the following extensions:

- Oldham, Rochdale, South and East Manchester (opened 2013);
- Ashton-under-Lyne, East Didsbury and Manchester Airport (opened 2014); ans
- Second City Crossing (opened 2017).

5.2.18 These expansions are likely to have resulted in a significant shift in mode share away from cars. Therefore it is proposed that the mode share generated by the 2011 Census data does not reflect the current travel patterns in the city, not least in the year 2030 at full build out.

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5.2.19 Further research has been undertaken into the recent transport trends in Greater Manchester. TfGM have published the results of the HFAS's (Transport for Greater Manchester Highways Forecasting and Analytical Services formerly known as GMTU) key centre monitoring during the financial year. The data provides includes trends in modal split for trips entering town centres in Greater Manchester.

5.2.20 The latest data set, published in June 2018, shows that for Manchester Key Centre, the morning peak hour car mode split has fallen from 30% to 23% between 2011 to 2017, an average decrease of more than 1% each year. This reflects the changes to public transport infrastructure in the city and therefore illustrates that a future car mode share of 18.5% is not unreasonable given the current trend in the city.

5.2.21 The adopted mode split is shown in Table 5.4 together with the resulting total person office trips by mode.

Table 5.4 Site Wide Trips by Mode – Proposed Office (154,800sqm GEA)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	18.5%	704	48	752	48	701	749
Car Passenger	3.7%	141	10	151	10	140	150
Taxi	0.6%	23	2	25	2	23	25
Bus	27.2%	1034	71	1105	71	1029	1101
Tram	23.5%	893	61	954	61	889	950
Rail	7.4%	282	19	301	19	281	300
Pedestrians	14.2%	540	37	577	37	538	575
Cycle	3.7%	141	10	151	10	140	150
Motorcycle	1.2%	47	3	50	3	47	50
TOTAL	**100%**	**3805**	**262**	**4067**	**262**	**3789**	**4051**

Retail/Leisure Uses

5.2.22 In June 2018, the 32,300sqm GEA retail / leisure use trip generation was based on A3 (food and drink) use, reflecting the Applicant's aspirations at that time for the development.

5.2.23 It is now understood that Phase 1 (comprising 1,200sqm GIA) is to include A1, A2, A3, A4, or D2 use.

5.2.24 For the purpose of the trip generation assessment, it has been assumed that retail / leisure use (32,300sqm GEA) will be A1 (food retail) use, which tends to give higher trip rate to other uses included in this category. This will be refined once the split of retail/leisure uses is fixed.

5.2.25 A selection of A1 Retail Uses in the TRICS database were made, based on the following criteria:

- Surveys undertaken since 2010;
- In Town Centre or Edge of Town Centre locations;
- Outside London.

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5.2.26 It is noted that the A1 retail sites available in the TRICS database are typically standalone convenience stores, rather than being ancillary to a larger mixed use development, as would be the case for the proposed development i.e. retail/leisure trips would linked to other uses at the site. It would therefore be appropriate to apply a cross-visitation factor to the retail trip rates to take account of trips that will be linked to other uses at the site and ensure the trip generation assessment best reflects the nature of the retail / leisure proposals.

5.2.27 Given the development's central location in Manchester and proximity to the station, a cross-visitation (reduction) factor of 20% has been applied to take account of trips that will be linked to other uses at the site. This reduction factor has been applied at other similar developments across the UK.

5.2.28 The derived person trip rates and resulting total person trips for 32,300sqm GEA retail / leisure development are shown in Table 5.5.

Table 5.5 Site Wide Person Trips – Proposed Retail/Leisure (32,300sqm GEA)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Person trip rate per 100sqm GEA	22.140	20.890	43.03	33.559	34.195	67.754
Total Person trips	1,430	1,350	2,780	2,168	2,209	4,377

5.2.29 In terms of mode share for retail/leisure use, TfGM stated in June 2018 that that the car mode share is unlikely to be zero.

5.2.30 Given that the retail and leisure uses proposed at the site would be car free (with the exception of accessible parking requirements) and are located in central Manchester, it is considered that the majority of trips would be on foot with very few car trips. To reflect this, a car mode share of 0.5% has been adopted, which is considered appropriate for a proposed development at this location where retail/leisure trips would linked to other uses in the area.

5.2.31 To validate this methodology, research has been undertaken into similar applications in Greater Manchester to understand the approach adopted for retail trips. The application for the Salford Central masterplan, approved in 2010 (reference: 09/57950/EIAHYB), proposed land uses very similar to Mayfield with up to 197,010sqm offices / commercial use, up to 24,255sqm retail and leisure use, up to 390 hotel rooms and a maximum of 390 residential units. The Transport Assessment submitted with the application assumed all retail and leisure trips are linked or pass-by trips, therefore not considered in trip generation. More recently, the applications for Manchester Goods Yard (ref: 121511/FO/2018) and Manchester Central (ref: 115871/FO/2017) contain elements of retail use as part of the application, but have not included retail trips in the trip generation as it considered ancillary. Therefore the approach taken at Mayfield by including some external trips is robust and conservative.

5.2.32 The proposed mode split is shown in Table 5.6 together with the resulting total person retail / leisure trips by mode.

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Table 5.6 Site Wide Trips by Mode – Proposed Retail/Leisure (32,300sqm GEA)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	0.5%	7	7	14	11	11	22
Car Passenger	0.0%	0	0	0	0	0	0
Taxi	0.0%	0	0	0	0	0	0
Bus	8.0%	114	108	222	173	177	350
Tram	11.0%	157	148	306	238	243	481
Rail	4.0%	57	54	111	87	88	175
Pedestrians	75.5%	1080	1019	2099	1637	1668	3305
Cycle	1.0%	14	13	28	22	22	44
Motorcycle	0.0%	0	0	0	0	0	0
TOTAL	**100%**	**1430**	**1350**	**2780**	**2168**	**2209**	**4377**

Hotel Use

5.2.33 A selection of Hotels in the TRICS database were made, based on the following criteria:

- Surveys undertaken since 2010;
- In Town Centre or Edge of Town Centre locations;
- Outside London; and
- Little or no car parking.

5.2.34 It is noted that the site selection from the criteria above includes a site located in Manchester (reference: GM-6-A-08). The derived person trip rates and resulting total person trips for the hotel development (650 rooms) are shown in Table 5.7.

5.2.35 A review of this TRICS selection has confirmed that it remains valid.

Table 5.7 Site Wide Person Trips – Proposed Hotel (650 Rooms)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Person trip rate per room	0.145	0.328	0.473	0.245	0.189	0.434
Total Person trips	94	213	307	159	123	282

5.2.36 From these sites used to generate the trip rates, a car driver mode share of 19% has been derived; this has been applied to the hotel use at the Mayfield development.

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5.2.37 In addition, to take account of TfGM's comments regarding a higher taxi usage at a hotel, it is proposed to increase the Taxi mode share from 0% to 6%, which is based on previous experience of hotel sites in similar city centre locations.

5.2.38 The proposed mode split is shown in Table 5.8 together with the resulting total person hotel trips by mode. The hotel component of the development is car-free, with only accessible spaces being provided. Therefore it is expected that the majority of the hotel car trips would not enter the development, but instead park elsewhere and enter the Mayfield development on foot.

Table 5.8 Site Wide Trips by Mode – Proposed Hotel (650 Rooms)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	19%	18	41	58	30	23	54
Car Passenger	10%	9	21	31	16	12	28
Taxi	6%	6	13	18	10	7	17
Bus	4%	4	9	12	6	5	11
Tram	5%	5	11	15	8	6	14
Rail	5%	5	11	15	8	6	14
Pedestrians	50%	47	107	154	80	61	141
Cycle	1%	1	2	3	2	1	3
Motorcycle	0%	0	0	0	0	0	0
TOTAL	**100%**	**94**	**213**	**307**	**159**	**123**	**282**

MSCP

5.2.39 The allocation of parking spaces across the site is still to be confirmed, but for the purposes of scoping the trip generation of the MSCP in Phase 1, we have assumed that around half of the spaces would be allocated to commuters working in Manchester city centre. To determine an arrival / departure profile for the car park, a 24-hour car park survey was undertaken at a similar car park nearby (NCP Car Park on Store Street) on Tuesday 12th February 2019. The resultant vehicle arrival / departure profile for the proposed MSCP, which is shown on Figure 5.1.

5.2.40 Figure 5.1 shows that the peak arrival for the MSCP occurs between 07:00 and 08:00 hours with the peak departure occurs between 16:00 and 17:00 hours. This suggests that commuters travelling to central Manchester tend to travel outside the typical network peak hours of 08:00-09:00 and 17:00-18:00. Anecdotally, this could be to avoid peak hour traffic in central Manchester or to ensure access to parking. This therefore suggests, that the car trip generation proposed for commercial-use is conservative and provides a robust estimate because in reality, some commuters have been observed travelling outside network peak hours.

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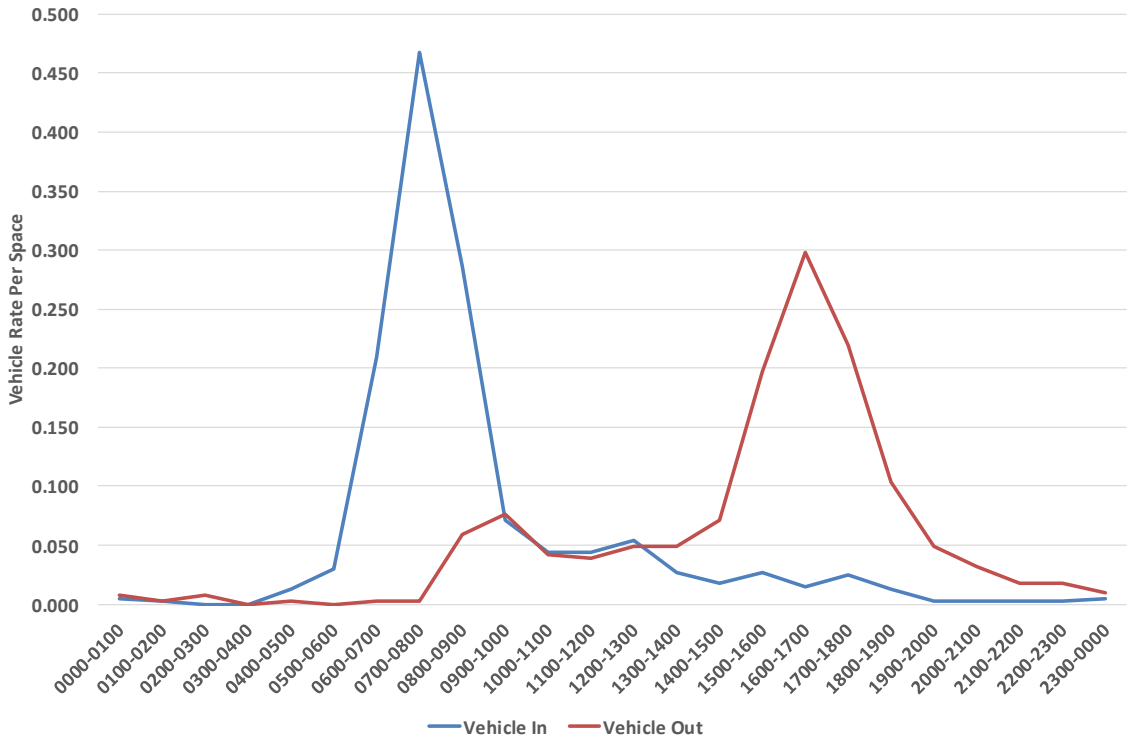


Figure 5.1 Proposed MSCP Arrival/Departure Profile

5.2.41 The MSCP commuter trips for Phase 1 is shown in Table 5.9.

Table 5.9 MSCP Car (Commuter) Trips – Phase 1 (350 spaces)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver Trip Rate (per space)	0.468	0.002	0.002	0.015	0.298	0.313
Car Driver	100	21	121	9	77	85

5.2.42 The car park would also generate person trips from those arriving by car and taking an onward journey by foot. A typical vehicle occupancy of 1.2 has been applied to generate this demand, which is shown in Table 5.10.

Table 5.10 MSCP Onward Pedestrian Trips – Phase 1

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Pedestrians	25	120	145	92	10	102

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Total Trip Generation

5.2.43 Table 5.11 shows the total trip generation predicted for the Mayfield SRF as a whole, at full build out.

Table 5.11 Site Wide Trips by Mode – Total Development (Mayfield SRF as a whole)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	**Departures**	**Total**	**Arrivals**	**Departures**	**Total**
Car Driver	760	228	988	223	805	1028
Car Passenger	152	38	190	33	157	190
Taxi	29	14	44	11	31	42
Bus	1171	268	1439	333	1254	1586
Tram	1076	309	1384	397	1184	1582
Rail	351	113	464	144	391	535
Pedestrians	1758	1545	3303	2140	2468	4608
Cycle	160	40	200	48	171	219
Motorcycle	47	3	50	3	47	50
TOTAL	**5503**	**2559**	**8063**	**3333**	**6507**	**9840**

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Phase 1 Trip Generation

5.2.44 As described in Section 1, the Phase 1 development includes Mayfield Park, the construction of a MSCP and some residential and commercial use, in Plots E, G/H, M and O respectively.

5.2.45 Table 5.12 and Table 5.13 show the Phase 1 trip generation for the residential and office use respectively. It is noted that the trip generation for the office development for Phase 1 is subject to change once the floor area has been fixed.

Table 5.12 Phase 1 Trips by Mode – Proposed Residential (650 dwellings)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	14	57	71	58	30	88
Car Passenger	1	3	4	3	2	5
Taxi	0	0	0	0	0	0
Bus	8	35	43	35	18	54
Tram	9	38	47	39	20	59
Rail	3	13	16	13	7	20
Pedestrians	39	166	205	168	87	255
Cycle	2	6	8	6	3	10
Motorcycle	0	0	0	0	0	0
TOTAL	**75**	**319**	**394**	**322**	**167**	**489**

Table 5.13 Phase 1 Trips by Mode – Proposed Office (circa 49,150sqm GIA)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	223	15	239	15	223	238
Car Passenger	45	3	48	3	45	48
Taxi	7	1	8	1	7	8
Bus	328	23	351	23	327	349
Tram	283	19	303	19	282	302
Rail	90	6	96	6	89	95
Pedestrians	172	12	183	12	171	183
Cycle	45	3	48	3	45	48
Motorcycle	15	1	16	1	15	16
TOTAL	**1208**	**83**	**1291**	**83**	**1203**	**1286**

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5.2.46 Table 5.14 below shows the Phase 1 trip generation for the proposed flexible A1, A2, A3, A4, B1 or D2 uses. Given that the split of these uses is unknown at this stage, the trip generation has been derived based on a worst case assuming A1 retail use (using the trip rates described previously).

Table 5.14 Phase 1 Trips by Mode – Proposed Flexible A1, A2, A3, A4, B1 or D2 uses (circa 1,200sqm GIA)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	0	0	1	0	0	1
Car Passenger	0	0	0	0	0	0
Taxi	0	0	0	0	0	0
Bus	4	4	8	6	7	13
Tram	6	6	11	9	9	18
Rail	2	2	4	3	3	7
Pedestrians	40	38	78	61	62	123
Cycle	1	1	1	1	1	2
Motorcycle	0	0	0	0	0	0
TOTAL	**53**	**50**	**103**	**81**	**82**	**163**

5.2.47 The total multi-modal trip generation for Phase 1 is shown in Table 5.15.

Table 5.15 Trips by Mode – Total Phase 1 Development

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	337	94	431	82	330	412
Car Passenger	46	6	52	6	46	53
Taxi	7	1	8	1	7	8
Bus	341	62	402	64	352	416
Tram	298	63	362	67	311	378
Rail	95	21	116	22	99	121
Pedestrians	251	215	466	240	320	560
Cycle	47	10	57	10	49	59
Motorcycle	15	1	16	1	15	16
TOTAL	**1437**	**472**	**1909**	**495**	**1529**	**2024**

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Total Vehicle Generation

5.2.48 The total vehicle trips generated during the highway peak hours is shown in Table 5.16 below together with Passenger Car Units (PCUs).

Table 5.16 Total Vehicle Trip Generation

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Full Build Out SRF						
Vehicles	915	324	1238	288	933	1220
PCUs	923	334	1257	298	941	1239
Phase 1						
Vehicles	371	106	477	103	371	473
PCUs	372	108	479	105	372	477

5.3 Trip Distribution

5.3.1 The vehicle trip distribution methodology submitted in June 2018 has been agreed in principle with TfGM. A similar methodology will be adopted for the purpose of distributing trips for the other modes of transport such as bus and rail.

5.3.2 The agreed vehicle trip distribution is set out in Table 5.17.

Table 5.17 Vehicle Trip Distribution

Mode	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
North	29%	25%	25%	29%
South	31%	35%	35%	31%
East	17%	15%	15%	17%
West	23%	25%	25%	23%

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5.3.3 Table 5.18 below shows the number of PCUs distributed by direction.

Table 5.18 Vehicle Trip Distribution (PCUs)

Direction	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
Full Build Out SRF				
North	109	26	25	109
South	114	37	36	114
East	63	16	16	63
West	85	27	26	85
Phase 1				
North	109	27	26	109
South	114	38	36	115
East	63	16	16	63
West	85	27	26	85

5.4 Service Vehicle Trip Generation

5.4.1 For assessment purposes, the servicing trips are considered in addition to the trip generation described above. Typical service vehicle rates and profiles have been derived based on previously agreed rates that have been used for similar residential, retail, office and hotel uses.

5.4.2 The daily service vehicle trip rates and peak hour proportions are shown in Table 5.19 below.

Table 5.19 Proposed Service Vehicle Trip Rates and Peak Hour Proportions

Land Use	Daily Servicing Rate	Percentage of Daily Servicing during the Peak Hours	AM Peak hour (%)	PM Peak hour (%)
Office	0.20 vehicles/100sqm	15%	5%	5%
Retail/Leisure	1.43 vehicles/100sqm	15%	10%	0%
Hotel	0.23 vehicles/100sqm	15%	10%	5%
Residential	0.14 trips per dwelling	20%	5%	15%

5.4.3 In terms of the retail/leisure development, reference has been made to daily service vehicle trip rates for retail uses as a worst case as these tend to generate a higher number of servicing trips compared to leisure uses.

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5.4.4 The service vehicle trip rate for A3 Retail (food and drink) is generally higher than other retail uses (1.43 daily trips per 100sqm compared to 0.34 daily trips per 100sqm for non-food (A1) retail. The upper limit has been applied for the purpose of this assessment and the resultant service vehicle trips for the Mayfield SRF site are shown in Table 5.20 below.

Table 5.20 Service Vehicle Trips – Total Development (Mayfield SRF as a whole)

Land Use	Daily (one-way vehicles)	Servicing Peak (one-way vehicles)	AM Peak hour (one-way vehicles)	PM Peak hour (one-way vehicles)
Office	310	46	15	15
Retail/Leisure	459	69	46	0
Hotel	63	9	6	4
Residential	210	42	11	32

5.4.5 The service vehicle trips for Phase 1 are shown below in Table 5.21. In terms of the flexible A1, A2, A3, A4, B1 or D2 uses in Phase 1, the servicing trip rate for A3 Retail (food and drink) has been adopted as a worst case.

Table 5.21 Service Vehicle Trips – Phase 1 Development

Land Use	Daily (one-way vehicles)	Servicing Peak (one-way vehicles)	AM Peak hour (one-way vehicles)	PM Peak hour (one-way vehicles)
Office	98	15	5	5
Flexible A1, A2, A3, A4, B1 or D2 uses	17	3	2	0
Residential	91	18	5	14

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6 Transport Impact Assessment

6.1.1 An assessment will be undertaken of the transport impact of the proposed development on all relevant modes of transport.

6.1.2 This will include committed developments where appropriate, which are to be determined in discussion with MCC / TfGM.

6.1.3 The following gives a brief summary of the topics that will be covered in the transport impact assessment chapter:

- **Pedestrian and Cycle Access** – an assessment methodology for walking and cycling trips is to be discussed and agreed with MCC / TfGM.
- **Public Transport** – it is proposed that proportions generated by the 2011 Census Travel to Work data will be used to distribute the peak hour bus/rail/tram trips. An impact assessment is proposed comparing total trips to bus / rail / tram service frequencies in each direction. This assessment methodology for public transport trips is to be discussed and agreed with MCC /TfGM.
- **Highway Network**– the highway assessment methodology is to be discussed and agreed with MCC/TfGM. It is understood that MCC/TfGM have a city centre traffic model and that they may be able to carry out the assessment modelling in-house but this is subject to further discussion/agreement with MCC / TfGM.
- **Mitigation** - the TA will describe any measures to reduce the impact of the development in transport terms. The measures will likely focus on the following:
    - **Framework Travel Plan** – site-wide Travel Plan seeking to promote sustainable travel choices at the site. It will include measures to reduce the impact of deliveries and servicing of the development.
    - **Framework Delivery and Servicing Plan** – outline delivery and servicing plan seeking to manage service vehicle activity to and from the site. It is envisaged that this framework would be secured by a suitably worded planning condition and developed following planning consent.
    - **Framework Construction Logistics Plan** – outline construction traffic management plan strategy outlining details of possible construction impacts and mitigation that will be provided where possible. It is envisaged that the Construction Management Plan would be secured by a suitably worded planning condition.

6.1.4 A Transport Chapter will also be prepared as part of the Environmental Impact Assessment, which will identify and assess the significance of the environmental effects resulting from the transport proposals. Where appropriate recommendations for mitigation of those effects will be made and then commentary made on the residual transport effects following adoption of those mitigation measures.

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Appendix A Trip Generation Methodology submitted to MCC/TfGM in June 2018 and Comments dated 28th June 2018

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MAYFIELD – TRIP GENERATION AND TRAFFIC DISTRIBUTION

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INTRODUCTION

- This study sets out the initial trip generation and traffic distribution for Mayfield.
- A methodology is described that distributes traffic generated by the development through the local site access junctions.
- The aim is to show the extent to which local junctions are likely to be impacted by the development with a view to agreeing with the highway authorities which junctions require traffic surveys for future assessment purposes.

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TRIP GENERATION – DEVELOPMENT QUANTUMS

- Total development quantum has been taken from the Strategic Regeneration Framework (SRF).

	Quantity
Commercial (sqm GEA)	154,800
Retail/Leisure (sqm GEA)	32,300
Hotel (rooms)	650
Residential (units)	1,500

- The TRICS database has been used to derive suitable trip rates for all uses.
  - **Residential** – non-London, with over 100 dwellings in town centre or edge of town centre;
  - **Office** – non-London, greater than 1000sqm, town centre or edge of town centre, no council offices;
  - **Hotel** – non-London, town centre or edge of town centre, with little parking;
  - **Retail/Leisure** – A3 Retail assumed as a worst case, town centre or edge of town centre. Due to client aspirations, supplemented with "Carluccio's" surveys (TRAVL).

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TRIP GENERATION – PERSON RATES AND PERSON TRIPS

- Residential

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per unit)	0.080	0.460	0.540	0.447	0.163	0.610	2.066	2.296	4.362
Person trips	120	690	810	671	245	915	3099	3444	6543

- Office

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per 100sqm)	2.409	0.169	2.578	0.200	2.333	2.533	10.409	10.027	20.436
Person trips	3729	262	3991	310	3611	3921	16113	15522	31635

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TRIP GENERATION – PERSON RATES AND PERSON TRIPS

- Hotel

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per room)	0.154	0.339	0.493	0.238	0.176	0.414	2.718	2.706	5.424
Person trips	100	220	320	155	114	269	1767	1759	3526

- Retail/Leisure

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per 100sqm)	8	5	13	10	10	20	189	176	365
Person trips	973	701	1674	1346	1234	2580	24448	22683	47130

- Total person trips

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Person trips	4922	1873	6795	2376	5100	7477	45426	43408	88834

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MODAL SPLIT

- Modal split for residential and office from 2011 Journey to Work Census Data, "Location of usual residence and place of work by method of travel to work (MSOA level)";
- Car mode share for office use reduced to account for limited parking on-site. Difference split across the remaining modes;
- Hotel and retail mode split derived from professional experience for similar land uses.

	Residential	Office (Census Base)	Office (Adjusted)	Hotel	Retail/Leisure
Car Driver	18%	34%	5%	0%	0%
Car passenger	1%	3%	4%	1%	0%
Taxi	0%	1%	1%	17%	0%
Bus	11%	22%	32%	5%	8%
Tram	12%	19%	27%	28%	11%
Rail	4%	6%	9%	34%	4%
Pedestrians	52%	12%	17%	15%	76%
Cycle	2%	3%	4%	0%	1%
Motorbike	0%	1%	1%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

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TRIPS PER LAND USE BY MODE

- Residential

		AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per unit)		0.080	0.460	0.540	0.447	0.163	0.610	2.066	2.296	4.362
Person trips		120	690	810	671	245	915	3099	3444	6543
Mode	Split (%)	In	Out	Total	In	Out	Total	In	Out	Total
Car	18%	22	124	146	121	44	165	558	620	1178
Car Passenger	1%	1	7	8	7	2	9	31	34	65
Taxi	0%	0	0	0	0	0	0	0	0	0
Bus	11%	13	76	89	74	27	101	341	379	720
Tram	12%	14	83	97	80	29	110	372	413	785
Rail	4%	5	28	32	27	10	37	124	138	262
Pedestrians	52%	62	359	421	349	127	476	1611	1791	3402
Cycle	2%	2	14	16	13	5	18	62	69	131
Motorbike	0%	0	0	0	0	0	0	0	0	0
Total	**100%**	**120**	**690**	**810**	**671**	**245**	**915**	**3099**	**3444**	**6543**

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TRIPS PER LAND USE BY MODE

- Office

		AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per 100sqm)		2.409	0.169	2.578	0.200	2.333	2.533	10.409	10.027	20.436
Person trips		3729	262	3991	310	3611	3921	16113	15522	31635
Mode	Split (%)	In	Out	Total	In	Out	Total	In	Out	Total
Car	5%	186	13	200	15	181	196	806	776	1582
Car Passenger	4%	161	11	172	13	156	169	696	670	1366
Taxi	1%	27	2	29	2	26	28	116	112	228
Bus	32%	1181	83	1264	98	1144	1242	5102	4915	10018
Tram	27%	1020	72	1091	85	988	1072	4407	4245	8652
Rail	9%	322	23	345	27	312	339	1392	1341	2732
Pedestrians	17%	617	43	661	51	598	649	2667	2569	5237
Cycle	4%	161	11	172	13	156	169	696	670	1366
Motorbike	1%	54	4	57	4	52	56	232	223	455
Total	**100%**	**3729**	**262**	**3991**	**310**	**3611**	**3921**	**16113**	**15522**	**31635**

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TRIPS PER LAND USE BY MODE

- Hotel

		AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per room)		0.154	0.339	0.493	0.238	0.176	0.414	2.718	2.706	5.424
Person trips		100	220	320	155	114	269	1767	1759	3526
Mode	Split (%)	In	Out	Total	In	Out	Total	In	Out	Total
Car	0%	0	0	0	0	0	0	0	0	0
Car Passenger	1%	1	2	3	2	1	3	18	18	35
Taxi	17%	17	37	54	26	19	46	300	299	599
Bus	5%	5	11	16	8	6	13	88	88	176
Tram	28%	28	62	90	43	32	75	495	492	987
Rail	34%	34	75	109	53	39	91	601	598	1199
Pedestrians	15%	15	33	48	23	17	40	265	264	529
Cycle	0%	0	0	0	0	0	0	0	0	0
Motorbike	0%	0	0	0	0	0	0	0	0	0
Total	**100%**	**100**	**220**	**320**	**155**	**114**	**269**	**1767**	**1759**	**3526**

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TRIPS PER LAND USE BY MODE

- Retail

		AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate (per 100sqm)		8	5	13	10	10	20	189	176	365
Person trips		973	701	1674	1346	1234	2580	24448	22683	47130
Mode	Split (%)	In	Out	Total	In	Out	Total	In	Out	Total
Car	0%	0	0	0	0	0	0	0	0	0
Car Passenger	0%	0	0	0	0	0	0	0	0	0
Taxi	0%	0	0	0	0	0	0	0	0	0
Bus	8%	78	56	134	108	99	206	1956	1815	3770
Tram	11%	107	77	184	43	32	75	2689	2495	5184
Rail	4%	39	28	67	54	49	103	978	907	1885
Pedestrians	76%	740	533	1272	1023	938	1961	18580	17239	35819
Cycle	1%	10	7	17	13	12	26	244	227	471
Motorbike	0%	0	0	0	0	0	0	0	0	0
Total	**100%**	**973**	**701**	**1674**	**1242**	**1130**	**2372**	**24448**	**22683**	**47130**

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TRIPS BY MODE

- Total Development

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Car	208	137	345	136	225	361	1363	1396	2759
Car Passenger	163	20	184	22	160	181	744	722	1467
Taxi	44	39	83	29	45	74	416	411	827
Bus	1277	226	1503	287	1275	1562	7488	7197	14684
Tram	1169	293	1462	252	1081	1333	7962	7646	15608
Rail	400	153	553	160	410	570	3094	2984	6078
Pedestrians	1434	968	2402	1446	1680	3126	23124	21863	44987
Cycle	173	32	205	40	173	213	1002	966	1968
Motorbike	54	4	57	4	52	56	232	223	455
Total	**4922**	**1873**	**6795**	**2376**	**5100**	**7477**	**45426**	**43408**	**88834**

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SERVICING TRIPS

- Servicing trip rates per land use and profiles derived TRICS/site surveys and data collected / experience gained of similar sites and appraisals throughout the UK.

Land Use	Daily Rate	Daily vehicles	AM Peak %	AM Peak Vehicles	PM Peak %	PM Peak Vehicles
Residential	0.1 per unit	150	5%	8	15%	23
Office	0.2 per 100sqm	310	5%	15	5%	15
Hotel	0.23 per 100sqm	71	10%	7	5%	4
Retail	0.65 per 100sqm	210	10%	21	0%	0

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Servicing Vehicles	51	51	102	42	42	83	740	740	1481

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TOTAL DEVELOPMENT VEHICLE TRIPS

- The following shows the total vehicle trips generated by the development, including servicing vehicles.

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Vehicles	303	228	531	206	312	518	2520	2547	5067

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TRIP DISTRIBUTION

- Trip distribution estimated from 2011 Journey to Work Census Data, *"Location of usual residence and place of work by method of travel to work (MSOA level)"*.
- Area E02006912, where the site is located, chosen as usual residence and place of work for Residential and Office trips respectively. The area is shown here.



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TOTAL VEHICLE TRIPS BY DIRECTION

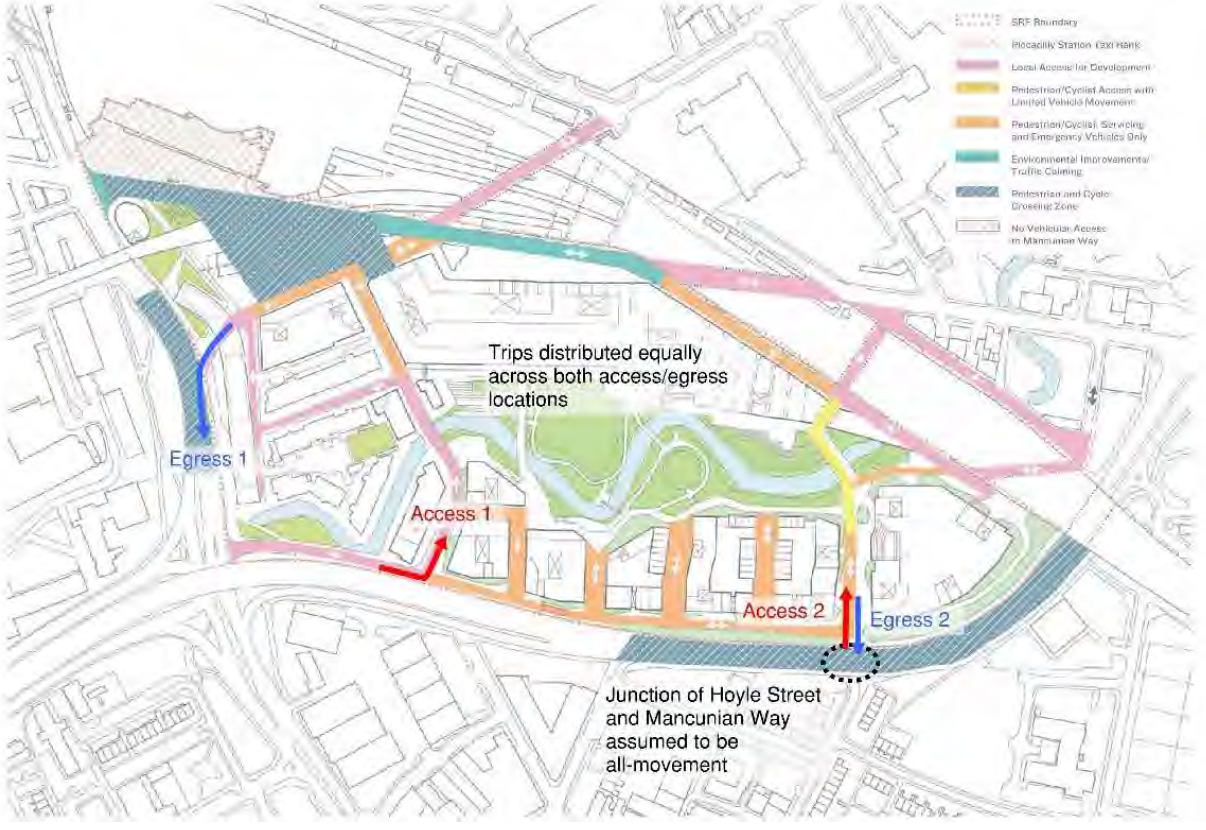
- Top 20 origins and destinations for car drivers sorted by Local Authority District;
- For example:
  - Top five origins for those working in E02006912 are Manchester, Salford, Trafford, Stockport and Tameside;
  - Top five destinations for those living in E02006912 are Manchester, Trafford, Salford, Cheshire East and Oldham.
- Proportion of AM and PM peak hour arrival and departure trips by direction – north, south, east, west has been determined and is shown below.

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	In	Out	Total	In	Out	Total
N	89	56	145	51	91	142
S	93	79	173	72	96	168
E	52	35	86	31	53	84
W	69	57	127	52	71	123
Total	**303**	**228**	**531**	**206**	**312**	**518**

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SITE ACCESS ASSUMPTIONS

Trips have been distributed on the network based on the site access assumptions shown on the diagram, which takes account of the movement strategy presented in the SRF.

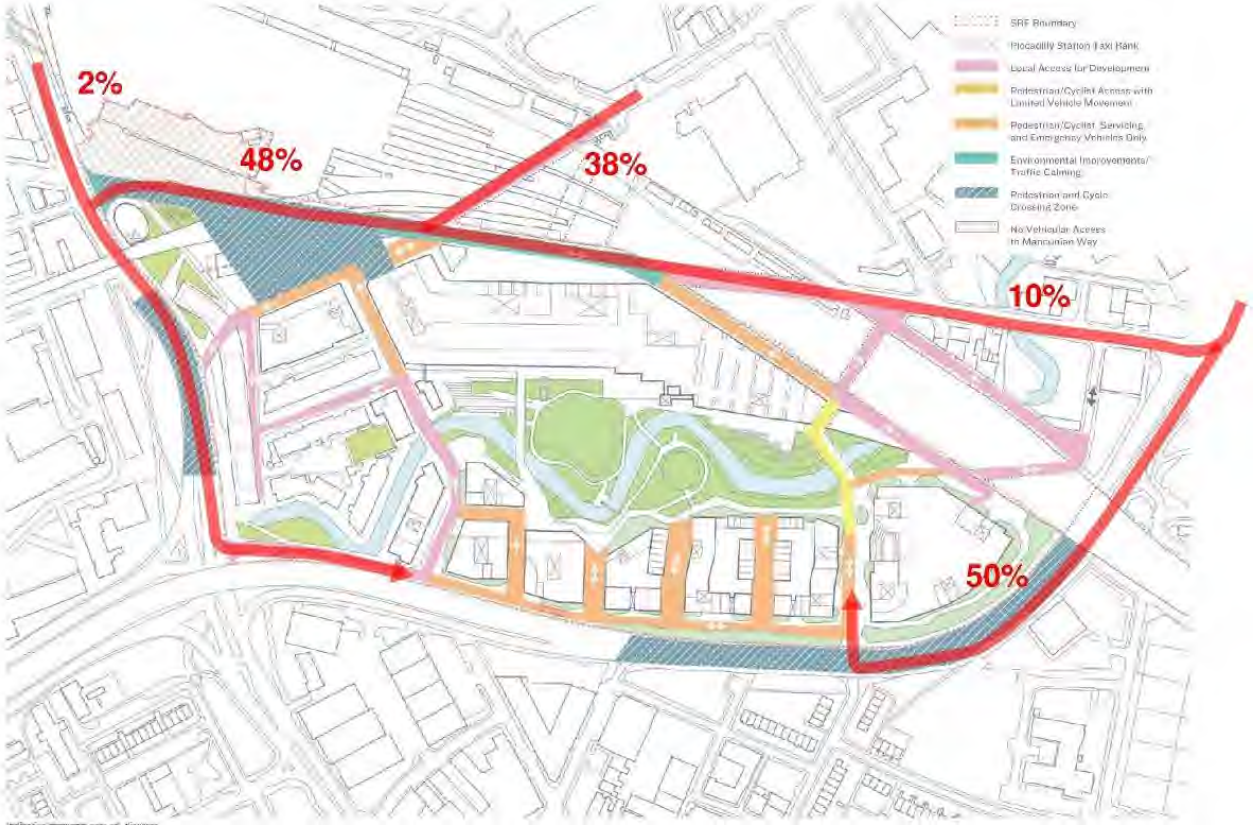


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ROUTING – TRAFFIC ARRIVING FROM THE NORTH

Trips arriving from the north have been assigned a routing to the site access points, shown previously.

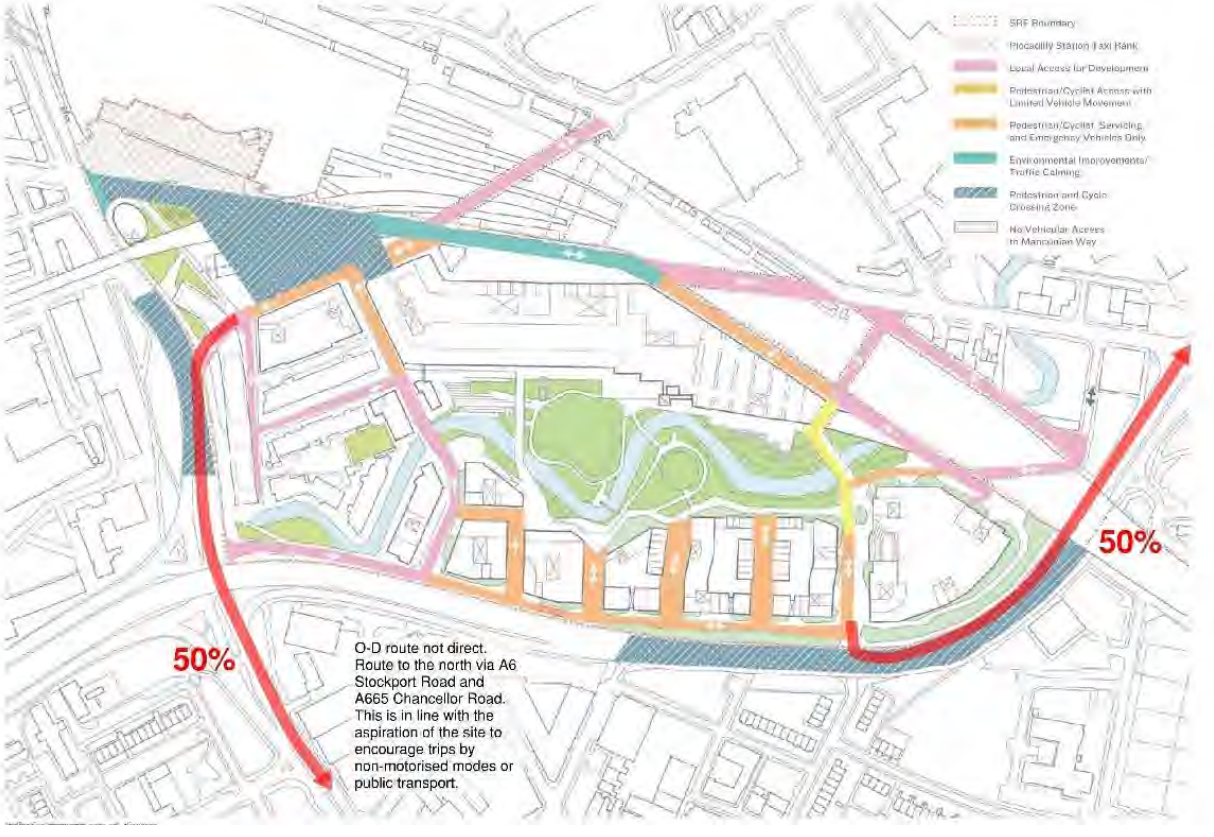


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ROUTING – TRAFFIC DEPARTING TO THE NORTH

Trips departing to the north have been assigned a routing from the site egress points, shown previously.

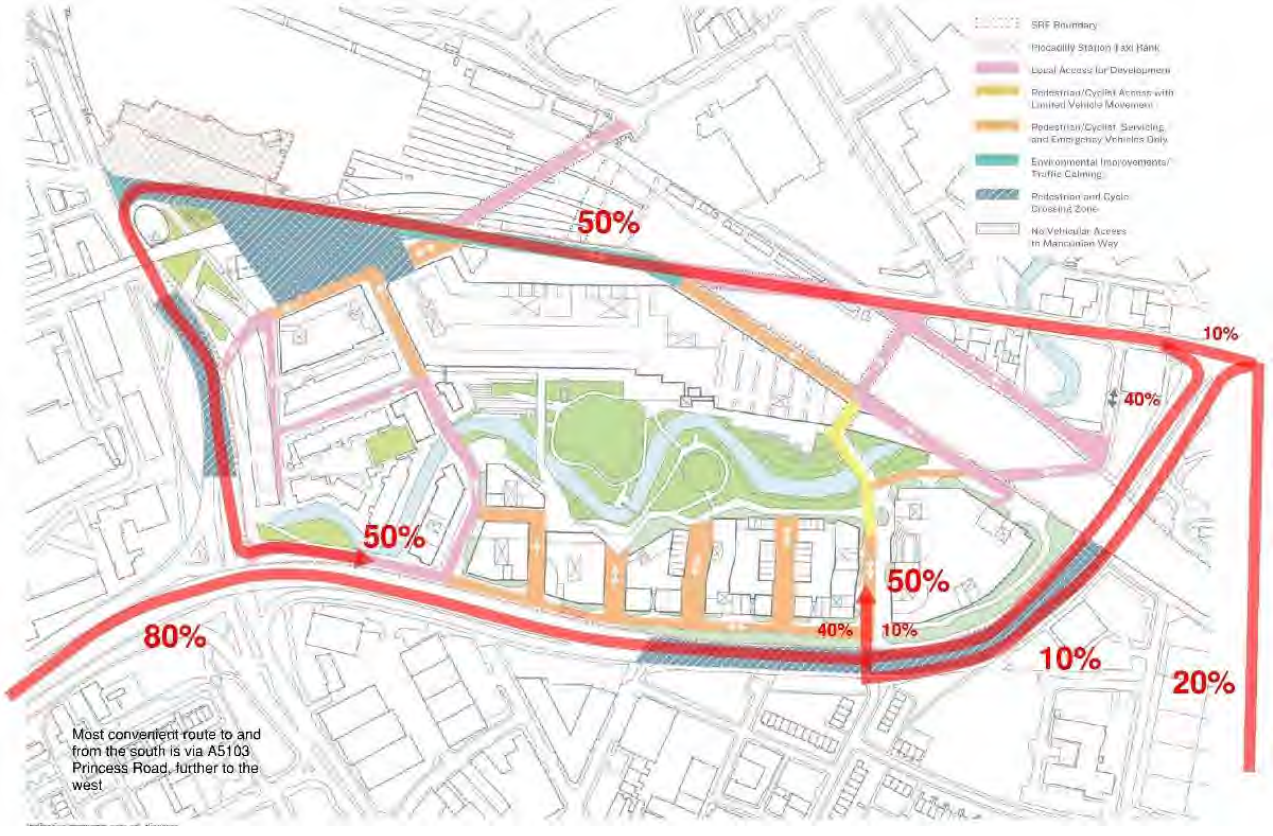


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ROUTING – TRAFFIC ARRIVING FROM THE SOUTH

Trips arriving from the south have been assigned a routing to the site access points, shown previously.

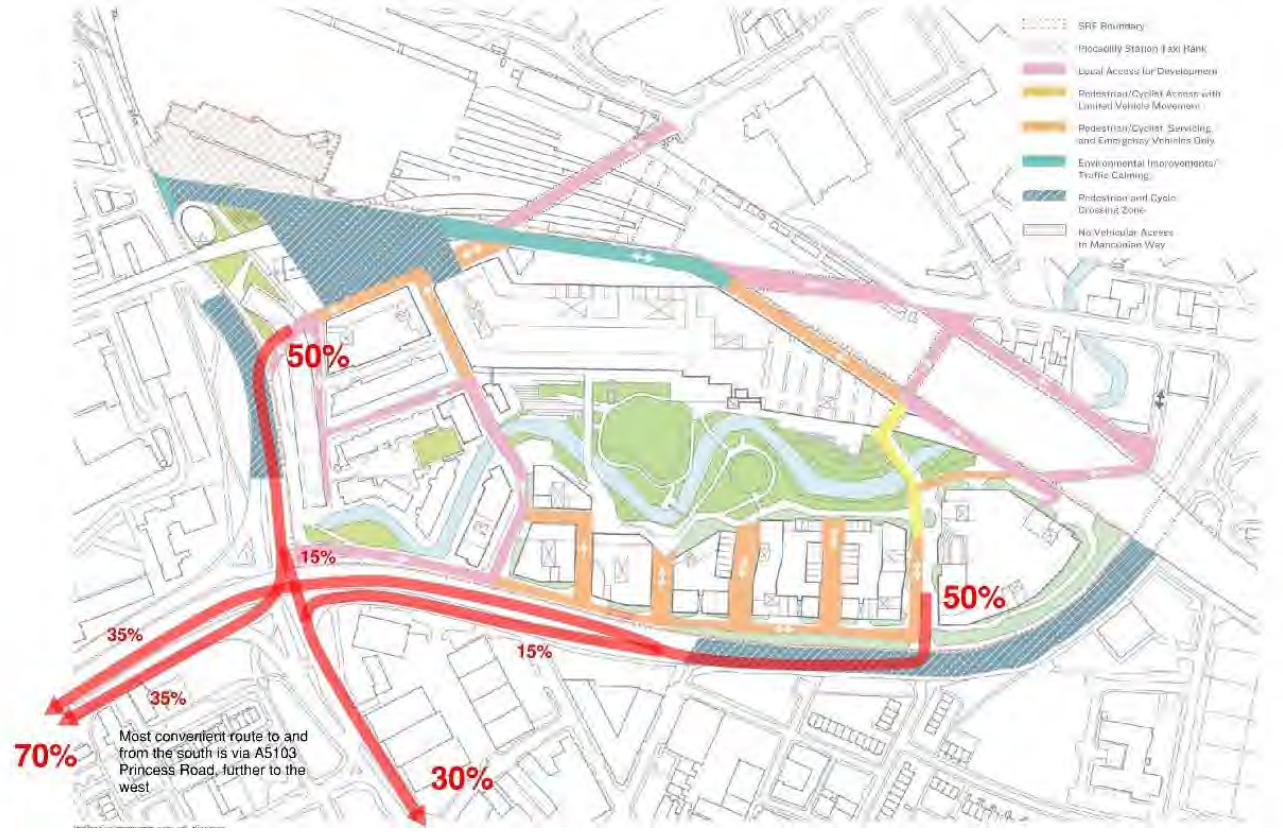


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ROUTING – TRAFFIC DEPARTING TO THE SOUTH

Trips departing to the south have been assigned a routing from the site egress points, shown previously.

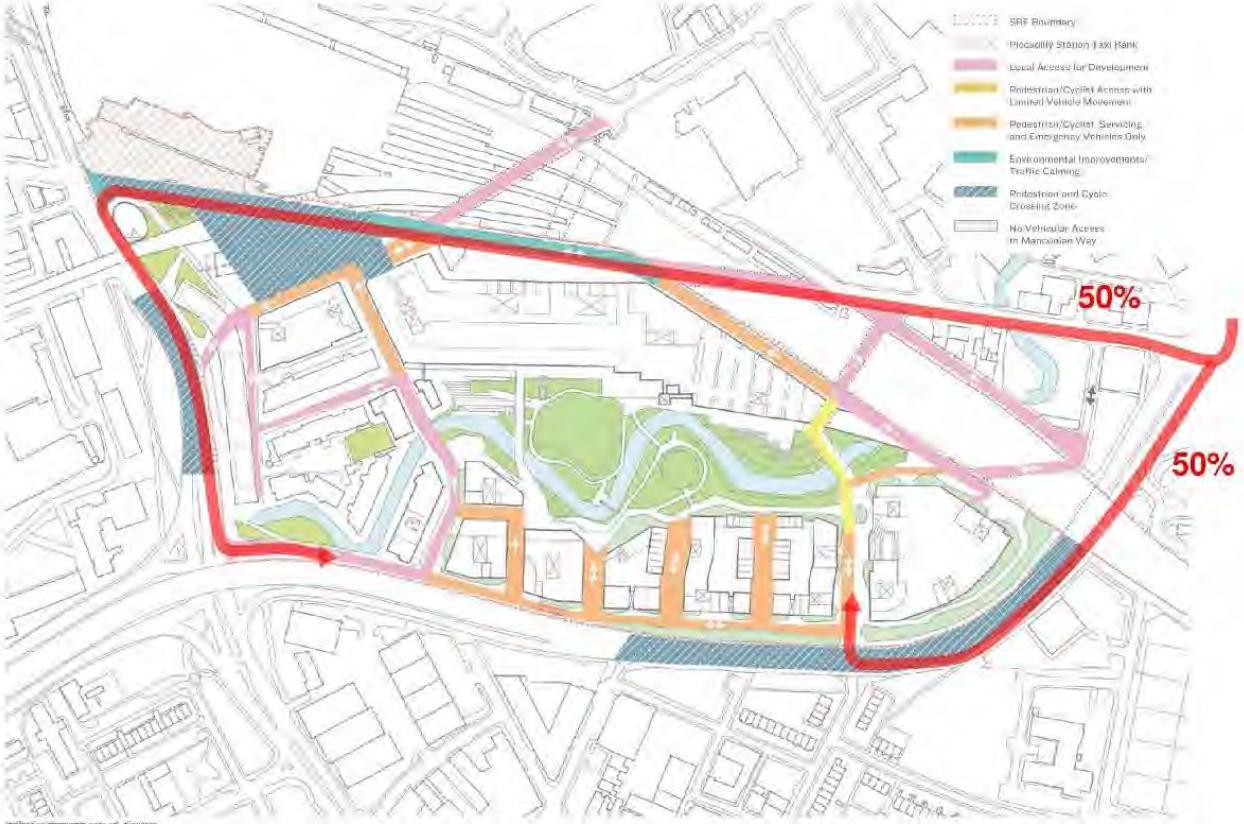


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ROUTING – TRAFFIC ARRIVING FROM THE EAST

Trips arriving from the east have been assigned a routing to the site access points, shown previously.

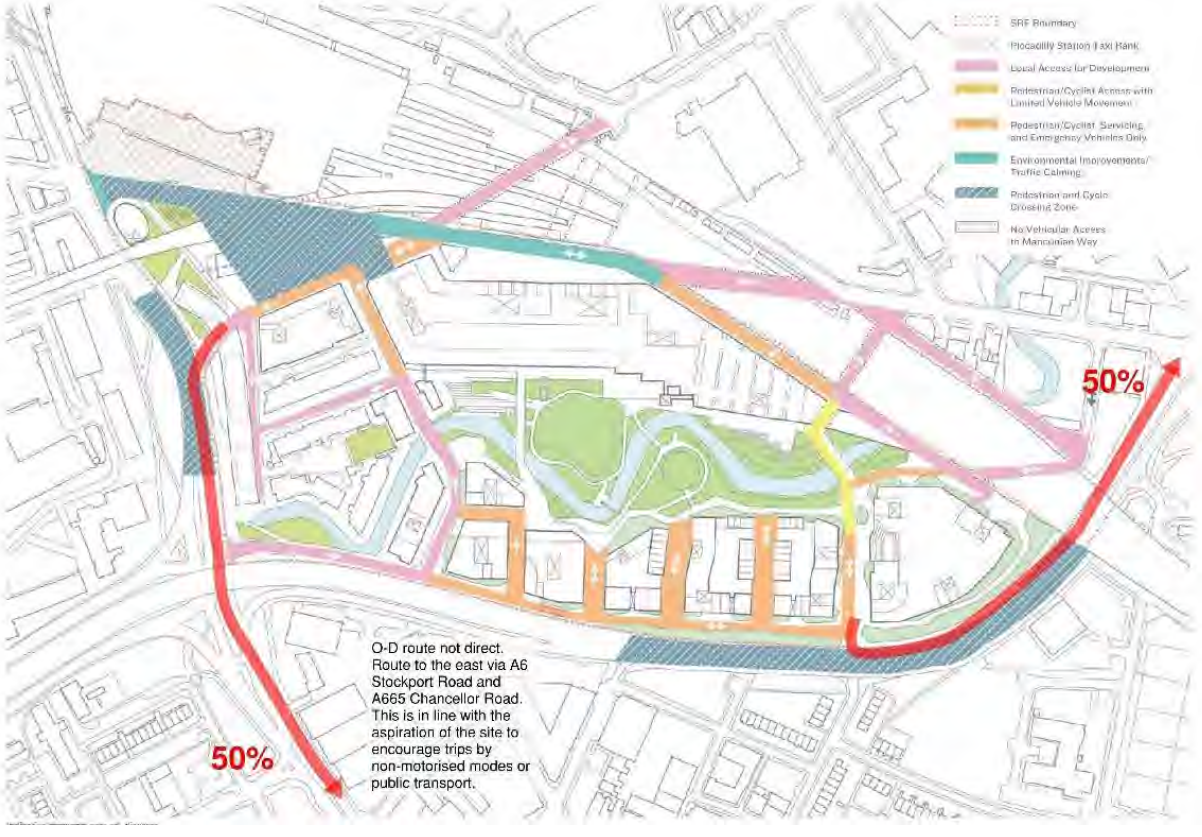


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ROUTING – TRAFFIC DEPARTING TO THE EAST

Trips departing to the east have been assigned a routing from the site egress points, shown previously.

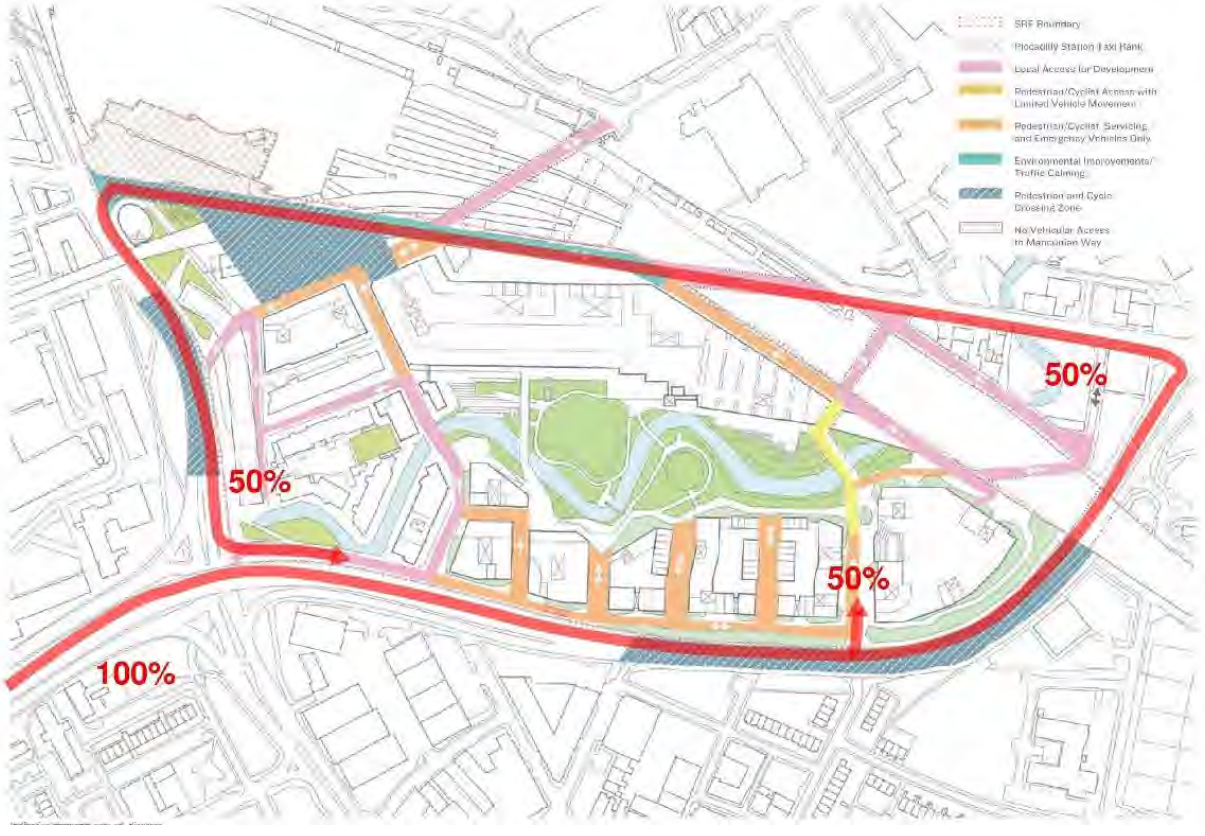


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ROUTING – TRAFFIC ARRIVING FROM THE WEST

Trips arriving from the west have been assigned a routing to the site access points, shown previously.

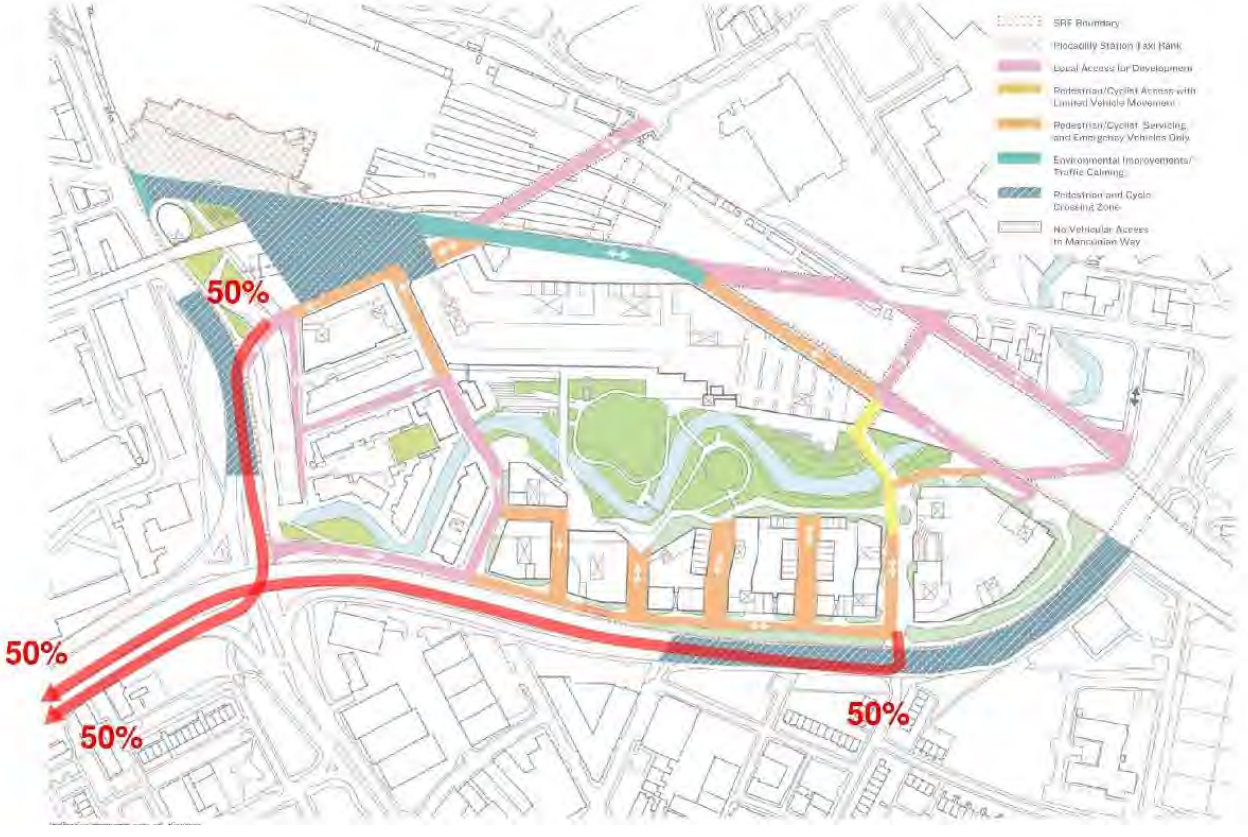


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ROUTING – TRAFFIC DEPARTING TO THE WEST

Trips departing to the west have been assigned a routing from the site egress points, shown previously.



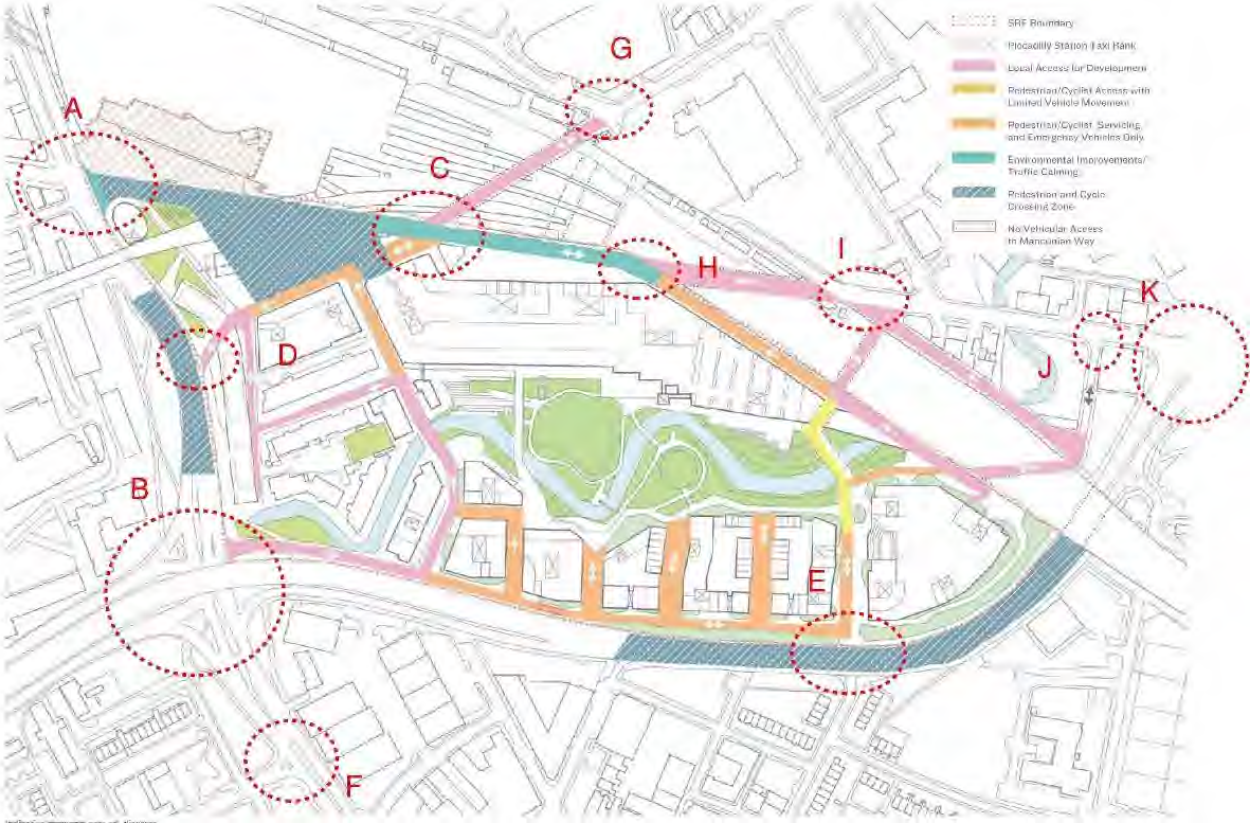
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LOCAL IMPACT JUNCTIONS

Trips generated by the development have been shown at the local junctions around the site, as shown in the figure.

The flow diagrams on the next sheets show the turns at each junction.



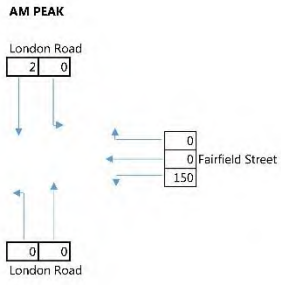
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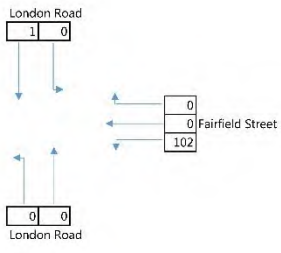
PEAK HOUR TURNING MOVEMENTS BY JUNCTION

Junction A

AM PEAK

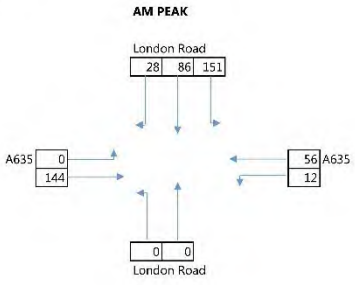


PM PEAK

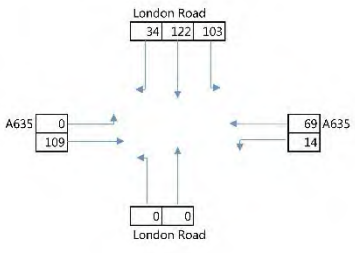


Junction B

AM PEAK

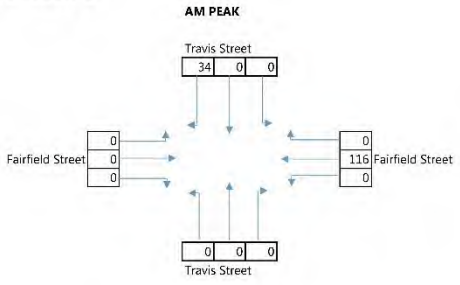


PM PEAK

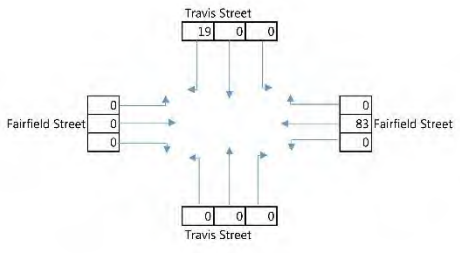


Junction C

AM PEAK



PM PEAK



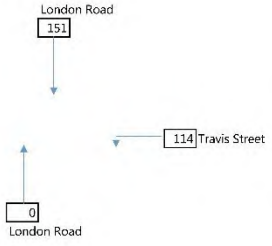
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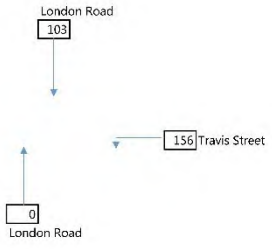
PEAK HOUR TURNING MOVEMENTS BY JUNCTION

Junction D

AM PEAK

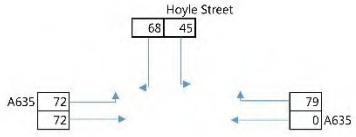


PM PEAK

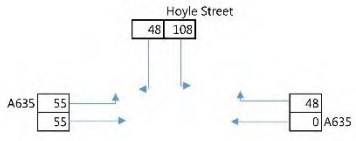


Junction E

AM PEAK

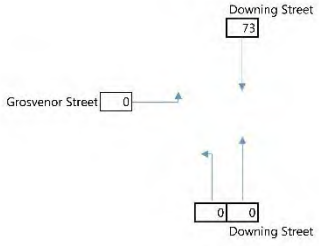


PM PEAK

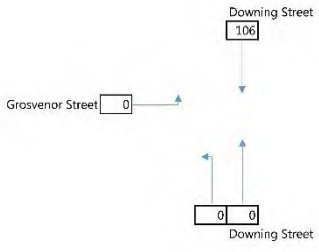


Junction F

AM PEAK



PM PEAK



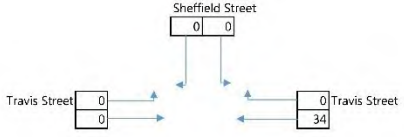
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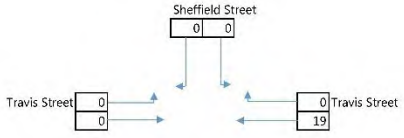
PEAK HOUR TURNING MOVEMENTS BY JUNCTION

Junction G

AM PEAK

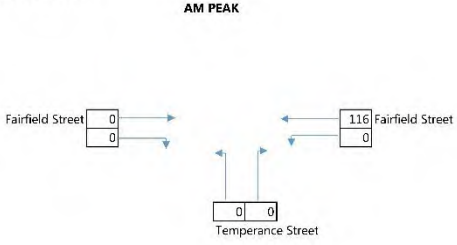


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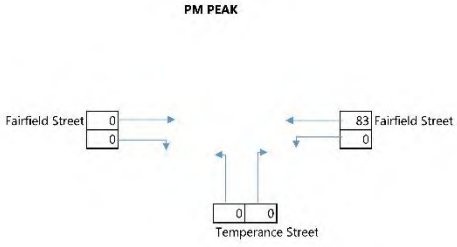


Junction H

AM PEAK

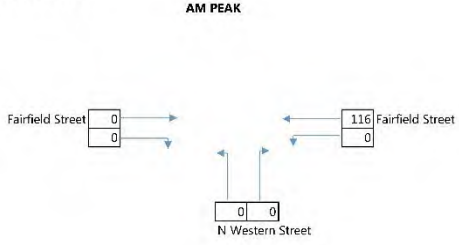


PM PEAK

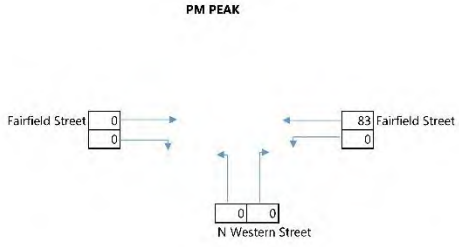


Junction I

AM PEAK



PM PEAK



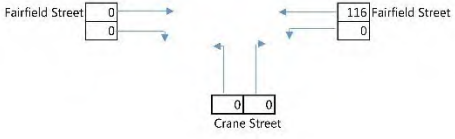
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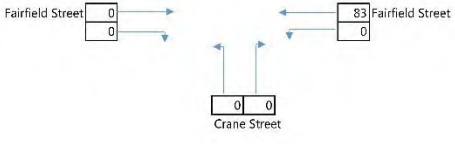
PEAK HOUR TURNING MOVEMENTS BY JUNCTION

Junction J

AM PEAK

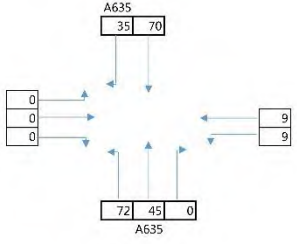


PM PEAK

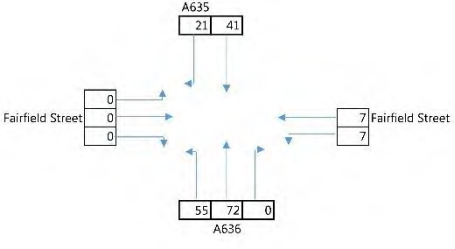


Junction K

AM PEAK



PM PEAK



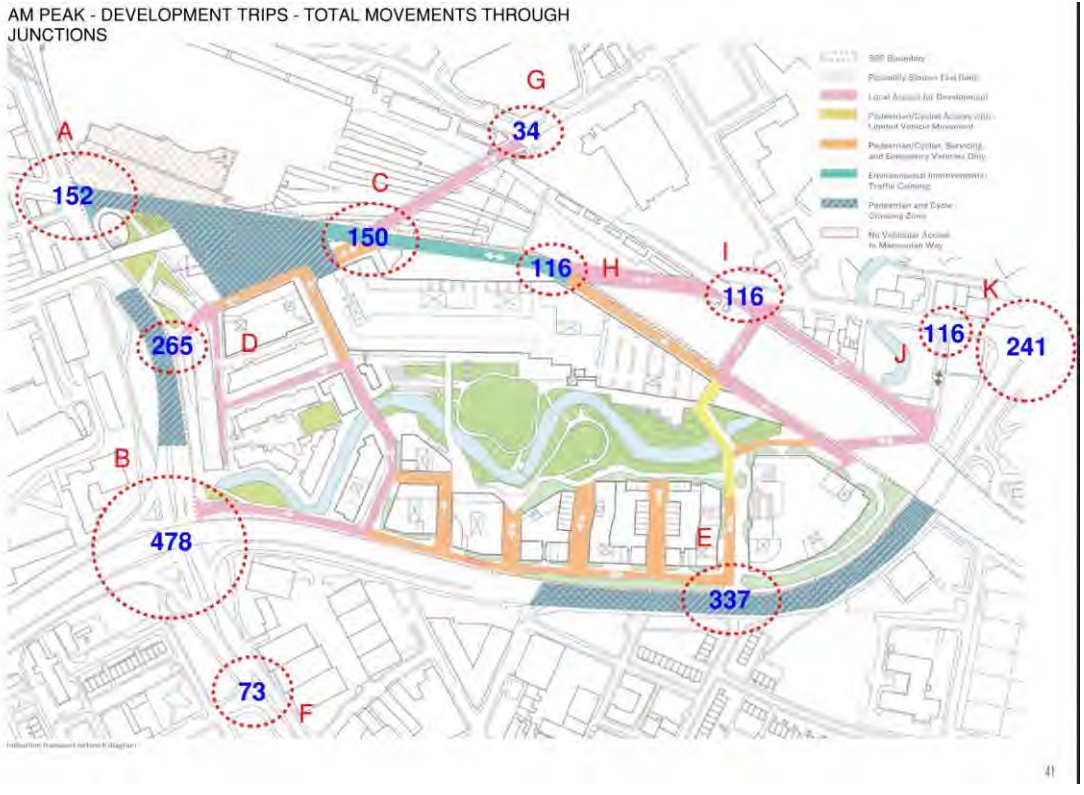
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PROPOSED SURVEY LOCATIONS

This Figure shows the total development trips generated that pass through the local impact junctions in the AM Peak.

This suggests that the proposed survey locations cover the key local impact junctions, reprovided on the next slide.



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PROPOSED SURVEY LOCATIONS – FROM SCOPING NOTE

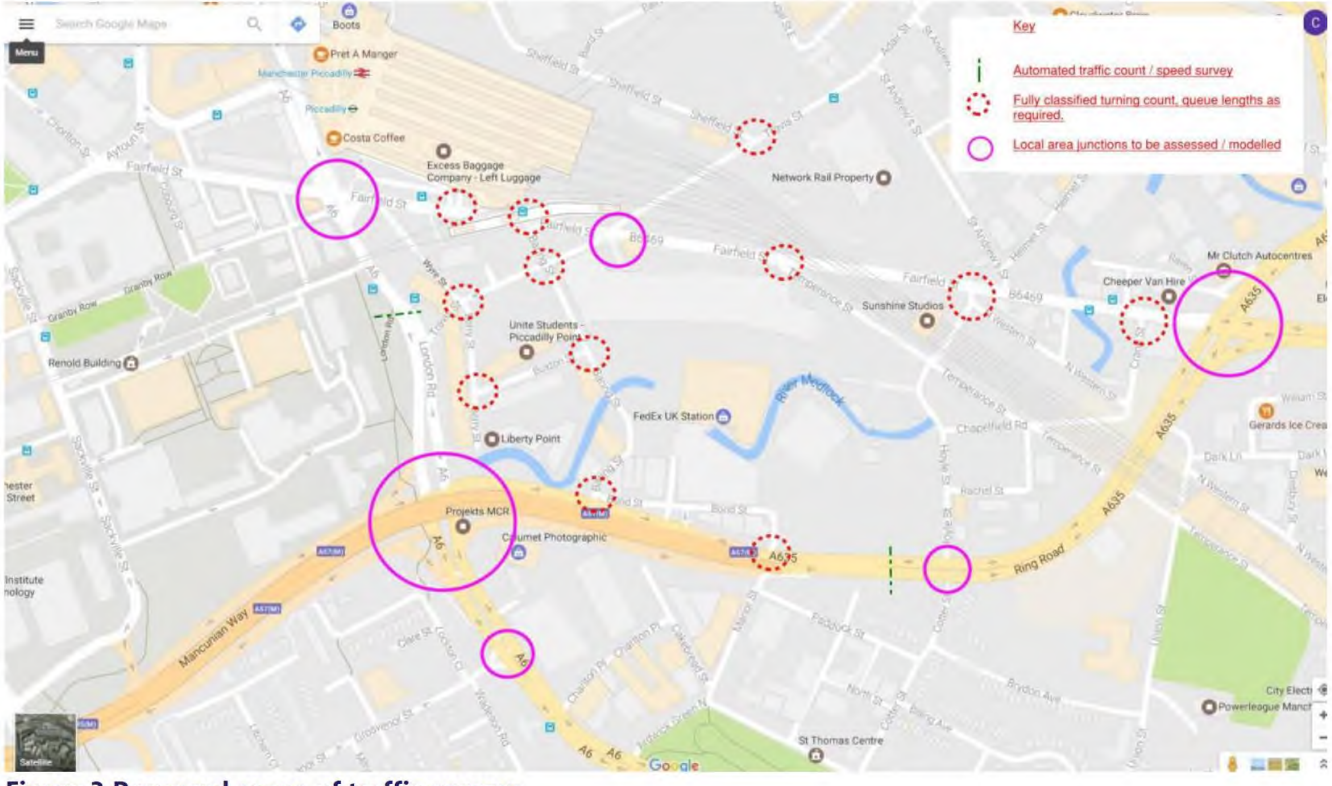


Figure 3 Proposed scope of traffic surveys

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Richard Evans

Subject: RE: KRN Ref. 18/115 - Mayfield

From: Riccardo Boncinelli <Riccardo.Boncinelli@tfgm.com>
Date: 28 June 2018 at 12:15:01 BST
To: "Chris Mullett (Chris.Mullett@BuroHappold.com)" <Chris.Mullett@BuroHappold.com>
Cc: "a.connell@manchester.gov.uk" <a.connell@manchester.gov.uk>, "Wai Ling Cheung" <WaiLing.Cheung@tfgm.com>, Richard Dolphin <Richard.Dolphin@tfgm.com>, Richard Clowes <Richard.Clowes@tfgm.com>
Subject: FW: KRN Ref. 18/115 - Mayfield

**** External E-Mail ****

Sorry discard previous, I made a bit of a mess explaining the extra junctions to be surveyed, see below for correct text:

Hello Chris,

I have now had the opportunity to review the trip generation and distribution information you sent over recently.
Please note my comments below. To keep it as simple as possible I have listed these against your note headings.
I hope it all makes sense.

Trip Generation Person Rates and Trips (pages 4,5)
These are acceptable to TfGM. Of course should the development quantum change, the trip rates will need to be revised.
I note that for the retail leisure part A3 use has been assumed; this is for food and drink.

Modal Split (page 6)
TfGM agree with the percentages shown in the first two columns (Residential and Office Census Base).

We note that a discount has been applied to derive an adjusted car modal share (5%) for the office use.
The note states that car mode share for office use was reduced to account for limited parking on site.
For the hotel and retail uses the modal split was derived from professional experience for similar land use.
Hotel and retail uses both show a car driver share of 0%.

In our opinion the reduction applied to the office car driver modal share is too high and we believe that it is unlikely that the hotel
and retail share will be zero.
This will of course depend partly on the parking strategy adopted for the whole site which, as I understand it, is unclear at the moment.

Generally in relation to modal share reductions we advise the following:
If the sites searched on TRICS are of similar characteristics, and in particular if the locations are comparable, then that search reveals a best estimate of the likely traffic generation, without any further reduction based on a proposed low level of on-site parking provision.

Traffic likely to be generated by the development is likely to seek parking in the vicinity, not only at the development itself but at adjacent car parks or on-street.
This traffic should be acknowledged as being new to the adjacent road network, although it is reasonable to consider this a worst-case scenario.
We have applied this principle to the reviews of many developments across GM and would suggest that this be applied to the Mayfield development too

This is not an exact science therefore the modal share percentage will likely rest somewhere between the non-discounted share and the discounted share listed on pages 6.
I would suggest that maybe further research should carried out within TRICS to select only sites which have no parking or limited parking to see what the difference is.
If trip rates can be extracted on this basis then discount will not be necessary.
Obviously, as stated previously, until the parking strategy is clear it is difficult to predict any reductions on the basis of parking allowance.

I would also emphasize that in our previous response we highlighted the need for considering sustainable travel initiatives for the area. This of course will have an impact on reducing car trips and increasing PT / cycling modal share.

Trips Per Land Use By Mode - Residential (page 7)
Agreed

Trips Per Land Use by Mode – Office (page 8)
Not agreed see previous regarding discount

Trips Per Land Use by Mode – Hotel (page 9)
Not agreed see previous regarding discount

Trips Per Land Use by Mode – Retail (page 10)
Not agreed see previous regarding discount

Total Development (page 11)
Not agreed due to the above

Servicing Trips (page 12)
TfGM would need to see more information regarding the percentages applied in the AM and PM columns prior to agreeing the number of servicing trips.

Total Development Trips (page 13)
TfGM would suggest the number are revised to take into account the comments above.

Trip Distribution(page 14)
Methodology is acceptable to TfGM

Site Access Assumptions
TfGM note that egress will be allowed onto the A6 and from Hoyle St. Access will be allowed at Baring St and via a new junction at Hoyle St (this will also allow egress).
Should this change the trip distribution will need to be revised accordingly.

Routing (pages 17 to 25)
Overall the approach taken looks reasonable however I would be grateful if you could provide further info on the spreadsheet you provided which shows the route allocations for the N, S, W and E columns.
I am assuming that for each origin / destination area a group of wards will have been allocated together and then assigned to a N S W or E route. I would like a bit more info on this part of this exercise, maybe via diagrams showing wards grouped together?

TfGM have some reservations regarding the percentage of trips allocated to the junction of London Rd / Fairfield St for the north arm of London Road (page 17). This is shown as 2%.
We accept that most inbound trips will likely be arriving via Fairfield St and the A57. However we believe that in all likelihood more than 2% arrivals will be transiting from the A6 North at its junction with the Fairfield St. These trips are likely to travel via Store Street onto the A6 London Road and possibly via Ducie St onto the A6.
Assuming a junction impact assessment threshold of 30 two way trips we don't think it is inconceivable to predict that 30 trips out of a total of 303 will travel via Store St / London Rd into the development during the morning peak. This would account for 10% of the trips generated.
For this reason we would suggest that the junction of A6 London Rd / Store St, the junction of Store St / A665 and the junction of Ducie St / A6 are included in the junction assessment list and surveyed accordingly. In particular the junctions of the A6 / Store St and Ducie St / A6 are already very busy and TfGM need to understand the potential effect of the development on this junction.

Turning Movements by Junction
I have not had time to review all the calculations but looking at Junction C on page 6 it seems that the values for Travis Street and Fairfield Street have been transposed. % distribution at Travis Street is shown as 38% in the distribution diagram but the
traffic flows there is shown as 34. The figure should be 116?

Survey locations
In view of the above we would suggest that the junctions of the A6 / Store St, A665 / Store St and A6 / Ducie St are surveyed in addition to the ones listed in your note.
Surveys should be conducted outside of holiday periods and should include queue surveys to allow for supressed demand. If further info is required on the queue surveys I would suggest you contact Richard Dolphin directly.

Other
I would be grateful if, in addition to the current list of attendees, the following TfGM personnel could be included in future workshops:

Richard Clowes (Richard.Clowes@tfgm.com)
Dominic Smith (Dominic.Smith@tfgm.com)
Julian Ashworth (Julian.Ashworth@tfgm.com)
Anthony Murden (Anthony.Murden@tfgm.com)

I hope the above is clear but let me know if you require any further info.

Regards,

Riccardo Boncinelli
Infrastructure Development Officer
Highway Forecasting and Analytical Services

Transport for Greater Manchester
2 Piccadilly Place, Manchester M1 3BG
Direct Line 0161 244 1420, Extension 1420

Please note that my working week is from Monday to Thursday.

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Mayfield Phase 1 – Transport Scoping Study – 06 June 2019 – Revision 02

Highway Network

The study area should include the junctions of Ashton Old Rd / Fairfield St / Pin Mill Brow, Ring Rd and Adair St / Great Ancoats / Pollard Street.

Trip Generation Methodology

Residential Use

The methodology for this use is agreed by TfGM. TfGM note that Census data for the relevant ward has been used to determine vehicle modal share for the residents.

Commercial Use

People trip rate is agreed.
In relation to the modal share for cars, the note states the following:
"To ensure that car parking does not exceed capacity on-site, it was proposed as part of the methodology submitted to MCC / TfGM in June 2018 that the Car Driver mode share would be reduced from 34% to 5%.However TfGM suggested that this reduction was too high and that in reality, some office workers may still choose to drive their car to / from work and park elsewhere, despite parking provision on-site and the alternative transport modes available at this location".
It also states *"To take account of TfGM's comments, it is proposed to reduce the car driver mode share from 34% to 14% which is the average car driver mode share derived from the office site selection in TRICS".*

TfGM are of the opinion that then methodology above potentially covers sites which are different from the development site characteristics. We would suggest that the modal share is determined in the same way as it was determined for the residential use, using Census 2011 data modal share. TfGM's view is that different sites within TRICS have been used to determine trip rate and modal share. We believe this approach is slightly inconsistent and that using ward modal share ensures better consistency in the determination of car share.

Retail / Leisure Uses

The note states that *"given that the retail and leisure uses proposed at the site would be car free (with the exception of accessible parking requirements) and are located in central Manchester, it is considered that the majority of trips would be on foot with very few car trips. To reflect this, a car mode share of 0.5% has been adopted, which is considered appropriate for a proposed development at this location where retail/leisure trips would be linked to other uses in the area".*

TfGM would need to see more evidence before validating the low modal share.

Hotel Use

For the hotel use the note states that "*to derive an appropriate mode split, reference has been made additionally to other hotel sites located next to railway stations. From these sites,*

a car model share of 16% has been derived; this has been applied to the hotel use at the Mayfield development".
TfGM's view is that different sites within TRICS have been used to determine trip rate and modal share. The same sites should be used to determine the trip rate and the modal share to ensure consistency.

Conclusion
TfGM are of the opinion that some of the modal share adopted is on the low side. Before validating the percentages proposed in the note we would need to see firm evidence in the form of surveys of existing sites or previously approved Transport Assessments which cover existing uses similar to those proposed at Mayfield.

If the evidence is not available TfGM would suggest that sensitivity testing is carried out using modal share available from the Census 2011 data for all the proposed uses.
The models could be run using different trip generation figures to enable the local authority to have a better picture of how different trip patterns could affect the highway network.

Appendix B Traffic Survey Data

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Manchester Mayfield MCC Survey
Mancunian Way - London Road Junction

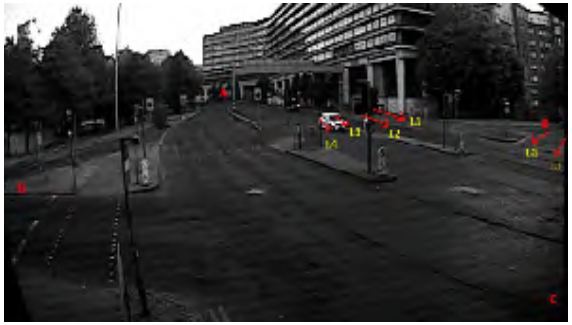
Week Commencing
Wednesday 11th July 2018

for Buro Happold

DETAILS OF SITE

LOCATION	**Manchester Mayfield Surveys**
DATES	Wednesday 11th July 2018
TIME PERIOD	07:00-10:00 16:00-19:00
WEATHER	The weather for the week was very pleasant
COMMENTS	Arms as per camera images
INCIDENTS	There were no incidents.



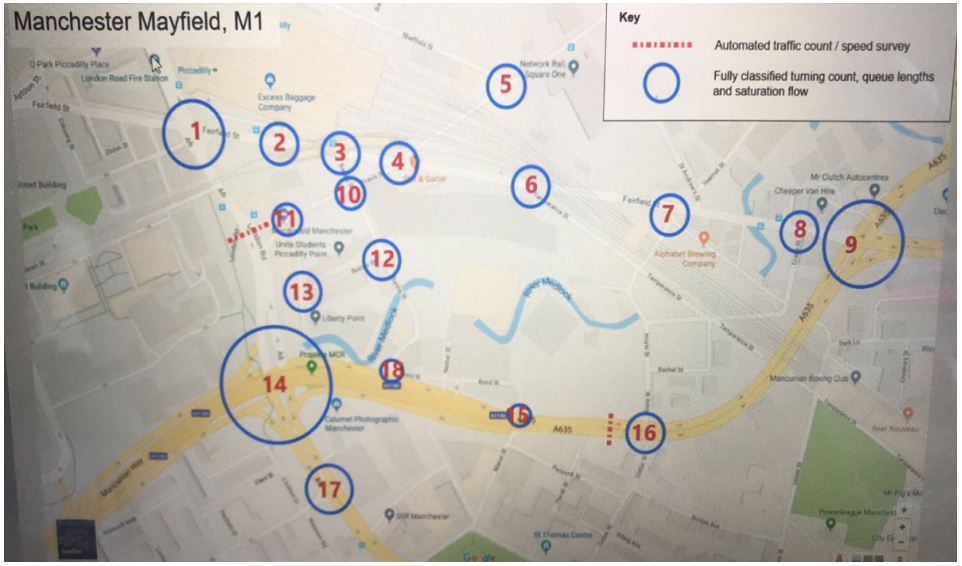


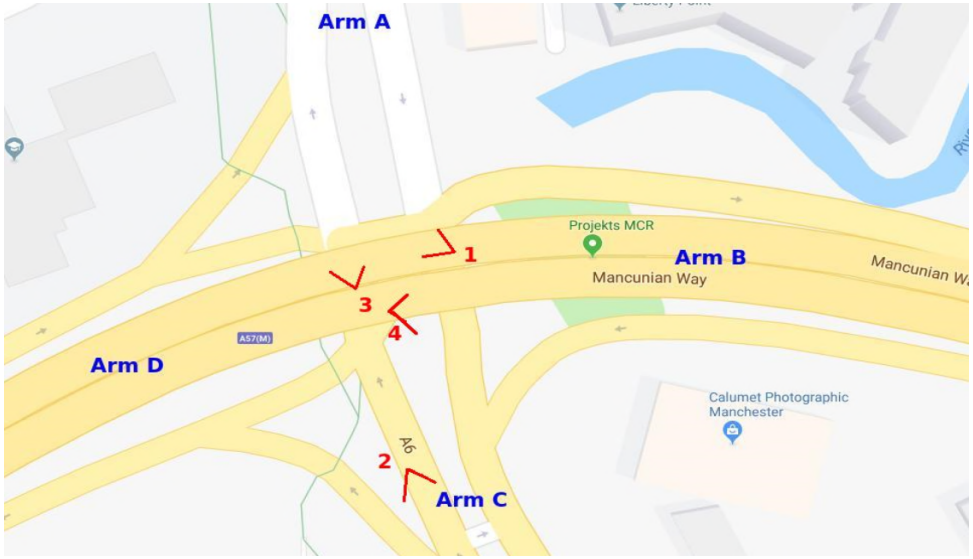






Original Sites





Summary of Survey

Fully classified turning counts were captured at the junctions shown on the attached plan tab.

The survey was undertaken between 0700 and 1000 hours and 1600 to 1900 hours on a Tuesday, Wednesday or Thursday.

Vehicle Classifications should include Cycle/Motorcycle/Car/LGV/OGV1/OGV2/PSV and PCUs are included in the excel summary tables - counts are summarised for each 15-minute time segment through the hour, with all hourly summaries i.e. 0700-0800, 0715-0815 etc etc

Queue lengths were observed for each lane (taking note of the maximum storage capacity for each lane or noting it as infinite length where appropriate) – the maximum queue observed during each 15-minute time segment should be provided throughout the survey period.

At signal junctions, saturation flows should were observed (based on ten typical readings to obtain a mean average - the minimum length of each measurement was 12 seconds) – making a note of any right turner storage/blocking effects.

Mayfield - Manchester Traffic Surveys: Wednesday, 11 July 2018

Junction: A - A6 North / B - Mancunian Way East / C - A6 South / D - Mancunian Way West

Approach: A - A6 North

	A to B									A to C									A to D									A to A								
TIME	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL
07:00 - 07:15	0	0	0	0	0	0	0	0.0	0	0	0	70	8	1	3	10	106.4	92	0	0	99	13	1	0	0	113.9	113	0	0	0	0	0	0	0	0.0	0
07:15 - 07:30	0	0	1	0	0	0	0	1.0	1	2	0	56	10	2	0	11	91.4	81	0	0	79	10	2	1	0	94.3	92	0	0	0	0	0	0	0	0.0	0
07:30 - 07:45	0	0	0	0	0	0	0	0.0	0	3	0	93	13	0	0	7	120.6	116	0	0	92	8	0	0	0	100.0	100	0	0	0	0	0	0	0	0.0	0
07:45 - 08:00	0	0	0	0	0	0	0	0.0	0	2	0	113	11	1	0	11	147.9	138	0	0	55	10	1	0	0	66.5	66	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**7**	**0**	**332**	**42**	**4**	**3**	**39**	**466**	**427**	**0**	**0**	**325**	**41**	**4**	**1**	**0**	**374**	**371**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
08:00 - 08:15	0	0	0	0	0	0	0	0.0	0	3	1	104	10	0	0	9	133.0	127	0	0	40	11	2	0	0	54.0	53	0	0	0	0	0	0	0	0.0	0
08:15 - 08:30	0	0	0	0	0	0	0	0.0	0	7	1	99	14	2	0	9	135.8	132	0	0	41	6	1	3	0	55.4	51	0	0	0	0	0	0	0	0.0	0
08:30 - 08:45	0	0	1	0	0	0	0	1.0	1	6	1	107	7	4	0	12	145.6	137	0	0	48	6	2	0	0	57.0	56	0	0	0	0	0	0	0	0.0	0
08:45 - 09:00	0	0	1	0	0	0	0	1.0	1	10	0	99	6	2	1	8	128.3	126	0	0	45	7	2	0	0	55.0	54	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	**2**	**26**	**3**	**409**	**37**	**8**	**1**	**38**	**542**	**522**	**0**	**0**	**174**	**30**	**7**	**3**	**0**	**222**	**214**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
09:00 - 09:15	0	0	0	0	0	0	0	0.0	0	3	1	83	14	3	0	11	104.5	95	0	0	87	8	3	1	0	101.0	99	0	0	0	0	0	0	0	0.0	0
09:15 - 09:30	0	0	1	0	0	0	0	1.0	1	5	0	74	11	0	1	20	128.3	111	0	0	68	13	2	0	0	84.0	83	0	0	0	0	0	0	0	0.0	0
09:30 - 09:45	0	0	0	0	0	0	0	0.0	0	7	0	92	8	1	1	17	139.2	126	0	0	88	10	3	0	0	102.5	101	0	0	0	0	0	0	0	0.0	0
09:45 - 10:00	0	0	0	0	0	0	0	0.0	0	3	0	73	10	0	1	17	119.9	104	0	0	84	12	1	0	0	97.5	97	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**18**	**1**	**302**	**43**	**4**	**3**	**65**	**492**	**436**	**0**	**0**	**327**	**43**	**9**	**1**	**0**	**386**	**380**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**4**	**4**	**51**	**4**	**1043**	**122**	**16**	**7**	**142**	**1500**	**1385**	**0**	**0**	**826**	**114**	**20**	**5**	**0**	**982**	**965**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 - 16:15	0	0	0	0	0	0	0	0.0	0	9	4	166	15	4	0	11	212.4	209	0	0	60	4	1	0	0	65.5	65	0	0	2	0	0	0	0	2.0	2
16:15 - 16:30	0	0	0	0	0	0	0	0.0	0	11	2	172	10	0	0	20	225.0	215	0	0	62	5	2	0	1	72.0	70	0	0	2	0	0	0	0	2.0	2
16:30 - 16:45	0	0	1	0	0	0	0	1.0	1	10	4	163	6	3	2	14	209.7	202	0	0	66	0	0	0	0	66.0	66	0	0	1	0	0	0	0	1.0	1
16:45 - 17:00	0	0	0	0	0	0	0	0.0	0	15	1	180	14	0	0	19	235.4	229	0	0	53	1	0	1	0	56.3	55	0	0	3	0	0	0	0	3.0	3
Hourly Total	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**45**	**11**	**681**	**45**	**7**	**2**	**64**	**883**	**855**	**0**	**0**	**241**	**10**	**3**	**1**	**1**	**260**	**256**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**8**	**8**
17:00 - 17:15	0	0	0	0	0	0	0	0.0	0	12	1	168	11	2	0	13	208.8	205	0	3	79	1	1	0	0	82.7	84	0	0	1	0	0	0	0	1.0	1
17:15 - 17:30	0	0	0	0	0	0	0	0.0	0	17	2	167	7	0	0	18	204.2	201	0	0	52	2	0	0	0	54.0	54	0	0	0	0	0	0	0	0.0	0
17:30 - 17:45	0	0	1	0	0	0	0	1.0	1	16	2	169	8	1	0	14	210.5	210	0	1	65	1	0	0	0	68.4	67	0	0	1	0	0	0	0	1.0	1
17:45 - 18:00	0	0	0	0	0	0	0	0.0	0	24	3	171	5	0	0	20	222.0	223	0	1	66	1	0	0	0	67.4	68	0	0	2	0	0	0	0	2.0	2
Hourly Total	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**69**	**8**	**683**	**31**	**3**	**0**	**65**	**846**	**839**	**0**	**5**	**262**	**5**	**1**	**0**	**0**	**271**	**273**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**4**	**4**
18:00 - 18:15	0	0	0	0	0	0	0	0.0	0	17	0	139	10	0	0	16	184.4	182	0	0	75	1	0	0	0	76.0	76	0	0	0	0	0	0	0	0.0	0
18:15 - 18:30	0	0	0	0	0	0	0	0.0	0	7	5	105	1	0	0	22	153.4	140	0	2	103	3	0	0	0	106.8	108	0	0	0	0	0	0	0	0.0	0
18:30 - 18:45	0	0	0	0	0	0	0	0.0	0	6	0	89	6	0	0	14	124.2	115	0	0	98	1	0	0	0	99.0	99	0	0	0	0	0	0	0	0.0	0
18:45 - 19:00	0	0	0	0	0	0	0	0.0	0	6	1	75	3	1	0	23	127.1	109	0	1	84	2	0	0	0	86.4	87	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**36**	**6**	**408**	**20**	**1**	**0**	**75**	**589**	**546**	**0**	**3**	**360**	**7**	**0**	**0**	**0**	**368**	**370**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	**2**	**150**	**25**	**1752**	**96**	**11**	**2**	**204**	**2318**	**2240**	**0**	**8**	**863**	**22**	**4**	**1**	**1**	**899**	**899**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**12**	**12**

Mayfield - Manchester Traffic Surveys: Wednesday, 11 July 2018

Junction: A - A6 North / B - Mancunian Way East / C - A6 South / D - Mancunian Way West

Approach: B - Mancunian Way East

	B to C									B to D									B to A									B to B								
TIME	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL
07:00 - 07:15	0	0	5	4	1	0	0	10.5	10	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
07:15 - 07:30	0	1	9	2	1	0	0	12.9	13	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
07:30 - 07:45	0	0	8	2	1	0	0	11.5	11	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
07:45 - 08:00	0	1	26	1	1	1	0	31.2	30	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**2**	**48**	**9**	**4**	**1**	**0**	**66**	**64**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
08:00 - 08:15	0	0	14	2	2	1	0	21.3	19	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
08:15 - 08:30	0	0	17	1	1	0	0	19.5	19	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
08:30 - 08:45	0	0	21	4	1	0	0	26.5	26	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
08:45 - 09:00	0	0	28	3	2	2	0	38.6	35	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**80**	**10**	**6**	**3**	**0**	**106**	**99**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
09:00 - 09:15	0	1	54	11	4	3	0	78.3	73	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
09:15 - 09:30	0	0	66	11	5	1	0	86.8	83	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
09:30 - 09:45	0	0	17	1	0	0	0	18.0	18	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
09:45 - 10:00	0	0	15	2	2	0	0	20.0	19	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**1**	**152**	**25**	**11**	**4**	**0**	**203**	**193**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**0**	**3**	**280**	**44**	**21**	**8**	**0**	**375**	**356**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 - 16:15	1	0	85	21	3	0	0	110.7	110	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
16:15 - 16:30	0	0	103	7	2	0	1	115.0	113	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
16:30 - 16:45	2	0	110	11	1	1	0	125.2	125	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
16:45 - 17:00	0	1	91	9	0	0	0	100.4	101	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**3**	**1**	**389**	**48**	**6**	**1**	**1**	**451**	**449**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:00 - 17:15	1	0	79	10	0	0	0	89.2	90	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
17:15 - 17:30	0	3	75	2	0	1	1	82.5	82	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
17:30 - 17:45	0	0	87	6	0	0	0	93.0	93	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
17:45 - 18:00	0	1	110	5	0	0	0	115.4	116	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**1**	**4**	**351**	**23**	**0**	**1**	**1**	**380**	**381**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
18:00 - 18:15	0	0	35	1	0	0	0	36.0	36	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
18:15 - 18:30	0	0	14	0	0	0	0	14.0	14	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
18:30 - 18:45	0	0	17	1	0	0	0	18.0	18	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
18:45 - 19:00	0	0	14	0	0	0	1	16.0	15	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**80**	**2**	**0**	**0**	**1**	**84**	**83**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**4**	**5**	**820**	**73**	**6**	**2**	**3**	**915**	**913**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Mayfield - Manchester Traffic Surveys: Wednesday, 11 July 2018

Junction: A - A6 North / B - Mancunian Way East / C - A6 South / D - Mancunian Way West

Approach: C - A6 South

	C to D									C to A									C to B									C to C								
TIME	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL
07:00 - 07:15	0	0	170	32	2	5	4	224.5	213	4	0	45	5	2	1	16	88.1	73	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
07:15 - 07:30	0	1	160	26	9	3	1	208.8	200	9	2	61	8	1	1	10	95.4	92	0	0	2	0	0	0	0	2.0	2	0	0	0	0	0	0	0	0.0	0
07:30 - 07:45	0	4	105	26	8	4	0	153.8	147	11	4	71	10	0	1	11	109.1	106	0	0	1	0	0	0	0	1.0	1	0	0	0	0	0	0	0	0.0	0
07:45 - 08:00	0	1	78	17	4	4	1	112.6	105	18	1	110	7	1	1	9	142.8	147	0	0	1	0	0	0	0	1.0	1	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**6**	**513**	**101**	**23**	**16**	**6**	**700**	**665**	**42**	**7**	**287**	**30**	**4**	**4**	**46**	**435**	**420**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**4**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
08:00 - 08:15	0	4	93	19	3	4	0	127.3	123	11	1	93	7	0	0	8	118.6	120	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
08:15 - 08:30	0	2	90	11	2	6	0	118.6	111	17	2	88	4	1	0	11	119.7	123	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
08:30 - 08:45	0	2	74	16	3	1	0	97.6	96	21	5	100	10	2	0	9	137.2	147	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
08:45 - 09:00	0	0	62	11	3	5	0	89.0	81	15	1	99	10	0	1	8	130.7	134	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**8**	**319**	**57**	**11**	**16**	**0**	**433**	**411**	**64**	**9**	**380**	**31**	**3**	**1**	**36**	**507**	**524**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
09:00 - 09:15	0	2	112	16	5	6	1	152.1	142	14	2	78	9	2	0	13	119.6	118	0	0	1	0	0	0	0	1.0	1	0	0	0	0	0	0	0	0.0	0
09:15 - 09:30	0	1	135	22	6	2	1	173.0	167	8	1	57	12	1	0	16	104.5	95	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
09:30 - 09:45	0	0	104	13	2	4	0	129.2	123	9	3	68	7	0	0	13	104.0	100	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
09:45 - 10:00	0	1	114	23	0	7	1	155.5	146	5	1	43	4	0	0	18	84.4	71	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**4**	**465**	**74**	**13**	**19**	**3**	**611**	**578**	**36**	**7**	**246**	**32**	**3**	**0**	**60**	**413**	**384**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**0**	**18**	**1297**	**232**	**47**	**51**	**9**	**1744**	**1654**	**142**	**23**	**913**	**93**	**10**	**5**	**142**	**1355**	**1328**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 - 16:15	0	0	27	8	3	3	0	46.4	41	4	0	61	8	0	0	16	101.8	89	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
16:15 - 16:30	0	0	39	4	1	1	0	46.8	45	4	1	51	6	2	1	19	101.5	84	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
16:30 - 16:45	0	0	41	3	0	0	1	46.0	45	5	0	61	4	1	0	20	107.5	91	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
16:45 - 17:00	0	1	23	1	0	2	0	29.0	27	6	0	86	4	0	0	9	109.2	105	0	0	1	0	0	0	0	1.0	1	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**1**	**130**	**16**	**4**	**6**	**1**	**168**	**158**	**19**	**1**	**259**	**22**	**3**	**1**	**64**	**420**	**369**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:00 - 17:15	0	0	47	3	1	2	0	56.1	53	8	0	75	0	0	0	18	112.6	101	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
17:15 - 17:30	0	0	45	6	1	3	0	59.4	55	3	2	62	2	0	0	12	89.4	81	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
17:30 - 17:45	0	0	56	2	0	0	0	58.0	58	2	0	50	1	0	0	14	79.4	67	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
17:45 - 18:00	0	1	54	7	1	1	0	65.2	64	1	0	56	3	0	0	15	89.2	75	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**1**	**202**	**18**	**3**	**6**	**0**	**239**	**230**	**14**	**2**	**243**	**6**	**0**	**0**	**59**	**371**	**324**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
18:00 - 18:15	0	1	78	5	0	0	0	83.4	84	6	0	37	0	0	0	17	72.2	60	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
18:15 - 18:30	0	0	64	7	0	1	0	73.3	72	1	0	28	0	0	0	14	56.2	43	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
18:30 - 18:45	0	0	68	8	0	1	0	76.3	77	4	0	51	2	0	0	9	71.8	66	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
18:45 - 19:00	0	0	72	3	0	1	0	77.3	76	4	0	37	0	0	0	15	67.8	56	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**1**	**282**	**23**	**0**	**3**	**0**	**312**	**309**	**15**	**0**	**153**	**2**	**0**	**0**	**55**	**268**	**225**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**0**	**3**	**614**	**57**	**7**	**15**	**1**	**719**	**697**	**48**	**3**	**655**	**30**	**3**	**1**	**178**	**1059**	**918**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Mayfield - Manchester Traffic Surveys: Wednesday, 11 July 2018

Junction: A - A6 North / B - Mancunian Way East / C - A6 South / D - Mancunian Way West

Approach: D - Mancunian Way West

	D to A									D to B									D to C									D to D								
TIME	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL	P/CYCLE	M/CYCLE	CAR	LGV	OGV1	OGV2	BUS	PCU	TOTAL
07:00 - 07:15	0	0	70	6	2	0	0	79.0	78	0	0	0	0	0	0	0	0.0	0	0	0	78	18	7	3	3	119.4	109	0	0	0	0	0	0	0	0.0	0
07:15 - 07:30	0	1	64	8	0	0	0	72.4	73	0	0	0	0	0	0	0	0.0	0	0	1	93	19	2	4	0	124.6	119	0	0	0	0	0	0	0	0.0	0
07:30 - 07:45	0	2	63	5	2	0	0	71.8	72	0	0	0	0	0	0	0	0.0	0	0	2	98	13	6	3	0	127.7	122	0	0	0	0	0	0	0	0.0	0
07:45 - 08:00	0	0	72	2	2	0	0	77.0	76	0	0	0	0	0	0	0	0.0	0	0	2	97	17	4	3	0	127.7	123	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**3**	**269**	**21**	**6**	**0**	**0**	**300**	**299**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**366**	**67**	**19**	**13**	**3**	**500**	**473**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
08:00 - 08:15	0	1	76	5	2	0	0	84.4	84	0	0	1	0	0	0	0	1.0	1	0	1	103	23	5	5	0	145.4	137	0	0	0	0	0	0	0	0.0	0
08:15 - 08:30	0	1	66	3	2	0	0	72.4	72	0	0	0	0	0	0	0	0.0	0	0	1	116	16	8	5	0	155.9	146	0	0	0	0	0	0	0	0.0	0
08:30 - 08:45	0	1	85	5	2	0	0	93.4	93	0	0	0	0	0	0	0	0.0	0	0	1	92	18	7	3	1	129.8	122	0	0	0	0	0	0	0	0.0	0
08:45 - 09:00	0	0	78	5	0	0	0	83.0	83	0	0	0	0	0	0	0	0.0	0	0	0	119	20	3	6	0	157.3	148	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**3**	**305**	**18**	**6**	**0**	**0**	**333**	**332**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**3**	**430**	**77**	**23**	**19**	**1**	**589**	**553**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
09:00 - 09:15	0	1	90	4	1	0	0	95.9	96	0	0	0	0	0	0	0	0.0	0	0	1	107	20	5	5	3	152.4	141	0	0	0	0	0	0	0	0.0	0
09:15 - 09:30	0	0	81	2	0	0	0	83.0	83	0	0	1	0	0	0	0	1.0	1	0	0	109	15	6	6	1	148.8	137	0	0	0	0	0	0	0	0.0	0
09:30 - 09:45	0	0	61	9	0	0	1	72.0	71	0	0	0	0	0	0	0	0.0	0	0	1	90	23	4	6	2	137.2	126	0	0	0	0	0	0	0	0.0	0
09:45 - 10:00	0	1	61	5	0	0	0	66.4	67	0	0	0	0	0	0	0	0.0	0	0	1	80	26	9	5	1	133.4	122	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**2**	**293**	**20**	**1**	**0**	**1**	**318**	**317**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**3**	**386**	**84**	**24**	**22**	**7**	**572**	**526**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**0**	**8**	**867**	**59**	**13**	**0**	**1**	**951**	**948**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**11**	**1182**	**228**	**66**	**54**	**11**	**1661**	**1552**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 - 16:15	0	0	43	5	0	0	1	50.0	49	0	0	0	0	0	0	0	0.0	0	0	4	125	23	3	5	0	165.6	160	0	0	0	0	0	0	0	0.0	0
16:15 - 16:30	0	0	38	3	0	0	0	41.0	41	0	0	0	0	0	0	0	0.0	0	0	3	189	10	2	1	0	205.5	205	0	0	0	0	0	0	0	0.0	0
16:30 - 16:45	0	0	31	3	0	0	0	34.0	34	0	0	0	0	0	0	0	0.0	0	0	1	155	25	5	2	1	194.5	189	0	0	0	0	0	0	0	0.0	0
16:45 - 17:00	0	0	30	1	0	0	0	31.0	31	0	0	1	0	0	0	0	1.0	1	0	1	149	16	4	1	0	173.7	171	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**142**	**12**	**0**	**0**	**1**	**156**	**155**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**9**	**618**	**74**	**14**	**9**	**1**	**740**	**725**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:00 - 17:15	0	0	28	1	1	0	1	32.5	31	0	0	0	1	0	0	0	1.0	1	0	3	160	17	4	1	0	186.5	185	0	0	0	0	0	0	0	0.0	0
17:15 - 17:30	0	0	69	0	0	0	0	69.0	69	0	0	1	1	0	0	0	2.0	2	0	1	205	23	3	1	1	237.2	234	0	0	0	0	0	0	0	0.0	0
17:30 - 17:45	0	1	50	2	0	0	0	52.4	53	0	0	0	0	0	0	0	0.0	0	0	2	195	19	2	1	1	222.1	220	0	0	0	0	0	0	0	0.0	0
17:45 - 18:00	0	0	50	1	0	0	0	51.0	51	0	0	0	0	0	0	0	0.0	0	0	1	152	18	1	0	0	171.9	172	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**1**	**197**	**4**	**1**	**0**	**1**	**205**	**204**	**0**	**0**	**1**	**2**	**0**	**0**	**0**	**3**	**3**	**0**	**7**	**712**	**77**	**10**	**3**	**2**	**818**	**811**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
18:00 - 18:15	0	0	46	0	0	0	0	46.0	46	0	0	1	0	0	0	0	1.0	1	0	1	141	15	3	1	2	167.2	163	0	0	0	0	0	0	0	0.0	0
18:15 - 18:30	0	0	50	2	0	0	0	52.0	52	0	0	0	0	0	0	0	0.0	0	0	1	165	4	1	2	1	177.5	174	0	0	0	0	0	0	0	0.0	0
18:30 - 18:45	0	0	36	2	0	0	0	38.0	38	0	0	0	0	0	0	0	0.0	0	0	3	138	9	2	3	5	168.1	160	0	0	0	0	0	0	0	0.0	0
18:45 - 19:00	0	0	27	0	0	0	0	27.0	27	0	0	1	0	0	0	0	1.0	1	0	0	127	7	0	0	4	142.0	138	0	0	0	0	0	0	0	0.0	0
Hourly Total	**0**	**0**	**159**	**4**	**0**	**0**	**0**	**163**	**163**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**5**	**571**	**35**	**6**	**6**	**12**	**655**	**635**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Session Total	**0**	**1**	**498**	**20**	**1**	**0**	**2**	**524**	**522**	**0**	**0**	**4**	**2**	**0**	**0**	**0**	**6**	**6**	**0**	**21**	**1901**	**186**	**30**	**18**	**15**	**2213**	**2171**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Mayfield - Manchester Traffic Surveys: Wednesday, 11 July 2018

Junction: **A - A6 North / B - Mancunian Way East / C - A6 South / D - Mancunian Way West**

	A - A6 North				B - Mancunian Way East			C - A6 South				D - Mancunian Way West			
	Lane 1	Lane 2	Lane 3	Lane 4	Lane 1		Lane 2	Lane 1	Lane 2	Lane 3	Lane 4	Lane 1	Lane 2		Lane 3
Survey Period	Max	Max	Max	Max	Max	(Gap Method)	Max	Max	Max	Max	Max	Max	Max	(Gap Method)	Max
07:00 - 07:15	6	6	8	9	0	0	0	8	1	5	2	7	5	0	9
07:15 - 07:30	6	4	8	6	2	0	0	6	2	3	3	5	5	0	8
07:30 - 07:45	4	7	7	5	1	0	0	5	1	5	2	5	8	0	10
07:45 - 08:00	6	5	5	3	3	0	0	8	2	2	4	6	6	0	9
08:00 - 08:15	7	7	6	5	4	0	0	6	1	3	2	7	8	0	8
08:15 - 08:30	4	8	5	3	2	0	0	6	3	4	5	5	12	0	13
08:30 - 08:45	5	7	4	2	3	0	0	13	1	5	2	9	9	0	7
08:45 - 09:00	6	7	3	2	5	0	0	10	2	4	5	7	11	0	12
09:00 - 09:15	3	5	7	5	3	0	1	13	1	4	2	6	10	0	8
09:15 - 09:30	9	8	9	5	6	0	2	8	1	4	2	8	10	0	8
09:30 - 09:45	6	5	10	7	3	0	0	4	3	4	4	8	9	0	7
09:45 - 10:00	9	8	9	4	2	0	0	5	2	5	1	6	8	0	8
16:00 - 16:15	7	12	10	4	14	0	1	13	1	7	4	4	8	0	12
16:15 - 16:30	6	10	4	7	27+	34+	1	8	1	7	7	6	10	0	13
16:30 - 16:45	8	13	5	3	27+	33+	2	9	1	13	7	4	9	0	10
16:45 - 17:00	10	15	5	6	28+	36+	2	13	4	8	6	4	10	0	13
17:00 - 17:15	8	24	4	4	27+	36+	3	7	4	9	6	4	13+	19	13
17:15 - 17:30	6	16	4	4	27+	34+	3	3	1	8	5	5	13+	18	13
17:30 - 17:45	6	13	7	6	26+	33+	2	2	0	8	4	4	13	0	13
17:45 - 18:00	7	10	5	3	27+	32+	2	2	0	11	3	9	8	0	9
18:00 - 18:15	6	13	7	4	5	0	1	0	0	8	5	6	9	0	10
18:15 - 18:30	9	9	10	7	1	0	0	0	0	6	2	3	8	0	12
18:30 - 18:45	6	5	5	4	1	0	0	1	1	7	4	5	9	0	11
18:45 - 19:00	8	4	7	5	3	0	0	0	0	10	6	3	9	0	10

Appendix C LINSIG Modelling Results

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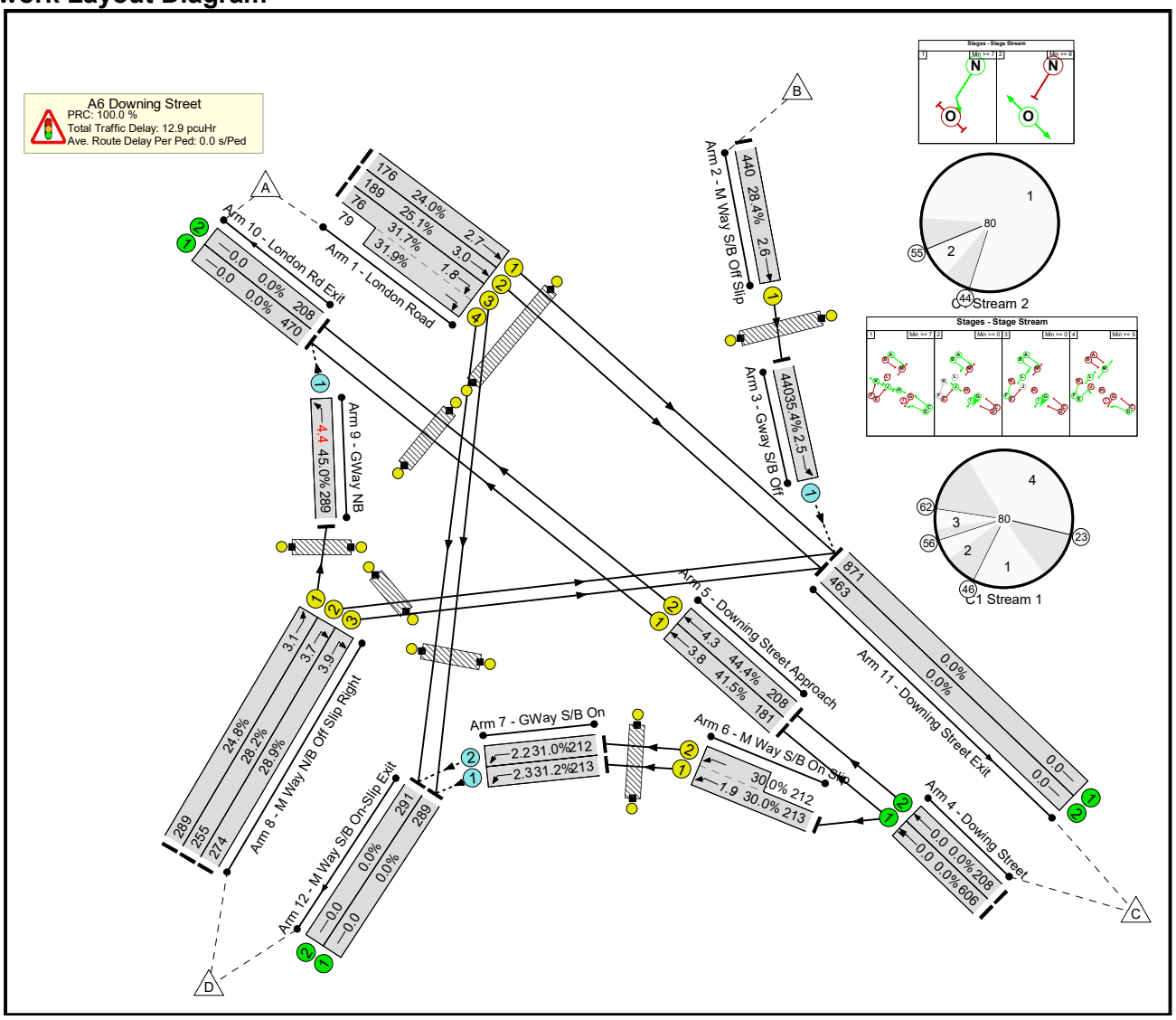
Basic Results Summary

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	Downing_Existing.lsg3x
Author:	
Company:	
Address:	

Scenario 1: 'AM Base' (FG1: 'AM 2018 Baseline', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**45.0%**	**318**	**836**	**0**	**12.9**	**-**	**-**
A6 Downing Street	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**45.0%**	**318**	**836**	**0**	**12.9**	**-**	**-**
1/1	London Road Ahead	U	A		1	31	-	176	1830	732	24.0%	-	-	-	0.9	19.2	2.7
1/2	London Road Ahead	U	A		1	31	-	189	1881	752	25.1%	-	-	-	1.0	19.2	3.0
1/3+1/4	London Road Right	U	B		1	10	-	155	1741:1800	239+248	31.7 : 31.9%	-	-	-	1.6	36.6	1.8
2/1	M Way S/B Off Slip Ahead	U	N		1	63	-	440	1940	1552	28.4%	-	-	-	0.5	3.7	2.6
3/1	Gway S/B Off Ahead	O	-		-	-	-	440	Inf	1242	35.4%	317	123	0	0.3	2.4	2.5
5/1	Downing Street Approach Ahead	U	C		1	17	-	181	1940	437	41.5%	-	-	-	1.7	33.5	3.8
5/2	Downing Street Approach Ahead	U	C		1	17	-	208	2080	468	44.4%	-	-	-	1.9	33.6	4.3
6/1+6/2	M Way S/B On Slip Ahead	U	D		1	54	-	425	1724:1724	711+708	30.0 : 30.0%	-	-	-	0.7	6.3	1.9
7/1	GWay S/B On Left	O	-		-	-	-	213	Inf	683	31.2%	0	213	0	0.3	4.6	2.3
7/2	GWay S/B On Left	O	-		-	-	-	212	Inf	683	31.0%	0	212	0	0.3	4.6	2.2
8/1	M Way N/B Off Slip Right Ahead	U	F		1	48	-	289	1899	1163	24.8%	-	-	-	0.7	9.2	3.1
8/2	M Way N/B Off Slip Right Right	U	E		1	36	-	255	1958	906	28.2%	-	-	-	1.1	16.1	3.7
8/3	M Way N/B Off Slip Right Right	U	E		1	36	-	274	2051	949	28.9%	-	-	-	1.2	16.0	3.9

Basic Results Summary

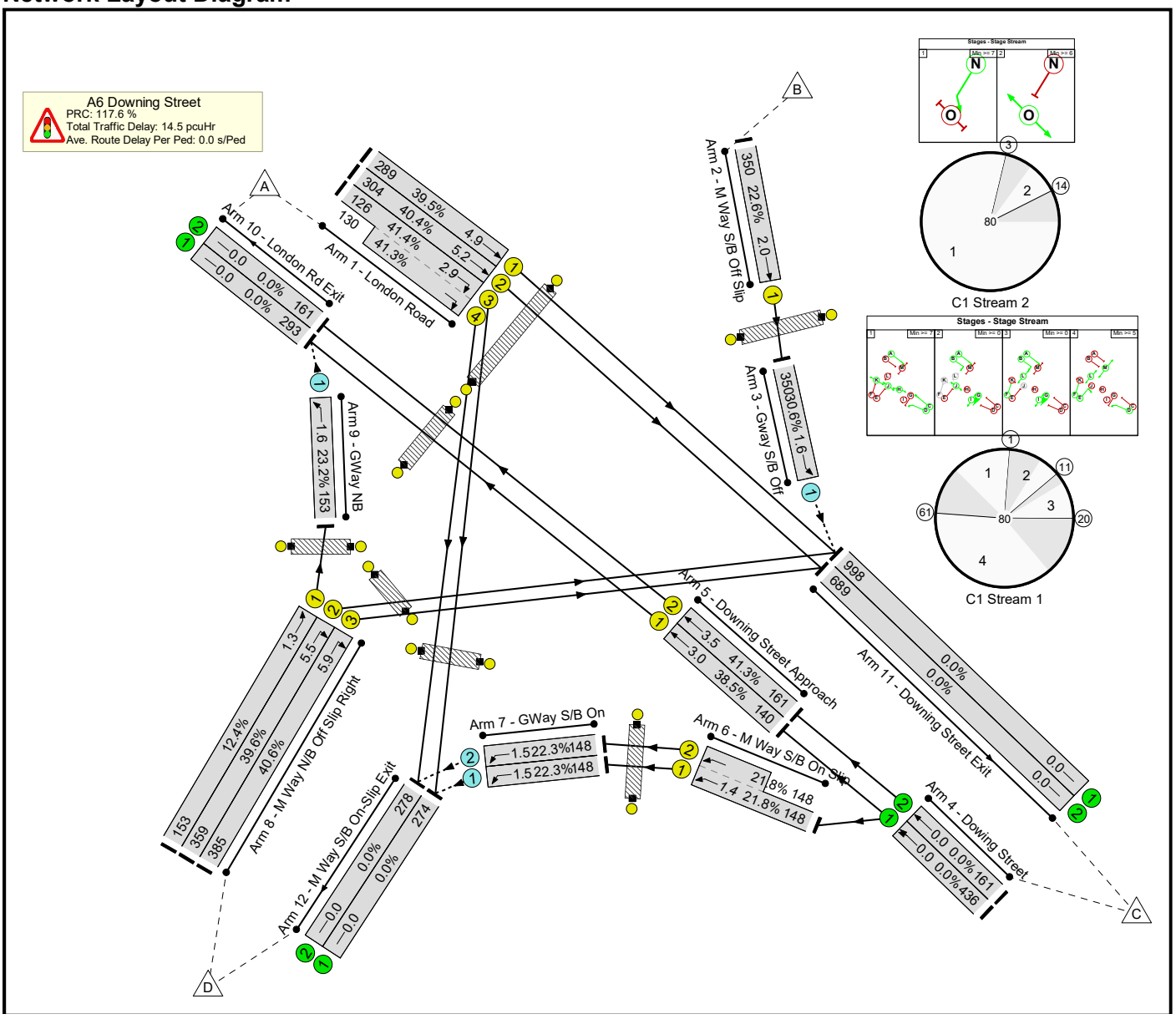
9/1	GWay NB Left	O	-		-	-	-	289	Inf	642	45.0%	0	289	0	0.6	7.6	4.4
Ped Link: P1	S/B ON	-	I		1	13	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	MWay S/B Exit	-	H		1	14	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Mway N/B Off RT	-	J		1	27	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	MWay N/B Off LT	-	K		1	15	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	London Exit	-	L		1	47	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	London Road	-	M		1	36	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	MWay SB Off	-	O		1	6	-	0	-	0	0.0%	-	-	-	-	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	102.5	Total Delay for Signalled Lanes (pcuHr):	10.98	Cycle Time (s):	80
C1	Stream: 2 PRC for Signalled Lanes (%):	217.5	Total Delay for Signalled Lanes (pcuHr):	0.45	Cycle Time (s):	80
	PRC Over All Lanes (%):	100.0	Total Delay Over All Lanes(pcuHr):	12.88		

Basic Results Summary

Scenario 2: 'PM Base' (FG2: 'PM 2018 Baseline', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**41.4%**	**247**	**552**	**0**	**14.5**	**-**	**-**
A6 Downing Street	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**41.4%**	**247**	**552**	**0**	**14.5**	**-**	**-**
1/1	London Road Ahead	U	A		1	31	-	289	1830	732	39.5%	-	-	-	1.7	21.2	4.9
1/2	London Road Ahead	U	A		1	31	-	304	1881	752	40.4%	-	-	-	1.8	21.2	5.2
1/3+1/4	London Road Right	U	B		1	13	-	256	1741:1800	305+315	41.4 : 41.3%	-	-	-	2.4	34.3	2.9
2/1	M Way S/B Off Slip Ahead	U	N		1	63	-	350	1940	1552	22.6%	-	-	-	0.3	3.5	2.0
3/1	Gway S/B Off Ahead	O	-		-	-	-	350	Inf	1145	30.6%	246	104	0	0.2	2.3	1.6
5/1	Downing Street Approach Ahead	U	C		1	14	-	140	1940	364	38.5%	-	-	-	1.4	36.5	3.0
5/2	Downing Street Approach Ahead	U	C		1	14	-	161	2080	390	41.3%	-	-	-	1.6	36.5	3.5
6/1+6/2	M Way S/B On Slip Ahead	U	D		1	51	-	296	1724:1724	678+678	21.8 : 21.8%	-	-	-	0.6	7.1	1.4
7/1	GWay S/B On Left	O	-		-	-	-	148	Inf	663	22.3%	0	148	0	0.2	4.0	1.5
7/2	GWay S/B On Left	O	-		-	-	-	148	Inf	663	22.3%	0	148	0	0.2	4.0	1.5
8/1	M Way N/B Off Slip Right Ahead	U	F		1	51	-	153	1899	1234	12.4%	-	-	-	0.3	7.0	1.3
8/2	M Way N/B Off Slip Right Right	U	E		1	36	-	359	1958	906	39.6%	-	-	-	1.7	17.4	5.5
8/3	M Way N/B Off Slip Right Right	U	E		1	36	-	385	2051	949	40.6%	-	-	-	1.9	17.4	5.9

Basic Results Summary

9/1	GWay NB Left	O	-		-	-	-	153	Inf	659	23.2%	0	153	0	0.2	4.2	1.6
Ped Link: P1	S/B ON	-	I		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	MWay S/B Exit	-	H		1	11	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Mway N/B Off RT	-	J		1	24	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	MWay N/B Off LT	-	K		1	12	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	London Exit	-	L		1	50	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	London Road	-	M		1	36	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	MWay SB Off	-	O		1	6	-	0	-	0	0.0%	-	-	-	-	-	-

C1 Stream: 1 PRC for Signalled Lanes (%): 117.6 Total Delay for Signalled Lanes (pcuHr): 13.46 Cycle Time (s): 80
C1 Stream: 2 PRC for Signalled Lanes (%): 299.1 Total Delay for Signalled Lanes (pcuHr): 0.34 Cycle Time (s): 80
PRC Over All Lanes (%): 117.6 Total Delay Over All Lanes(pcuHr): 14.53

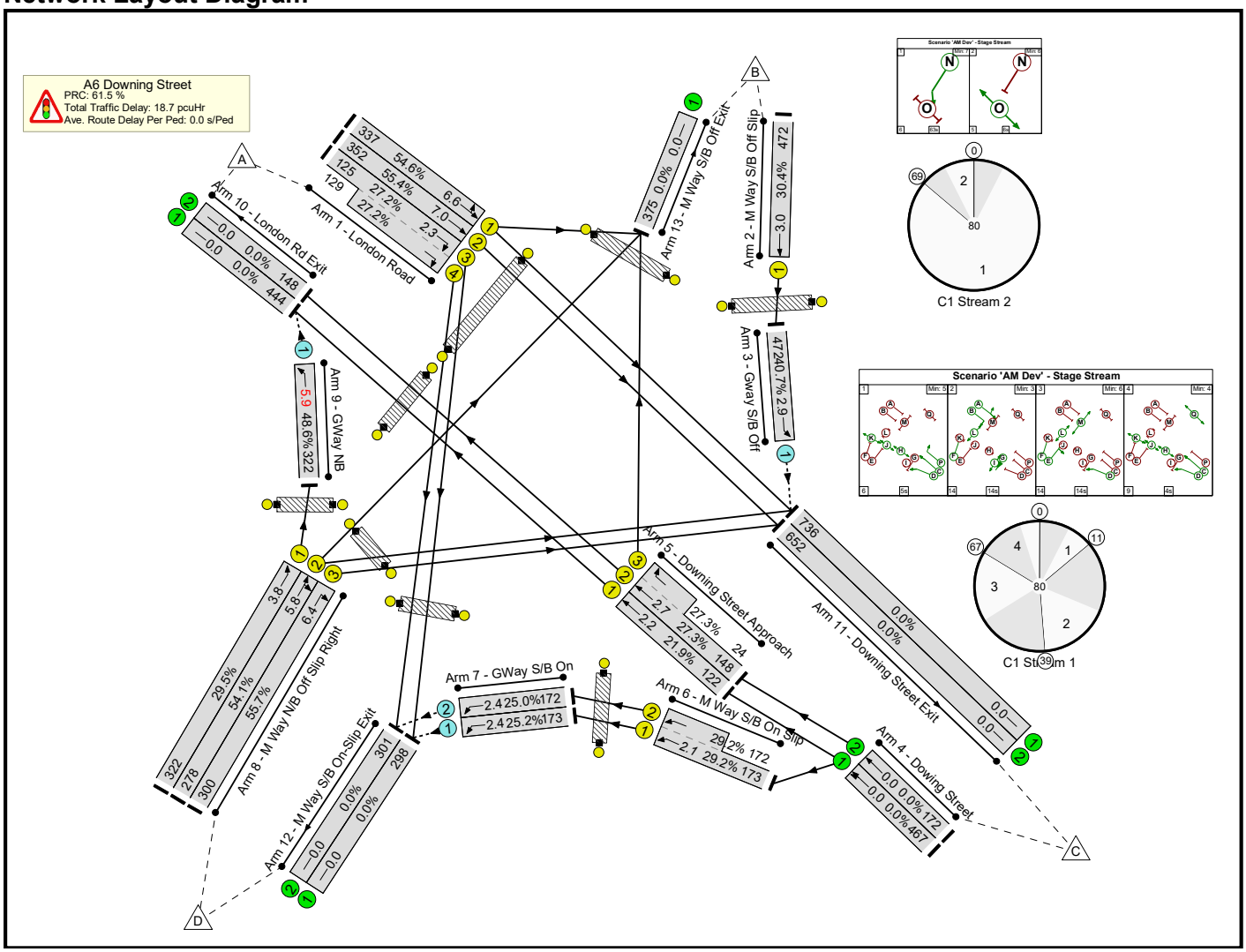
Basic Results Summary

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	Downing_Proposed (2LSBRT).lsg3x
Author:	
Company:	
Address:	

Scenario 1: 'AM Dev' (FG1: '2030 AM With Dev (TFGM Paramics flow)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**55.7%**	**284**	**855**	**0**	**18.7**	-	-
A6 Downing Street	-	-	-		-	-	-	-	-	-	**55.7%**	**284**	**855**	**0**	**18.7**	-	-
1/1	London Road Ahead Left	U	A		1	26	-	337	1830	618	54.6%	-	-	-	2.6	27.9	6.6
1/2	London Road Ahead	U	A		1	26	-	352	1881	635	55.4%	-	-	-	2.7	27.9	7.0
1/3+1/4	London Road Right	U	B		1	23	-	254	1741:1800	459+474	27.2 : 27.2%	-	-	-	1.7	23.8	2.3
2/1	M Way S/B Off Slip Ahead	U	N		1	63	-	472	1940	1552	30.4%	-	-	-	0.5	3.8	3.0
3/1	Gway S/B Off Ahead	O	-		-	-	-	472	Inf	1160	40.7%	283	189	0	0.4	2.7	2.9
5/1	Downing Street Approach Ahead	U	C		1	22	-	122	1940	558	21.9%	-	-	-	0.9	25.8	2.2
5/2+5/3	Downing Street Approach Ahead Right	U	C P		1	22:5	-	172	2080:1940	542+88	27.3 : 27.3%	-	-	-	1.3	27.6	2.7
6/1+6/2	M Way S/B On Slip Ahead	U	D		1	43	-	345	1724:1724	592+589	29.2 : 29.2%	-	-	-	1.1	11.2	2.1
7/1	GWay S/B On Left	O	-		-	-	-	173	Inf	687	25.2%	0	173	0	0.2	4.8	2.4
7/2	GWay S/B On Left	O	-		-	-	-	172	Inf	687	25.0%	0	172	0	0.2	4.8	2.4
8/1	M Way N/B Off Slip Right Ahead	U	F		1	45	-	322	1899	1092	29.5%	-	-	-	1.0	11.0	3.8
8/2	M Way N/B Off Slip Right Right Ahead	U	E		1	20	-	278	1958	514	54.1%	-	-	-	2.5	33.0	5.8
8/3	M Way N/B Off Slip Right Right	U	E		1	20	-	300	2051	538	55.7%	-	-	-	2.7	33.0	6.4
9/1	GWay NB Left	O	-		-	-	-	322	Inf	663	48.6%	0	322	0	0.8	9.2	5.9

Basic Results Summary

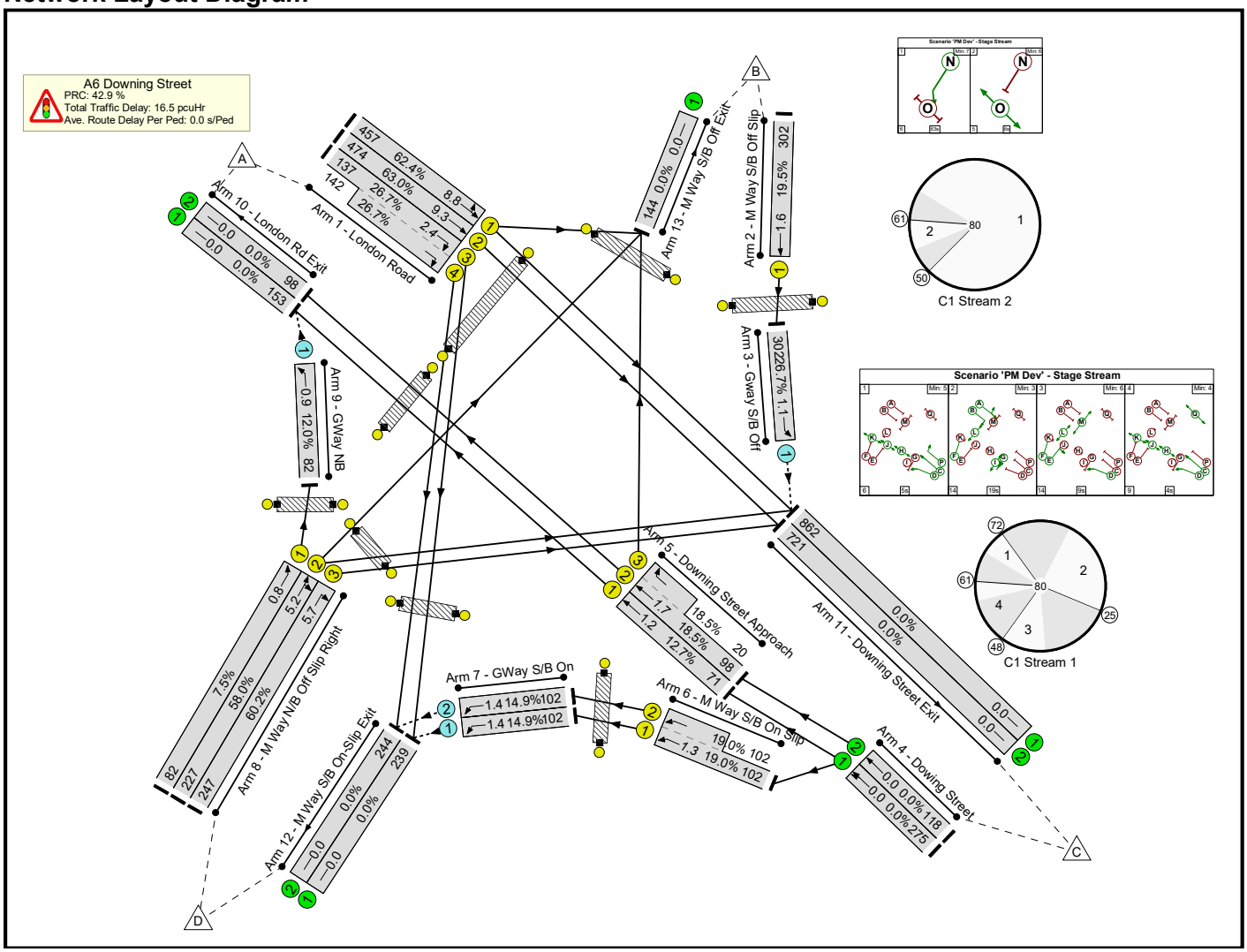
Ped Link: P1	S/B ON	-	I		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	MWay S/B Exit	-	H		1	15	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Mway N/B Off RT	-	J		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	MWay N/B Off LT	-	K		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	London Exit	-	L		1	42	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	London Road	-	M		1	19	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	MWay SB Off	-	O		1	6	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	MWay SB Exit	-	Q		1	5	-	0	-	0	0.0%	-	-	-	-	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	61.5	Total Delay for Signalled Lanes (pcuHr):	16.57	Cycle Time (s): 80
C1	Stream: 2 PRC for Signalled Lanes (%):	195.9	Total Delay for Signalled Lanes (pcuHr):	0.50	Cycle Time (s): 80
	PRC Over All Lanes (%):	61.5	Total Delay Over All Lanes(pcuHr):	18.70	

Basic Results Summary

Scenario 2: 'PM Dev' (FG2: '2030 PM With Dev (TFGM Paramics flows)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**63.0%**	**182**	**406**	**0**	**16.5**	-	-
A6 Downing Street	-	-	-		-	-	-	-	-	-	**63.0%**	**182**	**406**	**0**	**16.5**	-	-
1/1	London Road Ahead Left	U	A		1	31	-	457	1830	732	62.4%	-	-	-	3.3	25.7	8.8
1/2	London Road Ahead	U	A		1	31	-	474	1881	752	63.0%	-	-	-	3.4	25.7	9.3
1/3+1/4	London Road Right	U	B		1	28	-	279	1741:1800	512+531	26.7 : 26.7%	-	-	-	1.6	20.0	2.4
2/1	M Way S/B Off Slip Ahead	U	N		1	63	-	302	1940	1552	19.5%	-	-	-	0.3	3.3	1.6
3/1	Gway S/B Off Ahead	O	-		-	-	-	302	Inf	1130	26.7%	181	121	0	0.2	2.2	1.1
5/1	Downing Street Approach Ahead	U	C		1	22	-	71	1940	558	12.7%	-	-	-	0.5	24.8	1.2
5/2+5/3	Downing Street Approach Ahead Right	U	C P		1	22:5	-	118	2080:1940	529+108	18.5 : 18.5%	-	-	-	0.9	27.1	1.7
6/1+6/2	M Way S/B On Slip Ahead	U	D		1	38	-	204	1724:1724	537+537	19.0 : 19.0%	-	-	-	0.8	13.3	1.3
7/1	GWay S/B On Left	O	-		-	-	-	102	Inf	685	14.9%	0	102	0	0.1	3.8	1.4
7/2	GWay S/B On Left	O	-		-	-	-	102	Inf	685	14.9%	0	102	0	0.1	3.8	1.4
8/1	M Way N/B Off Slip Right Ahead	U	F		1	45	-	82	1899	1092	7.5%	-	-	-	0.2	9.4	0.8
8/2	M Way N/B Off Slip Right Right Ahead	U	E		1	15	-	227	1958	392	58.0%	-	-	-	2.5	39.8	5.2
8/3	M Way N/B Off Slip Right Right	U	E		1	15	-	247	2051	410	60.2%	-	-	-	2.7	40.0	5.7
9/1	GWay NB Left	O	-		-	-	-	82	Inf	682	12.0%	0	82	0	0.1	3.3	0.9

Basic Results Summary

Ped Link: P1	S/B ON	-	I		1	23	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	MWay S/B Exit	-	H		1	15	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Mway N/B Off RT	-	J		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	MWay N/B Off LT	-	K		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	London Exit	-	L		1	42	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	London Road	-	M		1	14	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	MWay SB Off	-	O		1	6	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	MWay SB Exit	-	Q		1	5	-	0	-	0	0.0%	-	-	-	-	-	-

C1	Stream: 1 PRC for Signalled Lanes (%):	42.9	Total Delay for Signalled Lanes (pcuHr):	15.79	Cycle Time (s): 80
C1	Stream: 2 PRC for Signalled Lanes (%):	362.5	Total Delay for Signalled Lanes (pcuHr):	0.28	Cycle Time (s): 80
	PRC Over All Lanes (%):	42.9	Total Delay Over All Lanes(pcuHr):	16.55	

Appendix D On-Street Parking Survey Data

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Manchester Piccadilly Area

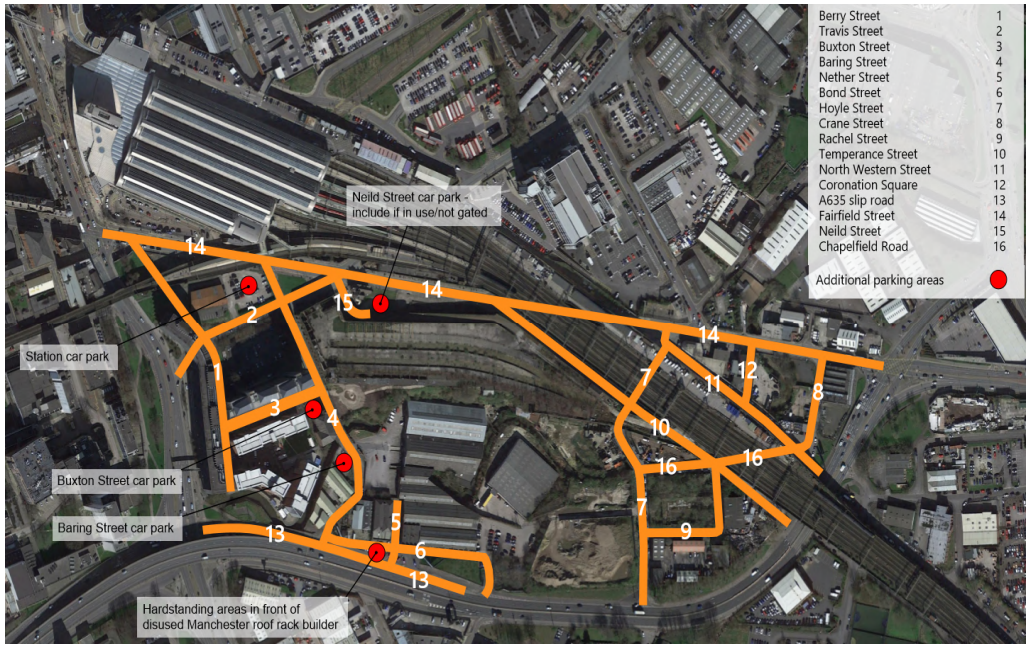
Vehicle Occupancy Count

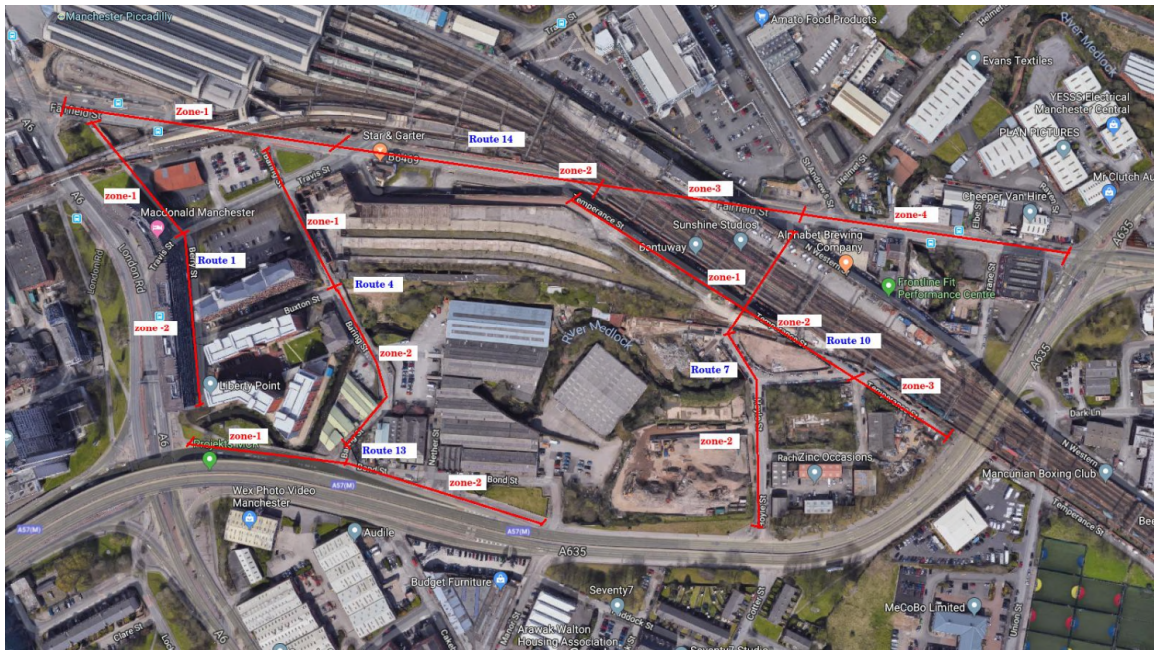
Video Footage Link

Tuesday 12th February 2019

Hourly Counts at 7am, 10am, 1pm, 4pm, 7pm and 10pm

for Buro Happold


Berry Street 1
Travis Street 2
Buxton Street 3
Baring Street 4
Nether Street 5
Bond Street 6
Hoyle Street 7
Crane Street 8
Rachel Street 9
Temperance Street 10
North Western Street 11
Coronation Square 12
A635 slip road 13
Fairfield Street 14
Neild Street 15
Chapelfield Road 16
Additional parking areas
Neild Street car park - include if in use/not gated
Station car park
Buxton Street car park
Baring Street car park
Hardstanding areas in front of disused Manchester roof rack builder

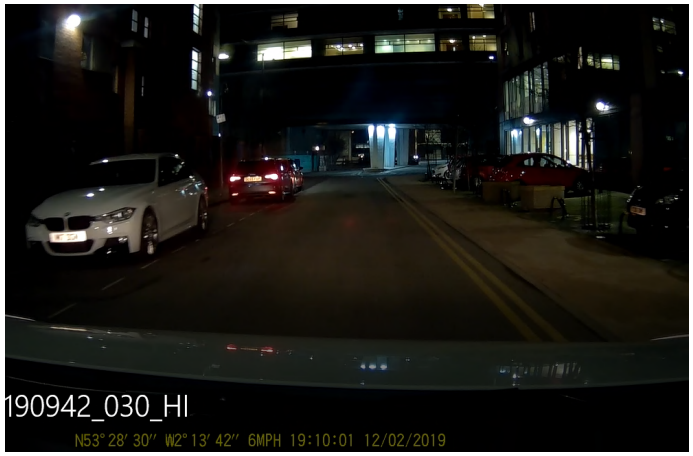

Manchester Piccadilly
Amato Food Products
Evans Textiles
YESSS Electrical Manchester Central
PLAN PICTURES
Mr Clutch Au
Cheeper Van Hire
Fairfield St
Zone-1
Star & Garter
Route 14
zone-2
zone-3
zone-4
zone-1
Macdonald Manchester
Travis St
Route 1
Sunshine Studios
Bentuway
Alphabet Brewing Company
Frontline Fit Performance Centre
Route 4
Burton St
zone -2
zone-2
Route 10
Route 7
River Medlock
Liberty Point
zone-1
Route 13
Nether St
Bond St
zone-2
zone-3
RachZinc Occasions
Mancunian Boxing Club
Wex Photo Video Manchester
Audlie
A635
Budget Furniture
Seventy7
MeCoBo Limited
Arawak Walton Housing Association
Clare St
Dark Lnl
N Western
Temperance St
A57(M)
A6

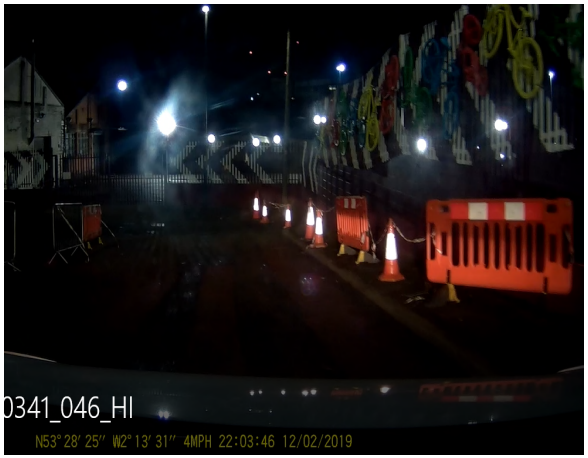



12_100350_026_HI
N53° 28' 27" W2° 13' 23" 0MPH 10:03:57 12/02/2019


27_039_HI
N53° 28' 30" W2° 0' 0" 6MPH 12:59:28 12/02/2019


00_004_HI
N53° 28' 29" W2° 13' 14" 10MPH 15:56:01 12/02/2019


190942_030_HI
N53° 28' 30" W2° 13' 42" 6MPH 19:10:01 12/02/2019


0341_046_HI
N53° 28' 25" W2° 13' 31" 4MPH 22:03:46 12/02/2019

Counts of Vehicles at each hour indicated in the tables below

Bond Street

	A (Point 4) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	7	0	1	0	0	0	0

	A (Point 4) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	5	0	0	0	0	0	0

Hoyle Street

	B (Point 7) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	12	0	1	0	0	0	0

	B (Point 7) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	11	0	1	0	0	0	0

	B (Point 7) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	B (Point 7) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	1	0	0	0	0	0	0

Clone Street

	C (Point 8) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	2	0	0	0	0	0	0

	C (Point 8) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	1	0	0	0	0	0	0

North Western Street

	D (Point 11) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	12	0	1	0	0	0	0

	D (Point 11) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	15	0	1	0	0	0	0

Coronation Square

	E (Point 12) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	2	0	0	0	0	0	0

	E (Point 12) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Chapelfield Road

	F (Point 16) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	2	0	0	0	0	0	0

	F (Point 16) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	1	0	0	0	0	0	0

Temperance Street

	G (Point 10) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	13	0	0	0	0	0	0

	G (Point 10) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	11	0	2	0	0	0	0

	G (Point 10) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	9	0	0	1	0	0	0

	G (Point 10) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	6	0	0	0	0	0	0

	G (Point 10) Zone 3 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	1	0	0	0	0	0	0

	G (Point 10) Zone 3 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	1	0	0	0	0	0	0

Rachel Street

	H (Point 9) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	H (Point 9) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Fairfield Street

	I (Point 14) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	I (Point 14) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	3	1	0	0	0	0	0

	I (Point 14) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	I (Point 14) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	I (Point 14) Zone 3 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	I (Point 14) Zone 3 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	I (Point 14) Zone 4 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	I (Point 14) Zone 4 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Travis Street

	J (Point 2) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	2	1	0	0	0	0	0

	J (Point 2) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Berry Street

	K (Point 1) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	K (Point 1) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	K (Point 1) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	K (Point 1) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Ruston Street

	L (Point 3) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	L (Point 3) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	2	0	0	0	0	0	0

Baring Street

	M (Point 4) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	M (Point 4) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	M (Point 4) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	M (Point 4) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Neild Street

	N (Point 15) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	N (Point 15) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Aksib Slip Road

	O (Point 13) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	O (Point 13) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	O (Point 13) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

	O (Point 13) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00	0	0	0	0	0	0	0

Nether Street

	P (No Road)						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
7:00							

Counts of Vehicles at each hour indicated in the tables below

Crane Street

A (Point 9) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	12	0	0	0	0	0	0

A (Point 8) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	8	0	0	0	0	0	0

Concordia St

B (Point 12) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	5	0	0	0	0	0	0

B (Point 12) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

North Wes

C (Point 11) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	23	0	3	0	0	0	0

C (Point 11) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	19	0	2	0	0	0	0

Chapelfield Rd

D (Point 10) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	22	1	1	0	0	0	0

D (Point 10) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	18	0	2	0	0	0	0

Rachel Street

E (Point 9) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	17	0	0	0	0	0	0

E (Point 9) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	17	0	0	0	0	0	0

Temperance

F (Point 10) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	16	0	0	0	0	0	0

F (Point 10) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	14	0	1	0	0	0	0

F (Point 10) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	12	0	1	0	0	0	0

F (Point 10) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	12	0	2	0	0	0	0

F (Point 10) Zone 3 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
7:00	12	0	0	0	0	0	0

F (Point 10) Zone 3 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
7:00	7	0	0	0	0	0	0

Nedd Street

G (Point 13) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

G (Point 13) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	1	0	0	0	0	0	0

Travis Street

H (Point 2) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	7	3	0	0	0	0	0

H (Point 2) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	5	1	0	0	0	0	0

Atkills Slip Road

I (Point 12) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

I (Point 12) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	1	0	1	0	0	0	0

I (Point 12) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

I (Point 12) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

Bond Street

J (Point 6) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	23	0	1	0	0	0	0

J (Point 6) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	18	0	1	0	0	0	0

Hoyle Street

K (Point 7) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	15	0	1	0	0	0	0

K (Point 7) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	14	0	2	0	0	0	0

K (Point 7) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	18	0	1	0	0	0	0

K (Point 7) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	16	0	0	0	0	0	0

Roring Street

L (Point 4) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

L (Point 4) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	11	0	0	0	0	0

L (Point 4) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

L (Point 4) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	1	0	0	0	0	0

Beeton Street

M (Point 5) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	1	0	0	0	0	0	0

M (Point 5) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

Berry Street

N (Point 1) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

N (Point 1) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

L (Point 1) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

L (Point 1) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

Fairfield Street

O (Point 14) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	8	2	0	0	0	0	0

O (Point 14) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

O (Point 14) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

O (Point 14) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

O (Point 14) Zone 3 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

O (Point 14) Zone 3 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	0	0	0	0

O (Point 14) Zone 4 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	1	0	0	0	0

O (Point 14) Zone 4 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00	0	0	0	1	0	0	0

Nether Street

P (No Road)							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
10:00							

Counts of Vehicles at each hour indicated in the tables below

Crane Street

A (Point 8) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	12	0	0	0	0	0	0

A (Point 8) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	8	0	0	0	0	0	0

Concursion St

B (Point 12) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	4	0	0	0	0	0	0

B (Point 12) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

North Wester

C (Point 11) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	21	0	2	0	0	0	0

C (Point 11) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	19	1	1	0	0	0	0

Chapelfield Rd

D (Point 10) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	23	0	1	0	0	0	0

D (Point 10) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	18	0	2	0	0	0	0

Rachel Street

E (Point 9) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	17	0	0	0	0	0	0

E (Point 9) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	18	0	0	0	0	0	0

Temperance

F (Point 10) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	15	0	0	0	0	0	0

F (Point 10) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	15	0	2	0	0	0	0

F (Point 10) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	11	0	1	0	0	0	0

F (Point 10) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	14	0	2	0	0	0	0

F (Point 10) Zone 3 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	12	0	1	0	0	0	0

F (Point 10) Zone 3 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	9	0	0	0	0	0	0

Nedd Street

G (Point 13) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

G (Point 13) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	1	0	0	0	0	0	0

Travis Street

H (Point 2) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	5	4	0	0	0	0	0

H (Point 2) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	1	0	0	0	0	0	0

Aikith Slip Rod

I (Point 12) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

I (Point 12) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	1	0	0	0	0

I (Point 12) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

I (Point 12) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

Bond Street

J (Point 5) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	21	0	1	0	0	0	0

J (Point 5) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	19	0	1	0	0	0	0

Hoyle Street

K (Point 7) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	16	1	1	1	0	0	0

K (Point 7) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	14	0	1	0	0	0	0

K (Point 7) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	11	0	1	0	0	0	0

K (Point 7) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	16	0	0	0	0	0	0

Raring Street

L (Point 4) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

L (Point 4) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

L (Point 4) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

L (Point 4) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

Beeton Street

M (Point 3) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	2	0	0	0	0	0	0

M (Point 3) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

Berry Street

N (Point 1) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

N (Point 1) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

L (Point 1) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

L (Point 1) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

Fairfield Stree

O (Point 14) Zone 1 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	5	1	0	0	0	1	0

O (Point 14) Zone 1 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	1	0	0	0	0	0

O (Point 14) Zone 2 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

O (Point 14) Zone 2 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

O (Point 14) Zone 3 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

O (Point 14) Zone 3 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

O (Point 14) Zone 4 Leftside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	0	0	0	0	0	0	0

O (Point 14) Zone 4 Rightside							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00	1	0	0	0	0	0	0

Nether Street

P (No Road)							
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
13:00							

Counts of Vehicles at each hour indicated in the tables below

Crane Street

	A (Point 9) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	32	0	0	0	0	0	0

	A (Point 8) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	5	0	0	0	0	0	0

** Manual Counts carried out for Chapelfield and Rachel at 4pm to charge battery*

Concordia Square

	B (Point 12) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	3	0	0	0	0	0	0

	B (Point 13) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

North Western Street

	C (Point 11) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	22	0	0	0	0	0	0

	C (Point 11) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	17	0	0	0	0	0	0

Chapelfield Road

	D (Point 16) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	21	0	1	0	0	0	0

	D (Point 16) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	19	0	2	0	0	0	0

Rachel Street

	E (Point 9) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	17	0	0	0	0	0	0

	E (Point 9) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	15	0	0	0	0	0	0

Temperance Street

	F (Point 10) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	14	0	0	0	0	0	0

	F (Point 10) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	16	0	2	0	0	0	0

	F (Point 10) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	12	0	1	0	0	0	0

	F (Point 10) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	11	0	1	0	0	0	0

	F (Point 10) Zone 3 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	11	0	0	0	0	0	0

	F (Point 10) Zone 3 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	8	0	0	0	0	0	0

Nield Street

	G (Point 15) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	G (Point 15) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

Travis Street

	H (Point 2) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	7	1	0	0	0	0	0

	H (Point 2) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

Akith Slip Road

	I (Point 13) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	I (Point 13) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	7	0	1	0	0	0	0

	I (Point 13) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	I (Point 13) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

Bond Street

	J (Point 6) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	22	0	0	0	0	0	0

	J (Point 6) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	15	0	1	0	0	0	0

Hoyle Street

	K (Point 7) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	13	0	1	0	0	0	0

	K (Point 7) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	11	0	2	0	0	0	0

	K (Point 7) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	10	0	0	0	0	0	0

	K (Point 7) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	12	0	0	0	0	0	0

Baring Street

	L (Point 4) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	L (Point 4) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	1	0	0	0	0	0	0

	L (Point 4) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	L (Point 4) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

Beeston Street

	M (Point 3) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	1	0	0	0	0	0	0

	M (Point 3) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

Barry Street

	N (Point 1) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	N (Point 1) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	L (Point 1) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	L (Point 1) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

Fairfield Street

	O (Point 14) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	2	0	0	0	0	0	0

	O (Point 14) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	O (Point 14) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	O (Point 14) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	O (Point 14) Zone 3 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	O (Point 14) Zone 3 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	O (Point 14) Zone 4 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	0	0	0	0	0	0	0

	O (Point 14) Zone 4 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00	1	0	0	0	0	0	0

Nether Street

	P (No Road)						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
16:00							

Counts of Vehicles at each hour indicated in the tables below

Crane Street

	A (Point 9) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	2	0	0	0	0	0	0

	A (Point 9) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Conconfon St

	B (Point 12) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	B (Point 12) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

North Wester

	C (Point 11) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	10	0	0	0	0	0	0

	C (Point 11) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	5	0	3	0	0	0	0

Chapelfield Rd

	D (Point 10) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	4	0	0	0	0	0	0

	D (Point 10) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	1	0	0	0	0	0	0

Rachel Street

	E (Point 9) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	2	0	0	0	0	0	0

	E (Point 9) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	2	0	0	0	0	0	0

Temperance

	F (Point 10) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	12	0	1	0	0	0	0

	F (Point 10) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	7	0	0	0	0	0	0

	F (Point 10) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	4	0	0	0	0	0	0

	F (Point 10) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	3	0	0	0	0	0	0

	F (Point 10) Zone 3 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	3	0	2	0	0	0	0

	F (Point 10) Zone 3 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	1	0	0	0	0	0	0

Nedd Street

	G (Point 13) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	G (Point 13) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Travis Street

	H (Point 2) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	7	0	0	0	0	0	0

	H (Point 2) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Akith Slip Roa

	I (Point 13) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	I (Point 13) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	3	0	1	0	0	0	0

	I (Point 13) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	I (Point 13) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Bond Street

	J (Point 5) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	7	0	0	0	0	0	0

	J (Point 5) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	1	0	0	0	0	0	0

Hoyle Street

	K (Point 7) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	3	0	2	0	0	0	0

	K (Point 7) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	4	1	0	0	0	0	0

	K (Point 7) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	1	0	0	0	0	0	0

	K (Point 7) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Raring Street

	L (Point 4) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	L (Point 4) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	L (Point 4) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	L (Point 4) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Beeton Street

	M (Point 3) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	4	0	0	0	0	0	0

	M (Point 3) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Berry Street

	N (Point 1) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	N (Point 1) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	L (Point 1) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	L (Point 1) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Fairfield Stree

	O (Point 14) Zone 1 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	3	0	0	0	0	0	0

	O (Point 14) Zone 1 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	O (Point 14) Zone 2 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	O (Point 14) Zone 2 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	O (Point 14) Zone 3 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	O (Point 14) Zone 3 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	O (Point 14) Zone 4 Leftside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

	O (Point 14) Zone 4 Rightside						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00	0	0	0	0	0	0	0

Nether Street

	P (No Road)						
	Car	Taxi	Lgv	Opv1	Opv2	PSV	MC
19:00							

Counts of Vehicles at each hour indicated in the tables below

Crane Street

	A (Point 9) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	A (Point 8) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Concorsion Sq

	B (Point 12) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	B (Point 12) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

North Wester

	C (Point 11) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	C (Point 11) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Chapelfield Rd

	D (Point 10) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	D (Point 10) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	1	0	0	0	0	0	0

Rachel Street

	E (Point 9) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	E (Point 9) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Temperance

	F (Point 10) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	6	0	1	0	0	0	0

	F (Point 10) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	1	0	0	0	0	0	0

	F (Point 10) Zone 2 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	1	0	0	0	0	0	0

	F (Point 10) Zone 2 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	F (Point 10) Zone 3 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	2	0	0	0	0	0	0

	F (Point 10) Zone 3 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Nedd Street

	G (Point 13) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	G (Point 13) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Travis Street

	H (Point 2) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	5	0	1	0	0	0	0

	H (Point 2) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	1	0	0	0	0	0

Atkilt Slip Rod

	I (Point 13) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	I (Point 13) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	I (Point 13) Zone 2 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	I (Point 13) Zone 2 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Bond Street

	J (Point 5) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	3	0	0	0	0	0	0

	J (Point 5) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Hoyle Street

	K (Point 7) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	1	0	1	0	0	0	0

	K (Point 7) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	K (Point 7) Zone 2 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	K (Point 7) Zone 2 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Baring Street

	L (Point 4) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	1	0	0	0	0	0	0

	L (Point 4) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	L (Point 4) Zone 2 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	L (Point 4) Zone 2 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Beeton Street

	M (Point 3) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	2	1	0	0	0	0	0

	M (Point 3) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Berry Street

	N (Point 1) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	N (Point 1) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	L (Point 1) Zone 2 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	L (Point 1) Zone 2 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Fairfield Stree

	O (Point 14) Zone 1 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	4	0	0	0	0	0	0

	O (Point 14) Zone 1 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	2	0	0	0	0	0	0

	O (Point 14) Zone 2 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	O (Point 14) Zone 2 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	O (Point 14) Zone 3 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	O (Point 14) Zone 3 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	1	0	0	0	0	0	0

	O (Point 14) Zone 4 Leftside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

	O (Point 14) Zone 4 Rightside						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00	0	0	0	0	0	0	0

Nether Street

	P (No Road)						
	Car	Taxi	Lgv	Ogv1	Ogv2	PSV	MC
22:00							

Appendix E Collision Data

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TRANSPORT FOR GREATER MANCHESTER

Transport for Greater Manchester

Traffic Accident Data for

BuroHappold Engineering

Reported Road Injury Accidents in Specified Area of Manchester City Centre, Manchester.
01/05/2014 to 30/04/2019

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A1033530, 2017
A1033377, 2017
A1014906, 2016
A1010356, 2016
A1090129, 2014
A2054780, 2019
A1017760, 2016
A1051445, 2018
A1038319, 2017
A1041415, 2018
A1040191, 2018
A1028229, 2017
A1092083, 2014
A1045966, 2018
A1049331, 2018
A1035161, 2017
A1006460, 2015
A1022663, 2016
A1052591, 2019
A1043668, 2018
A1005167, 2015
A1091301, 2014
A1004626, 2015
A1001721, 2015
A1007528, 2015
A1039984, 2018
A1025806, 2017
A1090967, 2014
A1037894, 2017
A1087825, 2014
E1092268, 2014
A1011100, 2016
E1012459, 2016
A1025618, 2017
A1026047, 2017
E1029467, 2017
A1052213, 2018
A3090887, 2014
A3041476, 2018
A3030388, 2017
A1094232, 2014
A1090240, 2014
A3095425, 2014
A1091503, 2014
A1013409, 2016
A1016989, 2016
A3041017, 2018
A3004691, 2015
A1029260, 2017
A3096065, 2015
A1088417, 2014
A1037347, 2017
A1045612, 2018
A1011465, 2016
A1049228, 2018
A1099536, 2015
A1032600, 2017
A1039664, 2018
A1087757, 2014
A1035649, 2017
A1016625, 2016
A1043310, 2018
A1097315, 2015
E1087220, 2014
A1044271, 2018
A1090200, 2014
A1030155, 2017
A1030916, 2017
A1013684, 2016
A1002805, 2015
A1000929, 2015
A1003610, 2015
A1024809, 2016
A1098832, 2015
A1012225, 2016
A1009939, 2015
A3048199, 2018
A3006737, 2015
A3045407, 2018
A1010584, 2016
A3032131, 2017
A3037868, 2017
A3051209, 2018
A1035397, 2017
A1000914, 2015
E1051932, 2018
A1050364, 2018
A1045114, 2018
A1024373, 2016
A1088350, 2014
A1005014, 2015
E1034979, 2017
A1088367, 2014
A1021300, 2016
A1098045, 2015
A1029443, 2017
A1089563, 2014
E1097343, 2015
E1002051, 2015
E1094876, 2014
E1098169, 2015
E1003464, 2015
E1044560, 2018

Ancoats
Brunswick
Ardwick
MANCHESTER
City Centre
London Road
Great Ancoats Street
Mancunian Way
River Medlock

Severity Symbol Key
- Slight
- Serious
- Fatal

Transport for Greater Manchester
2 Piccadilly Place,
Manchester,
M1 3BG

Reported Road Injury Accidents in Specified Area of Manchester City Centre, Manchester, 01/05/2014 to 30/04/2019

Drawn By : liuj

Note: A road accident which occurs at or within 20m of a junction, is coded as a junction accident

Date : 28/08/2019

TRANSPORT FOR GREATER MANCHESTER

Reported Road Injury Accidents in Specified Area of Manchester City Centre, Manchester.
01/05/2014 to 30/04/2019

Injury Accidents	May – Dec 2014	2015	2016	2017	2018	Jan-Apr 2019	Total
Fatal	0	0	0	0	0	0	0
Serious	4	3	4	4	5	1	21
Slight	15	19	12	18	17	1	82
Total	19	22	16	22	22	2	103

Standard Totals Report : Reported Injury Accidents in Specified Area of Manchester City Centre, Manchester, 01/05/2014 to 30/04/2019

Accidents

Serious	21
Slight	82
Total Accidents	**103**

Casualties By Age and Sex

Severity	0 - 15	16 - 59	60 - 69	70 +	Total
Serious					
Male	0	17	0	0	17
Female	0	4	0	0	4
Total	**0**	**21**	**0**	**0**	**21**
Slight					
Male	4	79	3	2	88
Female	1	40	1	1	43
Total	**5**	**119**	**4**	**3**	**131**
Total Casualties	**5**	**140**	**4**	**3**	**152**

Casualties By Age and Class

Severity	0 - 15	16 - 59	60 - 69	70 +	Total
Serious					
Driver or rider	0	9	0	0	9
Veh or pillion pas	0	3	0	0	3
Pedestrian	0	9	0	0	9
Total	**0**	**21**	**0**	**0**	**21**
Slight					
Driver or rider	1	71	3	0	75
Veh or pillion pas	4	30	0	3	37
Pedestrian	0	18	1	0	19
Total	**5**	**119**	**4**	**3**	**131**
Total Casualties	**5**	**140**	**4**	**3**	**152**

Cyclist (Rider and Pillion) and Pedestrian Casualties By Age

Severity	0 - 15	16 - 59	60 - 69	70 +	Total
Serious	0	13	0	0	13
Slight	1	33	2	0	36
Total Casualties	**1**	**46**	**2**	**0**	**49**

Casualties Broken Down By Type

Car (Driver)	**0-15**	**16+**	**Total**
Serious	0	2	2
Slight	0	48	48
Total	**0**	**50**	**50**
Car (Passenger)	**0-15**	**16+**	**Total**
Serious	0	2	2
Slight	3	18	21
Total	**3**	**20**	**23**
Pedestrian	**0-15**	**16+**	**Total**
Serious	0	9	9
Slight	0	19	19
Total	**0**	**28**	**28**
TWPV (Rider)	**0-15**	**16+**	**Total**
Serious	0	3	3
Slight	0	6	6
Total	**0**	**9**	**9**
TWPV (Pillion)	**0-15**	**16+**	**Total**
Slight	0	1	1
Total	**0**	**1**	**1**
Cyclist (Rider)	**0-15**	**16+**	**Total**
Serious	0	4	4
Slight	1	16	17
Total	**1**	**20**	**21**
PSV (Driver)	**0-15**	**16+**	**Total**
Slight	0	3	3
Total	**0**	**3**	**3**
PSV (Passenger)	**0-15**	**16+**	**Total**
Serious	0	1	1
Slight	1	14	15
Total	**1**	**15**	**16**
Other (Driver)	**0-15**	**16+**	**Total**
Slight	0	1	1
Total	**0**	**1**	**1**
Total	**5**	**147**	**152**

Standard Report - Reported Injury Accidents in Specified Area of Manchester City Centre, Manchester, 01/05/2014 to 30/04/2019

This printout has been generated from the Transport for Greater Manchester's database of road traffic accident records using the query system, GMAXI.

The road traffic accident database contains STATS19 data supplied by Greater Manchester Police and further validated by the Highways Forecasting and Analytical Services (HFAS) section of Transport for Greater Manchester. It is maintained by HFAS on behalf of the ten District Councils in Greater Manchester.

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Accident Reference Number: A1041415 **Day:** Wednesday **Date:** 07/03/2018 **Time:** 07:20

Place Reported: Scene **District:** Manchester

Location: Aytoun Street at junction with Auburn Street

Description: Both Vehs Trav N Aytoun St. V2 (PCV) Stationary At ATS, V1 (PCV) Appr From Behind & Coll With Rear Of V1. Both Drivers and Passengers on V2 Injured.

Locational Details

Road:	A6/U	Junction Details:	Tjun
OSGR:	384566 397977	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	13

Contributory Factors

Factor	Conf	Ref
DTired	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
PCV	Ahead	S	N	
PCV	Waitg	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	60	Slight	
3 Pas	M	33	Slight	
4 Pas	M	30	Slight	
5 Pas	F	24	Slight	
6 Pas	M	33	Slight	
7 Pas	M	43	Slight	
8 Pas	F	55	Slight	
9 Pas	F	38	Slight	
10 Pas	F	40	Slight	
11 Pas	F	82	Slight	
12 Pas	F	30	Serious	
13 Pas	F	27	Slight	
2 Drv	M	50	Slight	

Accident Reference Number: A1038319 **Day:** Saturday **Date:** 16/12/2017 **Time:** 00:29

Place Reported: Scene **District:** Manchester

Location: Aytoun Street at junction with Auburn Street

Description: V1 (Tram) Trav Nw On Aytoun St When C1 (Pedestrian) Crossing Road From Offside Walks Into V1. V1 Not Aware And Continues Journey.

Locational Details

Road:	A6/U	Junction Details:	Tjun		
OSGR:	384575 397981	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Ice
Light Conditions:	Dark
Weather Conditions:	Othr

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PJudge	VLike	C1
PAlcoh	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Tram	Stopg	SE	NW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Ped	M	46	Serious	

Accident Reference Number: A1014906 **Day:** Monday **Date:** 18/04/2016 **Time:** 22:09

Place Reported: Scene **District:** Manchester

Location: Piccadilly at junction with Gore Street

Description: V1 Trav Se Piccadilly. C1 And C2 Cross Road And Collision Occurs

Locational Details

Road:	A6/U	Junction Details:	Tjun		
OSGR:	384606 398142	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
PFLoo	VLike	C1
PFLoo	VLike	C2
PAlcoh	VLike	C1
PAlcoh	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Ped	M	20	Slight	
2	Ped	F	18	Slight	

Accident Reference Number: A1017760 **Day:** Wednesday **Date:** 29/06/2016 **Time:** 23:10

Place Reported: Scene **District:** Manchester

Location: Piccadilly at junction with Lena Street

Description: V1 Trav Sw Lena St Pulls Out Of Side Street Brakes To Avoid V2 (Motorcycle) Trav Nw Piccadilly, No Contact Made But Rider of V2 Injured.

Locational Details

Road:	A6/U	Junction Details:	Tjun		
OSGR:	384612 398120	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	NE	NW	Skid
m/cl	Ahead	SE	NW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Rid	M	37	Slight	
2	Pas	F	25	Slight	

Accident Reference Number: A1033530 **Day:** Thursday **Date:** 20/07/2017 **Time:** 02:02

Place Reported: Else **District:** Manchester

Location: Piccadilly 40 metres North West of Ducie Street

Description: V2 (Taxi) Parked On Picadilly At Taxi Rank When V1 (Taxi) Trav Se Piccadilly Undertakes U-Turn, Collides With V2. V1 FTS

Locational Details

Road:	A6	Junction Details:			
OSGR:	384637 398096	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Taxi	Uturn	NW	NW	
Taxi	Parkd	Pk	Pk	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	M	59	Slight	

Accident Reference Number: A1049331 **Day:** Friday **Date:** 12/10/2018 **Time:** 22:50

Place Reported: Else **District:** Manchester

Location: Fairfield Street at junction with Back Acton Street

Description: V2 Trav W Fairfield St Heading Twds Manchester, V1 (Taxi) Trav E Coming In Opp Dir Does U Turn In Road & Hits V2 Offside

Locational Details

Road:	B6469/U	Junction Details:	Tjun		
OSGR:	384658 397782	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Taxi	Uturn	W	W	
Car	Ahead	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	27	Slight	

Accident Reference Number: A2054780 **Day:** Thursday **Date:** 14/03/2019 **Time:** 23:10

Place Reported: Scene **District:** Manchester

Location: Ducie Street 15 metres NE Of London Road

Description: V1 Trav Sw Ducie St & Collides With C1 (Pedestrian) Entering Pedestrian Crossing From Drivers N/s Heading N-bd. V1 FTS

Locational Details

Road:	B6181/A6	Junction Details:	Mult		
OSGR:	384662 398059	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NE	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	40	Serious	

Accident Reference Number: A1090129 **Day:** Saturday **Date:** 16/08/2014 **Time:** 08:55

Place Reported: Scene **District:** Manchester

Location: Ducie Street at junction with London Road

Description: V1 Travels West On Ducie Street With Lights On Green. C1 Crosses Road With Lights On Red For Him. C1 Does Not See V1 And Collision Occurs.

Locational Details

Road:	B6181/A6	Junction Details:	Mult		
OSGR:	384666 398057	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PFLoo	Poss	C1
PCare	Poss	C1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	46	Slight	

Accident Reference Number: A1040191 **Day:** Thursday **Date:** 18/01/2018 **Time:** 02:15

Place Reported: Else **District:** Manchester

Location: Whitworth Street, outside Monroes, 82 metres NW Of Fairfield Street

Description: V1 (Sweeper) Trav Nw On Whitworth St Into Left Hand Bend Collides With C1 (Pedestrian) Who Steps Onto Pedestrian Crossing From Drivers Nearside Dir Unkn

Locational Details

Road:	A6	Junction Details:			
OSGR:	384688 397862	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
Slip	VLike	V1
PPedX	Poss	C1
PAlcoh	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
othr	Lbend	SE	SW	Skid

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	33	Slight	

Accident Reference Number: A1051445 **Day:** Friday **Date:** 02/11/2018 **Time:** 10:20

Place Reported: Else **District:** Manchester

Location: London Road at junction with Store Street

Description: V1 Trav S London Rd Turns Left Onto Store St, V1 (Pedal Cycle) With Punctured Tyre Crossing Store St Heading N Dir. When V1 Turns Collision Occurs

Locational Details

Road:	A6/C	Junction Details:	Tjun		
OSGR:	384694 397920	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:	Ref		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	N/A

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DCPav	Poss	V2
DFLoo	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnL	N	E	
p/c	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	58	Slight	

Accident Reference Number: A1028229 **Day:** Monday **Date:** 20/02/2017 **Time:** 18:38

Place Reported: Scene **District:** Manchester

Location: Whitworth Street 27 metres N Of Fairfield Street

Description: V2 (Taxi) Trav N Whitworth St. V1 (Motorcycle) Trav Same Slows As Result Of Traffic. V2 Looks In Rear View Mirror, Sees V1 Skid And Hit Him

Locational Details

Road:	A6	Junction Details:			
OSGR:	384723 397805	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DJudge	Poss	V1
DLoss	Poss	V1
DBrake	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
m/cl	Ahead	S	N	Skid
Taxi	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	41	Slight	

Accident Reference Number: A1035161 **Day:** Saturday **Date:** 02/09/2017 **Time:** 16:48

Place Reported: Else **District:** Manchester

Location: Fairfield Street at junction with London Road

Description: V1 (Pedal Cycle) Trav Se Fairfield St Wrong Side Of Rd Near Railings. V2 (PCV) Trav N London Rd Turns Left Onto Fairfield St Colliding With V1. V1 Cuaght Between Wheel & Railing

Locational Details

Road:	B6469/A6	Junction Details:	Xrds		
OSGR:	384731 397769	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	N/A

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DCare	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
p/c	Ahead	NW	SE	
PCV	TurnL	S	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	14	Slight	

Accident Reference Number: A1045966 **Day:** Wednesday **Date:** 11/07/2018 **Time:** 08:16

Place Reported: Scene **District:** Manchester

Location: London Road at junction with Fairfield Street

Description: V1 Trav E Fairfield St Proceeds Through Red ATS And Collides With V2 (Pedal Cycle) Trav Nw London Rd. V1 FTS.

Locational Details

Road:	A6/B6469	Junction Details:	Xrds		
OSGR:	384732 397776	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DATS	VLike	V1
DFLoo	VLike	V1
DJudge	VLike	V1
DSun	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	W	E	
p/c	Ahead	SE	NW	O/tn

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	22	Serious	

Accident Reference Number: A1006460 **Day:** Wednesday **Date:** 30/09/2015 **Time:** 15:55
Place Reported: Scene **District:** Manchester
Location: London Road at junction with Fairfield Street
Description: V1 (PCV) Trav Nw London Rd, When V2 Pulls In Front of V1. V1 Braked Hard Causing Injuries To Passengers On Bus

Locational Details

Road:	A6/B6469	Junction Details:	Xrds
OSGR:	384740 397764	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	3

Contributory Factors

Factor	Conf	Ref
DCare	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
PCV	Start	SE	NW	
Car	Start	SE	NW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Pas	M	6	Slight	
2	Pas	F	40	Slight	
3	Pas	F	56	Slight	

Accident Reference Number: A1052591 **Day:** Thursday **Date:** 17/01/2019 **Time:** 09:05
Place Reported: Else **District:** Manchester
Location: Fairfield Street at junction with London Road
Description: V1 Trav S London Rd Collides With V2 (Pedal Cycle) Trav N London Rd Turning Right Onto Fairfield St

Locational Details

Road:	B6469/A6	Junction Details:	Xrds
OSGR:	384744 397724	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	N	S	
p/c	TurnR	S	E	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Rid	M	45	Slight	

Accident Reference Number: A1022663 **Day:** Saturday **Date:** 29/10/2016 **Time:** 08:15
Place Reported: Scene **District:** Manchester
Location: London Road at junction with Fairfield Street
Description: V1 Trav N On London Rd. C1 Crossing E-bound Across Path Of V1 & Collision Occurs

Locational Details

Road:	A6/B6469	Junction Details:	Xrds
OSGR:	384746 397752	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Wet
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
PFLoo	VLike	C1
PFLoo	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Taxi	Ahead	S	N	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Ped	M	23	Slight	

Accident Reference Number: E1092268 **Day:** Wednesday **Date:** 08/10/2014 **Time:** 16:10
Place Reported: Scene **District:** Manchester
Location: M Mancunian Way Access 70 metres SW of Downing Street
Description: V1 Travels Sw Mancunian Way In Slow Moving Traffic And Nudges Rear Of V2 Trav Same.

Locational Details

Road:	A57(M)	Junction Details:	
OSGR:	384750 397438	Junction Control:	n/a
Speed Limit:	50	Ped Crossing:	

Conditions

Road Surface:	Wet
Light Conditions:	Light
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
Other	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Stopg	NE	SW	
Car	Stopg	NE	SW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	F	43	Slight	

Accident Reference Number: A1092083 **Day:** Tuesday **Date:** 30/09/2014 **Time:** 12:45

Place Reported: Scene **District:** Manchester

Location: Fairfield Street 15 metres E of London Road

Description: V1 Trav E On Fairfield St. C1 (Pedestrian) Steps From Offside Into Road From Pedestrian Island And Is Hit By V1.

Locational Details

Road:	B6469/A6	Junction Details:	Xrds
OSGR:	384764 397773	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	Ref

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PFLoo	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Taxi	Ahead	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	F	31	Slight	

Accident Reference Number: A1043310 **Day:** Wednesday **Date:** 14/03/2018 **Time:** 07:40

Place Reported: Else **District:** Manchester

Location: London Road at junction with Altrincham Street

Description: Both Vehs Trav Nw London Rd. V2 (Pedal Cycle) In Nearside Lane When V1 Turns Left Towards Altrincham St. V1 Nearside Collides With Front Of V2

Locational Details

Road:	A6/U	Junction Details:	Tjun
OSGR:	384771 397706	Junction Control:	GW
Speed Limit:	30	Ped Crossing:	

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DTurn	VLike	V1
RdLay	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnL	SE	SW	
p/c	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	51	Slight	

Accident Reference Number: A1016625 **Day:** Friday **Date:** 03/06/2016 **Time:** 15:50

Place Reported: Scene **District:** Manchester

Location: London Road at junction with Altrincham Street

Description: V1 Trav Nw London Rd Does A U-turn And Collision With V2, Trav Nw London Rd, Occurs

Locational Details

Road:	A6/U	Junction Details:	Tjun
OSGR:	384774 397709	Junction Control:	GW
Speed Limit:	30	Ped Crossing:	

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DTurn	VLike	V1
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Uturn	SE	SE	
Car	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	34	Slight	
2 Drv	M	60	Slight	

Accident Reference Number: A1037894 **Day:** Thursday **Date:** 23/11/2017 **Time:** 20:13

Place Reported: Else **District:** Manchester

Location: Mancunian Way Exit Slip Road at junction with London Road

Description: V2 Trav Ne On Mancunian Way Waiting At Ats To Turn Right. V1 Collides With Rear Of V2 Then Drives Off

Locational Details

Road:	A57(M)/A6	Junction Details:	Slip
OSGR:	384808 397500	Junction Control:	TS
Speed Limit:	50	Ped Crossing:	TSX

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Stopg	SW	SE	
Car	Waitg	SW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	33	Slight	

Accident Reference Number: A1037347 **Day:** Friday **Date:** 10/11/2017 **Time:** 22:55

Place Reported: Else **District:** Manchester

Location: Store Street 40 metres South West of Boad Street

Description: V2 Trav Sw Store St Doing 3 Point Turn On As V1 Reverses Ne Store St And Collides With V1

Locational Details

Road:	C	Junction Details:			
OSGR:	384813 397988	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Taxi	Revg	SW	NE	
Taxi	Uturn	NE	NE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	32	Slight	

Accident Reference Number: A1090967 **Day:** Tuesday **Date:** 02/09/2014 **Time:** 20:50

Place Reported: Scene **District:** Manchester

Location: A57(M) Mancunian Way at junction with London Road

Description: V1 Trav E On Mancunian Way, Exits Onto Slip Road As Result Of Incident. Attention Of C1 (Pedestrian) Distracted, Enters Crossing From Nearside And Collision Occurs.

Locational Details

Road:	A57(M)/A6	Junction Details:	Xrds		
OSGR:	384817 397503	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PFLoo	VLike	C1
PPedX	VLike	C1
PCare	Poss	C1
PCloth	VLike	C1
Other	Poss	C1
Other	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Start	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	22	Slight	

Accident Reference Number: A1007528 **Day:** Monday **Date:** 26/10/2015 **Time:** 15:10

Place Reported: Scene **District:** Manchester

Location: London Road at junction with (m) Mancunian Way Exit Slip

Description: V1 Trav E Leaves Mancunian Way To Turn Left Onto London Rd. V2 (Pedal Cycle) Trav N On London Rd. V1 Collides With V2 And Rider Of V2 Sustains Injury

Locational Details

Road:	A6/A57(M)	Junction Details:	Xrds		
OSGR:	384818 397528	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DCare	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Taxi	TurnL	W	N	
p/c	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	30	Slight	

Accident Reference Number: A1004626 **Day:** Sunday **Date:** 09/08/2015 **Time:** 03:24

Place Reported: Scene **District:** Manchester

Location: London Road at junction with Travis Street

Description: V1 Trav Sw Travis St, V1 Att To O/t Veh Crosses Central Reservation Coll Head On With V2 Trav N London Rd.

Locational Details

Road:	A6/U	Junction Details:	Tjun		
OSGR:	384820 397626	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	TurnL	NE	S	Skid
Taxi	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	50	Slight	

Accident Reference Number: A1087825 **Day:** Monday **Date:** 16/06/2014 **Time:** 07:15
Place Reported: Scene **District:** Manchester
Location: London Road at junction with A57(M) Mancunian Way Off-slip road
Description: V1 Trav E On Mancunian Way Off-slip Road Enters Junction And Collides With V2 (Pedal Cycle) Trav N On London Rd.

Locational Details

Road:	A6/A57(M)	Junction Details:	Tjun
OSGR:	384823 397503	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Start	W	E	
p/c	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	F	38	Slight	

Accident Reference Number: A1025618 **Day:** Tuesday **Date:** 03/01/2017 **Time:** 11:35
Place Reported: Scene **District:** Manchester
Location: London Road at junction with Mancunian Way
Description: V1 Trav S On London Rd Turning Right Onto Manunian Way, Passes Through Red Ats Across Path Of V2 Trav N London Rd

Locational Details

Road:	A6/A57(M)	Junction Details:	Mult
OSGR:	384831 397478	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Wet
Light Conditions:	Light
Weather Conditions:	Wind

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	3

Contributory Factors

Factor	Conf	Ref
DATS	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	N	W	
Car	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
2 Drv	M	25	Slight	
3 Pas	M	31	Slight	
1 Drv	F	43	Slight	

Accident Reference Number: A1026047 **Day:** Monday **Date:** 30/01/2017 **Time:** 19:15
Place Reported: Scene **District:** Manchester
Location: London Road at junction with Mancunian Way
Description: V1 Trav S London Rd Turning Right Collides With V2 Trav N London Rd

Locational Details

Road:	A6/A57(M)	Junction Details:	Xrds
OSGR:	384831 397478	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	4

Contributory Factors

Factor	Conf	Ref
DAIcoh	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	N	W	
Car	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
2 Drv	M	24	Slight	
1 Drv	M	52	Slight	
3 Pas	F	50	Serious	
4 Pas	F	17	Slight	

Accident Reference Number: A1025806 **Day:** Tuesday **Date:** 10/01/2017 **Time:** 17:20
Place Reported: Scene **District:** Manchester
Location: London Road at junction with Mancunian Way
Description: V1 Trav S London Rd, Stat At Ats, V1 Turn R Onto Mancunian Way. V1 Clearing Ped Crossing It Clipped C1 Crossing Sw-bound.

Locational Details

Road:	A6/A57(M)	Junction Details:	Xrds
OSGR:	384831 397519	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	Poss	V1
PFLoo	VLike	C1
PPedX	Poss	C1
PCare	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	N	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	F	24	Slight	

Accident Reference Number: A1005167 **Day:** Wednesday **Date:** 26/08/2015 **Time:** 12:20

Place Reported: Scene **District:** Manchester

Location: Travis Street at junction with London Road

Description: Both Veh Trav Sw Travis St. V1 Trav Behind V2 Trav Twds Jct London Rd. V2 Slows Down And V1 Coll Rear V2

Locational Details

Road:	U/A6	Junction Details:	Tjun		
OSGR:	384831	397641	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Stopg	NE	SW	
Taxi	Stopg	NE	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	43	Slight	

Accident Reference Number: E1012459 **Day:** Wednesday **Date:** 10/02/2016 **Time:** 18:02

Place Reported: Else **District:** Manchester

Location: Downing Street at junction with Mancunian Way On-slip

Description: V1 Trav S Downing St Turns Right In Front Of V2 Trav N Downing St

Locational Details

Road:	A6/A57(M)	Junction Details:	Tjun		
OSGR:	384832	397479	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	4

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	N	W	
Car	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	41	Serious	
2 Drv	M	35	Slight	
3 Pas	M	27	Slight	
4 Pas	M	26	Slight	

Accident Reference Number: A1043668 **Day:** Thursday **Date:** 10/05/2018 **Time:** 08:59

Place Reported: Scene **District:** Manchester

Location: Travis Street 5 metres North East of London Road

Description: C1 Crosses Travis St S-bound At Junction With London Rd. V1 Trav Sw Travis St, Stops At Junction, Accelerates Hitting C1.

Locational Details

Road:	U/A6	Junction Details:	Tjun		
OSGR:	384832	397644	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DGWor	Poss	V1
DFLoo	VLike	V1
DJudge	VLike	V1
PFLoo	VLike	C1
DLoss	Poss	V1
DCare	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Start	NE	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	F	26	Slight	

Accident Reference Number: E1029467 **Day:** Thursday **Date:** 02/02/2017 **Time:** 21:23

Place Reported: Scene **District:** Manchester

Location: Downing Street at junction with Mancunian Way

Description: V2 Trav N Downing St. V1 Trav Opposite Direction Turns Right Across Path of V2 And Collision Occurs. Driver V1 Escapes on Foot.

Locational Details

Road:	A6/A57(M)	Junction Details:	Tjun		
OSGR:	384833	397478	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:	TSX	

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DCare	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	N	W	
Taxi	Ahead	S	N	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	47	Slight	
2 Pas	F	22	Slight	

Accident Reference Number: A1039984 **Day:** Monday **Date:** 22/01/2018 **Time:** 17:10

Place Reported: Scene **District:** Manchester

Location: London Road at junction with Mancunian Way Exit Slip

Description: V1 (HGV) Trav S On London Rd Through Ats (Believed To Be Red) To Turn Right Onto Mancunian Way Collides With C1 (Pedestrian) On Pedestrian Crossing.

Locational Details

Road:	A6/A57(M)	Junction Details:	Mult		
OSGR:	384833 397522	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DATS	Poss	V1
DFLoo	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
HGV	TurnR	N	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	40	Serious	

Accident Reference Number: A1001721 **Day:** Wednesday **Date:** 27/05/2015 **Time:** 23:25

Place Reported: Scene **District:** Manchester

Location: London Road 50 Metres North of the Mancunian Way

Description: Both Veh Trav S London Rd. V1 Is Stopped Then Performs A U Turn Hits V2

Locational Details

Road:	A6	Junction Details:			
OSGR:	384836 397558	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Uturn	N	N	
Car	Ahead	N	S	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	38	Slight	
2 Pas	M	32	Slight	

Accident Reference Number: A1011100 **Day:** Tuesday **Date:** 19/01/2016 **Time:** 19:55

Place Reported: Scene **District:** Manchester

Location: London Road at junction with Mancunian Way

Description: Both Veh Trav S London Rd And V1 Turns Left Onto Mancunian Way Slip Rd, V2 (Pedal Cycle) Collides With Rear Of V1

Locational Details

Road:	A6/A57(M)	Junction Details:	Slip		
OSGR:	384846 397511	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DJudge	Poss	V1
DJudge	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
Car	TurnL	N	E	
p/c	Ahead	N	S	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	42	Slight	

Accident Reference Number: A1032600 **Day:** Wednesday **Date:** 12/07/2017 **Time:** 10:30

Place Reported: Scene **District:** Manchester

Location: Fairfield St at junction with Taxi Rank Exit, 110 metres East of London Road

Description: V1 Turning Out Of Drop Off/pick Up Area At Picadilly Station S-bound Onto Fairfield St. Sunlight Hits V1's Windscreen Causing Him To Collide With C1 and C2 Crossing W-bound

Locational Details

Road:	B6469/U	Junction Details:	ent		
OSGR:	384856 397760	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DSun	VLike	V1
PJudge	Poss	C1
PIlIns	Poss	C1
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Taxi	Start	N	S	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	59	Slight	
2 Ped	F	61	Slight	

Accident Reference Number: A1010356 **Day:** Monday **Date:** 04/01/2016 **Time:** 08:30

Place Reported: Scene **District:** Manchester

Location: Ducie Street at junction with Jutland Street

Description: Both Veh Trav Sw Along Ducie St In Heavy Traffic. Passenger In V1 Gets Out Opening Door Into Path Of V2 (Pedal Cycle). Rider Of V2 Is Knocked Off

Locational Details

Road:	C/U	Junction Details:	Tjun		
OSGR:	384856 398169	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DTurn	VLike	V2
DCare	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Waitg	NE	SW	
p/c	U/T	NE	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	40	Slight	

Accident Reference Number: A1091301 **Day:** Friday **Date:** 12/09/2014 **Time:** 11:49

Place Reported: Scene **District:** Manchester

Location: Berry Street 35 metres N of Buxton Street

Description: V1 Trav S On Berry St Reverses, Colliding With C1 And C2 (Pedestrians). V1 Stops Briefly, Then Drives Off Without Exchanging Details.

Locational Details

Road:	U	Junction Details:			
OSGR:	384864 397632	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Revg	N	S	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	F	28	Slight	
2 Ped	F	30	Slight	

Accident Reference Number: E1002051 **Day:** Wednesday **Date:** 03/06/2015 **Time:** 10:15

Place Reported: Scene **District:** Manchester

Location: Grosvenor Street at junction with Wadeson Road

Description: V1 Way Blocked By Vehicle Involved In Construction In Street, Reverses W Grosvenor St And Collides Pedestrian

Locational Details

Road:	C/U	Junction Details:	Tjun		
OSGR:	384868 397351	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DAggre	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Revg	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	F	46	Slight	

Accident Reference Number: E1097343 **Day:** Thursday **Date:** 12/02/2015 **Time:** 11:35

Place Reported: Scene **District:** Manchester

Location: Downing Street 25 metres North West of Grosvenor Street

Description: Both Vehicles Travel Nw On Downing St In Adjacent Lanes. V1 Changes Lane And Collides With V2 (Motorcycle), Resulting In Rider Of V2 Falling Off

Locational Details

Road:	A6	Junction Details:			
OSGR:	384872 397391	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DTired	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	chlnR	SE	NW	
m/s	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	35	Slight	

Accident Reference Number: E1003464 **Day:** Wednesday **Date:** 08/07/2015 **Time:** 14:00
Place Reported: Else **District:** Manchester
Location: Downing Street at junction with Braley Street
Description: Both Veh Trav Se Downing St. V1 (PCV) Moves R On V2 (Motorcycle) Does Same. Collision Occurs

Locational Details

Road:	A6/U	Junction Details:	Rdbt		
OSGR:	384888 397393	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry	Severity:	Slight
Light Conditions:	Light	No. of Vehicles:	2
Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
PCV	chlnR	NW	SE	
m/s	chlnR	NW	SE	O/tn

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	30	Slight	

Accident Reference Number: E1044560 **Day:** Friday **Date:** 01/06/2018 **Time:** 16:15
Place Reported: Else **District:** Manchester
Location: Downing Street at junction with Grosvenor Street
Description: Both Vehs Trav Nw Downing St. V1 (MGV) In Lane 2, V2 (Pedal Cycle) In Lane 1. V1 Suddenly Changes Lane To Lane 1 Colliding With V2, Who Fell Off Bike

Locational Details

Road:	A6/C	Junction Details:	Tjun		
OSGR:	384890 397368	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	TSX		

Conditions

Road Surface:	Dry	Severity:	Serious
Light Conditions:	Light	No. of Vehicles:	2
Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DClose	VLike	V1
DJudge	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
MGV	chlnL	SE	NW	
p/c	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	21	Serious	

Accident Reference Number: A1045612 **Day:** Tuesday **Date:** 26/06/2018 **Time:** 06:50
Place Reported: Else **District:** Manchester
Location: Boad Street 65 metres North West of Baird Street
Description: V1 (LGV) Trav Se Boad St, V2 (Pedal Cycle) Trav Se Boad St On Pavment Enters C/way & Collides With V1. V1 FTS

Locational Details

Road:	U	Junction Details:			
OSGR:	384901 397911	Junction Control:	n/a		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry	Severity:	Slight
Light Conditions:	Light	No. of Vehicles:	2
Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
LGV	Ahead	NW	SE	
p/c	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	60	Slight	

Accident Reference Number: A1039664 **Day:** Tuesday **Date:** 16/01/2018 **Time:** 19:10
Place Reported: Else **District:** Manchester
Location: Fairfield Street 2 metres W of Baring Street
Description: V1 (Car) Trav E On Fairfield St Collides with C1 (Pedestrian) Trav S Across Fairfield St from Nearside.

Locational Details

Road:	B6469/U	Junction Details:	Tjun		
OSGR:	384914 397748	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet	Severity:	Slight
Light Conditions:	Dark	No. of Vehicles:	1
Weather Conditions:	Rain	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PFLoo	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	21	Slight	

Accident Reference Number: E1094876 **Day:** Thursday **Date:** 11/12/2014 **Time:** 18:13

Place Reported: Scene **District:** Manchester

Location: Downing Street at junction with Charlton Place

Description: V2 Travels Nw On Downing St Towards Manchester. V1 Travels Sw On Charlton Place And Turns Right Onto Downing St At Speed, Hitting V2

Locational Details

Road:	A6/U	Junction Details:	Xrds		
OSGR:	384937 397308	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	NE	NW	
Car	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	44	Slight	

Accident Reference Number: E1098169 **Day:** Saturday **Date:** 07/03/2015 **Time:** 02:44

Place Reported: Scene **District:** Manchester

Location: Downing Street at junction with Charlton Place

Description: Both Vehs Trav Se On Downing St. V1 Stops And Reverses At Speed Colliding With V2 Which Is Stationary On Same Road.

Locational Details

Road:	A6/U	Junction Details:	Tjun		
OSGR:	384942 397317	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DAlcoh	VLike	V1
DCare	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Revg	SE	NW	
Car	Waitg	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	28	Serious	

Accident Reference Number: A1009939 **Day:** Monday **Date:** 21/12/2015 **Time:** 23:15

Place Reported: Scene **District:** Manchester

Location: Travis St 15 metres SW of Fairfield St

Description: V2 Trav Ne Travis St Performs A U Turn And Collides With V1 Trav Sw Travis St

Locational Details

Road:	U/B6469	Junction Details:	Xrds		
OSGR:	384966 397723	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DITurn	Poss	V2
DJudge	Poss	V2
DSpee	Poss	V1
DRain	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NE	SW	
Car	Uturn	SW	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	19	Slight	

Accident Reference Number: A1097315 **Day:** Thursday **Date:** 05/02/2015 **Time:** 16:40

Place Reported: Scene **District:** Manchester

Location: (m) Mancunian Way 150 metres W of Manor Street

Description: All Traffic Travels W Mancunian Way In Lane 2 Of 2. V2 And 3 Have Stopped As Result Of Traffic. V1 Fails To Notice Standing Traffic, Brakes Hits V2. V2 Hits V3

Locational Details

Road:	A57(M)	Junction Details:			
OSGR:	384978 397481	Junction Control:	n/a		
Speed Limit:	50	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	3
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DLearn	VLike	V1
DJudge	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	E	W	Skid
LGV	Waitg	E	W	
Car	Waitg	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	21	Slight	
2 Drv	M	35	Slight	

Accident Reference Number: A1090200 **Day:** Wednesday **Date:** 06/08/2014 **Time:** 17:31

Place Reported: Scene **District:** Manchester

Location: Mancunian Way 150 metres W of Manor Street

Description: All Vehicles Travel E Mancunian Way. V2 And 3 Have Stopped In Standing Traffic. V1 Is Unable To Stop In Time And His V2, Which Is Pushed Into V3.

Locational Details

Road:	A57(M)	Junction Details:			
OSGR:	384980 397485	Junction Control:	n/a		
Speed Limit:	50	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	3
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DAlcoh	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	W	E	
Car	Ahead	W	E	
Car	Ahead	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	53	Slight	

Accident Reference Number: A1012225 **Day:** Monday **Date:** 08/02/2016 **Time:** 05:40

Place Reported: Scene **District:** Manchester

Location: Fairfield Street at junction with Travis St

Description: V1 (Taxi) Trav E Fairfield St Turns Right Into Travis St Across Path Of V2 (Motorcycle) Trav W Fairfield St Collision Occurs

Locational Details

Road:	B6469/U	Junction Details:	Mult		
OSGR:	384980 397734	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Taxi	TurnR	W	SW	
m/s	Ahead	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	29	Serious	

Accident Reference Number: A1098832 **Day:** Sunday **Date:** 15/03/2015 **Time:** 22:35

Place Reported: Scene **District:** Manchester

Location: Travis Street at junction with Fairfiled Street

Description: V1 Travels Sw On Travis Str, Intending To Turn Right Onto Fairfield St. V2 Travels Ne On Travis St. V1 Turns Across Path Of V2, Collision Occurs

Locational Details

Road:	U/B6469	Junction Details:	Mult		
OSGR:	384981 397735	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	Ref		

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DTurn	VLike	V1
DSign	Poss	V1
DFLoo	VLike	V1
DJudge	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	NE	W	
Taxi	Ahead	SW	NE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	44	Slight	

Accident Reference Number: A1024809 **Day:** Thursday **Date:** 15/12/2016 **Time:** 23:20

Place Reported: Scene **District:** Manchester

Location: Travis Street at junction with Fairfield Street

Description: V2 (Motorcycle) Trav Ne Travis St Through Jct Contr By Ats, V1 Trav Sw Travis St Appr Same Jct Turns Right Across Path Of V2 And Collision Occurs.

Locational Details

Road:	U/B6469	Junction Details:	Mult		
OSGR:	384981 397735	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
RdLay	Poss	V1
DFLoo	VLike	V1
DWscr	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	NE	NW	
m/cl	Ahead	SW	NE	O/tn

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	36	Slight	

Accident Reference Number: E1087220 **Day:** Sunday **Date:** 25/05/2014 **Time:** 11:30
Place Reported: Scene **District:** Manchester
Location: M Mancunian Way 150 metres W of Manor Street
Description: V1 Trav W On Mancunian Way Collides With Central Res Coming To Rest In Carriageway. V2 Trav Same Is Unable To Stop In Time. Collision Occurs.

Locational Details

Road:	A57(M)	Junction Details:			
OSGR:	384982 397474	Junction Control:	n/a		
Speed Limit:	50	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	4

Contributory Factors

Factor	Conf	Ref
DFast	VLike	V1
DLoss	VLike	V1
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Lbend	E	W	
Car	Ahead	E	W	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	M	36	Slight	
2	Drv	F	57	Slight	
3	Pas	M	91	Slight	
4	Pas	F	56	Slight	

Accident Reference Number: A1000929 **Day:** Wednesday **Date:** 06/05/2015 **Time:** 08:58
Place Reported: Scene **District:** Manchester
Location: Travis Street at junction with Fairfield Street
Description: V1 Trav Ne Travis St Through Junction with Fairfield St. C1 Steps Into Carriageway & Collides With V1

Locational Details

Road:	U/B6469	Junction Details:	Mult		
OSGR:	384997 397745	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Wet
Light Conditions:	Light
Weather Conditions:	Rain

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PFLoo	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Mbus	Ahead	SW	NE	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Ped	M	29	Serious	

Accident Reference Number: A1002805 **Day:** Saturday **Date:** 06/06/2015 **Time:** 02:00
Place Reported: Scene **District:** Manchester
Location: Travis Street at junction with Fairfield Street
Description: V1 Trav Sw On Travis St Stopped At Ats. Intoxicated Male Walks Into Middle Of C/way In Path Of V1 & Refused To Move. V1 Has Set Off Knocking Ped To Floor

Locational Details

Road:	U/B6469	Junction Details:	Slip		
OSGR:	385007 397747	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DAggre	VLike	V1
PAlcoh	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
LGV	Start	NE	SW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Ped	M	27	Serious	

Accident Reference Number: A1003610 **Day:** Thursday **Date:** 16/07/2015 **Time:** 08:30
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Travis Street
Description: V1 Stationary on Fairfield St, Passenger Opens Door, V2 (Pedal Cycle) Trav W Fairfield St Undertakes, Comes Off Bike

Locational Details

Road:	B6469/U	Junction Details:	Xrds		
OSGR:	385011 397730	Junction Control:	TS		
Speed Limit:	30	Ped Crossing:	Ref		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Parkd	Pk	Pk	
p/c	U/T	E	W	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Rid	M	39	Slight	

Accident Reference Number: A1013684 **Day:** Sunday **Date:** 06/03/2016 **Time:** 22:12
Place Reported: Scene **District:** Manchester
Location: Fairfield Street 30 metres E of Travis Street
Description: C1 (Pedestrian) Crossing N-bd Between Cars Collides With V1 Trav E Fairfield St

Locational Details

Road:	B6469		Junction Details:		
OSGR:	385028	397733	Junction Control:	n/a	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PXMas	Poss	C1
PFLoo	Poss	C1
PCare	Poss	C1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	F	20	Serious	

Accident Reference Number: A1033377 **Day:** Saturday **Date:** 29/07/2017 **Time:** 18:41
Place Reported: Scene **District:** Manchester
Location: Store Street 30 metres South West of Millbank Street
Description: V2 Parked At Side Of Rd. V1 Trav Ne Store St Drives Into Rear Of V2.

Locational Details

Road:	C		Junction Details:		
OSGR:	385039	398140	Junction Control:	n/a	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DJudge	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Stopg	SW	NE	
Taxi	Parkd	Pk	Pk	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	45	Slight	

Accident Reference Number: A1011465 **Day:** Monday **Date:** 18/01/2016 **Time:** 19:00
Place Reported: Else **District:** Manchester
Location: Sheffield Street 5 metres NW Of Travis Street
Description: C1 (Pedestrian) Walks Into Road W-bd From Between Two Stationary Vehicles. He Is Then Hit By V1 Trav Se Sheffield St, Which Fails To Stop.

Locational Details

Road:	U/U		Junction Details:	Tjun	
OSGR:	385112	397824	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DJudge	Poss	V1
DCare	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	24	Slight	

Accident Reference Number: A1049228 **Day:** Saturday **Date:** 15/09/2018 **Time:** 17:10
Place Reported: Else **District:** Manchester
Location: Travis Street at junction with Sheffield Street
Description: V2 (Pedal Cycle) Trav Ne Travis St, V1 Trav Sw Travis St & Turns Right Onto Sheffield St Across Path Of V2, Collision Occurs

Locational Details

Road:	U/U		Junction Details:	Tjun	
OSGR:	385114	397817	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	N/A

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	NE	NW	
p/c	Ahead	SW	NE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	47	Slight	

Accident Reference Number: A1099536 **Day:** Thursday **Date:** 26/03/2015 **Time:** 16:30
Place Reported: Scene **District:** Manchester
Location: Travis Street at junction with Sheffield Street
Description: V2 Trav Ne On Travis St Towards Ancoats. V1 Trav Opp Dir Is Indicating To Turn Right Into Sheffield St. V1 Turns Across The Path Of V2. Collision Occurs

Locational Details

Road:	U/U	Junction Details:	Tjun		
OSGR:	385116 397817	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Wind

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DTurn	VLike	V1
DSun	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	NE	NW	
Car	Ahead	SW	NE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	30	Slight	

Accident Reference Number: A1044271 **Day:** Sunday **Date:** 27/05/2018 **Time:** 20:45
Place Reported: Else **District:** Manchester
Location: Mancunian Way at junction with Manor Street
Description: V2 Trav E Mancunian Way When V1 Trav E Onto Mancunain Way From Slip Rd. As V1 Moved Onto Manc Way V2 Moved To O/side Lane, V1 Collides With V2

Locational Details

Road:	A635/U	Junction Details:	Slip		
OSGR:	385124 397452	Junction Control:	GW		
Speed Limit:	40	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DMobP	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	W	E	
Car	Ahead	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	23	Slight	
2 Pas	F	30	Slight	

Accident Reference Number: A1030916 **Day:** Friday **Date:** 05/05/2017 **Time:** 08:35
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Temperance Street
Description: V2 (Pedal Cycle) Trav E Fairfield St Towards Manchester City Centre. V1 Trav Nw Temperance St Waits To Turn Right. As V1 Turns, Collisiion Occurs With V2

Locational Details

Road:	B6469/U	Junction Details:	Tjun		
OSGR:	385141 397708	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	SE	E	
p/c	Ahead	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	31	Slight	

Accident Reference Number: A1030155 **Day:** Friday **Date:** 05/05/2017 **Time:** 09:17
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Temperance Street
Description: V2 (Pedal Cycle) Trav W On Fairfield St. V1 Trav E On Same Road. V1 Turns Right Twds Temperance St And Collides With V2 As It Does So.

Locational Details

Road:	B6469/U	Junction Details:	Tjun		
OSGR:	385146 397707	Junction Control:	GW		
Speed Limit:	30	Ped Crossing:			

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DCDar	VLike	V2
Other	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	W	SE	
p/c	Ahead	E	W	O/tn

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	33	Serious	

Accident Reference Number: A1094232 **Day:** Saturday **Date:** 29/11/2014 **Time:** 01:55
Place Reported: Scene **District:** Manchester
Location: Great Ancoats Street 15 metres NW of Store Street
Description: V1 Trav Nw On Great Ancoats St Collides With C1 (Pedestrian) Crossing Carriageway From Offside In Westerly Direction.

Locational Details

Road:	A665/C		Junction Details:	Xrds	
OSGR:	385177	398256	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	Poss	V1
DEye	Poss	V1
PFLoo	Poss	C1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	27	Serious	

Accident Reference Number: A3030388 **Day:** Wednesday **Date:** 26/04/2017 **Time:** 14:55
Place Reported: Else **District:** Manchester
Location: Great Ancoats Street at junction with Old Mill Street
Description: Both Vehs Trav Se Great Ancoats St In Adjacent Lanes. V1 Moves Into Same Lane As V2 And Collision Ocurs. V1 Then Fails To Stop

Locational Details

Road:	A665/C		Junction Details:	Tjun	
OSGR:	385184	398260	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	
Car	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	32	Slight	

Accident Reference Number: A1013409 **Day:** Saturday **Date:** 05/03/2016 **Time:** 19:50
Place Reported: Scene **District:** Manchester
Location: Store Street at junction with Great Ancoats Street
Description: C1 (Pedestrian) Crosses Se-bd Infront Of A Passing Vehicle (V1) Trav Sw Store St And Collision Occurs

Locational Details

Road:	C/A665		Junction Details:	Xrds	
OSGR:	385188	398234	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PXMas	Poss	C1
PFLoo	Poss	C1
PJudge	Poss	C1
PAlcoh	Poss	C1
DDrugs	Poss	V1
DFast	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NE	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	23	Serious	

Accident Reference Number: A3090887 **Day:** Wednesday **Date:** 03/09/2014 **Time:** 11:15
Place Reported: Scene **District:** Manchester
Location: Great Ancoats Street 10 metres Nw of Old Mill Street
Description: C1 Is Crossing Road As V1 Trav Se Great Ancoats St Filters Through Standing Traffic. C1 Does Not See V1 And Collision Occurs, Resulting In C1 Being Knocked To Ground.

Locational Details

Road:	A665/C		Junction Details:	Xrds	
OSGR:	385189	398261	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:	Ref	

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PXMas	VLike	C1
PFLoo	VLike	C1
DStat	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
othr	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	F	30	Slight	

Accident Reference Number: A3095425 **Day:** Tuesday **Date:** 23/12/2014 **Time:** 04:25

Place Reported: Scene **District:** Manchester

Location: Great Ancoats Street at junction with Store Street

Description: V2 Travels Nw On Great Ancoats St. V1 Heads Ne On Store St. V1 Moves Through Red Light And Collides With V2. V1 Fts

Locational Details				Conditions		Accident Details	
Road:	A665/C	Junction Details:	Xrds	Road Surface:	Dry	Severity:	Slight
OSGR:	385190 398242	Junction Control:	TS	Light Conditions:	Dark	No. of Vehicles:	2
Speed Limit:	30	Ped Crossing:		Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DATS	VLike	V1
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SW	NE	
Car	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	54	Slight	

Accident Reference Number: A1091503 **Day:** Friday **Date:** 19/09/2014 **Time:** 06:34

Place Reported: Scene **District:** Manchester

Location: Great Ancoats Street at junction with Store Street

Description: V1 Trav Se On Great Ancoats St Turns Right, Is Blinded By Sun, And Crosses Path Of V2 (Motorcycle) Trav Nw Same. Collision Occurs

Locational Details				Conditions		Accident Details	
Road:	A665/C	Junction Details:	Xrds	Road Surface:	Dry	Severity:	Serious
OSGR:	385194 398241	Junction Control:	TS	Light Conditions:	Light	No. of Vehicles:	2
Speed Limit:	30	Ped Crossing:		Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DTurn	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	wtgTR	NW	SW	
m/cl	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	47	Serious	

Accident Reference Number: A3052213 **Day:** Tuesday **Date:** 25/12/2018 **Time:** 20:37

Place Reported: Scene **District:** Manchester

Location: Great Ancoats Street at junction with Old Mill Street

Description: Both Vehs Trav Se Great Ancoats St. V2 In Front Changes Lane To Left & Brakes. V1 Behind Brakes But Collides Rear V2

Locational Details				Conditions		Accident Details	
Road:	A665/C	Junction Details:	Xrds	Road Surface:	Wet	Severity:	Slight
OSGR:	385195 398259	Junction Control:	TS	Light Conditions:	Dark	No. of Vehicles:	2
Speed Limit:	30	Ped Crossing:		Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DBrake	VLike	V1
DTurn	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
Car	Waitg	NW	SE	
Car	chlnL	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	53	Slight	

Accident Reference Number: A1090240 **Day:** Thursday **Date:** 14/08/2014 **Time:** 21:00

Place Reported: Scene **District:** Manchester

Location: Great Ancoats Street at junction with Old Mill Street

Description: V1 Travels Se On Great Ancoats St. V2 Travels Opposite Direction, Turning Right Into Old Mill St. As V2 Turns, Collision Occurs.

Locational Details				Conditions		Accident Details	
Road:	A665/C	Junction Details:	Xrds	Road Surface:	Wet	Severity:	Slight
OSGR:	385199 398254	Junction Control:	TS	Light Conditions:	Dark	No. of Vehicles:	2
Speed Limit:	30	Ped Crossing:	Ref	Weather Conditions:	Rain	No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DATS	VLike	V1
DFast	VLike	V1
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	
Car	TurnR	SE	NE	

Casualty Details

Type	Sex	Age	Sev	Pupil
2 Pas	M	10	Slight	
1 Drv	M	27	Slight	

Accident Reference Number: A3041476 **Day:** Friday **Date:** 09/03/2018 **Time:** 22:30
Place Reported: Else **District:** Manchester
Location: Old Mill Street at junction with Great Ancoats Street
Description: V1 Trav Nw Gt Ancoats St Turns Right Onto Old Mill St And Collides With V2 (Pedal Cycle) Trav Se Across Old Mill St From Pavement.

Locational Details

Road:	C/A665	Junction Details:	Xrds		
OSGR:	385207	398262	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:	Ref	

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V2
DJudge	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	SE	NE	
p/c	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	F	24	Slight	

Accident Reference Number: A1016989 **Day:** Monday **Date:** 06/06/2016 **Time:** 00:35
Place Reported: Scene **District:** Manchester
Location: Great Ancoats Street 50 metres SE of Old Mill Street
Description: V1 Trav Nw Great Ancoats St As C1 Walks Into Road From Easterly Direction And Collision Occurs

Locational Details

Road:	A665	Junction Details:			
OSGR:	385228	398201	Junction Control:	n/a	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PFLoo	Poss	C1
PAlcoh	Poss	C1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SE	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	30	Slight	

Accident Reference Number: A1089563 **Day:** Sunday **Date:** 27/07/2014 **Time:** 10:25
Place Reported: Scene **District:** Manchester
Location: Hoyle Street at junction with Temperance Street
Description: V1 Trav Nw Temperance St And V2 Trav Ne Hoyle St. Vehicles Collide At Unmarked Crossroads.

Locational Details

Road:	U/U	Junction Details:	Xrds		
OSGR:	385272	397620	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
Other	VLike	V1
Other	VLike	V2

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SE	NW	
LGV	Ahead	SW	NE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	49	Slight	

Accident Reference Number: A1029443 **Day:** Wednesday **Date:** 19/04/2017 **Time:** 14:55
Place Reported: Scene **District:** Manchester
Location: Hoyle Street at junction with Temperance Street
Description: V2 Trav Ne On Hoyle St As V1 Trav Nw Temperance St. V2 Hits V1 As They Reach Junction And V1 Then Hits V3 (Parked and Unattended)

Locational Details

Road:	U/U	Junction Details:	Xrds		
OSGR:	385272	397621	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	3
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
Mark	VLike	V1
DFLoo	Poss	V1
DFLoo	Poss	V2
DStat	Poss	V1
DStat	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SE	NW	
Car	Ahead	SW	NE	
Car	Parkd	Pk	Pk	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	22	Slight	

Accident Reference Number: A1098045 **Day:** Tuesday **Date:** 17/02/2015 **Time:** 09:55

Place Reported: Scene **District:** Manchester

Location: Temperance Street at junction with Hoyle Street

Description: V3 And V4 Parked And Unattended On Southbound Carriageway. V2 Travels Ne On Hoyle Street As V1 Travels Se Temperance St, Does Not Stop. Collision Occurs.

Locational Details				Conditions		Accident Details	
Road:	U/U	Junction Details:	Xrds	Road Surface:	Dry	Severity:	Slight
OSGR:	385274 397622	Junction Control:	GW	Light Conditions:	Light	No. of Vehicles:	4
Speed Limit:	30	Ped Crossing:		Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DCare	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	
Car	Ahead	SW	NE	
Car	Parkd	Pk	Pk	
Car	Parkd	Pk	Pk	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	26	Slight	

Accident Reference Number: A1021300 **Day:** Monday **Date:** 03/10/2016 **Time:** 18:15

Place Reported: Else **District:** Manchester

Location: Hoyle Street at junction with Temperance Street

Description: V2 Trav Se Temperance St As V1 Trav Ne Hoyle St. Collision Occurs At Unmarked Crossroad

Locational Details				Conditions		Accident Details	
Road:	U/U	Junction Details:	Xrds	Road Surface:	Dry	Severity:	Slight
OSGR:	385274 397623	Junction Control:	GW	Light Conditions:	Light	No. of Vehicles:	2
Speed Limit:	30	Ped Crossing:		Weather Conditions:	Fine	No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DJnOvr	Poss	V1
DFLoo	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SW	NE	
Car	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	F	21	Slight	

Accident Reference Number: A3041017 **Day:** Sunday **Date:** 11/02/2018 **Time:** 01:00

Place Reported: Else **District:** Manchester

Location: Great Ancoats Street at junction with Pollard Street

Description: Both Vehs Trav Se Great Ancoats St. V2 Stationary In Traffic At ATS - V1 Approaches From Behind & Collides With V2. V1 FTS.

Locational Details				Conditions		Accident Details	
Road:	A665/A662	Junction Details:	Tjun	Road Surface:	Wet	Severity:	Slight
OSGR:	385309 398125	Junction Control:	TS	Light Conditions:	Dark	No. of Vehicles:	2
Speed Limit:	30	Ped Crossing:	TSX	Weather Conditions:	R&W	No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	
Car	Waitg	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	28	Slight	
2 Pas	M	34	Slight	

Accident Reference Number: A3004691 **Day:** Sunday **Date:** 16/08/2015 **Time:** 11:15

Place Reported: Scene **District:** Manchester

Location: Great Ancoats Street at junction with Pollard Street

Description: Both Veh Trav Se Great Ancoats St; V1 In Inside Lane V2 Is In Outside Lane. V1 Collides With V2

Locational Details				Conditions		Accident Details	
Road:	A665/A662	Junction Details:	Tjun	Road Surface:	Dry	Severity:	Slight
OSGR:	385321 398110	Junction Control:	TS	Light Conditions:	Light	No. of Vehicles:	2
Speed Limit:	30	Ped Crossing:	TSX	Weather Conditions:	Fine	No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DJudge	Poss	V1
DTurn	VLike	V1
DDisIn	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
othr	chlnR	NW	SE	
Mbus	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Pas	F	40	Slight	
2 Pas	M	10	Slight	

Accident Reference Number: A3096065 **Day:** Sunday **Date:** 04/01/2015 **Time:** 19:54

Place Reported: Scene **District:** Manchester

Location: Great Ancoats Street at junction with Pollard Street

Description: V1 Travels Nw On Great Ancoats St As C1 Crosses V1's Path On V2 (Pedal Cycle). V2 Is On Pedestrian Crossing. C1 Is Knocked To Floor.

Locational Details

Road:	A665/A662	Junction Details:	Tjun
OSGR:	385324 398094	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SE	NW	
p/c	Ahead	NE	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	F	22	Slight	

Accident Reference Number: A1029260 **Day:** Sunday **Date:** 09/04/2017 **Time:** 03:35

Place Reported: Scene **District:** Manchester

Location: Great Ancoats Street at junction with Pollard Street

Description: C1 Waits To Cross Road, Believed To Be Under Influence. V1 Trav Se Great Ancoats St Crosses Junction As C1 Runs Into Road. V1 Tries To Avoid C1 But Collision Occurs

Locational Details

Road:	A665/A662	Junction Details:	Tjun
OSGR:	385333 398100	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PAlcoh	VLike	C1
PDrugs	VLike	C1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Ped	M	24	Serious	

Accident Reference Number: A1087757 **Day:** Thursday **Date:** 12/06/2014 **Time:** 11:56

Place Reported: Scene **District:** Manchester

Location: Fairfield Street at junction with St Andrew's Street

Description: V1 Trav W On Fairfield St Turns Right Into Path Of V2 (Pedal Cycle) Trav Opp Dir. Collision Occurs And Rider Of V2 Falls To Ground.

Locational Details

Road:	B6469/U	Junction Details:	Tjun
OSGR:	385337 397686	Junction Control:	GW
Speed Limit:	30	Ped Crossing:	

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DJudge	VLike	V1
DTurn	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	E	NW	
m/cl	Ahead	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	49	Slight	
2 Rid	M	30	Slight	

Accident Reference Number: A1035649 **Day:** Tuesday **Date:** 19/09/2017 **Time:** 17:20

Place Reported: Scene **District:** Manchester

Location: Fairfield Street at junction with St Andrew's Street

Description: V1 (Bus) Trav Se On Fairfield St. V2 (Pedalcycle) Crosses Road From Pavement Trav Nw After Unknown Vehicle Flashed Him, Into Path Of V1. V1 Brakes But Still Collides With V2

Locational Details

Road:	B6469/U	Junction Details:	Tjun
OSGR:	385338 397686	Junction Control:	GW
Speed Limit:	30	Ped Crossing:	

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DCPav	VLike	V2
DTurn	VLike	V2
DJudge	VLike	V2

Vehicle Details

Type	Move	From	To	Skid
PCV	Ahead	NW	SE	
p/c	Ahead	S	NW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	23	Slight	

Accident Reference Number: A1088417 **Day:** Friday **Date:** 27/06/2014 **Time:** 19:00
Place Reported: Scene **District:** Manchester
Location: Great Ancoats Street at junction with Adair Street
Description: V1 Trav Se On Great Ancoats St Turns Right Into Path Of V2 Trav Opp Dir. Collision Occurs

Locational Details

Road:	A665/U	Junction Details:	Tjun		
OSGR:	385375	398043	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DTurn	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Taxi	TurnR	NW	SW	
Car	Ahead	SE	NW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	M	28	Slight	
2	Pas	F	25	Serious	

Accident Reference Number: A1005014 **Day:** Wednesday **Date:** 26/08/2015 **Time:** 08:40
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Crane Street
Description: V1 Trav E Fairfield St, Turns Right Across Path V1 (Pedal Cycle) Trav Opposite.

Locational Details

Road:	B6469/U	Junction Details:	Tjun		
OSGR:	385459	397661	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DFLoo	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
LGV	TurnR	W	S	
p/c	Ahead	E	W	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Rid	M	34	Slight	

Accident Reference Number: A1088367 **Day:** Sunday **Date:** 29/06/2014 **Time:** 18:30
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Mancunian Way
Description: Both Vehs Trav W On Fairfield St. V2 In Lane 1 Gives Way At Jct. V1 Collides With Rear Of V2.

Locational Details

Road:	A635/A635	Junction Details:	Tjun		
OSGR:	385523	397616	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DTgate	Poss	V1
DJudge	Poss	V1
DBrake	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Stopg	E	W	
Car	Stopg	E	W	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	M	38	Slight	

Accident Reference Number: E1034979 **Day:** Tuesday **Date:** 05/09/2017 **Time:** 08:20
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Mancunian Way
Description: V2 Trav W Fairfield St Followed By V1. V2 Changes To Left Lane To Turn Left & Stops For Traffic. V1 Collides With V2 Rear

Locational Details

Road:	A635/A635	Junction Details:	Tjun		
OSGR:	385524	397619	Junction Control:	GW	
Speed Limit:	40		Ped Crossing:	TSX	

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	N/A

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
LGV	wtgTL	E	SW	
Car	wtgTL	E	SW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	F	31	Slight	

Accident Reference Number: A1024373 **Day:** Friday **Date:** 11/11/2016 **Time:** 19:10
Place Reported: Else **District:** Manchester
Location: Fairfield Street at junction with Mancunian Way
Description: Both Vehs Trav W Fairfield St. V1 Waiting At Ats, V2 Hits V1, V2 Fails To Stop

Locational Details

Road:	A635/A635	Junction Details:	Xrds
OSGR:	385555 397646	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	E	W	
Car	Stopg	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	23	Slight	

Accident Reference Number: A1045114 **Day:** Thursday **Date:** 21/06/2018 **Time:** 11:16
Place Reported: Scene **District:** Manchester
Location: Fairfield Street 15 metres East of Mancunian Way
Description: Both Vehs Trav W Fairfield St. V1 Goes Into Rear V2. V1 FTS.

Locational Details

Road:	A635/A635	Junction Details:	Slip
OSGR:	385556 397647	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	E	W	
Car	Stopg	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	53	Slight	

Accident Reference Number: A3048199 **Day:** Sunday **Date:** 26/08/2018 **Time:** 15:00
Place Reported: Else **District:** Manchester
Location: Great Ancoats Street 20 metres NW of Every Street
Description: Both Vehs Trav Se Great Ancoats St. V2 Stopped At Lights Sees V1 Coming At Speed. V1 Brakes Buts Hits V2. V1 Fts.

Locational Details

Road:	A665/C	Junction Details:	Tjun
OSGR:	385559 397958	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	NW	SE	Skid
Car	Waitg	NW	SE	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	33	Slight	

Accident Reference Number: A1088350 **Day:** Tuesday **Date:** 01/07/2014 **Time:** 13:00
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Mancunian Way
Description: V1 (Pedal Cycle) Enters Carriageway Fairfield St From Near Side, Passing In Front Of Lgv In Lane One Into Path Of V2 Travelling Sw In Lane 2 Fairfield St.

Locational Details

Road:	A635/A635	Junction Details:	Mult
OSGR:	385564 397639	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DCPav	VLike	V1
DPedX	Poss	V1
DFLoo	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
p/c	Ahead	E	W	O/tn
Car	Lbend	E	SW	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	21	Serious	

Accident Reference Number: A3045407 **Day:** Thursday **Date:** 28/06/2018 **Time:** 17:35
Place Reported: Scene **District:** Manchester
Location: Great Ancoats Street 5 metres South East of Every Street
Description: Both Vehs Trav Nw Gt Ancoats St Twds Mcr. V2 (Motorcycle) Stops At Amber ATS, V1 Colides Rear Of V2

Locational Details

Road:	A665/C		Junction Details:	Tjun	
OSGR:	385592	397935	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:	TSX	

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Serious
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DJudge	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	SE	NW	
m/cl	Ahead	SE	NW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Rid	M	57	Serious	

Accident Reference Number: A3006737 **Day:** Saturday **Date:** 10/10/2015 **Time:** 00:20
Place Reported: Scene **District:** Manchester
Location: Great Ancoats Street at junction with Every Street
Description: V1 Trav N Great Ancoats St Around Left Hand Bend, Collides With Central Reservation Barrier

Locational Details

Road:	A665/C		Junction Details:	Xrds	
OSGR:	385597	397939	Junction Control:	TS	
Speed Limit:	30		Ped Crossing:	TSX	

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	4

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Lbend	S	NW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	M	34	Slight	
2	Pas	M	28	Slight	
3	Pas	F	12	Slight	
4	Pas	M	73	Slight	

Accident Reference Number: A3032131 **Day:** Wednesday **Date:** 28/06/2017 **Time:** 10:20
Place Reported: Else **District:** Manchester
Location: Great Ancoats Street At Junction With Palmerston Street
Description: V1 Trav S Great Ancoats St When C1 Runs Out Ne-bound Between Traffic & Crosses Road. V1 Collides With C1

Locational Details

Road:	A665/C		Junction Details:	Tjun	
OSGR:	385639	397827	Junction Control:	GW	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Wet
Light Conditions:	Light
Weather Conditions:	Rain

Accident Details

Severity:	Slight
No. of Vehicles:	1
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
PFLoo	VLike	C1
Other	VLike	C1
DJudge	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	N	S	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Ped	M	30	Slight	

Accident Reference Number: A3037868 **Day:** Friday **Date:** 01/12/2017 **Time:** 01:50
Place Reported: Scene **District:** Manchester
Location: Pin Mill Brow 40 metres N of Mancunian Way
Description: V1 Trav Ne On Mancunian Way Goes Around Left Bend, Loses Control, Crosses Onto Other Side Of C/way & Collides With V2 At Ats Trav Sw On Pin Mill Brow.

Locational Details

Road:	A665		Junction Details:		
OSGR:	385640	397783	Junction Control:	n/a	
Speed Limit:	30		Ped Crossing:		

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DSpee	Poss	V1
DFast	Poss	V1

Vehicle Details

Type	Move	From	To	Skid
Car	Rbend	SW	N	
Taxi	wtgTR	N	SW	

Casualty Details

	Type	Sex	Age	Sev	Pupil
1	Drv	M	22	Slight	
2	Drv	M	49	Slight	

Accident Reference Number: A1010584 **Day:** Thursday **Date:** 07/01/2016 **Time:** 05:02
Place Reported: Scene **District:** Manchester
Location: Great Ancoats Street at junction with Palmerston Street
Description: V1 Trav Sw Emerging From Palmerston Street Collides With V2 (Pedal Cycle) Trav S Great Ancoats St, Causing Injury

Locational Details

Road:	A665/C	Junction Details:	Tjun
OSGR:	385642 397831	Junction Control:	GW
Speed Limit:	30	Ped Crossing:	

Conditions

Road Surface:	Wet
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DJnRst	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
LGV	TurnL	NE	S	
p/c	Ahead	N	S	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	56	Slight	

Accident Reference Number: A3051209 **Day:** Friday **Date:** 23/11/2018 **Time:** 09:30
Place Reported: Else **District:** Manchester
Location: Pin Mill Brow 20 metres Nw Of Fairfield Street
Description: Both Vehs Trav Se Pin Mill Brow, V2 Waiting At ATS, V1 Collides Rear Of V2. V1 FTS

Locational Details

Road:	A665/A635	Junction Details:	Xrds
OSGR:	385696 397662	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	Ref

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	3

Contributory Factors

Factor	Conf	Ref

Vehicle Details

Type	Move	From	To	Skid
Car	Ahead	N	S	
Car	Waitg	N	S	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Pas	F	49	Slight	
2 Pas	M	23	Slight	
3 Pas	F	21	Slight	

Accident Reference Number: A1035397 **Day:** Thursday **Date:** 21/09/2017 **Time:** 16:30
Place Reported: Scene **District:** Manchester
Location: Fairfield Street at junction with Chancellor Lane
Description: Both Vehs Trav E Fairfield St. V1 Commences Right Onto Chancellor La When V2 (Motorcycle) Attempts To Overtake V1 On Its Offside. V1 Collides With V2.

Locational Details

Road:	A635/A665	Junction Details:	Xrds
OSGR:	385699 397642	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	Ref

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	1

Contributory Factors

Factor	Conf	Ref
DTurn	Poss	V1
DTurn	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	W	S	
m/c	O/Tkg	W	E	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Rid	M	59	Slight	

Accident Reference Number: A1000914 **Day:** Wednesday **Date:** 22/04/2015 **Time:** 17:58
Place Reported: Else **District:** Manchester
Location: Fairfield Street at junction with Chancellor Lane
Description: V1 Trav E Fairfield St Turning R Onto Chancellor La, V2 Trav W Was Entring Jct From Ashton Old Rd, V1 Failed To See V2 And Collision Occurs

Locational Details

Road:	A635/A665	Junction Details:	Xrds
OSGR:	385714 397633	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	Ref

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	W	S	
Car	Ahead	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Drv	M	24	Slight	
2 Pas	F	34	Slight	

Accident Reference Number: E1051932 **Day:** Friday **Date:** 28/12/2018 **Time:** 16:37

Place Reported: Scene **District:** Manchester

Location: Ashton Old Road (Fairfield Street) at junction with Chancellor Lane

Description: V1 Trav E Fairfield St Turning Right Fails To Give Way & Turns Into Path Of V2 Trav W Ashton Old Rd

Locational Details

Road:	A635/A665	Junction Details:	Xrds
OSGR:	385714 397633	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	

Conditions

Road Surface:	Dry
Light Conditions:	Dark
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	3

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1
DGWor	VLike	V1
DDrugs	Poss	V2
DSpee	Poss	V2

Vehicle Details

Type	Move	From	To	Skid
Car	TurnR	W	S	
Car	Ahead	E	W	

Casualty Details

Type	Sex	Age	Sev	Pupil
3 Drv	F	27	Slight	
1 Drv	M	21	Slight	
2 Pas	M	31	Slight	

Accident Reference Number: A1050364 **Day:** Wednesday **Date:** 14/11/2018 **Time:** 08:24

Place Reported: Scene **District:** Manchester

Location: Fairfield Street 20 metres E Of Chancellor Lane

Description: Both Vehs Trav W Fairfield St, V1 (PCV) Collides With V2 (Parked MGV) Causing Crane Of V2 To Smash Through Top Deck Window Of V1 Causing Injury To Passengers

Locational Details

Road:	A635/A665	Junction Details:	Xrds
OSGR:	385743 397628	Junction Control:	TS
Speed Limit:	30	Ped Crossing:	TSX

Conditions

Road Surface:	Dry
Light Conditions:	Light
Weather Conditions:	Fine

Accident Details

Severity:	Slight
No. of Vehicles:	2
No. of Casualties:	2

Contributory Factors

Factor	Conf	Ref
DFLoo	VLike	V1

Vehicle Details

Type	Move	From	To	Skid
PCV	Stopg	E	W	
MGV	Parkd	Pk	Pk	

Casualty Details

Type	Sex	Age	Sev	Pupil
1 Pas	M	30	Slight	
2 Pas	M	30	Slight	

Abbreviations used in GMAXI Reports for New Contributory Factors - 2005/06

WARNING: Please note that -
Codes 101 to 999 only relate to accidents from 1 April 2005. - New National Factors introduced by DfT
Codes 1001 to 1154 relate to accidents from 1 April 1999 to 31 March 2005 only. - Local Factors introduced
Accidents before 1 April 1999 do not have contributory factors attached.

Code	ContribFactor1Name	ContribFactor1Abb
0	None	
101	Poor or defective road surface	Surf
102	Deposit on road (eg oil, mud, chippings)	Dposit
103	Slippery road (due to weather)	Slip
104	Inadequate/masked signs or road markings	Mark
105	Defective traffic signals	DefATS
106	Traffic calming (eg speed cushions, road humps, chicanes)	TCalm
107	Temporary road layout (eg contraflow)	TmpRd
108	Road layout (eg bend, hill, narrow carriageway)	RdLay
109	Animal or object in carriageway	ObjInC
201	Tyres illegal, defective or under inflated	VTyres
202	Defective lights or indicators	VLight
203	Defective brakes	VBrake
204	Defective steering or suspension	VSteer
205	Defective or missing mirrors	VMirr
206	Overloaded or poorly loaded vehicle or trailer	VLoad
301	Disobeyed automatic traffic signal	DATS
302	Disobeyed Give Way or Stop sign or markings	DGWorS
303	Disobeyed double white line	DWhite
304	Disobeyed pedestrian crossing facility	DPedX
305	Illegal turn or direction of travel	DITurn
306	Exceeding speed limit	DSpeed
307	Travelling too fast for conditions	DFast
308	Following too close	DTgate
309	Vehicle travelling along pavement	DPave
310	Cyclist entering road from pavement	DCPave
401	Junction overshoot	DJnOvr
402	Junction restart	DJnRst
403	Poor turn or manoeuvre	DTurn
404	Failed to signal/misleading signal	DSign
405	Failed to look properly	DFLook
406	Failed to judge other person's path or speed	DJudge
407	Passing too close to cyclist, horse rider or pedestrian	DClose
408	Sudden braking	DBrake
409	Swerved	DSwerv
410	Loss of control	DLossC
501	Impaired by alcohol	DAlcoh
502	Impaired by drugs (illicit or medicinal)	DDrugs
503	Fatigue	DTired
504	Uncorrected, defective eyesight	DEye
505	Illness or disability, mental or physical	DIllns
506	Not displaying lights at night or in poor visibility	DNoLit
507	Cyclist wearing dark clothing at night	DCDark
508	Driver using mobile phone	DMobPh
509	Distraction in vehicle	DDisIn
510	Distraction outside vehicle	DDisOu
601	Aggressive driving	DAggre
602	Careless/reckless/in a hurry	DCare

603	Nervous/uncertain/panic	DPanic
604	Driving too slow or conditions or slow vehicle (eg tractor)	DSlow
605	Learner or inexperienced driver/rider	DLearn
606	Inexperience of driving on the left	DInDrL
607	Inexperience with type of vehicle	DInVeh
701	Stationary or parked vehicle(s)	DStat
702	Vegetation	DVeg
703	Road layout (eg bend, winding road, hill crest)	DRdLay
704	Buildings, road signs, street furniture	DBuild
705	Dazzling headlights	DHLigt
706	Dazzling sun	DSun
707	Rain, sleet, snow, or fog	DRain
708	Spray from other vehicles	DFog
709	Visor or windscreen dirty or scratched	DSpray
710	Vehicle blind spot	DWscrn
801	Crossed road masked by stationary or parked vehicle	PXMask
802	Failed to look properly	PFLook
803	Failed to judge vehicle's path or speed	PJudge
804	Wrong use of pedestrian crossing facility	PPedX
805	Dangerous action in carriageway (eg playing)	PDange
806	Impaired by alcohol	PAlcoh
807	Impaired by drugs (illicit or medicinal)	PDrugs
808	Careless/reckless/in a hurry	PCare
809	Pedestrian wearing dark clothing at night	PCloth
810	Disability or illness, mental or physical	PIllns
901	Stolen vehicle	StoVeh
902	Vehicle in course of crime	VCrime
903	Emergency vehicle on call	EmVeh
904	Vehicle door opened or closed negligently	VDoor
999	Other	Other
1001	Failed to stop (mandatory sign)	Fstop
1002	Failed to give way	Fgive
1003	Failed to avoid pedestrian (pedestrian not to blame)	FAPed
1004	Failed to avoid vehicle or object in carriageway	FAObj
1005	Failure to signal/misleading signal	Fsig
1006	Loss of control of vehicle	Loss
1007	Pedestrian entered carriageway without due care	Ped
1008	Passenger fell in or near PSV	Pfell
1009	Swerved to avoid object in carriageway	Swerv
1010	Sudden braking	Brake
1011	Poor turn/manoeuvre	Turn
1012	Poor overtaking	Over
1013	Drove wrong way (e.g. 1-way street)	1Way
1014	Opening door carelessly	Door
1015	Other	Other
1101	Impairment alcohol	Alcoh
1102	Impairment drugs	Drugs
1103	Impairment fatigue	Tired
1104	Impairment illness	Ill
1105	Distraction stress/emotional state of mind	Stress
1106	Distraction physical in/on vehicle	DPhIn
1107	Distraction physical outside vehicle	DPhOut
1108	Behaviour panic	Panic
1109	Behaviour careless/thoughtless/reckless	Care
1110	Behaviour nervous/uncertain	Nerve
1111	Behaviour in a hurry	Hurry

1112	Failure to judge other person's path or speed	Fjudg
1113	Disability	Disab
1114	Failed to look	F2look
1115	Looked but did not see	Nsee
1116	Inattention	Inatt
1117	Person hit wore dark or inconspicuous clothing	Cloth
1118	Other (Personal details)	Pother
1119	Crossed from behind parked vehicle etc	Cross
1120	Ignored lights at crossing	Xlight
1121	Excessive Speed	Speed
1122	Following too close	Tgate
1123	Inexperience of driving	InDri
1124	Inexperience of vehicle	InVeh
1125	Interaction or competition with other road users	Users
1126	Aggressive driving	Aggr
1127	Lack of judgement of own path	Judge
1128	Tyres wrong pressure	Press
1129	Tyres deflation before impact	Deflat
1130	Tyres worn/insufficient tread	Tread
1131	Defective lights or signals	Signal
1132	Defective brakes	Brakes
1133	Other (Vehicle defects)	Vother
1134	Site details poor road surface	Surf
1135	Site details poor/no street lighting	Lightg
1136	Site details inadequate signing	Sign
1137	Site details steep hill	Hill
1138	Site details narrow road	Narr
1139	Site details bend/winding road	Rbend
1140	Site details roadworks	Works
1141	Slippery road	Slip
1142	High winds	Winds
1143	Earlier accident	Earli
1144	Other (Local conditions)	Lother
1145	View windows obscured	Obs
1146	View glare from sun	Glare
1147	View glare from headlights	Head
1148	Surroundings bend/winding road	Bend
1149	Surroundings stationary parked vehicle	Stat
1150	Surroundings moving vehicle	Move
1151	Surroundings buildings, fences, vegetation etc	Fence
1152	Weather (e.g. mist or sleet)	Weath
1153	Failed to see pedestrian or vehicle in blindspot	Blind
1154	Animal out of control	Animal
9999	GMP Out of Range	OoR

Appendix F Architects' Drawings

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General Notes

All setout in bold is metric. The drawing should not be used to calculate areas for any purpose whatsoever. All dimensions are to be checked on site by the contractor and work dimensioned to be their responsibility. Any discrepancies are to be reported to the architect. Do not scale from this drawing. Drawing remains and remains to be the property of the architect.

Notes

Boundaries

- Mayfield Highways & Public Realm Boundary
- Mayfield Park Boundary - Phase 1
- Mayfield Park Boundary - Phase 2
- Mayfield Park Boundary - Phase 3

Rev	Date	Reason for issue	Chk
P00	25.09.19	PLANNING	SEW

Keyplan

Scale Bar

sew Studio Egret West
2 Greenhouse Yard
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egretwest.com
@2015 SEW ltd

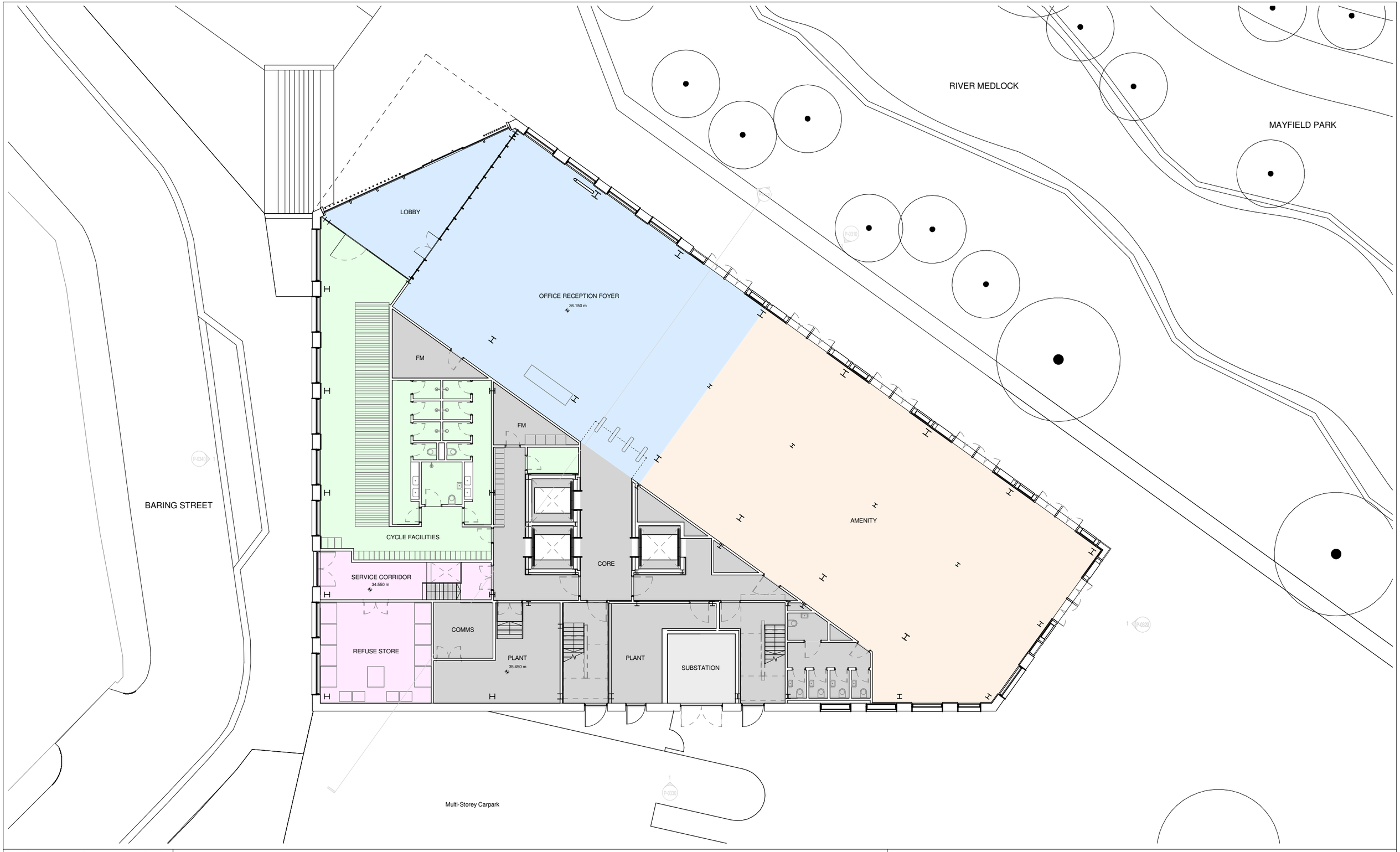
Client
Mayfield Partnership

Project
Mayfield Park

Drawing Title
Illustrative Masterplan

Project Number	Status
0345	Planning
Scale at A0	Date
1:500	25.09.19
Drawn by	Checked by
MA	SEW

Drawing Number: 0345-SEW-ZZ-00-DR-L-607100 Revision P00



Rev	Date	Revision	By	Chk
\	190920	Issued for Planning	KC	AL

Notes

N

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E manchester@bennettsassociates.com
For Bennetts Associates' electronic information issue disclaimer -

Project
Baring Street Office 1
Mayfield Partnership

Project No. 1811

Drawing Title
Planning
Ground floor plan
Proposed

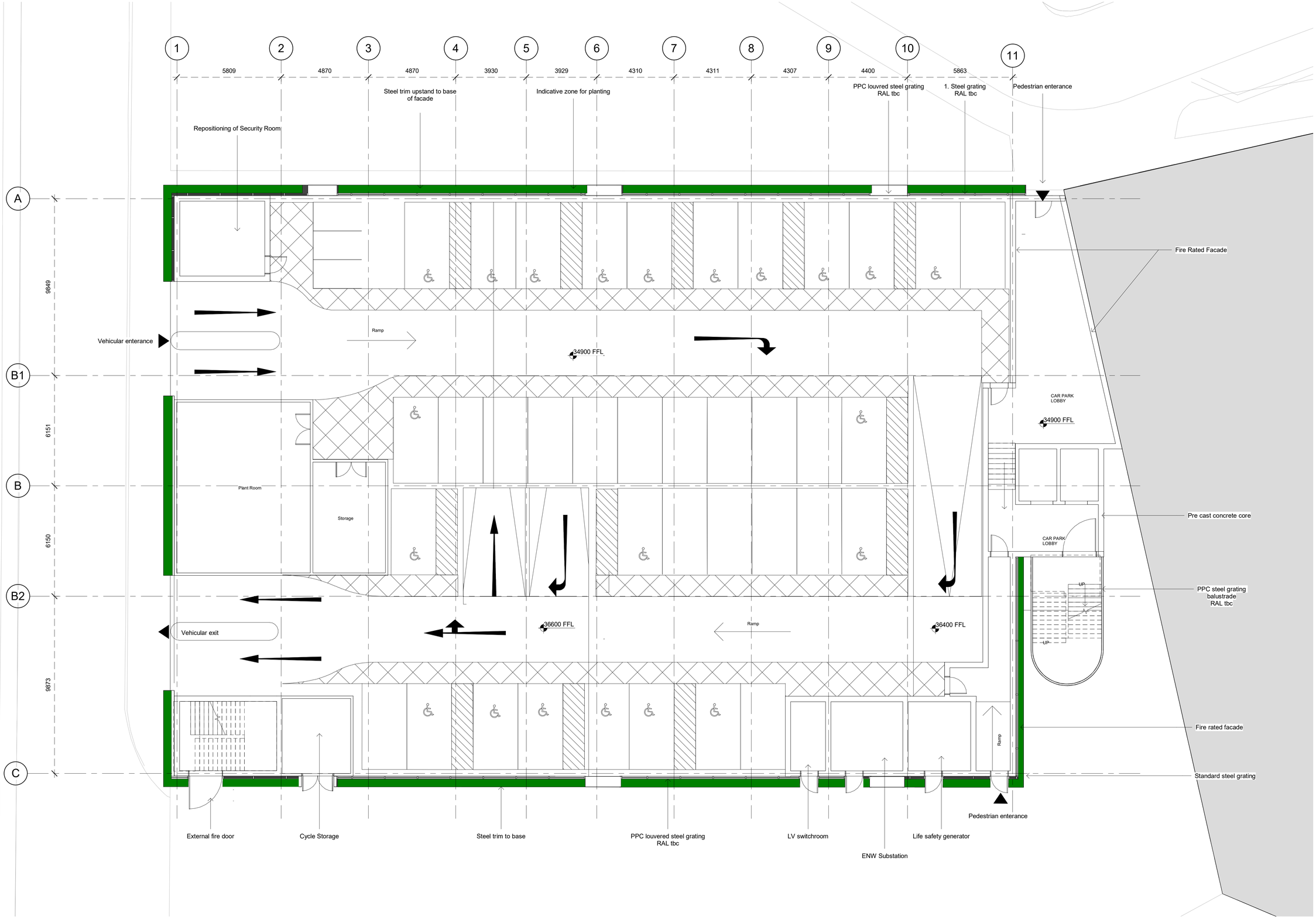
Drawing Number
1811-BA-XX-00-DR-A-P-0100

Revision/Suitability
\

Scale @ A3
1:200

Scale @ A1
1 : 100

Revision Date
190920
YY MM DD



NN_Level 00

1 : 100

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All work must comply with relevant British Standards and Building Regulations requirements. Drawing errors and omissions to be reported to the architect.

Notes

1 - Steel Grating
2 - Louvred Grating
3 - Steel Grating with Fireproof Panel
4 - Louvred Grating with Fireproof Panel
5 - Precast Concrete Core
6 - PPC Steel Grating Balustrade
7 - Blockwork Wall with Fire Lining
8 - PPC Expanded Aluminium Mesh
9 - Expanded Mesh with Fire Lining
10 - PPC Aluminium Panels with Perforations
11 - PPC Aluminium Panels with Perforations and Fire Lining
12 - PPC Black Steel Structure
13 - PPC Steel Panel Balustrade
14 - Steel Trim

Keyplan

Scale Bar
0 5m
@ 1:100

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hello@egretwest.com
egretwest.com
©2015 SEW ltd

Client
The Mayfield Partnership

Project
0344 Mayfield Car Park

Drawing Title
Proposed Floor Plan
Proposed - Level 00 (Ground)

Project Number	Status
0344	Planning
Scale at A1	Date
As indicated	26/09/19
Drawn by	Checked by
JT	SEW
Drawing Number	Revision
0344-SEW-ZZ-00-DR-A-001100	P1

Appendix G Highways Proposals

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CARRIAGEWAY WITHIN PHASE 1 PROPOSALS

FOOTWAY WITHIN PHASE 1 PROPOSALS

CYCLEWAY

NEW KERB

VISIBILITY SPLAY

PHASE 1 BOUNDARY

SRF BOUNDARY

N

NG STREET
CE 1

TOREY
RK

BARING STREET
OFFICE 2

10 5 0 10 20 30 40
1 : 500
SCALE BEFORE REDUCTION

Refer to Drawing
0042912-BHE-XX-XX-SK-C-0033

LOADING BAY

BARING STREET
OFFICE 1

MULTI-STOREY
CAR PARK

CONTRAFLOW CYCLE FACILITY TO BE PROVIDED ON BARING STREET

BARING STREET ONE WAY MOVEMENTS VIA TRAFFIC REGULATION ORDER

CONTRAFLOW CYCLE FACILITY TO BE PROVIDED ON MANCUNIAN WAY (SLIP)

RIVER MEDLOCK

Refer to Drawing
0042912-BHE-XX-XX-SK-C-0007

MANCUNIAN WAY (SLIP)

PROPOSED BUILDOUT WITH 120mm KERB HEIGHT. REFER TO DETAIL 8 ON DWG 0042912-BHE-XX-XX-SK-C-0018.

BOND STREET TO BE STOPPED UP

BOND STREET

PROPOSED FOOTWAY. REFER TO DETAIL 3 ON DWG 0042912-BHE-XX-XX-SK-C-0018

CAR PARK ACCESS

PROPOSED FOOTWAY. REFER TO DETAIL 3 ON DWG 0042912-BHE-XX-XX-SK-C-0018

NETHER STREET AND BOND STREET TO BE STOPPED-UP

CAR PARK EXIT

7.5

43m

2.4m

43m

PROPOSED KERB LINE AND REDESIGNED HIGHWAY ALIGNMENT TO DIRECT TRAFFIC TO BARING STREET. REFER TO DETAIL 8 ON DWG 0042912-BHE-XX-XX-SK-C-0018.

PROPOSED BUILDOUT WITH 120mm KERB HEIGHT. REFER TO DETAIL 8 ON DWG 0042912-BHE-XX-XX-SK-C-0018.

RING ROAD (ELEVATED)

EXISTING MANCUNIAN WAY (SLIP) ALIGNMENT TO BE MAINTAINED - TO BE RESURFACED. REFER TO DETAIL ON DWG 0042912-BHE-XX-XX-SK-C-0018.

MANCUNIAN WAY (SLIP)

PROVISION OF ACCESS CONTROL (MANCUNIAN WAY (SLIP) TO BE STOPPED-UP BEYOND THIS POINT)

10 5 0 10
1 : 200
SCALE BEFORE REDUCTION

Rev	Description	Date	Drn	Ch'd
A	INITIAL ISSUE	19.09.19	RB	CH

INFORMATION

Status of drawing

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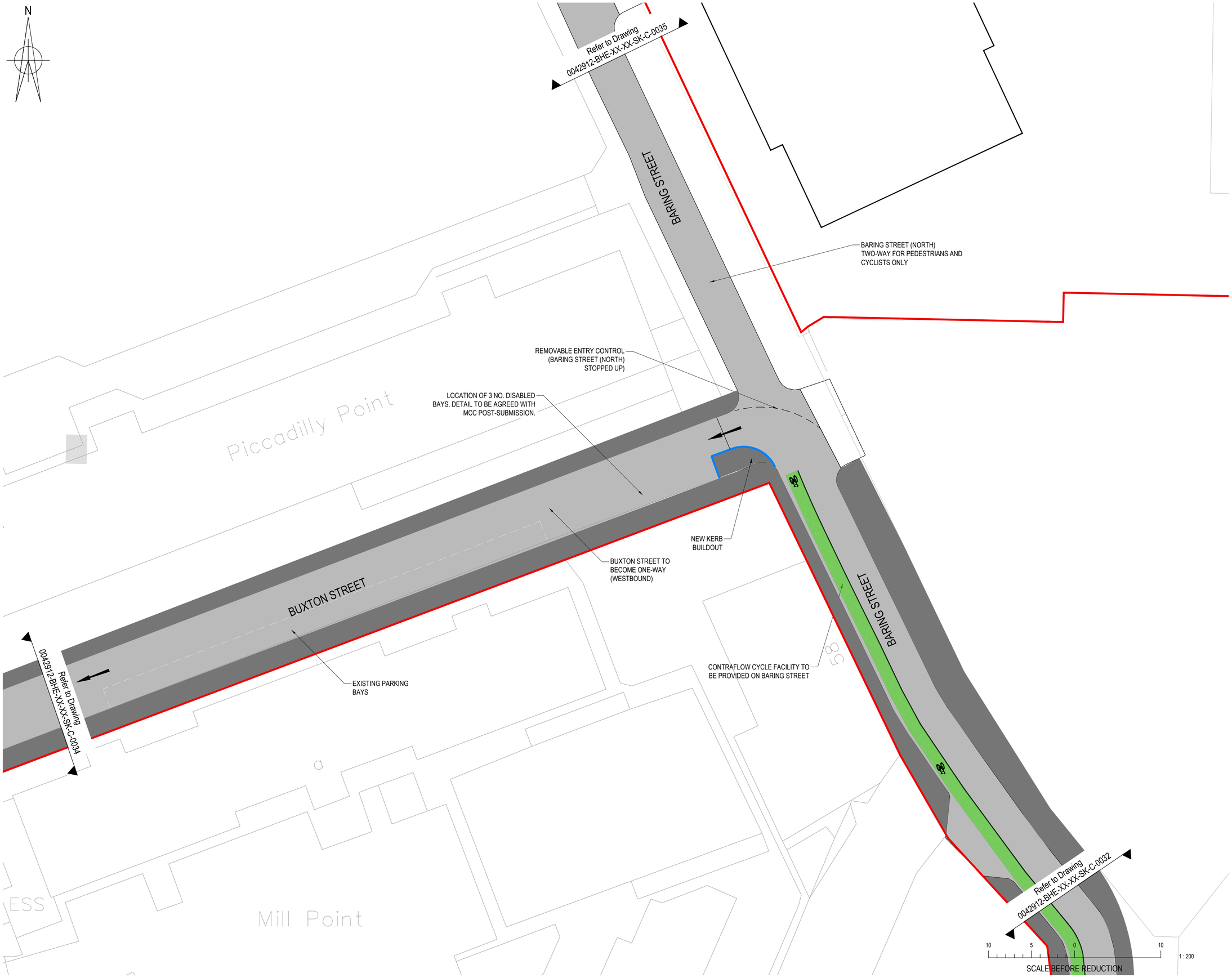
Project MAYFIELD DEVELOPMENT PARTNERSHIP

Drg Title PHASE 1 LAYOUT
BARING STREET JUNCTION
SHEET 1 OF 5

Scales@A1 1:200
Drawn by RB
Checked by CH

Job No. 0042912
Date SEPTEMBER 2019
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Drawing No. 0042912-BHE-XX-XX-SK-C-0032



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- CARRIAGEWAY WITHIN PHASE 1 PROPOSALS
- FOOTWAY WITHIN PHASE 1 PROPOSALS
- CYCLEWAY
- NEW KERB
- PHASE 1 BOUNDARY

Rev	Description	Date	Drn	Ch'd
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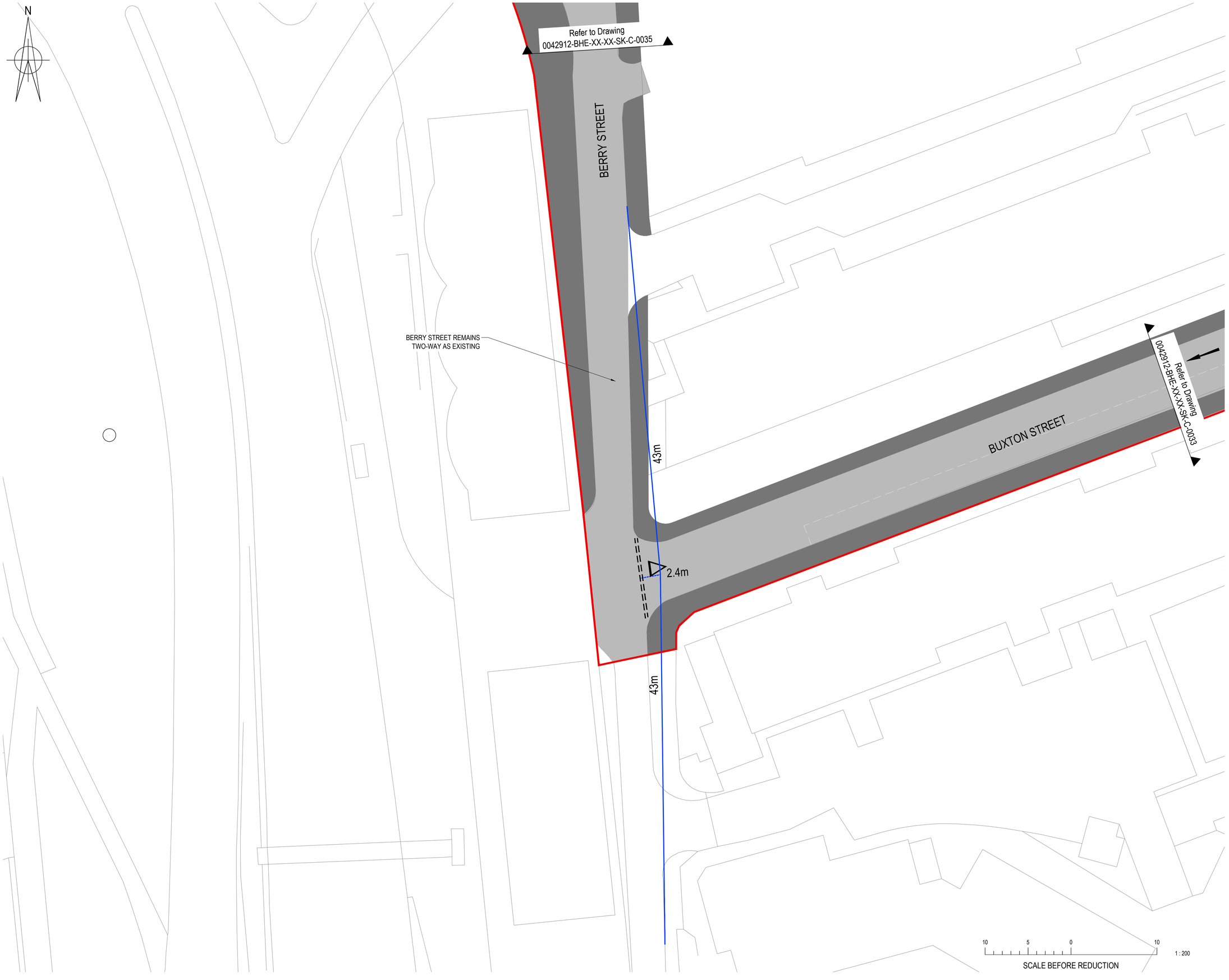
Project **MAYFIELD DEVELOPMENT PARTNERSHIP**

Drg Title PHASE 1 LAYOUT
BARING STREET & BERRY STREET
SHEET 2 OF 5

Scales@A1 1:200
Drawn by RB
Checked by CH

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- CARRIAGEWAY WITHIN PHASE 1 PROPOSALS
- FOOTWAY WITHIN PHASE 1 PROPOSALS
- CYCLEWAY
- VISIBILITY SPLAY
- PHASE 1 BOUNDARY

Rev	Description	Date	Drn	Ch'd
A	INITIAL ISSUE	19.09.19	RB	CH

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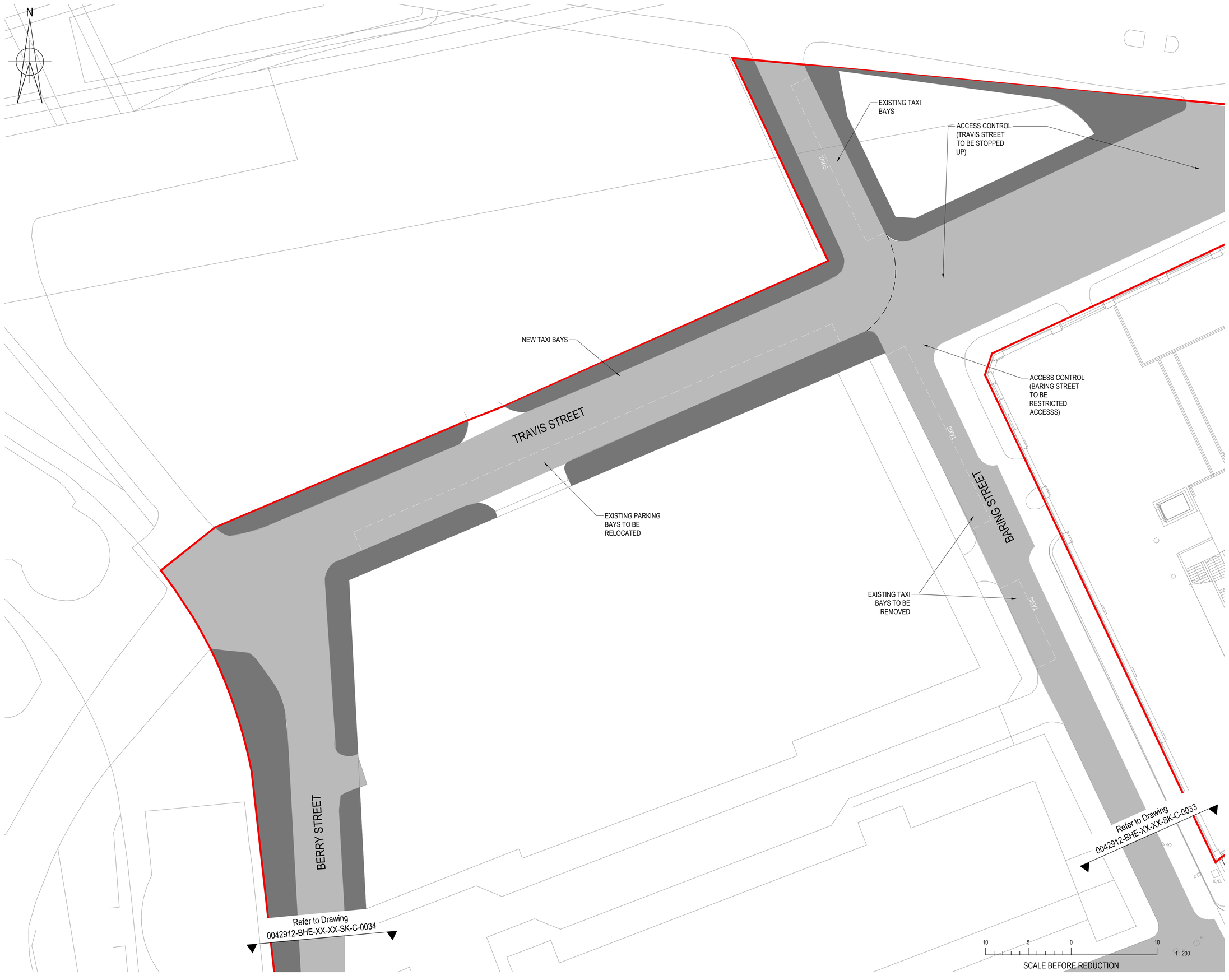
Project **MAYFIELD DEVELOPMENT PARTNERSHIP**

Drg Title PHASE 1 LAYOUT
BERRY STREET
SHEET 3 OF 5

Scales@A1 1:200
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DECOMMISSIONING/DEMOLITION.

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CARRIAGEWAY WITHIN PHASE 1 PROPOSALS

FOOTWAY WITHIN PHASE 1 PROPOSALS

CYCLEWAY

PHASE 1 BOUNDARY

Rev	Description	Date	Drn	Ch'd
A	INITIAL ISSUE	19.09.19	RB	CH

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Project **MAYFIELD DEVELOPMENT PARTNERSHIP**

Drg Title PHASE 1 LAYOUT
TRAVIS STREET
SHEET 4 OF 5

Scales@A1 1:200
Drawn by RB
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DECOMMISSIONING/DEMOLITION.

Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED
2. USE OF THIS DRAWING DOES NOT ABSOLVE THE CLIENT FROM HIS RESPONSIBILITIES UNDER HEALTH & SAFETY: THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015.
3. ALL HIGHWAY WORKS TO BE IN ACCORDANCE WITH THE DEPARTMENT OF TRANSPORT SPECIFICATION FOR HIGHWAY WORKS

REFUGE / ISLANDS / SPLITERS
CYCLEWAY
CARRIAGEWAY
PEDESTRIAN CROSSING
NEW 125mm KERB
PHASE 1 BOUNDARY

N

LONDON ROAD

DOWNING STREET

INSET

REFUGE SETBACK

RADIUS CHANGED TO FACILITATE LEFT TURN MOVEMENTS

REFUGE REALIGNED

ADDITIONAL PEDESTRIAN SIGNALS

VISIBILITY ZONE ZONE

PROPOSED CYCLEWAY RUNNING ADJACENT TO EXISTING FOOTWAY

FOR BULLNOSED KERB DETAIL REFER DETAIL 1 ON DWG 0042912-BHE-XX-XX-SK-C-0018.

ADDITIONAL SIGNAL HEAD

EXISTING REFUGE TO BE BROKEN OUT AND REBUILT TO ALLOW FOR RIGHT TURN MOVEMENTS

MANCUNIAN WAY
RING ROAD (ELEVATED)

MANCUNIAN WAY
RING ROAD (ELEVATED)

Refer to Drawing
0042912-BHE-XX-XX-SK-C-0032

397500N
397475N
397450N

10 5 0 10 20
SCALE BEFORE REDUCTION

1 : 250

Rev	Description	Date	Drn	Ch'd
A	INITIAL ISSUE	19.09.19	RB	CH

INFORMATION

Status of drawing

BUROHAPPOLD ENGINEERING

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Architect *SEW*

Project **MAYFIELD DEVELOPMENT PARTNERSHIP**

Drg Title PHASE 1 LAYOUT
LONDON ROAD JUNCTION
SHEET 5 OF 5

Scales@A1 1:200
Drawn by RB
Checked by CH

Job No. 0042912
Date SEPTEMBER 2019
Rev A

Drawing No. 0042912-BHE-XX-XX-SK-C-0036

Data Beige Jan-Anton/0Current/0042912 Mayfield Park Manchester Infrastructure/2 Civils - Infrastructure/2Sheet/Sketches/0042912-BHE-XX-XX-SK-C-0036 - Phase 1 Layout - London Road Junction - Sheet 5 of 5.dwg

Appendix H TRICS Outputs and Car Park Survey Data

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Calculation Reference: AUDIT-730101-190610-0620

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : C - FLATS PRIVATELY OWNED
MULTI-MODAL VEHICLES

Selected regions and areas:

02	SOUTH EAST		
	EX	ESSEX	1 days
	HC	HAMPSHIRE	1 days
04	EAST ANGLIA		
	NF	NORFOLK	1 days
	SF	SUFFOLK	1 days
08	NORTH WEST		
	GM	GREATER MANCHESTER	2 days
09	NORTH		
	CB	CUMBRIA	1 days
10	WALES		
	CO	CONWY	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Number of dwellings
Actual Range: 20 to 154 (units:)
Range Selected by User: 6 to 175 (units:)

Parking Spaces Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 05/06/18

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	1 days
Tuesday	2 days
Thursday	4 days
Friday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	8 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Town Centre	3
Edge of Town Centre	5

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	1
Built-Up Zone	7

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

C3	8 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

10,001 to 15,000	2 days
15,001 to 20,000	1 days
25,001 to 50,000	5 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

50,001 to 75,000	3 days
75,001 to 100,000	1 days
125,001 to 250,000	1 days
250,001 to 500,000	1 days
500,001 or More	2 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	4 days
1.1 to 1.5	4 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	1 days
No	7 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	8 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 CB-03-C-01 BLOCK OF FLATS CUMBRIA
KING STREET
CARLISLE

Town Centre
Built-Up Zone
Total Number of dwellings: 40
Survey date: THURSDAY *12/06/14* *Survey Type: MANUAL*

2 CO-03-C-01 BLOCKS OF FLATS CONWY
MOSTYN BROADWAY
LLANDUDNO

Edge of Town Centre
Built-Up Zone
Total Number of dwellings: 37
Survey date: MONDAY *26/03/18* *Survey Type: MANUAL*

3 EX-03-C-02 BLOCK OF FLATS ESSEX
WESTCLIFF PARADE
SOUTHEND-ON-SEA
WESTCLIFF
Edge of Town Centre
Residential Zone
Total Number of dwellings: 94
Survey date: TUESDAY *22/10/13* *Survey Type: MANUAL*

4 GM-03-C-02 BLOCK OF FLATS GREATER MANCHESTER
WHITWORTH STREET W.
MANCHESTER

Town Centre
Built-Up Zone
Total Number of dwellings: 154
Survey date: THURSDAY *13/10/11* *Survey Type: MANUAL*

5 GM-03-C-03 BLOCK OF FLATS GREATER MANCHESTER
FAIRFIELD STREET
MANCHESTER

Town Centre
Built-Up Zone
Total Number of dwellings: 20
Survey date: FRIDAY *14/10/11* *Survey Type: MANUAL*

6 HC-03-C-01 BLOCKS OF FLATS HAMPSHIRE
CROSS STREET
PORTSMOUTH

Edge of Town Centre
Built-Up Zone
Total Number of dwellings: 90
Survey date: TUESDAY *05/06/18* *Survey Type: MANUAL*

7 NF-03-C-01 BLOCKS OF FLATS NORFOLK
PAGE STAIR LANE
KING'S LYNN

Edge of Town Centre
Built-Up Zone
Total Number of dwellings: 51
Survey date: THURSDAY *11/12/14* *Survey Type: MANUAL*

8 SF-03-C-01 BLOCKS OF FLATS SUFFOLK
STATION HILL
BURY ST EDMUNDS

Edge of Town Centre
Built-Up Zone
Total Number of dwellings: 85
Survey date: THURSDAY *18/12/14* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
BD-03-C-01	selection
BD-03-C-02	selection
BD-03-C-03	selection
EX-03-C-01	selection

MANUALLY DESELECTED SITES (Cont.)

Site Ref	Reason for Deselection
SA-03-C-01	selection
SR-03-C-01	selection
SR-03-C-02	selection

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.039	8	71	0.088	8	71	0.127
08:00 - 09:00	8	71	0.053	8	71	0.140	8	71	0.193
09:00 - 10:00	8	71	0.070	8	71	0.067	8	71	0.137
10:00 - 11:00	8	71	0.079	8	71	0.095	8	71	0.174
11:00 - 12:00	8	71	0.088	8	71	0.086	8	71	0.174
12:00 - 13:00	8	71	0.109	8	71	0.098	8	71	0.207
13:00 - 14:00	8	71	0.095	8	71	0.107	8	71	0.202
14:00 - 15:00	8	71	0.070	8	71	0.088	8	71	0.158
15:00 - 16:00	8	71	0.081	8	71	0.060	8	71	0.141
16:00 - 17:00	8	71	0.109	8	71	0.061	8	71	0.170
17:00 - 18:00	8	71	0.116	8	71	0.082	8	71	0.198
18:00 - 19:00	8	71	0.098	8	71	0.068	8	71	0.166
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.007			1.040			2.047

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected:	20 - 154 (units:)
Survey date date range:	01/01/10 - 05/06/18
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	7

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL TAXIS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.004	8	71	0.004	8	71	0.008
08:00 - 09:00	8	71	0.000	8	71	0.002	8	71	0.002
09:00 - 10:00	8	71	0.002	8	71	0.002	8	71	0.004
10:00 - 11:00	8	71	0.002	8	71	0.002	8	71	0.004
11:00 - 12:00	8	71	0.014	8	71	0.014	8	71	0.028
12:00 - 13:00	8	71	0.011	8	71	0.011	8	71	0.022
13:00 - 14:00	8	71	0.007	8	71	0.007	8	71	0.014
14:00 - 15:00	8	71	0.000	8	71	0.000	8	71	0.000
15:00 - 16:00	8	71	0.004	8	71	0.004	8	71	0.008
16:00 - 17:00	8	71	0.007	8	71	0.005	8	71	0.012
17:00 - 18:00	8	71	0.004	8	71	0.002	8	71	0.006
18:00 - 19:00	8	71	0.009	8	71	0.009	8	71	0.018
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.064			0.062			0.126

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL OGVS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.005	8	71	0.005	8	71	0.010
08:00 - 09:00	8	71	0.000	8	71	0.000	8	71	0.000
09:00 - 10:00	8	71	0.002	8	71	0.002	8	71	0.004
10:00 - 11:00	8	71	0.000	8	71	0.000	8	71	0.000
11:00 - 12:00	8	71	0.000	8	71	0.000	8	71	0.000
12:00 - 13:00	8	71	0.002	8	71	0.002	8	71	0.004
13:00 - 14:00	8	71	0.002	8	71	0.002	8	71	0.004
14:00 - 15:00	8	71	0.000	8	71	0.000	8	71	0.000
15:00 - 16:00	8	71	0.000	8	71	0.000	8	71	0.000
16:00 - 17:00	8	71	0.000	8	71	0.000	8	71	0.000
17:00 - 18:00	8	71	0.000	8	71	0.000	8	71	0.000
18:00 - 19:00	8	71	0.000	8	71	0.000	8	71	0.000
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.011			0.011			0.022

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL CYCLISTS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.002	8	71	0.007	8	71	0.009
08:00 - 09:00	8	71	0.004	8	71	0.012	8	71	0.016
09:00 - 10:00	8	71	0.005	8	71	0.009	8	71	0.014
10:00 - 11:00	8	71	0.000	8	71	0.012	8	71	0.012
11:00 - 12:00	8	71	0.007	8	71	0.004	8	71	0.011
12:00 - 13:00	8	71	0.002	8	71	0.011	8	71	0.013
13:00 - 14:00	8	71	0.002	8	71	0.000	8	71	0.002
14:00 - 15:00	8	71	0.004	8	71	0.000	8	71	0.004
15:00 - 16:00	8	71	0.007	8	71	0.007	8	71	0.014
16:00 - 17:00	8	71	0.004	8	71	0.002	8	71	0.006
17:00 - 18:00	8	71	0.014	8	71	0.004	8	71	0.018
18:00 - 19:00	8	71	0.005	8	71	0.002	8	71	0.007
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.056			0.070			0.126

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

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TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL VEHICLE OCCUPANTS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.051	8	71	0.112	8	71	0.163
08:00 - 09:00	8	71	0.072	8	71	0.208	8	71	0.280
09:00 - 10:00	8	71	0.089	8	71	0.091	8	71	0.180
10:00 - 11:00	8	71	0.103	8	71	0.128	8	71	0.231
11:00 - 12:00	8	71	0.114	8	71	0.119	8	71	0.233
12:00 - 13:00	8	71	0.140	8	71	0.140	8	71	0.280
13:00 - 14:00	8	71	0.133	8	71	0.126	8	71	0.259
14:00 - 15:00	8	71	0.084	8	71	0.117	8	71	0.201
15:00 - 16:00	8	71	0.130	8	71	0.079	8	71	0.209
16:00 - 17:00	8	71	0.165	8	71	0.079	8	71	0.244
17:00 - 18:00	8	71	0.154	8	71	0.116	8	71	0.270
18:00 - 19:00	8	71	0.142	8	71	0.095	8	71	0.237
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.377			1.410			2.787

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL PEDESTRIANS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.014	8	71	0.054	8	71	0.068
08:00 - 09:00	8	71	0.025	8	71	0.156	8	71	0.181
09:00 - 10:00	8	71	0.035	8	71	0.119	8	71	0.154
10:00 - 11:00	8	71	0.070	8	71	0.079	8	71	0.149
11:00 - 12:00	8	71	0.077	8	71	0.086	8	71	0.163
12:00 - 13:00	8	71	0.121	8	71	0.119	8	71	0.240
13:00 - 14:00	8	71	0.110	8	71	0.093	8	71	0.203
14:00 - 15:00	8	71	0.100	8	71	0.077	8	71	0.177
15:00 - 16:00	8	71	0.091	8	71	0.096	8	71	0.187
16:00 - 17:00	8	71	0.168	8	71	0.159	8	71	0.327
17:00 - 18:00	8	71	0.214	8	71	0.126	8	71	0.340
18:00 - 19:00	8	71	0.133	8	71	0.040	8	71	0.173
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.158			1.204			2.362

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL BUS/TRAM PASSENGERS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.002	8	71	0.025	8	71	0.027
08:00 - 09:00	8	71	0.012	8	71	0.061	8	71	0.073
09:00 - 10:00	8	71	0.012	8	71	0.033	8	71	0.045
10:00 - 11:00	8	71	0.012	8	71	0.012	8	71	0.024
11:00 - 12:00	8	71	0.016	8	71	0.011	8	71	0.027
12:00 - 13:00	8	71	0.019	8	71	0.023	8	71	0.042
13:00 - 14:00	8	71	0.011	8	71	0.023	8	71	0.034
14:00 - 15:00	8	71	0.014	8	71	0.009	8	71	0.023
15:00 - 16:00	8	71	0.035	8	71	0.014	8	71	0.049
16:00 - 17:00	8	71	0.047	8	71	0.012	8	71	0.059
17:00 - 18:00	8	71	0.044	8	71	0.009	8	71	0.053
18:00 - 19:00	8	71	0.019	8	71	0.004	8	71	0.023
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.243			0.236			0.479

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL TOTAL RAIL PASSENGERS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.000	8	71	0.019	8	71	0.019
08:00 - 09:00	8	71	0.004	8	71	0.053	8	71	0.057
09:00 - 10:00	8	71	0.000	8	71	0.014	8	71	0.014
10:00 - 11:00	8	71	0.005	8	71	0.011	8	71	0.016
11:00 - 12:00	8	71	0.002	8	71	0.011	8	71	0.013
12:00 - 13:00	8	71	0.009	8	71	0.014	8	71	0.023
13:00 - 14:00	8	71	0.002	8	71	0.009	8	71	0.011
14:00 - 15:00	8	71	0.007	8	71	0.002	8	71	0.009
15:00 - 16:00	8	71	0.009	8	71	0.002	8	71	0.011
16:00 - 17:00	8	71	0.019	8	71	0.011	8	71	0.030
17:00 - 18:00	8	71	0.070	8	71	0.004	8	71	0.074
18:00 - 19:00	8	71	0.016	8	71	0.002	8	71	0.018
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.143			0.152			0.295

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL PUBLIC TRANSPORT USERS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.002	8	71	0.044	8	71	0.046
08:00 - 09:00	8	71	0.016	8	71	0.114	8	71	0.130
09:00 - 10:00	8	71	0.012	8	71	0.047	8	71	0.059
10:00 - 11:00	8	71	0.018	8	71	0.023	8	71	0.041
11:00 - 12:00	8	71	0.018	8	71	0.021	8	71	0.039
12:00 - 13:00	8	71	0.028	8	71	0.037	8	71	0.065
13:00 - 14:00	8	71	0.012	8	71	0.032	8	71	0.044
14:00 - 15:00	8	71	0.019	8	71	0.011	8	71	0.030
15:00 - 16:00	8	71	0.044	8	71	0.016	8	71	0.060
16:00 - 17:00	8	71	0.067	8	71	0.023	8	71	0.090
17:00 - 18:00	8	71	0.114	8	71	0.012	8	71	0.126
18:00 - 19:00	8	71	0.035	8	71	0.005	8	71	0.040
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.385			0.385			0.770

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.068	8	71	0.217	8	71	0.285
08:00 - 09:00	8	71	0.116	8	71	0.490	8	71	0.606
09:00 - 10:00	8	71	0.142	8	71	0.266	8	71	0.408
10:00 - 11:00	8	71	0.191	8	71	0.242	8	71	0.433
11:00 - 12:00	8	71	0.215	8	71	0.229	8	71	0.444
12:00 - 13:00	8	71	0.291	8	71	0.306	8	71	0.597
13:00 - 14:00	8	71	0.257	8	71	0.250	8	71	0.507
14:00 - 15:00	8	71	0.207	8	71	0.205	8	71	0.412
15:00 - 16:00	8	71	0.271	8	71	0.198	8	71	0.469
16:00 - 17:00	8	71	0.403	8	71	0.263	8	71	0.666
17:00 - 18:00	8	71	0.496	8	71	0.257	8	71	0.753
18:00 - 19:00	8	71	0.315	8	71	0.142	8	71	0.457
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.972			3.065			6.037

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL Servicing Vehicles
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	71	0.009	8	71	0.007	8	71	0.016
08:00 - 09:00	8	71	0.004	8	71	0.004	8	71	0.008
09:00 - 10:00	8	71	0.002	8	71	0.002	8	71	0.004
10:00 - 11:00	8	71	0.000	8	71	0.002	8	71	0.002
11:00 - 12:00	8	71	0.005	8	71	0.005	8	71	0.010
12:00 - 13:00	8	71	0.004	8	71	0.005	8	71	0.009
13:00 - 14:00	8	71	0.002	8	71	0.002	8	71	0.004
14:00 - 15:00	8	71	0.002	8	71	0.002	8	71	0.004
15:00 - 16:00	8	71	0.002	8	71	0.000	8	71	0.002
16:00 - 17:00	8	71	0.002	8	71	0.004	8	71	0.006
17:00 - 18:00	8	71	0.000	8	71	0.000	8	71	0.000
18:00 - 19:00	8	71	0.002	8	71	0.002	8	71	0.004
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.034			0.035			0.069

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Calculation Reference: AUDIT-730101-190620-0631

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : A - OFFICE
MULTI-MODAL VEHICLES

Selected regions and areas:
08 NORTH WEST
GM GREATER MANCHESTER 3 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Gross floor area
Actual Range: 2500 to 4200 (units: sqm)
Range Selected by User: 178 to 70291 (units: sqm)

Parking Spaces Range: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 04/10/18

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:
Monday 2 days
Wednesday 1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:
Manual count 3 days
Directional ATC Count 0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:
Town Centre 2
Edge of Town Centre 1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:
Built-Up Zone 3

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:
B1 3 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Secondary Filtering selection (Cont.):

Population within 1 mile:

20,001 to 25,000	1 days
25,001 to 50,000	2 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

500,001 or More	3 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	3 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No	3 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	3 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 GM-02-A-07 LAW OFFICES GREATER MANCHESTER
MOSELEY STREET
MANCHESTER

Town Centre
Built-Up Zone
Total Gross floor area: 4200 sqm
Survey date: WEDNESDAY *19/10/11* *Survey Type: MANUAL*

2 GM-02-A-08 REGUS GREATER MANCHESTER
FOUNTAIN STREET
MANCHESTER

Town Centre
Built-Up Zone
Total Gross floor area: 3960 sqm
Survey date: MONDAY *26/09/16* *Survey Type: MANUAL*

3 GM-02-A-09 LEASED OFFICES GREATER MANCHESTER
NEW MOUNT STREET
MANCHESTER

Edge of Town Centre
Built-Up Zone
Total Gross floor area: 2500 sqm
Survey date: MONDAY *26/09/16* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
BD-02-A-03	selection
BR-02-A-02	selection
CA-02-A-05	selection
CB-02-A-02	selection
CS-02-A-02	selection
DC-02-A-09	selection
DU-02-A-01	selection
EB-02-A-06	selection
ES-02-A-12	selection
ES-02-A-13	selection
EX-02-A-03	selection
HF-02-A-03	selection
HF-02-A-04	selection
KC-02-A-09	selection
KC-02-A-10	selection
KC-02-A-11	selection
MT-02-A-02	selection
NF-02-A-01	selection
NF-02-A-02	selection
NF-02-A-03	selection
NY-02-A-01	selection
PS-02-A-01	selection
RO-02-A-02	selection
SF-02-A-02	selection
SO-02-A-01	selection
SO-02-A-02	selection
SW-02-A-01	selection
SW-02-A-02	selection
TV-02-A-04	selection
TW-02-A-07	selection
WK-02-A-01	selection

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.038	3	3553	0.009	3	3553	0.047
07:30 - 08:00	3	3553	0.131	3	3553	0.009	3	3553	0.140
08:00 - 08:30	3	3553	0.159	3	3553	0.038	3	3553	0.197
08:30 - 09:00	3	3553	0.300	3	3553	0.056	3	3553	0.356
09:00 - 09:30	3	3553	0.319	3	3553	0.066	3	3553	0.385
09:30 - 10:00	3	3553	0.225	3	3553	0.056	3	3553	0.281
10:00 - 10:30	3	3553	0.056	3	3553	0.009	3	3553	0.065
10:30 - 11:00	3	3553	0.169	3	3553	0.084	3	3553	0.253
11:00 - 11:30	3	3553	0.038	3	3553	0.028	3	3553	0.066
11:30 - 12:00	3	3553	0.019	3	3553	0.009	3	3553	0.028
12:00 - 12:30	3	3553	0.047	3	3553	0.019	3	3553	0.066
12:30 - 13:00	3	3553	0.056	3	3553	0.009	3	3553	0.065
13:00 - 13:30	3	3553	0.066	3	3553	0.009	3	3553	0.075
13:30 - 14:00	3	3553	0.141	3	3553	0.131	3	3553	0.272
14:00 - 14:30	3	3553	0.131	3	3553	0.103	3	3553	0.234
14:30 - 15:00	3	3553	0.056	3	3553	0.113	3	3553	0.169
15:00 - 15:30	3	3553	0.075	3	3553	0.066	3	3553	0.141
15:30 - 16:00	3	3553	0.066	3	3553	0.094	3	3553	0.160
16:00 - 16:30	3	3553	0.094	3	3553	0.216	3	3553	0.310
16:30 - 17:00	3	3553	0.075	3	3553	0.216	3	3553	0.291
17:00 - 17:30	3	3553	0.047	3	3553	0.263	3	3553	0.310
17:30 - 18:00	3	3553	0.028	3	3553	0.188	3	3553	0.216
18:00 - 18:30	3	3553	0.009	3	3553	0.300	3	3553	0.309
18:30 - 19:00	3	3553	0.009	3	3553	0.131	3	3553	0.140
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			2.354			2.222			4.576

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected:	2500 - 4200 (units: sqm)
Survey date date range:	01/01/10 - 04/10/18
Number of weekdays (Monday-Friday):	3
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	5
Surveys manually removed from selection:	31

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL TAXIS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
07:30 - 08:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
08:00 - 08:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
08:30 - 09:00	3	3553	0.009	3	3553	0.009	3	3553	0.018
09:00 - 09:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
09:30 - 10:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
10:00 - 10:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
10:30 - 11:00	3	3553	0.019	3	3553	0.019	3	3553	0.038
11:00 - 11:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
11:30 - 12:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
12:00 - 12:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
12:30 - 13:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
13:00 - 13:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
13:30 - 14:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
14:00 - 14:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
14:30 - 15:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
15:00 - 15:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
15:30 - 16:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
16:00 - 16:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
16:30 - 17:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
17:00 - 17:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
17:30 - 18:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
18:00 - 18:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
18:30 - 19:00	3	3553	0.009	3	3553	0.009	3	3553	0.018
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.037			0.037			0.074

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
07:30 - 08:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
08:00 - 08:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
08:30 - 09:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
09:00 - 09:30	3	3553	0.009	3	3553	0.009	3	3553	0.018
09:30 - 10:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
10:00 - 10:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
10:30 - 11:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
11:00 - 11:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
11:30 - 12:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
12:00 - 12:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
12:30 - 13:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
13:00 - 13:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
13:30 - 14:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
14:00 - 14:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
14:30 - 15:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
15:00 - 15:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
15:30 - 16:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
16:00 - 16:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
16:30 - 17:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
17:00 - 17:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
17:30 - 18:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
18:00 - 18:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
18:30 - 19:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.009			0.009			0.018

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL CYCLISTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
07:30 - 08:00	3	3553	0.009	3	3553	0.000	3	3553	0.009
08:00 - 08:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
08:30 - 09:00	3	3553	0.028	3	3553	0.000	3	3553	0.028
09:00 - 09:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
09:30 - 10:00	3	3553	0.009	3	3553	0.000	3	3553	0.009
10:00 - 10:30	3	3553	0.019	3	3553	0.009	3	3553	0.028
10:30 - 11:00	3	3553	0.028	3	3553	0.028	3	3553	0.056
11:00 - 11:30	3	3553	0.019	3	3553	0.019	3	3553	0.038
11:30 - 12:00	3	3553	0.009	3	3553	0.009	3	3553	0.018
12:00 - 12:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
12:30 - 13:00	3	3553	0.009	3	3553	0.000	3	3553	0.009
13:00 - 13:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
13:30 - 14:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
14:00 - 14:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
14:30 - 15:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
15:00 - 15:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
15:30 - 16:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
16:00 - 16:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
16:30 - 17:00	3	3553	0.009	3	3553	0.009	3	3553	0.018
17:00 - 17:30	3	3553	0.000	3	3553	0.028	3	3553	0.028
17:30 - 18:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
18:00 - 18:30	3	3553	0.000	3	3553	0.056	3	3553	0.056
18:30 - 19:00	3	3553	0.000	3	3553	0.000	3	3553	0.000
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.139			0.158			0.297

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL VEHICLE OCCUPANTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.056	3	3553	0.009	3	3553	0.065
07:30 - 08:00	3	3553	0.150	3	3553	0.009	3	3553	0.159
08:00 - 08:30	3	3553	0.178	3	3553	0.038	3	3553	0.216
08:30 - 09:00	3	3553	0.356	3	3553	0.047	3	3553	0.403
09:00 - 09:30	3	3553	0.516	3	3553	0.084	3	3553	0.600
09:30 - 10:00	3	3553	0.366	3	3553	0.066	3	3553	0.432
10:00 - 10:30	3	3553	0.066	3	3553	0.009	3	3553	0.075
10:30 - 11:00	3	3553	0.197	3	3553	0.084	3	3553	0.281
11:00 - 11:30	3	3553	0.056	3	3553	0.028	3	3553	0.084
11:30 - 12:00	3	3553	0.028	3	3553	0.009	3	3553	0.037
12:00 - 12:30	3	3553	0.047	3	3553	0.019	3	3553	0.066
12:30 - 13:00	3	3553	0.066	3	3553	0.009	3	3553	0.075
13:00 - 13:30	3	3553	0.094	3	3553	0.009	3	3553	0.103
13:30 - 14:00	3	3553	0.235	3	3553	0.169	3	3553	0.404
14:00 - 14:30	3	3553	0.178	3	3553	0.131	3	3553	0.309
14:30 - 15:00	3	3553	0.075	3	3553	0.188	3	3553	0.263
15:00 - 15:30	3	3553	0.094	3	3553	0.122	3	3553	0.216
15:30 - 16:00	3	3553	0.094	3	3553	0.197	3	3553	0.291
16:00 - 16:30	3	3553	0.113	3	3553	0.319	3	3553	0.432
16:30 - 17:00	3	3553	0.122	3	3553	0.328	3	3553	0.450
17:00 - 17:30	3	3553	0.047	3	3553	0.356	3	3553	0.403
17:30 - 18:00	3	3553	0.028	3	3553	0.235	3	3553	0.263
18:00 - 18:30	3	3553	0.009	3	3553	0.450	3	3553	0.459
18:30 - 19:00	3	3553	0.000	3	3553	0.178	3	3553	0.178
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			3.171			3.093			6.264

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL PEDESTRIANS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.000	3	3553	0.000	3	3553	0.000
07:30 - 08:00	3	3553	0.019	3	3553	0.000	3	3553	0.019
08:00 - 08:30	3	3553	0.159	3	3553	0.038	3	3553	0.197
08:30 - 09:00	3	3553	0.244	3	3553	0.047	3	3553	0.291
09:00 - 09:30	3	3553	0.169	3	3553	0.131	3	3553	0.300
09:30 - 10:00	3	3553	0.159	3	3553	0.103	3	3553	0.262
10:00 - 10:30	3	3553	0.347	3	3553	0.291	3	3553	0.638
10:30 - 11:00	3	3553	0.319	3	3553	0.216	3	3553	0.535
11:00 - 11:30	3	3553	0.216	3	3553	0.347	3	3553	0.563
11:30 - 12:00	3	3553	0.150	3	3553	0.188	3	3553	0.338
12:00 - 12:30	3	3553	0.469	3	3553	0.807	3	3553	1.276
12:30 - 13:00	3	3553	0.169	3	3553	0.807	3	3553	0.976
13:00 - 13:30	3	3553	0.553	3	3553	0.910	3	3553	1.463
13:30 - 14:00	3	3553	0.994	3	3553	0.310	3	3553	1.304
14:00 - 14:30	3	3553	0.422	3	3553	0.131	3	3553	0.553
14:30 - 15:00	3	3553	0.441	3	3553	0.197	3	3553	0.638
15:00 - 15:30	3	3553	0.141	3	3553	0.159	3	3553	0.300
15:30 - 16:00	3	3553	0.253	3	3553	0.084	3	3553	0.337
16:00 - 16:30	3	3553	0.141	3	3553	0.075	3	3553	0.216
16:30 - 17:00	3	3553	0.019	3	3553	0.028	3	3553	0.047
17:00 - 17:30	3	3553	0.028	3	3553	0.206	3	3553	0.234
17:30 - 18:00	3	3553	0.009	3	3553	0.141	3	3553	0.150
18:00 - 18:30	3	3553	0.000	3	3553	0.206	3	3553	0.206
18:30 - 19:00	3	3553	0.000	3	3553	0.028	3	3553	0.028
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			5.421			5.450			10.871

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL BUS/TRAM PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.028	3	3553	0.000	3	3553	0.028
07:30 - 08:00	3	3553	0.103	3	3553	0.000	3	3553	0.103
08:00 - 08:30	3	3553	0.206	3	3553	0.000	3	3553	0.206
08:30 - 09:00	3	3553	0.460	3	3553	0.000	3	3553	0.460
09:00 - 09:30	3	3553	0.328	3	3553	0.000	3	3553	0.328
09:30 - 10:00	3	3553	0.253	3	3553	0.000	3	3553	0.253
10:00 - 10:30	3	3553	0.103	3	3553	0.000	3	3553	0.103
10:30 - 11:00	3	3553	0.056	3	3553	0.028	3	3553	0.084
11:00 - 11:30	3	3553	0.000	3	3553	0.019	3	3553	0.019
11:30 - 12:00	3	3553	0.019	3	3553	0.000	3	3553	0.019
12:00 - 12:30	3	3553	0.009	3	3553	0.103	3	3553	0.112
12:30 - 13:00	3	3553	0.066	3	3553	0.159	3	3553	0.225
13:00 - 13:30	3	3553	0.028	3	3553	0.188	3	3553	0.216
13:30 - 14:00	3	3553	0.122	3	3553	0.028	3	3553	0.150
14:00 - 14:30	3	3553	0.009	3	3553	0.075	3	3553	0.084
14:30 - 15:00	3	3553	0.056	3	3553	0.028	3	3553	0.084
15:00 - 15:30	3	3553	0.000	3	3553	0.066	3	3553	0.066
15:30 - 16:00	3	3553	0.084	3	3553	0.056	3	3553	0.140
16:00 - 16:30	3	3553	0.075	3	3553	0.122	3	3553	0.197
16:30 - 17:00	3	3553	0.047	3	3553	0.122	3	3553	0.169
17:00 - 17:30	3	3553	0.000	3	3553	0.441	3	3553	0.441
17:30 - 18:00	3	3553	0.000	3	3553	0.291	3	3553	0.291
18:00 - 18:30	3	3553	0.000	3	3553	0.225	3	3553	0.225
18:30 - 19:00	3	3553	0.000	3	3553	0.084	3	3553	0.084
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			2.052			2.035			4.087

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL TOTAL RAIL PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.019	3	3553	0.000	3	3553	0.019
07:30 - 08:00	3	3553	0.084	3	3553	0.000	3	3553	0.084
08:00 - 08:30	3	3553	0.291	3	3553	0.000	3	3553	0.291
08:30 - 09:00	3	3553	0.535	3	3553	0.000	3	3553	0.535
09:00 - 09:30	3	3553	0.366	3	3553	0.019	3	3553	0.385
09:30 - 10:00	3	3553	0.094	3	3553	0.019	3	3553	0.113
10:00 - 10:30	3	3553	0.038	3	3553	0.019	3	3553	0.057
10:30 - 11:00	3	3553	0.028	3	3553	0.047	3	3553	0.075
11:00 - 11:30	3	3553	0.019	3	3553	0.000	3	3553	0.019
11:30 - 12:00	3	3553	0.019	3	3553	0.000	3	3553	0.019
12:00 - 12:30	3	3553	0.019	3	3553	0.000	3	3553	0.019
12:30 - 13:00	3	3553	0.047	3	3553	0.047	3	3553	0.094
13:00 - 13:30	3	3553	0.038	3	3553	0.066	3	3553	0.104
13:30 - 14:00	3	3553	0.038	3	3553	0.084	3	3553	0.122
14:00 - 14:30	3	3553	0.038	3	3553	0.000	3	3553	0.038
14:30 - 15:00	3	3553	0.066	3	3553	0.084	3	3553	0.150
15:00 - 15:30	3	3553	0.000	3	3553	0.047	3	3553	0.047
15:30 - 16:00	3	3553	0.066	3	3553	0.075	3	3553	0.141
16:00 - 16:30	3	3553	0.047	3	3553	0.056	3	3553	0.103
16:30 - 17:00	3	3553	0.009	3	3553	0.244	3	3553	0.253
17:00 - 17:30	3	3553	0.056	3	3553	0.478	3	3553	0.534
17:30 - 18:00	3	3553	0.000	3	3553	0.272	3	3553	0.272
18:00 - 18:30	3	3553	0.038	3	3553	0.244	3	3553	0.282
18:30 - 19:00	3	3553	0.000	3	3553	0.113	3	3553	0.113
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			1.955			1.914			3.869

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL PUBLIC TRANSPORT USERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.047	3	3553	0.000	3	3553	0.047
07:30 - 08:00	3	3553	0.188	3	3553	0.000	3	3553	0.188
08:00 - 08:30	3	3553	0.497	3	3553	0.000	3	3553	0.497
08:30 - 09:00	3	3553	0.994	3	3553	0.000	3	3553	0.994
09:00 - 09:30	3	3553	0.694	3	3553	0.019	3	3553	0.713
09:30 - 10:00	3	3553	0.347	3	3553	0.019	3	3553	0.366
10:00 - 10:30	3	3553	0.141	3	3553	0.019	3	3553	0.160
10:30 - 11:00	3	3553	0.084	3	3553	0.075	3	3553	0.159
11:00 - 11:30	3	3553	0.019	3	3553	0.019	3	3553	0.038
11:30 - 12:00	3	3553	0.038	3	3553	0.000	3	3553	0.038
12:00 - 12:30	3	3553	0.028	3	3553	0.103	3	3553	0.131
12:30 - 13:00	3	3553	0.113	3	3553	0.206	3	3553	0.319
13:00 - 13:30	3	3553	0.066	3	3553	0.253	3	3553	0.319
13:30 - 14:00	3	3553	0.159	3	3553	0.113	3	3553	0.272
14:00 - 14:30	3	3553	0.047	3	3553	0.075	3	3553	0.122
14:30 - 15:00	3	3553	0.122	3	3553	0.113	3	3553	0.235
15:00 - 15:30	3	3553	0.000	3	3553	0.113	3	3553	0.113
15:30 - 16:00	3	3553	0.150	3	3553	0.131	3	3553	0.281
16:00 - 16:30	3	3553	0.122	3	3553	0.178	3	3553	0.300
16:30 - 17:00	3	3553	0.056	3	3553	0.366	3	3553	0.422
17:00 - 17:30	3	3553	0.056	3	3553	0.919	3	3553	0.975
17:30 - 18:00	3	3553	0.000	3	3553	0.563	3	3553	0.563
18:00 - 18:30	3	3553	0.038	3	3553	0.469	3	3553	0.507
18:30 - 19:00	3	3553	0.000	3	3553	0.197	3	3553	0.197
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			4.006			3.950			7.956

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	3	3553	0.103	3	3553	0.009	3	3553	0.112
07:30 - 08:00	3	3553	0.366	3	3553	0.009	3	3553	0.375
08:00 - 08:30	3	3553	0.835	3	3553	0.075	3	3553	0.910
08:30 - 09:00	3	3553	1.623	3	3553	0.094	3	3553	1.717
09:00 - 09:30	3	3553	1.379	3	3553	0.235	3	3553	1.614
09:30 - 10:00	3	3553	0.882	3	3553	0.188	3	3553	1.070
10:00 - 10:30	3	3553	0.572	3	3553	0.328	3	3553	0.900
10:30 - 11:00	3	3553	0.629	3	3553	0.403	3	3553	1.032
11:00 - 11:30	3	3553	0.310	3	3553	0.413	3	3553	0.723
11:30 - 12:00	3	3553	0.225	3	3553	0.206	3	3553	0.431
12:00 - 12:30	3	3553	0.544	3	3553	0.929	3	3553	1.473
12:30 - 13:00	3	3553	0.356	3	3553	1.023	3	3553	1.379
13:00 - 13:30	3	3553	0.713	3	3553	1.173	3	3553	1.886
13:30 - 14:00	3	3553	1.388	3	3553	0.591	3	3553	1.979
14:00 - 14:30	3	3553	0.647	3	3553	0.338	3	3553	0.985
14:30 - 15:00	3	3553	0.638	3	3553	0.497	3	3553	1.135
15:00 - 15:30	3	3553	0.235	3	3553	0.394	3	3553	0.629
15:30 - 16:00	3	3553	0.497	3	3553	0.413	3	3553	0.910
16:00 - 16:30	3	3553	0.375	3	3553	0.572	3	3553	0.947
16:30 - 17:00	3	3553	0.206	3	3553	0.732	3	3553	0.938
17:00 - 17:30	3	3553	0.131	3	3553	1.510	3	3553	1.641
17:30 - 18:00	3	3553	0.038	3	3553	0.938	3	3553	0.976
18:00 - 18:30	3	3553	0.047	3	3553	1.182	3	3553	1.229
18:30 - 19:00	3	3553	0.000	3	3553	0.403	3	3553	0.403
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			12.739			12.655			25.394

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

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Calculation Reference: AUDIT-730101-190610-0607

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 01 - RETAIL
Category : O - CONVENIENCE STORE
MULTI-MODAL VEHICLES

Selected regions and areas:

04	EAST ANGLIA		
	CA	CAMBRIDGESHIRE	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	NY	NORTH YORKSHIRE	1 days
	SY	SOUTH YORKSHIRE	1 days
11	SCOTLAND		
	EB	CITY OF EDINBURGH	2 days
	GC	GLASGOW CITY	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Gross floor area
Actual Range: 219 to 1500 (units: sqm)
Range Selected by User: 70 to 1500 (units: sqm)

Parking Spaces Range: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 07/04/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	1 days
Wednesday	2 days
Thursday	2 days
Friday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	6 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Town Centre	5
Edge of Town Centre	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	1
Built-Up Zone	5

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

A1	6 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

5,001 to 10,000	1 days
15,001 to 20,000	1 days
25,001 to 50,000	1 days
50,001 to 100,000	3 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

75,001 to 100,000	2 days
100,001 to 125,000	1 days
250,001 to 500,000	2 days
500,001 or More	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	6 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Petrol filling station:

Included in the survey count	0 days
Excluded from count or no filling station	6 days

This data displays the number of surveys within the selected set that include petrol filling station activity, and the number of surveys that do not.

Travel Plan:

Yes	1 days
No	5 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	6 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 CA-01-O-02 LITTLE WAITROSE CAMBRIDGESHIRE
FITZROY STREET
CAMBRIDGE

Town Centre
Built-Up Zone
Total Gross floor area: 1056 sqm
Survey date: FRIDAY *12/07/13* *Survey Type: MANUAL*

2 EB-01-O-01 SAINSBURY'S LOCAL CITY OF EDINBURGH
EARL GREY STREET
EDINBURGH

Town Centre
Built-Up Zone
Total Gross floor area: 350 sqm
Survey date: THURSDAY *28/05/15* *Survey Type: MANUAL*

3 EB-01-O-02 SAINSBURY'S LOCAL CITY OF EDINBURGH
ST ANDREW SQUARE
EDINBURGH

Town Centre
Built-Up Zone
Total Gross floor area: 1500 sqm
Survey date: THURSDAY *17/03/16* *Survey Type: MANUAL*

4 GC-01-O-01 SAINSBURY'S CENTRAL GLASGOW CITY
BUCHANAN STREET
GLASGOW

Town Centre
Built-Up Zone
Total Gross floor area: 1450 sqm
Survey date: WEDNESDAY *25/06/14* *Survey Type: MANUAL*

5 NY-01-O-02 SAINSBURY'S LOCAL NORTH YORKSHIRE
COLD BATH ROAD
HARROGATE

Edge of Town Centre
Residential Zone
Total Gross floor area: 220 sqm
Survey date: MONDAY *10/12/12* *Survey Type: MANUAL*

6 SY-01-O-01 SAINSBURY'S LOCAL SOUTH YORKSHIRE
DIVISION STREET
SHEFFIELD

Town Centre
Built-Up Zone
Total Gross floor area: 219 sqm
Survey date: WEDNESDAY *12/12/12* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	1.377	6	787	1.059	6	787	2.436
08:00 - 09:00	6	787	1.928	6	787	1.292	6	787	3.220
09:00 - 10:00	6	787	1.462	6	787	1.462	6	787	2.924
10:00 - 11:00	6	787	1.335	6	787	1.229	6	787	2.564
11:00 - 12:00	6	787	1.992	6	787	1.674	6	787	3.666
12:00 - 13:00	6	787	1.843	6	787	1.631	6	787	3.474
13:00 - 14:00	6	787	1.758	6	787	1.292	6	787	3.050
14:00 - 15:00	6	787	2.246	6	787	2.500	6	787	4.746
15:00 - 16:00	6	787	2.479	6	787	2.246	6	787	4.725
16:00 - 17:00	6	787	1.928	6	787	1.949	6	787	3.877
17:00 - 18:00	6	787	2.458	6	787	2.966	6	787	5.424
18:00 - 19:00	6	787	1.843	6	787	2.987	6	787	4.830
19:00 - 20:00	6	787	1.758	6	787	1.377	6	787	3.135
20:00 - 21:00	6	787	0.763	6	787	0.996	6	787	1.759
21:00 - 22:00	6	787	0.466	6	787	0.720	6	787	1.186
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			25.636			25.380			51.016

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected:	219 - 1500 (units: sqm)
Survey date date range:	01/01/10 - 07/04/17
Number of weekdays (Monday-Friday):	6
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL TAXIS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	0.148	6	787	0.148	6	787	0.296
08:00 - 09:00	6	787	0.064	6	787	0.064	6	787	0.128
09:00 - 10:00	6	787	0.042	6	787	0.042	6	787	0.084
10:00 - 11:00	6	787	0.000	6	787	0.000	6	787	0.000
11:00 - 12:00	6	787	0.212	6	787	0.212	6	787	0.424
12:00 - 13:00	6	787	0.000	6	787	0.000	6	787	0.000
13:00 - 14:00	6	787	0.085	6	787	0.085	6	787	0.170
14:00 - 15:00	6	787	0.169	6	787	0.169	6	787	0.338
15:00 - 16:00	6	787	0.021	6	787	0.021	6	787	0.042
16:00 - 17:00	6	787	0.212	6	787	0.212	6	787	0.424
17:00 - 18:00	6	787	0.254	6	787	0.254	6	787	0.508
18:00 - 19:00	6	787	0.169	6	787	0.148	6	787	0.317
19:00 - 20:00	6	787	0.085	6	787	0.106	6	787	0.191
20:00 - 21:00	6	787	0.148	6	787	0.148	6	787	0.296
21:00 - 22:00	6	787	0.106	6	787	0.106	6	787	0.212
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.715			1.715			3.430

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	0.106	6	787	0.106	6	787	0.212
08:00 - 09:00	6	787	0.000	6	787	0.000	6	787	0.000
09:00 - 10:00	6	787	0.021	6	787	0.021	6	787	0.042
10:00 - 11:00	6	787	0.000	6	787	0.000	6	787	0.000
11:00 - 12:00	6	787	0.042	6	787	0.042	6	787	0.084
12:00 - 13:00	6	787	0.000	6	787	0.000	6	787	0.000
13:00 - 14:00	6	787	0.000	6	787	0.000	6	787	0.000
14:00 - 15:00	6	787	0.000	6	787	0.000	6	787	0.000
15:00 - 16:00	6	787	0.021	6	787	0.021	6	787	0.042
16:00 - 17:00	6	787	0.000	6	787	0.000	6	787	0.000
17:00 - 18:00	6	787	0.000	6	787	0.000	6	787	0.000
18:00 - 19:00	6	787	0.000	6	787	0.000	6	787	0.000
19:00 - 20:00	6	787	0.000	6	787	0.000	6	787	0.000
20:00 - 21:00	6	787	0.000	6	787	0.000	6	787	0.000
21:00 - 22:00	6	787	0.021	6	787	0.000	6	787	0.021
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.211			0.190			0.401

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL CYCLISTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	0.127	6	787	0.106	6	787	0.233
08:00 - 09:00	6	787	0.275	6	787	0.381	6	787	0.656
09:00 - 10:00	6	787	0.085	6	787	0.085	6	787	0.170
10:00 - 11:00	6	787	0.169	6	787	0.127	6	787	0.296
11:00 - 12:00	6	787	0.127	6	787	0.191	6	787	0.318
12:00 - 13:00	6	787	0.297	6	787	0.191	6	787	0.488
13:00 - 14:00	6	787	0.254	6	787	0.233	6	787	0.487
14:00 - 15:00	6	787	0.106	6	787	0.169	6	787	0.275
15:00 - 16:00	6	787	0.191	6	787	0.212	6	787	0.403
16:00 - 17:00	6	787	0.297	6	787	0.212	6	787	0.509
17:00 - 18:00	6	787	0.254	6	787	0.381	6	787	0.635
18:00 - 19:00	6	787	0.169	6	787	0.212	6	787	0.381
19:00 - 20:00	6	787	0.085	6	787	0.169	6	787	0.254
20:00 - 21:00	6	787	0.169	6	787	0.127	6	787	0.296
21:00 - 22:00	6	787	0.042	6	787	0.148	6	787	0.190
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.647			2.944			5.591

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL VEHICLE OCCUPANTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	1.398	6	787	0.975	6	787	2.373
08:00 - 09:00	6	787	2.585	6	787	1.441	6	787	4.026
09:00 - 10:00	6	787	1.631	6	787	1.610	6	787	3.241
10:00 - 11:00	6	787	1.631	6	787	1.419	6	787	3.050
11:00 - 12:00	6	787	2.479	6	787	2.246	6	787	4.725
12:00 - 13:00	6	787	2.203	6	787	1.949	6	787	4.152
13:00 - 14:00	6	787	2.097	6	787	1.419	6	787	3.516
14:00 - 15:00	6	787	2.373	6	787	2.945	6	787	5.318
15:00 - 16:00	6	787	3.178	6	787	2.797	6	787	5.975
16:00 - 17:00	6	787	2.564	6	787	2.500	6	787	5.064
17:00 - 18:00	6	787	2.775	6	787	3.581	6	787	6.356
18:00 - 19:00	6	787	2.415	6	787	3.835	6	787	6.250
19:00 - 20:00	6	787	2.331	6	787	1.801	6	787	4.132
20:00 - 21:00	6	787	0.975	6	787	1.186	6	787	2.161
21:00 - 22:00	6	787	0.636	6	787	0.890	6	787	1.526
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			31.271			30.594			61.865

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL PEDESTRIANS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	3.475	6	787	5.530	6	787	9.005
08:00 - 09:00	6	787	7.034	6	787	13.114	6	787	20.148
09:00 - 10:00	6	787	7.627	6	787	8.708	6	787	16.335
10:00 - 11:00	6	787	8.750	6	787	8.369	6	787	17.119
11:00 - 12:00	6	787	11.186	6	787	11.864	6	787	23.050
12:00 - 13:00	6	787	35.614	6	787	35.890	6	787	71.504
13:00 - 14:00	6	787	27.987	6	787	31.356	6	787	59.343
14:00 - 15:00	6	787	14.110	6	787	14.852	6	787	28.962
15:00 - 16:00	6	787	12.797	6	787	13.390	6	787	26.187
16:00 - 17:00	6	787	12.733	6	787	11.822	6	787	24.555
17:00 - 18:00	6	787	20.911	6	787	16.716	6	787	37.627
18:00 - 19:00	6	787	15.487	6	787	13.347	6	787	28.834
19:00 - 20:00	6	787	15.233	6	787	13.602	6	787	28.835
20:00 - 21:00	6	787	10.318	6	787	10.699	6	787	21.017
21:00 - 22:00	6	787	7.394	6	787	7.839	6	787	15.233
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			210.656			217.098			427.754

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL BUS/TRAM PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	4.555	6	787	3.136	6	787	7.691
08:00 - 09:00	6	787	7.924	6	787	3.475	6	787	11.399
09:00 - 10:00	6	787	2.966	6	787	1.970	6	787	4.936
10:00 - 11:00	6	787	3.538	6	787	3.453	6	787	6.991
11:00 - 12:00	6	787	5.106	6	787	3.644	6	787	8.750
12:00 - 13:00	6	787	3.581	6	787	3.157	6	787	6.738
13:00 - 14:00	6	787	4.555	6	787	3.263	6	787	7.818
14:00 - 15:00	6	787	5.784	6	787	4.979	6	787	10.763
15:00 - 16:00	6	787	6.229	6	787	5.678	6	787	11.907
16:00 - 17:00	6	787	5.127	6	787	5.614	6	787	10.741
17:00 - 18:00	6	787	6.758	6	787	10.000	6	787	16.758
18:00 - 19:00	6	787	5.530	6	787	6.716	6	787	12.246
19:00 - 20:00	6	787	2.754	6	787	5.064	6	787	7.818
20:00 - 21:00	6	787	2.119	6	787	2.119	6	787	4.238
21:00 - 22:00	6	787	1.758	6	787	2.585	6	787	4.343
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			68.284			64.853			133.137

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL TOTAL RAIL PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	2.542	6	787	1.123	6	787	3.665
08:00 - 09:00	6	787	4.322	6	787	2.479	6	787	6.801
09:00 - 10:00	6	787	1.822	6	787	1.483	6	787	3.305
10:00 - 11:00	6	787	1.250	6	787	0.953	6	787	2.203
11:00 - 12:00	6	787	2.648	6	787	2.013	6	787	4.661
12:00 - 13:00	6	787	1.928	6	787	1.229	6	787	3.157
13:00 - 14:00	6	787	3.411	6	787	3.856	6	787	7.267
14:00 - 15:00	6	787	2.436	6	787	2.246	6	787	4.682
15:00 - 16:00	6	787	2.924	6	787	2.860	6	787	5.784
16:00 - 17:00	6	787	2.076	6	787	3.136	6	787	5.212
17:00 - 18:00	6	787	2.860	6	787	3.517	6	787	6.377
18:00 - 19:00	6	787	2.013	6	787	2.987	6	787	5.000
19:00 - 20:00	6	787	1.970	6	787	1.864	6	787	3.834
20:00 - 21:00	6	787	1.356	6	787	1.102	6	787	2.458
21:00 - 22:00	6	787	0.678	6	787	0.191	6	787	0.869
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			34.236			31.039			65.275

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL PUBLIC TRANSPORT USERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	7.097	6	787	4.258	6	787	11.355
08:00 - 09:00	6	787	12.246	6	787	5.953	6	787	18.199
09:00 - 10:00	6	787	4.788	6	787	3.453	6	787	8.241
10:00 - 11:00	6	787	4.788	6	787	4.407	6	787	9.195
11:00 - 12:00	6	787	7.754	6	787	5.657	6	787	13.411
12:00 - 13:00	6	787	5.508	6	787	4.386	6	787	9.894
13:00 - 14:00	6	787	7.966	6	787	7.119	6	787	15.085
14:00 - 15:00	6	787	8.220	6	787	7.225	6	787	15.445
15:00 - 16:00	6	787	9.153	6	787	8.538	6	787	17.691
16:00 - 17:00	6	787	7.203	6	787	8.750	6	787	15.953
17:00 - 18:00	6	787	9.619	6	787	13.517	6	787	23.136
18:00 - 19:00	6	787	7.542	6	787	9.703	6	787	17.245
19:00 - 20:00	6	787	4.725	6	787	6.928	6	787	11.653
20:00 - 21:00	6	787	3.475	6	787	3.220	6	787	6.695
21:00 - 22:00	6	787	2.436	6	787	2.775	6	787	5.211
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			102.520			95.889			198.409

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	787	12.097	6	787	10.869	6	787	22.966
08:00 - 09:00	6	787	22.140	6	787	20.890	6	787	43.030
09:00 - 10:00	6	787	14.131	6	787	13.856	6	787	27.987
10:00 - 11:00	6	787	15.339	6	787	14.322	6	787	29.661
11:00 - 12:00	6	787	21.547	6	787	19.958	6	787	41.505
12:00 - 13:00	6	787	43.623	6	787	42.415	6	787	86.038
13:00 - 14:00	6	787	38.305	6	787	40.127	6	787	78.432
14:00 - 15:00	6	787	24.809	6	787	25.191	6	787	50.000
15:00 - 16:00	6	787	25.318	6	787	24.936	6	787	50.254
16:00 - 17:00	6	787	22.797	6	787	23.284	6	787	46.081
17:00 - 18:00	6	787	33.559	6	787	34.195	6	787	67.754
18:00 - 19:00	6	787	25.614	6	787	27.097	6	787	52.711
19:00 - 20:00	6	787	22.373	6	787	22.500	6	787	44.873
20:00 - 21:00	6	787	14.936	6	787	15.233	6	787	30.169
21:00 - 22:00	6	787	10.508	6	787	11.653	6	787	22.161
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			347.096			346.526			693.622

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Calculation Reference: AUDIT-730101-190620-0620

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 06 - HOTEL, FOOD & DRINK
Category : A - HOTELS
MULTI-MODAL VEHICLES

Selected regions and areas:

03	SOUTH WEST		
	WL	WILTSHIRE	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	WY	WEST YORKSHIRE	1 days
08	NORTH WEST		
	GM	GREATER MANCHESTER	1 days
10	WALES		
	CF	CARDIFF	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Number of bedrooms
Actual Range: 51 to 134 (units:)
Range Selected by User: 4 to 227 (units:)

Parking Spaces Range: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 23/10/18

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	3 days
Wednesday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	4 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Town Centre	3
Edge of Town Centre	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Development Zone	1
Built-Up Zone	3

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

C1	4 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Secondary Filtering selection (Cont.):

Population within 1 mile:

5,001 to 10,000	1 days
25,001 to 50,000	2 days
50,001 to 100,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

25,001 to 50,000	1 days
125,001 to 250,000	1 days
250,001 to 500,000	1 days
500,001 or More	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	2 days
1.1 to 1.5	2 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No	4 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	4 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 CF-06-A-04 TRAVELODGE CARDIFF
THE FRIARY
CARDIFF

Town Centre
Built-Up Zone
Total Number of bedrooms: 96
Survey date: MONDAY *16/07/12* *Survey Type: MANUAL*

2 GM-06-A-08 IBIS GREATER MANCHESTER
PORTLAND STREET
MANCHESTER

Town Centre
Built-Up Zone
Total Number of bedrooms: 127
Survey date: MONDAY *26/09/16* *Survey Type: MANUAL*

3 WL-06-A-02 HOLIDAY INN EXPRESS WILTSHIRE
BRIDGE STREET
SWINDON

Town Centre
Built-Up Zone
Total Number of bedrooms: 134
Survey date: WEDNESDAY *27/11/13* *Survey Type: MANUAL*

4 WY-06-A-03 TRAVELODGE WEST YORKSHIRE
DEAN CLOUGH
HALIFAX

Edge of Town Centre
Development Zone
Total Number of bedrooms: 51
Survey date: MONDAY *22/10/18* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
CB-06-A-01	selected
CF-06-A-03	selected
DS-06-A-02	selected
HI-06-A-04	selected
HI-06-A-05	selected
NT-06-A-02	selected
NW-06-A-01	selected
NY-06-A-01	selected
TV-06-A-04	selected
TW-06-A-03	selected

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL VEHICLES
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.025	4	102	0.071	4	102	0.096
08:00 - 09:00	4	102	0.051	4	102	0.176	4	102	0.227
09:00 - 10:00	4	102	0.044	4	102	0.125	4	102	0.169
10:00 - 11:00	4	102	0.047	4	102	0.074	4	102	0.121
11:00 - 12:00	4	102	0.037	4	102	0.059	4	102	0.096
12:00 - 13:00	4	102	0.037	4	102	0.029	4	102	0.066
13:00 - 14:00	4	102	0.047	4	102	0.039	4	102	0.086
14:00 - 15:00	4	102	0.020	4	102	0.020	4	102	0.040
15:00 - 16:00	4	102	0.047	4	102	0.020	4	102	0.067
16:00 - 17:00	4	102	0.071	4	102	0.025	4	102	0.096
17:00 - 18:00	4	102	0.056	4	102	0.029	4	102	0.085
18:00 - 19:00	4	102	0.044	4	102	0.027	4	102	0.071
19:00 - 20:00	4	102	0.061	4	102	0.042	4	102	0.103
20:00 - 21:00	4	102	0.042	4	102	0.017	4	102	0.059
21:00 - 22:00	4	102	0.022	4	102	0.007	4	102	0.029
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.651			0.760			1.411

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected:	51 - 134 (units:)
Survey date date range:	01/01/10 - 23/10/18
Number of weekdays (Monday-Friday):	4
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	10

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL TAXIS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.000	4	102	0.000	4	102	0.000
08:00 - 09:00	4	102	0.002	4	102	0.005	4	102	0.007
09:00 - 10:00	4	102	0.000	4	102	0.000	4	102	0.000
10:00 - 11:00	4	102	0.002	4	102	0.002	4	102	0.004
11:00 - 12:00	4	102	0.002	4	102	0.002	4	102	0.004
12:00 - 13:00	4	102	0.002	4	102	0.002	4	102	0.004
13:00 - 14:00	4	102	0.002	4	102	0.002	4	102	0.004
14:00 - 15:00	4	102	0.000	4	102	0.000	4	102	0.000
15:00 - 16:00	4	102	0.000	4	102	0.000	4	102	0.000
16:00 - 17:00	4	102	0.002	4	102	0.002	4	102	0.004
17:00 - 18:00	4	102	0.000	4	102	0.000	4	102	0.000
18:00 - 19:00	4	102	0.002	4	102	0.002	4	102	0.004
19:00 - 20:00	4	102	0.000	4	102	0.000	4	102	0.000
20:00 - 21:00	4	102	0.000	4	102	0.000	4	102	0.000
21:00 - 22:00	4	102	0.002	4	102	0.002	4	102	0.004
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.016			0.019			0.035

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL OGVS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.000	4	102	0.000	4	102	0.000
08:00 - 09:00	4	102	0.000	4	102	0.000	4	102	0.000
09:00 - 10:00	4	102	0.005	4	102	0.002	4	102	0.007
10:00 - 11:00	4	102	0.000	4	102	0.002	4	102	0.002
11:00 - 12:00	4	102	0.000	4	102	0.000	4	102	0.000
12:00 - 13:00	4	102	0.000	4	102	0.000	4	102	0.000
13:00 - 14:00	4	102	0.002	4	102	0.002	4	102	0.004
14:00 - 15:00	4	102	0.002	4	102	0.002	4	102	0.004
15:00 - 16:00	4	102	0.000	4	102	0.000	4	102	0.000
16:00 - 17:00	4	102	0.000	4	102	0.000	4	102	0.000
17:00 - 18:00	4	102	0.000	4	102	0.000	4	102	0.000
18:00 - 19:00	4	102	0.000	4	102	0.000	4	102	0.000
19:00 - 20:00	4	102	0.000	4	102	0.000	4	102	0.000
20:00 - 21:00	4	102	0.000	4	102	0.000	4	102	0.000
21:00 - 22:00	4	102	0.000	4	102	0.000	4	102	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.009			0.008			0.017

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL CYCLISTS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.000	4	102	0.000	4	102	0.000
08:00 - 09:00	4	102	0.000	4	102	0.000	4	102	0.000
09:00 - 10:00	4	102	0.000	4	102	0.000	4	102	0.000
10:00 - 11:00	4	102	0.000	4	102	0.000	4	102	0.000
11:00 - 12:00	4	102	0.000	4	102	0.000	4	102	0.000
12:00 - 13:00	4	102	0.000	4	102	0.000	4	102	0.000
13:00 - 14:00	4	102	0.002	4	102	0.000	4	102	0.002
14:00 - 15:00	4	102	0.000	4	102	0.000	4	102	0.000
15:00 - 16:00	4	102	0.000	4	102	0.000	4	102	0.000
16:00 - 17:00	4	102	0.000	4	102	0.000	4	102	0.000
17:00 - 18:00	4	102	0.000	4	102	0.000	4	102	0.000
18:00 - 19:00	4	102	0.005	4	102	0.002	4	102	0.007
19:00 - 20:00	4	102	0.000	4	102	0.000	4	102	0.000
20:00 - 21:00	4	102	0.000	4	102	0.000	4	102	0.000
21:00 - 22:00	4	102	0.000	4	102	0.000	4	102	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.007			0.002			0.009

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL VEHICLE OCCUPANTS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.032	4	102	0.100	4	102	0.132
08:00 - 09:00	4	102	0.078	4	102	0.228	4	102	0.306
09:00 - 10:00	4	102	0.056	4	102	0.184	4	102	0.240
10:00 - 11:00	4	102	0.064	4	102	0.086	4	102	0.150
11:00 - 12:00	4	102	0.037	4	102	0.091	4	102	0.128
12:00 - 13:00	4	102	0.044	4	102	0.032	4	102	0.076
13:00 - 14:00	4	102	0.064	4	102	0.059	4	102	0.123
14:00 - 15:00	4	102	0.027	4	102	0.025	4	102	0.052
15:00 - 16:00	4	102	0.083	4	102	0.029	4	102	0.112
16:00 - 17:00	4	102	0.118	4	102	0.047	4	102	0.165
17:00 - 18:00	4	102	0.074	4	102	0.054	4	102	0.128
18:00 - 19:00	4	102	0.069	4	102	0.027	4	102	0.096
19:00 - 20:00	4	102	0.071	4	102	0.059	4	102	0.130
20:00 - 21:00	4	102	0.059	4	102	0.025	4	102	0.084
21:00 - 22:00	4	102	0.029	4	102	0.005	4	102	0.034
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.905			1.051			1.956

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL PEDESTRIANS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.007	4	102	0.007	4	102	0.014
08:00 - 09:00	4	102	0.042	4	102	0.083	4	102	0.125
09:00 - 10:00	4	102	0.066	4	102	0.103	4	102	0.169
10:00 - 11:00	4	102	0.051	4	102	0.096	4	102	0.147
11:00 - 12:00	4	102	0.027	4	102	0.061	4	102	0.088
12:00 - 13:00	4	102	0.088	4	102	0.064	4	102	0.152
13:00 - 14:00	4	102	0.091	4	102	0.103	4	102	0.194
14:00 - 15:00	4	102	0.081	4	102	0.103	4	102	0.184
15:00 - 16:00	4	102	0.074	4	102	0.071	4	102	0.145
16:00 - 17:00	4	102	0.115	4	102	0.130	4	102	0.245
17:00 - 18:00	4	102	0.152	4	102	0.132	4	102	0.284
18:00 - 19:00	4	102	0.186	4	102	0.184	4	102	0.370
19:00 - 20:00	4	102	0.162	4	102	0.145	4	102	0.307
20:00 - 21:00	4	102	0.169	4	102	0.130	4	102	0.299
21:00 - 22:00	4	102	0.135	4	102	0.051	4	102	0.186
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.446			1.463			2.909

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL BUS/TRAM PASSENGERS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.000	4	102	0.002	4	102	0.002
08:00 - 09:00	4	102	0.005	4	102	0.010	4	102	0.015
09:00 - 10:00	4	102	0.000	4	102	0.002	4	102	0.002
10:00 - 11:00	4	102	0.002	4	102	0.007	4	102	0.009
11:00 - 12:00	4	102	0.000	4	102	0.005	4	102	0.005
12:00 - 13:00	4	102	0.002	4	102	0.002	4	102	0.004
13:00 - 14:00	4	102	0.022	4	102	0.010	4	102	0.032
14:00 - 15:00	4	102	0.005	4	102	0.000	4	102	0.005
15:00 - 16:00	4	102	0.017	4	102	0.005	4	102	0.022
16:00 - 17:00	4	102	0.005	4	102	0.000	4	102	0.005
17:00 - 18:00	4	102	0.002	4	102	0.000	4	102	0.002
18:00 - 19:00	4	102	0.010	4	102	0.000	4	102	0.010
19:00 - 20:00	4	102	0.010	4	102	0.000	4	102	0.010
20:00 - 21:00	4	102	0.005	4	102	0.002	4	102	0.007
21:00 - 22:00	4	102	0.005	4	102	0.000	4	102	0.005
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.090			0.045			0.135

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL TOTAL RAIL PASSENGERS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.010	4	102	0.005	4	102	0.015
08:00 - 09:00	4	102	0.020	4	102	0.007	4	102	0.027
09:00 - 10:00	4	102	0.005	4	102	0.017	4	102	0.022
10:00 - 11:00	4	102	0.007	4	102	0.005	4	102	0.012
11:00 - 12:00	4	102	0.020	4	102	0.012	4	102	0.032
12:00 - 13:00	4	102	0.005	4	102	0.000	4	102	0.005
13:00 - 14:00	4	102	0.025	4	102	0.002	4	102	0.027
14:00 - 15:00	4	102	0.017	4	102	0.005	4	102	0.022
15:00 - 16:00	4	102	0.020	4	102	0.002	4	102	0.022
16:00 - 17:00	4	102	0.039	4	102	0.015	4	102	0.054
17:00 - 18:00	4	102	0.015	4	102	0.002	4	102	0.017
18:00 - 19:00	4	102	0.029	4	102	0.002	4	102	0.031
19:00 - 20:00	4	102	0.007	4	102	0.002	4	102	0.009
20:00 - 21:00	4	102	0.010	4	102	0.000	4	102	0.010
21:00 - 22:00	4	102	0.007	4	102	0.000	4	102	0.007
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.236			0.076			0.312

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL COACH PASSENGERS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.000	4	102	0.000	4	102	0.000
08:00 - 09:00	4	102	0.000	4	102	0.000	4	102	0.000
09:00 - 10:00	4	102	0.000	4	102	0.000	4	102	0.000
10:00 - 11:00	4	102	0.000	4	102	0.000	4	102	0.000
11:00 - 12:00	4	102	0.000	4	102	0.000	4	102	0.000
12:00 - 13:00	4	102	0.000	4	102	0.000	4	102	0.000
13:00 - 14:00	4	102	0.002	4	102	0.002	4	102	0.004
14:00 - 15:00	4	102	0.000	4	102	0.000	4	102	0.000
15:00 - 16:00	4	102	0.000	4	102	0.000	4	102	0.000
16:00 - 17:00	4	102	0.000	4	102	0.000	4	102	0.000
17:00 - 18:00	4	102	0.002	4	102	0.000	4	102	0.002
18:00 - 19:00	4	102	0.000	4	102	0.000	4	102	0.000
19:00 - 20:00	4	102	0.000	4	102	0.000	4	102	0.000
20:00 - 21:00	4	102	0.000	4	102	0.000	4	102	0.000
21:00 - 22:00	4	102	0.000	4	102	0.000	4	102	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.004			0.002			0.006

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL PUBLIC TRANSPORT USERS
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.010	4	102	0.007	4	102	0.017
08:00 - 09:00	4	102	0.025	4	102	0.017	4	102	0.042
09:00 - 10:00	4	102	0.005	4	102	0.020	4	102	0.025
10:00 - 11:00	4	102	0.010	4	102	0.012	4	102	0.022
11:00 - 12:00	4	102	0.020	4	102	0.017	4	102	0.037
12:00 - 13:00	4	102	0.007	4	102	0.002	4	102	0.009
13:00 - 14:00	4	102	0.049	4	102	0.015	4	102	0.064
14:00 - 15:00	4	102	0.022	4	102	0.005	4	102	0.027
15:00 - 16:00	4	102	0.037	4	102	0.007	4	102	0.044
16:00 - 17:00	4	102	0.044	4	102	0.015	4	102	0.059
17:00 - 18:00	4	102	0.020	4	102	0.002	4	102	0.022
18:00 - 19:00	4	102	0.039	4	102	0.002	4	102	0.041
19:00 - 20:00	4	102	0.017	4	102	0.002	4	102	0.019
20:00 - 21:00	4	102	0.015	4	102	0.002	4	102	0.017
21:00 - 22:00	4	102	0.012	4	102	0.000	4	102	0.012
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.332			0.125			0.457

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	102	0.049	4	102	0.115	4	102	0.164
08:00 - 09:00	4	102	0.145	4	102	0.328	4	102	0.473
09:00 - 10:00	4	102	0.127	4	102	0.306	4	102	0.433
10:00 - 11:00	4	102	0.125	4	102	0.194	4	102	0.319
11:00 - 12:00	4	102	0.083	4	102	0.169	4	102	0.252
12:00 - 13:00	4	102	0.140	4	102	0.098	4	102	0.238
13:00 - 14:00	4	102	0.206	4	102	0.176	4	102	0.382
14:00 - 15:00	4	102	0.130	4	102	0.132	4	102	0.262
15:00 - 16:00	4	102	0.194	4	102	0.108	4	102	0.302
16:00 - 17:00	4	102	0.277	4	102	0.191	4	102	0.468
17:00 - 18:00	4	102	0.245	4	102	0.189	4	102	0.434
18:00 - 19:00	4	102	0.299	4	102	0.216	4	102	0.515
19:00 - 20:00	4	102	0.250	4	102	0.206	4	102	0.456
20:00 - 21:00	4	102	0.243	4	102	0.157	4	102	0.400
21:00 - 22:00	4	102	0.176	4	102	0.056	4	102	0.232
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.689			2.641			5.330

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

STORE STREET CAR PARK - RAW SURVEY DATA

TIME PERIOD	INBOUND COUNT								OUTBOUND COUNT								PARKED VEHICLES
	CAR	TAXI	LGV	OGV	PSV	MCL	TOTAL	Vehicle rate per space	CAR	TAXI	LGV	OGV	PSV	MCL	TOTAL	Vehicle rate per space	
0000-0100	2	0	0	0	0	0	2	0.005	3	0	0	0	0	0	3	0.007	24
0100-0200	1	0	0	0	0	0	1	0.002	1	0	0	0	0	0	1	0.002	24
0200-0300	0	0	0	0	0	0	0	0.000	3	0	0	0	0	0	3	0.007	21
0300-0400	0	0	0	0	0	0	0	0.000	0	0	0	0	0	0	0	0.000	21
0400-0500	3	0	2	0	0	0	5	0.012	0	0	1	0	0	0	1	0.002	25
0500-0600	12	0	0	0	0	0	12	0.030	0	0	0	0	0	0	0	0.000	37
0600-0700	69	0	16	0	0	0	85	0.209	0	0	1	0	0	0	1	0.002	121
0700-0800	177	0	13	0	0	0	190	0.468	0	0	1	0	0	0	1	0.002	310
0800-0900	115	0	1	0	0	0	116	0.286	24	0	0	0	0	0	24	0.059	402
0900-1000	29	0	0	0	0	0	29	0.071	31	0	0	0	0	0	31	0.076	400
1000-1100	17	0	1	0	0	0	18	0.044	17	0	0	0	0	0	17	0.042	401
1100-1200	18	0	0	0	0	0	18	0.044	14	0	2	0	0	0	16	0.039	403
1200-1300	22	0	0	0	0	0	22	0.054	17	0	3	0	0	0	20	0.049	405
1300-1400	11	0	0	0	0	0	11	0.027	17	0	3	0	0	0	20	0.049	396
1400-1500	7	0	0	0	0	0	7	0.017	26	0	3	0	0	0	29	0.071	374
1500-1600	11	0	0	0	0	0	11	0.027	78	0	2	0	0	0	80	0.197	305
1600-1700	6	0	0	0	0	0	6	0.015	115	0	6	0	0	0	121	0.298	190
1700-1800	10	0	0	0	0	0	10	0.025	80	0	9	0	0	0	89	0.219	111
1800-1900	5	0	0	0	0	0	5	0.012	37	0	5	0	0	0	42	0.103	74
1900-2000	1	0	0	0	0	0	1	0.002	20	0	0	0	0	0	20	0.049	55
2000-2100	1	0	0	0	0	0	1	0.002	13	0	0	0	0	0	13	0.032	43
2100-2200	1	0	0	0	0	0	1	0.002	7	0	0	0	0	0	7	0.017	37
2200-2300	1	0	0	0	0	0	1	0.002	7	0	0	0	0	0	7	0.017	31
2300-0000	1	1	0	0	0	0	2	0.005	3	1	0	0	0	0	4	0.010	29

APPROXIMATE NUMBER OF SPACES		406
VEHICLES PARKED AT 23:59 11.02.2019		25
VEHICLES PARKED AFTER 24 HOURS		31

Appendix I Distribution of Bus and Rail Trips

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Bus distribution

Work - Mayfield

Origin	Bus, minibus or coach	N	S	E	W
Manchester	3,708	30%	50%	20%	0%
Salford	649	0%	0%	0%	100%
Tameside	559	0%	0%	100%	0%
Oldham	420	50%	0%	50%	0%
Trafford	322	0%	50%	0%	50%
Stockport	262	0%	100%	0%	0%
Rochdale	258	100%	0%	0%	0%
Bury	183	100%	0%	0%	0%
Wigan	80	0%	0%	0%	100%
Bolton	60	50%	0%	0%	50%
Rossendale	39	100%	0%	0%	0%
Liverpool	29	0%	0%	0%	100%
Burnley	18	100%	0%	0%	0%
Hyndburn	11	100%	0%	0%	0%
Birmingham	10	0%	100%	0%	0%

Live - Mayfield
Manchester

	Bus, minibus or coach	N	S	E	W
Manchester	248	30%	50%	20%	0%
Trafford	84	0%	50%	0%	50%
Salford	29	0%	0%	0%	100%
Oldham	19	50%	0%	50%	0%
Stockport	19	0%	100%	0%	0%
Tameside	14	0%	0%	100%	0%
Rochdale	8	100%	0%	0%	0%
Bury	5	100%	0%	0%	0%
Liverpool	5	0%	0%	0%	100%
Blackburn with	2	100%	0%	0%	0%
Lambeth	2	0%	100%	0%	0%
Cheshire East	1	0%	100%	0%	0%
Bolton	1	50%	0%	0%	50%
Warrington	1	0%	50%	0%	50%
Leeds	1	50%	0%	50%	0%

Train distribution

Work - Mayfield

Origin	Train	N	S	E	W
Stockport	1,087	0%	100%	0%	0%
Cheshire E	516	0%	100%	0%	0%
Tameside	482	0%	0%	100%	0%
Bolton	431	50%	0%	0%	50%
Manchester	407	30%	50%	20%	0%
High Peak	313	0%	50%	50%	0%
Wigan	265	0%	0%	0%	100%
Warrington	214	0%	50%	0%	50%
Liverpool	159	0%	0%	0%	100%
Rochdale	147	100%	0%	0%	0%
Salford	132	0%	0%	0%	100%
St. Helens	129	0%	0%	0%	100%
Trafford	117	0%	50%	0%	50%
Cheshire W	115	0%	50%	0%	50%
Chorley	94	50%	0%	0%	50%

Live - Mayfield
Mancheste

	Train	N	S	E	W
Mancheste	99	30%	50%	20%	0%
Stockport	80	0%	100%	0%	0%
Cheshire E	61	0%	100%	0%	0%
Warringtor	32	0%	50%	0%	50%
Leeds	25	50%	0%	50%	0%
Liverpool	22	0%	0%	0%	100%
Bolton	21	50%	0%	0%	50%
Salford	17	0%	0%	0%	100%
Preston	13	50%	0%	0%	50%
Sheffield	13	0%	50%	50%	0%
Westminst	11	0%	100%	0%	0%
Tameside	11	0%	0%	100%	0%
Rochdale	9	100%	0%	0%	0%
Wigan	8	0%	0%	0%	100%
Blackburn	7	100%	0%	0%	0%

Origin	Bus, minibus or coach	N	S	E	W	
Manchester	3,708	1112	1854	742	0	
Salford	649	0	0	0	649	
Tameside	559	0	0	559	0	
Oldham	420	210	0	210	0	
Trafford	322	0	161	0	161	
Stockport	262	0	262	0	0	
Rochdale	258	258	0	0	0	
Bury	183	183	0	0	0	
Wigan	80	0	0	0	80	
Bolton	60	30	0	0	30	
Rossendale	39	39	0	0	0	
Liverpool	29	0	0	0	29	
Burnley	18	18	0	0	0	
Hyndburn	11	11	0	0	0	
Birmingham	10	0	10	0	0	
	Total	1,861	2,287	1,511	949	6,608

	N	S	E	W
Distribution	28%	35%	23%	14%

	AM		PM	
	IN	OUT	IN	OUT
N	28%	23%	23%	28%
S	35%	43%	43%	35%
E	23%	17%	17%	23%
W	14%	18%	18%	14%

Destination	Driving a car or van	N	S	E	W	
Manchester	248	74	124	50	0	
Trafford	84	0	42	0	42	
Salford	29	0	0	0	29	
Oldham	19	10	0	10	0	
Stockport	19	0	19	0	0	
Tameside	14	0	0	14	0	
Rochdale	8	8	0	0	0	
Bury	5	5	0	0	0	
Liverpool	5	0	0	0	5	
Blackburn with	2	2	0	0	0	
Lambeth	2	0	2	0	0	
Cheshire East	1	0	1	0	0	
Bolton	1	1	0	0	1	
Warrington	1	0	1	0	1	
Leeds	1	1	0	1	0	
	Total	100	189	74	77	439

	N	S	E	W
Distribution	23%	43%	17%	18%

Origin	Train	N	S	E	W	
Stockport	1,087	0	1087	0	0	
Cheshire E	516	0	516	0	0	
Tameside	482	0	0	482	0	
Bolton	431	216	0	0	216	
Manchester	407	122	204	81	0	
High Peak	313	0	157	157	0	
Wigan	265	0	0	0	265	
Warrington	214	0	107	0	107	
Liverpool	159	0	0	0	159	
Rochdale	147	147	0	0	0	
Salford	132	0	0	0	132	
St. Helens	129	0	0	0	129	
Trafford	117	0	59	0	59	
Cheshire W	115	0	58	0	58	
Chorley	94	47	0	0	47	
		532	2,186	720	1,171	4,608

	N	S	E	W
Distribution	12%	47%	16%	25%

	AM		PM	
	IN	OUT	IN	OUT
N	12%	18%	18%	12%
S	47%	52%	52%	47%
E	16%	12%	12%	16%
W	25%	19%	19%	25%

Destination	Train	N	S	E	W	
Mancheste	99	30	50	20	0	
Stockport	80	0	80	0	0	
Cheshire E	61	0	61	0	0	
Warringtor	32	0	16	0	16	
Leeds	25	13	0	13	0	
Liverpool	22	0	0	0	22	
Bolton	21	11	0	0	11	
Salford	17	0	0	0	17	
Preston	13	7	0	0	7	
Sheffield	13	0	7	7	0	
Westminst	11	0	11	0	0	
Tameside	11	0	0	11	0	
Rochdale	9	9	0	0	0	
Wigan	8	0	0	0	8	
Blackburn	7	7	0	0	0	
	Total	75	224	50	80	429

	N	S	E	W
Distribution	18%	52%	12%	19%

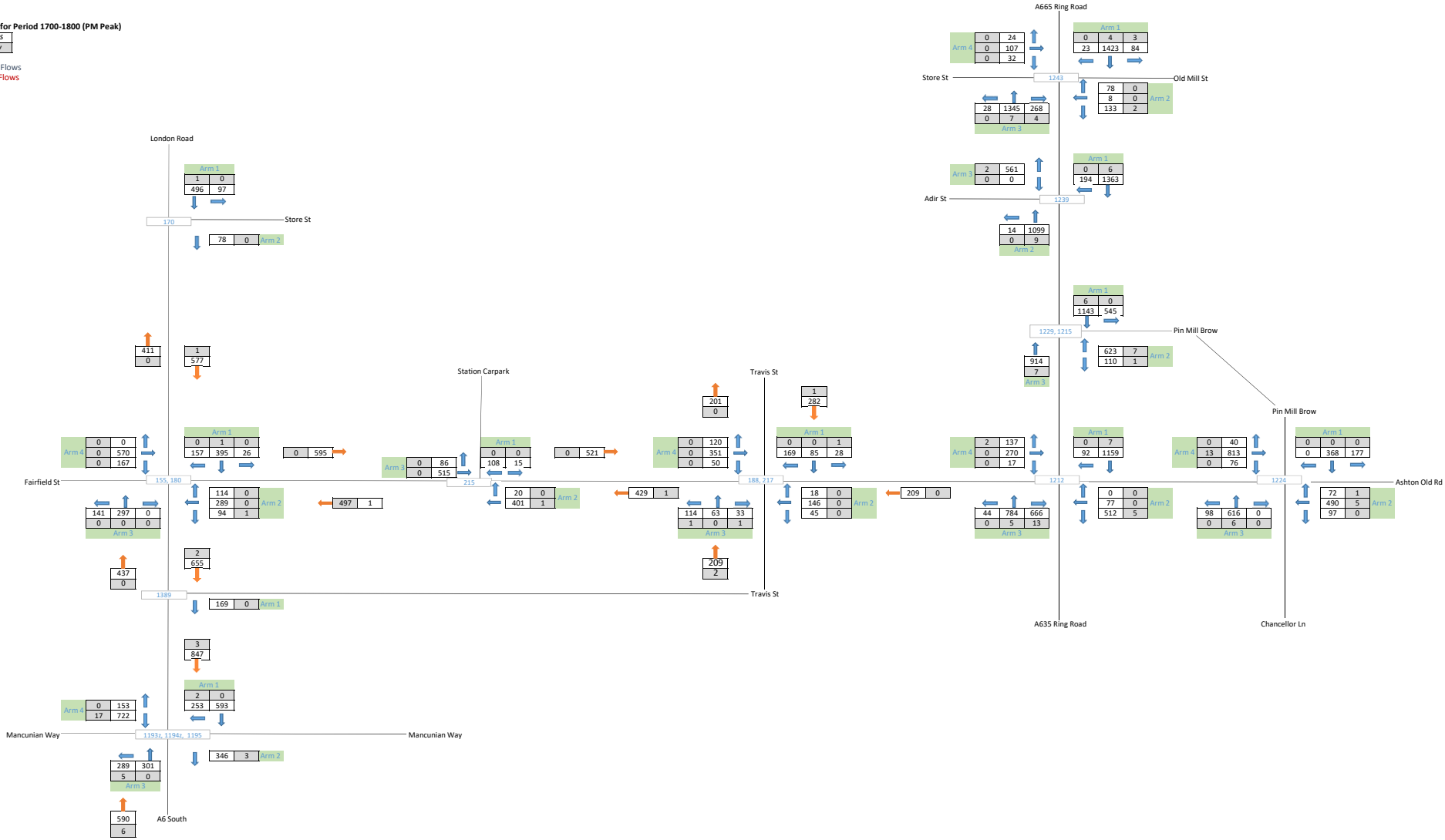
Appendix J TfGM Paramics Modelling Outputs

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2018 PM Base Flows

Key:
Model Flows for Period 1700-1800 (PM Peak)
1. All Vehicles
2. HGVs only

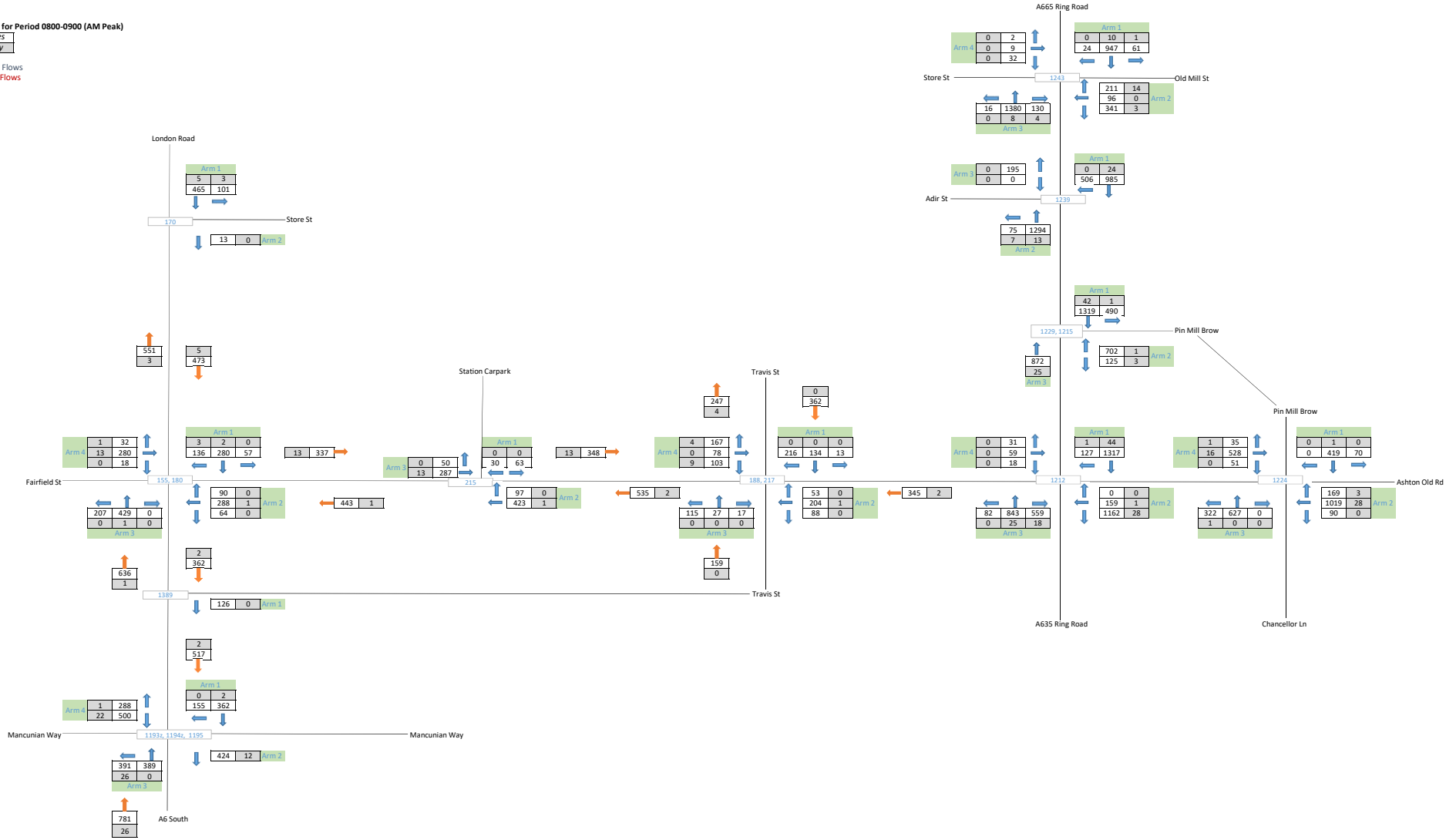
Turn Flows
Link Flows



2018 AM Base Flows

Key:
Model Flows for Period 0800-0900 (AM Peak)
1. All Vehicles
2. HGVs only

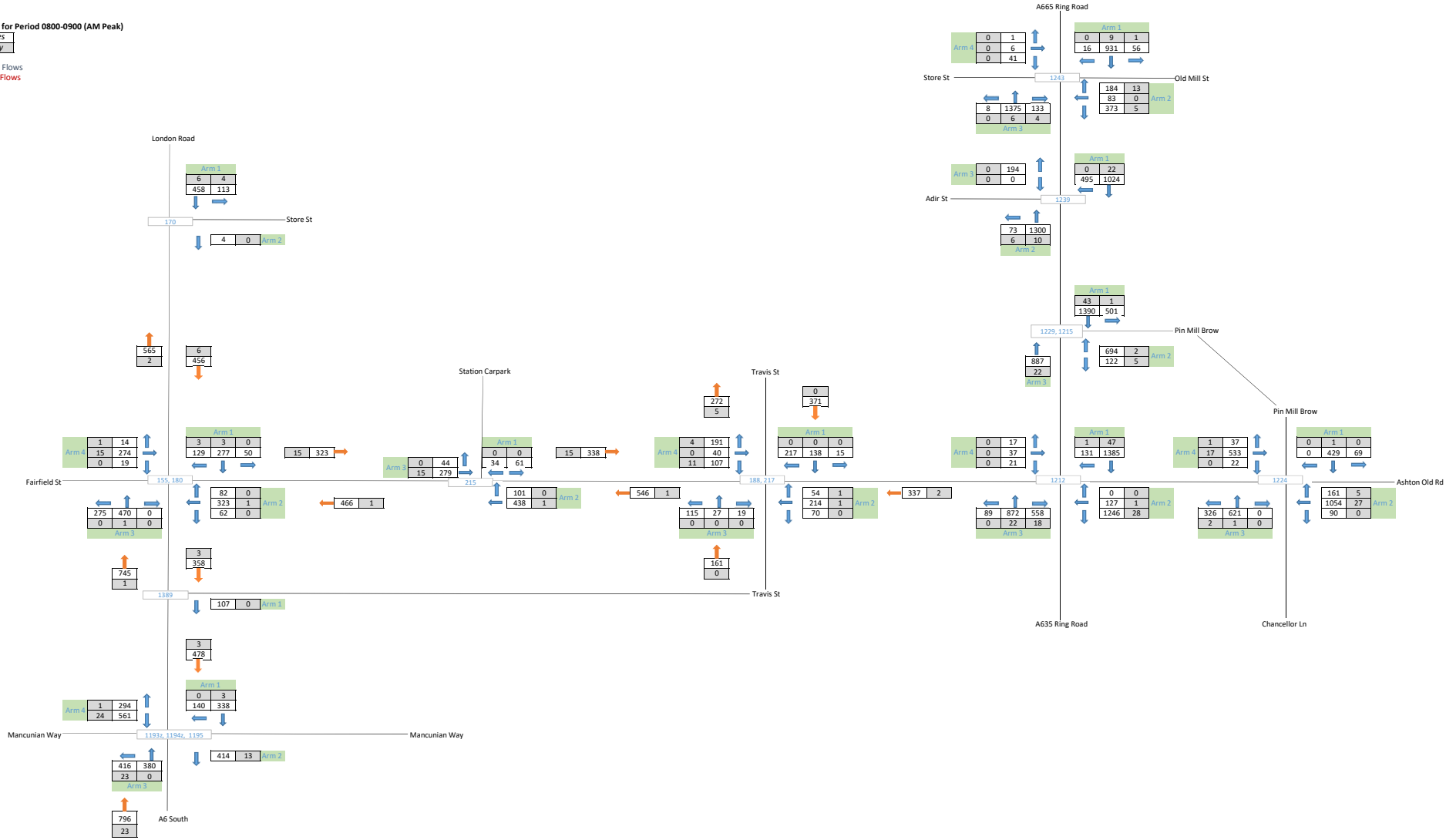
Turn Flows
Link Flows



2023 AM Do-Min Flows

Key:
Model Flows for Period 0800-0900 (AM Peak)
1. All Vehicles
2. HGVs only

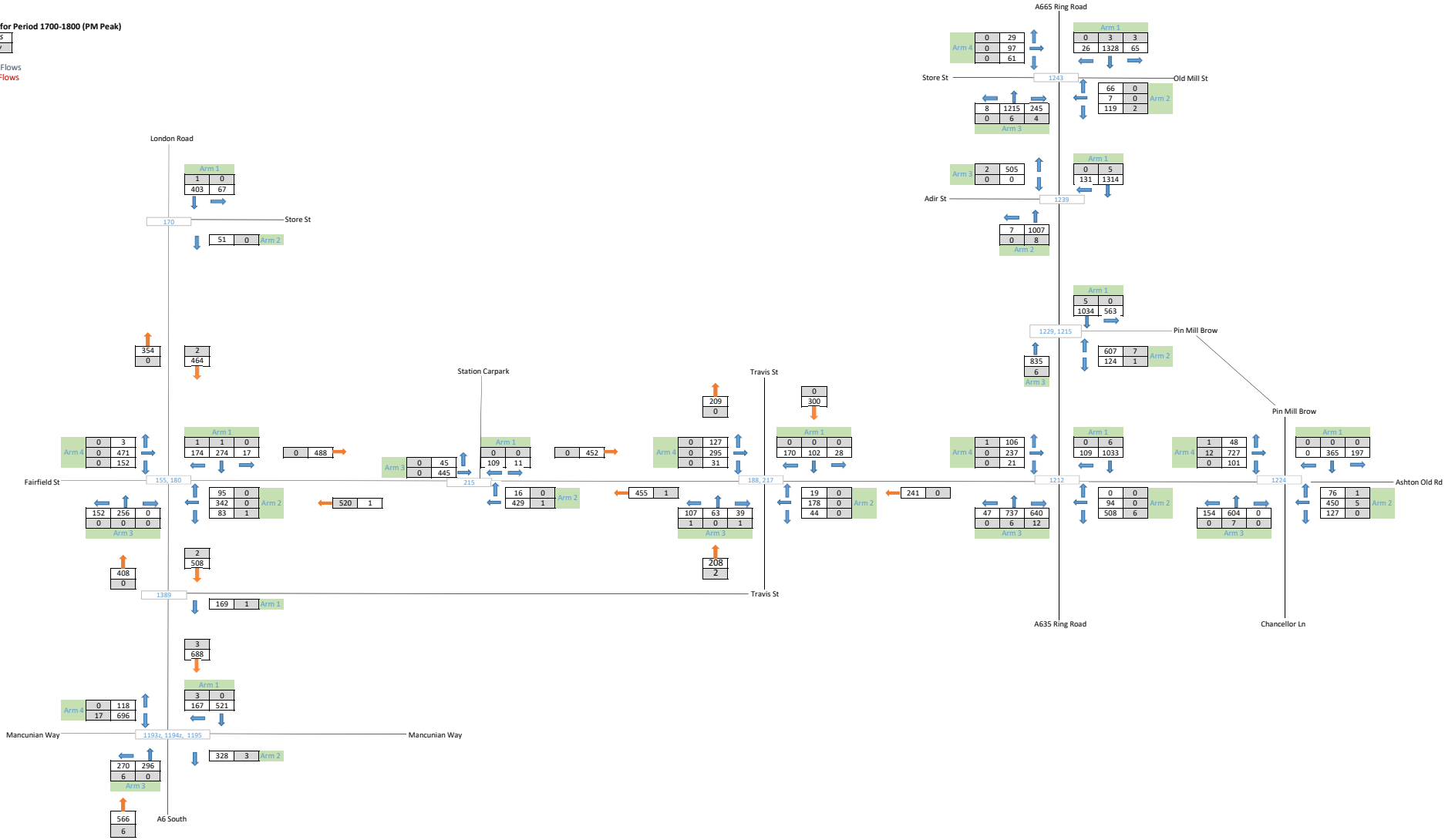
Turn Flows
Link Flows



2023 PM Do-Min Flows

Key:
Model Flows for Period 1700-1800 (PM Peak)
1. All Vehicles
2. HGVs only

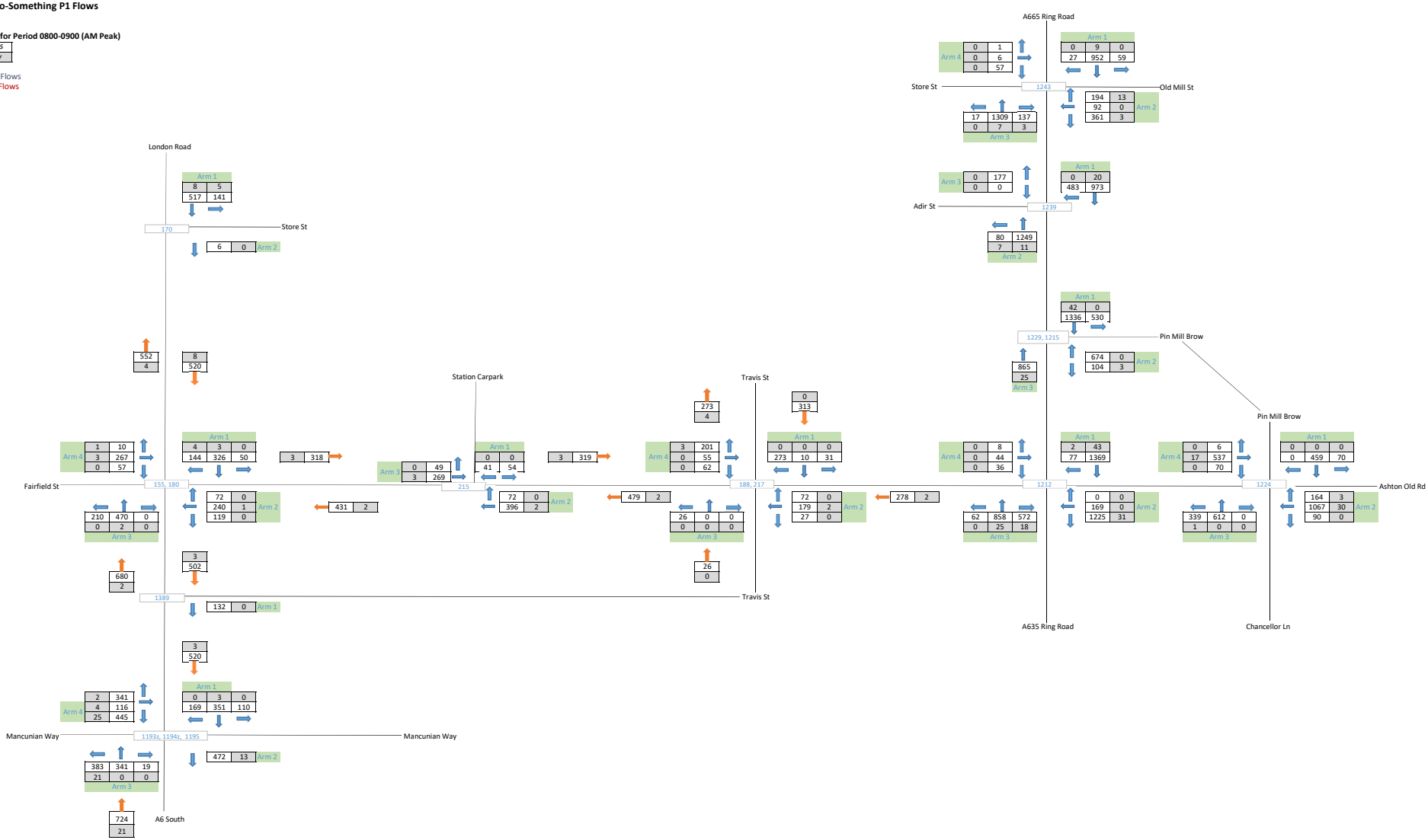
Turn Flows
Link Flows



2023 AM Do-Something P1 Flows

Key:
Model Flows for Period 0800-0900 (AM Peak)
1. All Vehicles
2. HGVs only

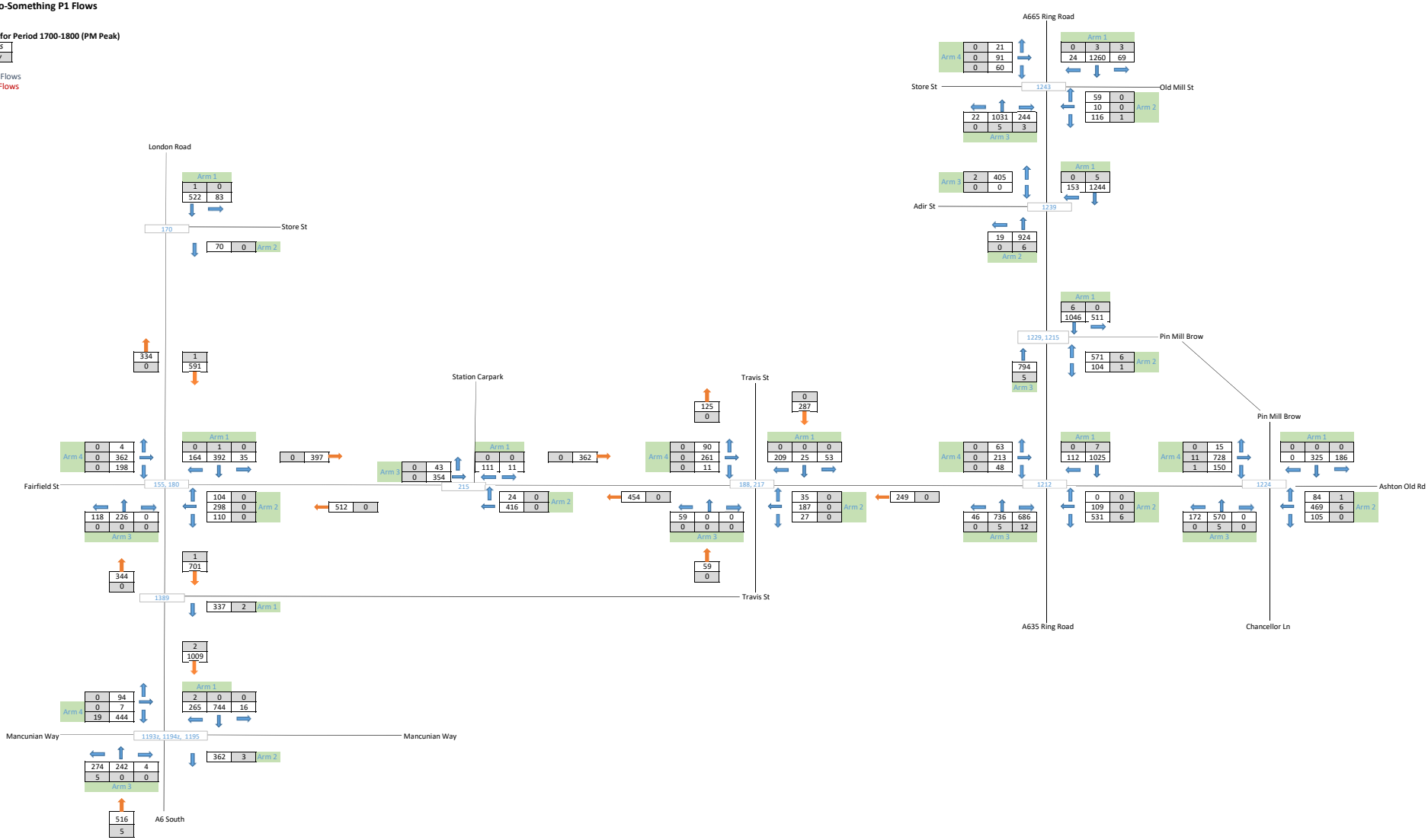
Turn Flows
Link Flows



2023 PM Do-Something P1 Flows

Key:
Model Flows for Period 1700-1800 (PM Peak)
1. All Vehicles
2. HGVs only

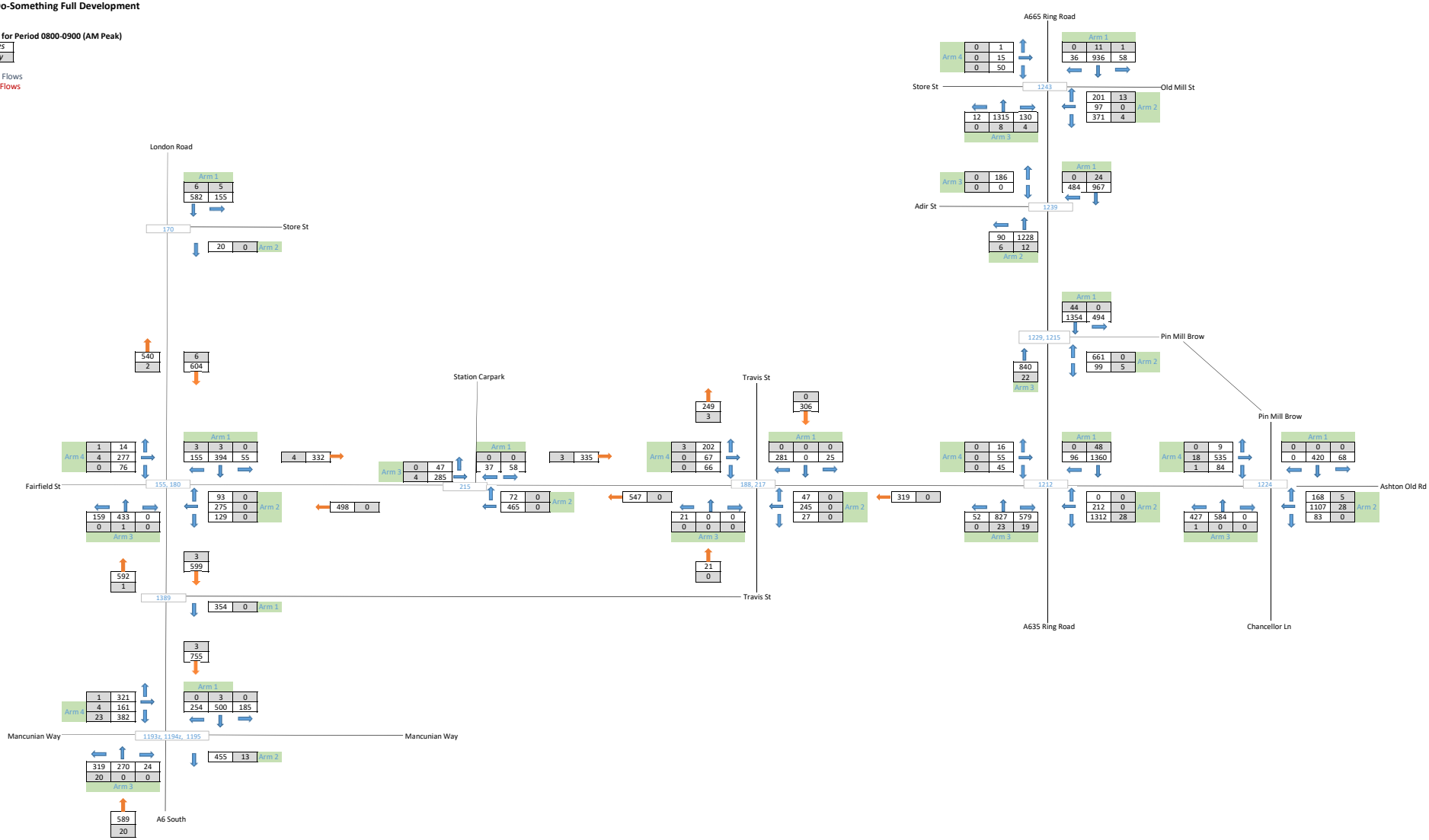
Turn Flows
Link Flows



2030 AM Do-Something Full Development

Key:
Model Flows for Period 0800-0900 (AM Peak)
1. All Vehicles
2. HGVs only

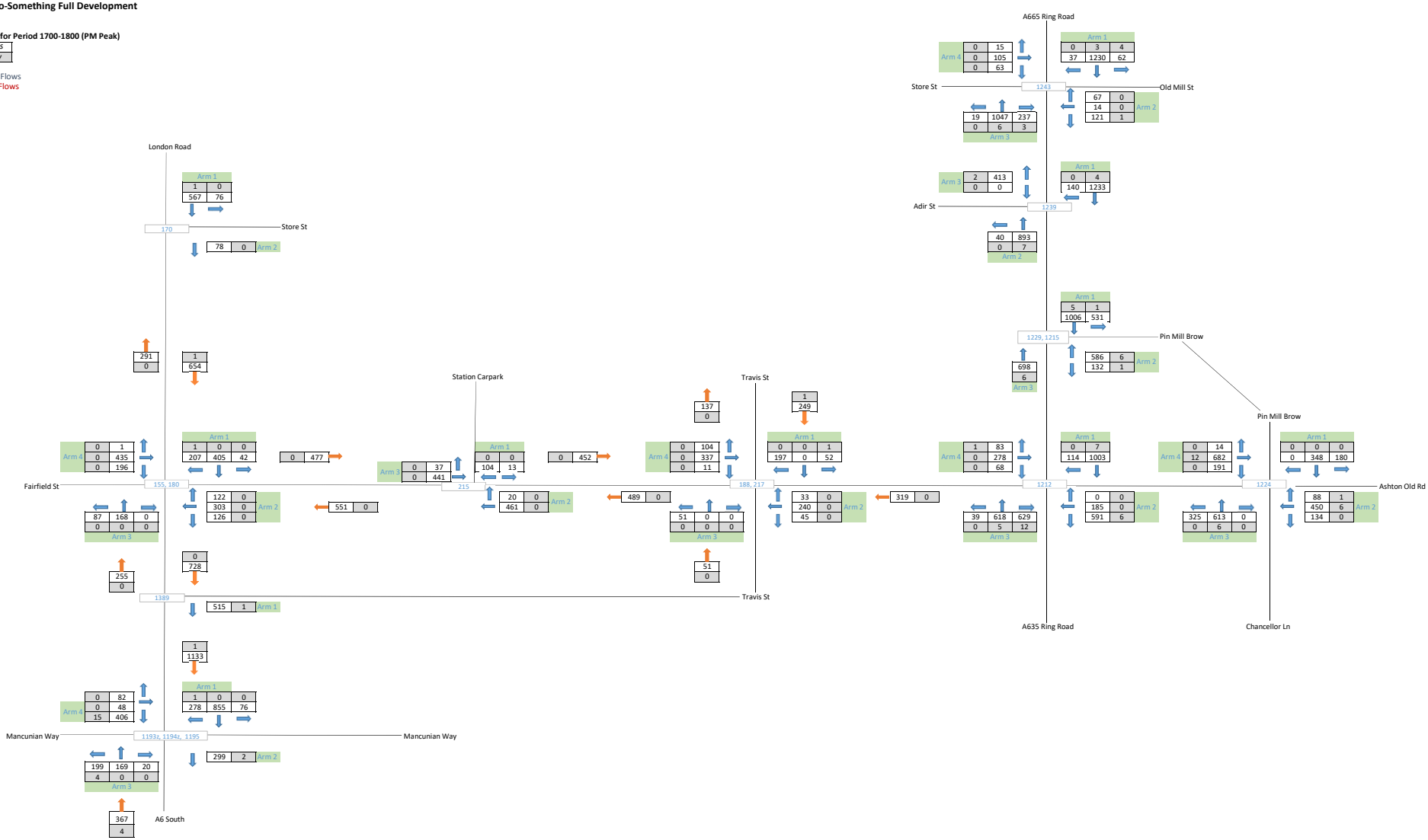
Turn Flows
Link Flows



2030 PM Do-Something Full Development

Key:
Model Flows for Period 1700-1800 (PM Peak)
1. All Vehicles
2. HGVs only

Turn Flows
Link Flows



2018 AM Base (0800-0900)

	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	57	0	0%
	London Rd (N) SO	280	2	1%
	London Rd (N) RT	136	3	2%
Arm 2	Fairfield St (E) LT	64	0	0%
	Fairfield St (E) SO	288	1	0%
	Fairfield St (E) RT	90	0	0%
Arm 3	London Rd (S) LT	207	0	0%
	London Rd (S) SO	429	1	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	32	1	4%
	Fairfield St (W) SO	280	13	5%
	Fairfield St (W) RT	18	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	% HGV
Arm 1	Station carpark LT	63	0	0%
	Station carpark RT	30	0	0%
Arm 2	Fairfield St (E) SO	423	1	0%
	Fairfield St (E) RT	97	0	0%
Arm 3	Fairfield St (W) LT	50	0	0%
	Fairfield St (W) SO	287	13	5%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St (N) LT	13	0	0%
	Travis St (N) SO	134	0	0%
	Travis St (N) RT	216	0	0%
Arm 2	Fairfield St (E) LT	88	0	0%
	Fairfield St (E) SO	204	1	1%
	Fairfield St (E) RT	53	0	0%
Arm 3	Travis St (S) LT	115	0	0%
	Travis St (S) SO	27	0	0%
	Travis St (S) RT	17	0	0%
Arm 4	Fairfield St (W) LT	167	4	3%
	Fairfield St (W) SO	78	0	0%
	Fairfield St (W) RT	103	9	9%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) SO	1317	44	3%
	Ring Rd (N) RT	127	1	1%
Arm 2	Fairfield St (E) LT	1162	28	2%
	Fairfield St (E) SO	159	1	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	82	0	0%
	Ring Rd (S) SO	843	25	3%
	Ring Rd (S) RT	559	18	3%
Arm 4	Fairfield St (W) LT	31	0	0%
	Fairfield St (W) SO	59	0	0%
	Fairfield St (W) RT	18	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St LT	126	0	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downing_Street (14)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd SO	362	2	1%
	London Rd RT	155	0	0%
Arm 2	A57(M) LT	424	12	3%
Arm 3	Downing St LT	391	26	7%
	Downing St SO	389	0	0%
Arm 4	A57(M) LT	288	1	0%
	A57(M) RT	500	22	4%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	101	3	3%
	London Rd (N) SO	465	5	1%
Arm 2	Store St LT	13	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) LT	61	1	1%
	Ring Rd (N) SO	947	10	1%
	Ring Rd (N) RT	24	0	0%
Arm 2	Old Mill St LT	341	3	1%
	Old Mill St SO	96	0	0%
	Old Mill St RT	211	14	7%
Arm 3	Ring Rd (S) LT	16	0	1%
	Ring Rd (S) SO	1380	8	1%
	Ring Rd (S) RT	130	4	3%
Arm 4	Store St LT	2	0	0%
	Store St SO	9	0	0%
	Store St RT	32	0	0%

	Turn_counts_at_node_1224- A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancellor_Lane/A635_Fairfield_Street (22)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow LT	70	0	0%
	Pin Mill Brow SO	419	1	0%
	Pin Mill Brow RT	0	0	0%
Arm 2	Ashton Old Rd LT	90	0	0%
	Ashton Old Rd SO	1019	28	3%
	Ashton Old Rd RT	169	3	2%
Arm 3	Chancellor Ln LT	322	1	0%
	Chancellor Ln SO	627	0	0%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	35	1	3%
	Fairfield St SO	528	16	3%
	Fairfield St RT	51	0	0%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow (N) SO	490	1	0%
	Pin Mill Brow (N) RT	1319	42	3%
Arm 2	Pin Mill Brow (S) LT	125	3	3%
	Pin Mill Brow (S) SO	702	1	0%
Arm 3	Ring Road SO	872	25	3%

Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)

		All Vehicles	HGV	% HGV
Arm 1	Great Ancoats St (N) SO	985	24	2%
	Great Ancoats St (N) RT	506	0	0%
Arm 2	Great Ancoats St (S) LT	75	7	10%
	Great Ancoats St (S) SO	1294	13	1%
Arm 3	Adair St LT	195	0	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	719	15	2%
A6042 (W) LT	320	17	5%
A665 Cheetham Hill Rd (N) SO	498	8	2%
A665 Cheetham Hill Rd (N) RT	537	25	5%
Ring Road (S) LT	1062	28	3%
Ring Road (S) SO)	208	0	0%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	84	0	0%
Shude Hill LT	125	0	0%
Swan St RT	163	5	3%
Swan St LT	179	6	3%
Swan ST SO	1220	29	2%
Rochdale Rd (N) SO	473	2	0%
Rochdale Rd (N) RT	260	2	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	30	3	9%
Ring Road SO	1050	20	2%
Ring Road RT	207	0	0%
Oldham Road LT	1110	13	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	70	2	2%
Great Ancoats St (E) LT	136	1	1%
Great Ancoats St (E) SO	1149	21	2%
Great Ancoats St (W) SO	965	11	1%
Great Ancoats St (W) RT	301	3	1%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV
Great Ancoats St (E) RT	4	0	0%
Great Ancoats St (E) SO	1315	23	2%
Great Ancoats St (W) LT	118	0	0%
Great Ancoats St (W) SO	987	11	1%
Central Retail Park LT	0	0	0%
Central Retail Park RT	3	0	0%
Laystall St SO	0	0	0%
Laystall St RT	116	1	1%
Laystall St LT	9	0	2%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	282	0	0%
Ring Road (E) SO	1308	23	2%
Ring Road (W) SO	1043	11	1%

Ring Road (W) RT	54	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	50	0	0%
Arm 1 Ring Road (W) SO	1274	14	1%
Pollard St LT	211	10	5%
Arm 2 Pollard St RT	106	0	0%
Ring Road (E) RT	74	0	0%
Arm 3 Ring Road (E) SO	1411	12	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	437	13	3%
Hyde Rd (E) LT	129	3	2%
Hyde Rd (E) SO	680	27	4%
Hyde Rd (E) RT	323	1	0%
A665 (N) LT	56	0	0%
A665 (N) SO	261	1	0%
A665 (S) RT	48	0	0%
A665 (S) SO	562	0	0%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	1	0	0%
Higher Ardwick to A6	88	0	0%
Higher Ardwick to Brunswick St	108	1	1%
Higher Ardwick to Ardwick Green South	31	0	1%
Higher Ardwick u-turn	1	0	0%
Hyde Rd to A6	10	0	0%
Hyde Rd to Brunswick St	231	4	2%
Hyde Rd to Ardwick Green S	388	21	5%
Hyde Rd to Higher Ardwick	10	0	0%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	70	5	7%
A6 to Ardwick Green S	418	6	1%
A6 to Higher Ardwick	65	0	0%
A6 to Hyde Rd	4	0	0%
A6 u-turn	3	0	0%
Brunswick St to Ardwick Green S	70	1	1%
Brunswick St to Higher Ardwick	230	3	1%
Brunswick St to Hyde Rd	63	1	1%
Brunswick St to A6	81	0	0%
Brunswick St u-turn	6	0	0%
Ardwick Green S to Higher Ardwick	70	6	8%
Ardwick Green S to Hyde Rd	373	13	3%
Ardwick Green S to A6	425	13	3%
Ardwick Green S to Brunswick St	132	2	2%
Ardwick Green S u-turn	5	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	19	0	0%
Portland St SO	97	1	1%
Portland ST RT	17	0	0%
Newton St LT	327	6	2%

Turn counts at node 166z - A6 Piccadilly / Ducie Street

	All Vehicles	HGV	% HGV
Auburn St SO	238	0	0%
Auburn St RT	67	2	4%
Auburn St LT	176	4	2%
Ducie St LT	49	1	1%
Piccadilly SO	449	6	1%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	137	1	1%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV
Fairfield St (W) SO	333	15	5%
Fairfield St (W) LT	297	7	2%
Fairfield St (E) SO	620	4	1%
Fairfield St (E) RT	9	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	310	10	3%
New Bridge St (E) SO	1059	39	4%
New Bridge St (E) RT	125	2	2%
A56 Great Ducie St (N) LT	196	0	0%
A56 Great Ducie St (N) SO	263	0	0%
A56 Great Ducie St (N) SO	342	25	7%
A56 Great Ducie St (S) RT	79	2	2%
A56 Great Ducie St (S) LT	0	0	0%
A56 Great Ducie St (S) SO	23	0	0%
Trinity Way SO	833	34	4%
Trinity Way RT	62	0	0%
Trinity Way LT	203	19	9%

Turn counts at node 428 - Chapel St / Victoria Bridge St			
	All Vehicles	HGV	% HGV
Victoria Bridge St RT	189	2	1%
Victoria Bridge St LT	3	1	20%
Chapel St (E) LT	436	8	2%
Chapel St (E) LT	83	0	0%
Chapel St (W) SO	92	4	4%
Chapel St (W) RT	58	0	0%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	172	3	2%
Deansgate (S) LT	144	3	2%
Blackfriars St LT	40	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	0	0	0%
St Mary's Gate LT	13	0	0%
St Mary's Gate SO	1	0	0%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	418	8	2%
Deansgate (N) RT	19	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	260	7	3%

Deansgate (S) RT	0	0	0%
Deansgate (S) LT	152	4	2%
Deansgate (N) LT	124	2	2%
Deansgate (N) SO	341	6	2%
Deansgate (N) RT	13	0	0%
Bridge St LT	37	0	0%
Bridge St SO	118	2	2%
John Dalton St LT	70	1	1%
John Dalton St SO	71	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	259	11	4%
Deansgate (S) RT	48	0	0%
Deansgate (S) LT	136	4	3%
Peter St RT	81	0	0%
Peter St LT	54	0	0%
Peter St SO	71	0	0%
Deansgate (N) LT	24	0	0%
Deansgate (N) SO	355	6	2%
Deansgate (N) RT	43	0	0%
Quay St LT	77	0	0%
Quay St SO	179	3	2%
Quay St RT	105	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	383	14	4%
Deansgate (S) RT	296	0	0%
Deansgate (N) LT	166	0	0%
Deansgate (N) SO	412	8	2%
Great Bridgewater St RT	27	0	1%
Great Bridgewater St LT	125	0	0%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	480	14	3%
Deansgate (S) LT	248	0	0%
Deansgate (N) SO	467	6	1%
Deansgate (N) RT	71	2	2%
Liverpool St RT	116	1	1%
Liverpool St LT	199	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	527	5	1%
Deansgate (S) RT	311	5	2%
Whitworth St West RT	197	9	5%
Whitworth St West LT	250	2	1%
Deansgate (N) LT	158	3	2%
Deansgate (N) SO	420	4	1%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV
Oxford St (S) SO	151	0	0%
Oxford St (S) LT	86	0	0%
Oxford St (N) SO	255	5	2%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St

	All Vehicles	HGV	% HGV
Albion St SO	535	6	1%
Albion St RT	337	0	0%
Albion St LT	127	5	4%
Great Bridgewater St (E) RT	6	0	0%
Great Bridgewater St (E) LT	48	0	0%
Great Bridgewater St (E) SO	49	0	0%
Lower Mosley St LT	20	0	0%
Lower Mosley St SO	147	0	0%
Lower Mosley St RT	34	0	0%
Great Bridgewater St (W) LT	20	0	0%
Great Bridgewater St (W) SO	69	0	0%
Great Bridgewater St (W) RT	28	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	45	0	0%
Albion St (N) SO	116	0	0%
Albion St (N) RT	63	0	0%
Whitworth St West (E) LT	108	0	0%
Whitworth St West (E) SO	211	5	2%
Whitworth St West (E) RT	281	8	3%
Albion St (S) LT	162	5	3%
Albion St (S) SO	560	3	0%
Albion St (S) RT	178	12	7%
Whitworth St West (W) LT	142	2	1%
Whitworth St West (W) SO	166	0	0%
Whitworth St West (W) RT	151	6	4%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	71	0	0%
Portland St (N) SO	232	0	0%
Portland St (N) RT	0	0	0%
Princess St (W) LT	16	0	0%
Princess St (W) SO	27	0	0%
Princess St (W) RT	2	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	347	3	1%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	157	5	3%
Oxford St (N) SO	71	1	1%
Oxford St (N) RT	33	0	0%
Portland St LT	29	0	0%
Portland St SO	96	0	0%
Portland St RT	221	0	0%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	16	0	0%
Oxford St (S) RT	113	0	0%
Chepstow St LT	0	0	0%
Chepstow St SO	91	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	64	1	1%

Oxford St (N) SO	35	0	0%
Whitworth St (E) LT	71	0	0%
Whitworth St (E) SO	393	10	2%
Oxford St (S) LT	167	0	0%
Oxford St (S) SO	123	0	0%
Whitworth St (W) LT	12	0	0%
Whitworth St (W) SO	543	18	3%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	25	0	0%
Princess St (N) SO	16	0	0%
Princess St (N) RT	76	0	0%
Whitworth St (E) LT	125	3	2%
Whitworth St (E) SO	264	0	0%
Whitworth St (E) RT	32	0	0%
Princess St (S) RT	168	4	2%
Princess St (S) LT	177	9	5%
Princess St (S) SO	182	2	1%
Whitworth St (W) LT	274	0	0%
Whitworth St (W) SO	256	16	6%
Whitworth St (W) RT	14	1	10%

Turn counts at node 87 - Whitworth St / Sackville St			
	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	96	0	0%
Whitworth St (E) SO	381	3	1%
Whitworth St (E) RT	155	0	0%
Sackville St (S) LT	47	0	0%
Sackville St (S) SO	147	0	0%
Sackville St (S) RT	227	1	1%
Whitworth St (W) LT	42	0	0%
Whitworth St (W) SO	395	20	5%
Whitworth St (W) RT	1	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	180	0	0%
Trinity Way (N) SO	1030	62	6%
Trinity Way (N) RT	33	0	0%
Blackfriars Rd (E) LT	26	0	0%
Blackfriars Rd (E) SO	8	0	0%
Blackfriars Rd (E) RT	20	0	2%
Trinity Way (S) LT	193	12	6%
Trinity Way (S) SO	1007	52	5%
Trinity Way (S) RT	41	5	12%
Blackfriars Rd (W) LT	165	2	1%
Blackfriars Rd (W) SO	269	0	0%
Blackfriars Rd (W) RT	336	28	8%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	50	0	0%
Trinity Way (N) SO	950	59	6%
Trinity Way (N) RT	322	31	10%
Chapel St (E) LT	105	3	3%

Chapel St (E) SO	264	0	0%
Chapel St (E) RT	14	0	0%
Trinity Way (S) SO	975	53	5%
Trinity Way (S) RT	195	18	9%
Trinity Way (S) LT	160	0	0%
Chapel St (W) LT	253	16	6%
Chapel St (W) SO	307	0	0%
Chapel St (W) RT	416	5	1%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	782	61	8%
Trinity Way (N) SO	619	3	0%
New Bailey access SO	0	0	0%
New Bailey access RT	9	0	0%
New Bailey access LT	0	0	0%
Irwell St RT	3	0	0%
Irwell St LT	31	0	0%
Irwell St SO	385	0	0%
Trinity Way (S) SO	9	0	0%
Trinity Way (S) RT	165	7	4%
Trinity Way (S) LT	779	0	0%

Turn_counts_at_node_1663,1150z,1028-A6042_Trinity_Way/A57_Regent_Road/A57_Dawson_Street			
	All Vehicles	HGV	% HGV
Trinity St (N) LT	383	0	0%
Trinity St (N) SO	20	0	0%
Trinity St (N) RT	379	0	0%
Dawson St (E) LT	8	0	0%
Dawson St (E) SO	1401	0	0%
Dawson St (E) RT	436	0	0%
Water St (S) LT	25	0	0%
Water St (S) SO	38	0	0%
Water St (S) RT	20	0	0%
Regent Rd (W) LT	364	24	6%
Regent Rd (W) SO	1702	44	3%

Turn counts (composite) at roundabout node 1000, 1002, 1003, 1005, 1162 - A56 Chester / A57 (M) / A5067 Chorlton Road			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (N)	152	7	4%
A57(M) EB off slip to A57(M) EB on slip	61	3	5%
A57(M) EB off slip to Chorlton Rd	149	8	5%
A57(M) EB off slip to Chester Rd (S)	86	14	16%
A57(M) EB off slip to A57(M) WB on slip	0	0	0%
Chester Rd (N) to A57(M) EB on slip	55	0	0%
Chester Rd (N) to Chorlton Rd	60	2	3%
Chester Rd (N) to Chester Road (S) via rbt	0	0	0%
Chester Rd (N) to A57(M) WB on slip	84	0	0%
Chester Rd (N) to Chester Road (N)	0	0	0%
A57(M) WB off slip to Chorlton Road	150	2	1%
A57(M) WB off slip to Chester Rd (S)	626	21	3%
A57(M) WB off slip to A57(M) WB on slip	187	0	0%
A57(M) WB off slip to Chester Rd (N)	190	0	0%
A57(M) WB off slip to A57(M) EB on slip	66	0	1%
Chorlton Rd to Chester Rd (S)	13	1	8%
Chorlton Rd to A57(M) WB on slip	54	10	19%

Chorlton Rd to Chester Rd (N)	73	2	3%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on slip	128	19	15%
Chester Rd (S) to Chester Rd (N) via rbt	94	2	2%
Chester Rd (S) to A57(M) EB on slip	356	20	6%
Chester Rd (S) to Chorlton Rd	22	2	7%
Chester Rd (S) to Chester Rd (S)	22	2	7%

Chester Road (N) SO	402	1	0%
Chester Road (S) SO	736	4	1%

Turn counts (composite) at roundabout node 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174 - A57 M / Princess Road / Medlock Street			
	All Vehicles	HGV	% HGV
Medlock St to A5103 link EB	7	0	0%
Medlock St to Princess Rd	286	2	1%
Medlock St to A57(M) WB on slip	27	0	0%
Medlock St to Medlock St	0	0	0%
A5103 link WB to Princess Rd	714	33	5%
A5103 link WB to A57(M) WB on slip	173	0	0%
A5103 link WB to Medlock St	105	2	2%
A5103 link WB to A5103 link EB	2	0	0%
Princess Rd to A57(M) WB on slip	351	4	1%
Princess Rd to Medlock St	1029	21	2%
Princess Rd to A5103 link EB	815	26	3%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	66	2	2%
A57(M) EB off slip to A5103 link EB	215	0	0%
A57(M) EB off slip to Princess Rd	341	0	0%
A57(M) EB off slip to A57(M) WB on slip	24	0	0%

A57 (M) WB	1932	46	2%
A57 (M) EB	2214	47	2%

Turn counts (composite) at roundabout node 563, 564, 567, 568, 570, 571, 575, 576 - Cambridge St Junction / A5103/ Higher Cambridge St / A57(M)			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	42	0	0%
Cambridge St to Higher Cambridge St	23	0	0%
Cambridge St to A5103 link WB	151	0	0%
Cambridge St to Cambridge St	0	0	0%
A57(M) WB off slip to Higher Cambridge St	388	8	2%
A57(M) WB off slip to A5103 link WB	644	34	5%
A57(M) WB off slip to Cambridge St	160	1	1%
A57(M) WB off slip to A57(M) EB on slip	85	3	4%
Higher Cambridge St to A5103 link WB	197	2	1%
Higher Cambridge St to Cambridge St	353	4	1%
Higher Cambridge St to A57(M) EB on slip	544	9	2%
Higher Cambridge St to Higher Cambridge St	0	0	0%
A5103 link EB to Cambridge St	337	6	2%
A5103 link EB to A57(M) EB on slip	517	20	4%
A5103 link EB to Higher Cambridge St	171	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126, 139, 100 - A57(M) / A34 / Brook Street			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	5	0	0%

A34 (N) SO	227	2.8	0%
Brook St to A34 (S)	377	4	0%
A34 (N) within junction to A57(M) WB	107	0	0%
A34(S) to A57(M) Westbound	847	12.2	0%
A34 (S) to SO	776	20.4	0%
A57(M) EB to Sackville Street	380	4	0%
A57(M) EB to Brook Street	455	5.4	0%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West			
	All Vehicles	HGV	% HGV
Oxford Road (N) LT	0	0	0%
Oxford Road (N) SO	57	0	0%
Oxford Road (N) RT	18	0	0%
Booth St East LT	0	0	0%
Booth St East SO	365	6	0%
Booth St East RT	0	0	0%
Oxford Road (S) LT	22	0	0%
Oxford Road (S) SO	95	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	23	0	0%
Booth St West SO	455	1.2	0%
Booth St West RT	12	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	283	0	0%
Upper Brook St (N) SO	771	18.6	0%
A5184 LT	14	1.2	0%
A5184 RT	448	4.8	0%
Upper Brook St (S) SO	1736	46.2	0%

2018 AM Base (0800-0900)

	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	57	0	0%
	London Rd (N) SO	280	2	1%
	London Rd (N) RT	136	3	2%
Arm 2	Fairfield St (E) LT	64	0	0%
	Fairfield St (E) SO	288	1	0%
	Fairfield St (E) RT	90	0	0%
Arm 3	London Rd (S) LT	207	0	0%
	London Rd (S) SO	429	1	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	32	1	4%
	Fairfield St (W) SO	280	13	5%
	Fairfield St (W) RT	18	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	% HGV
Arm 1	Station carpark LT	63	0	0%
	Station carpark RT	30	0	0%
Arm 2	Fairfield St (E) SO	423	1	0%
	Fairfield St (E) RT	97	0	0%
Arm 3	Fairfield St (W) LT	50	0	0%
	Fairfield St (W) SO	287	13	5%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St (N) LT	13	0	0%
	Travis St (N) SO	134	0	0%
	Travis St (N) RT	216	0	0%
Arm 2	Fairfield St (E) LT	88	0	0%
	Fairfield St (E) SO	204	1	1%
	Fairfield St (E) RT	53	0	0%
Arm 3	Travis St (S) LT	115	0	0%
	Travis St (S) SO	27	0	0%
	Travis St (S) RT	17	0	0%
Arm 4	Fairfield St (W) LT	167	4	3%
	Fairfield St (W) SO	78	0	0%
	Fairfield St (W) RT	103	9	9%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) SO	1317	44	3%
	Ring Rd (N) RT	127	1	1%
Arm 2	Fairfield St (E) LT	1162	28	2%
	Fairfield St (E) SO	159	1	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	82	0	0%
	Ring Rd (S) SO	843	25	3%
	Ring Rd (S) RT	559	18	3%
Arm 4	Fairfield St (W) LT	31	0	0%
	Fairfield St (W) SO	59	0	0%
	Fairfield St (W) RT	18	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St LT	126	0	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downing_Street (14)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd SO	362	2	1%
	London Rd RT	155	0	0%
Arm 2	A57(M) LT	424	12	3%
Arm 3	Downing St LT	391	26	7%
	Downing St SO	389	0	0%
Arm 4	A57(M) LT	288	1	0%
	A57(M) RT	500	22	4%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	101	3	3%
	London Rd (N) SO	465	5	1%
Arm 2	Store St LT	13	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) LT	61	1	1%
	Ring Rd (N) SO	947	10	1%
	Ring Rd (N) RT	24	0	0%
Arm 2	Old Mill St LT	341	3	1%
	Old Mill St SO	96	0	0%
	Old Mill St RT	211	14	7%
Arm 3	Ring Rd (S) LT	16	0	1%
	Ring Rd (S) SO	1380	8	1%
	Ring Rd (S) RT	130	4	3%
Arm 4	Store St LT	2	0	0%
	Store St SO	9	0	0%
	Store St RT	32	0	0%

	Turn_counts_at_node_1224- A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancellor_Lane/A635_Fairfield_Street (22)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow LT	70	0	0%
	Pin Mill Brow SO	419	1	0%
	Pin Mill Brow RT	0	0	0%
Arm 2	Ashton Old Rd LT	90	0	0%
	Ashton Old Rd SO	1019	28	3%
	Ashton Old Rd RT	169	3	2%
Arm 3	Chancellor Ln LT	322	1	0%
	Chancellor Ln SO	627	0	0%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	35	1	3%
	Fairfield St SO	528	16	3%
	Fairfield St RT	51	0	0%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow (N) SO	490	1	0%
	Pin Mill Brow (N) RT	1319	42	3%
Arm 2	Pin Mill Brow (S) LT	125	3	3%
	Pin Mill Brow (S) SO	702	1	0%
Arm 3	Ring Road SO	872	25	3%

Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)

		All Vehicles	HGV	% HGV
Arm 1	Great Ancoats St (N) SO	985	24	2%
	Great Ancoats St (N) RT	506	0	0%
Arm 2	Great Ancoats St (S) LT	75	7	10%
	Great Ancoats St (S) SO	1294	13	1%
Arm 3	Adair St LT	195	0	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	719	15	2%
A6042 (W) LT	320	17	5%
A665 Cheetham Hill Rd (N) SO	498	8	2%
A665 Cheetham Hill Rd (N) RT	537	25	5%
Ring Road (S) LT	1062	28	3%
Ring Road (S) SO)	208	0	0%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	84	0	0%
Shude Hill LT	125	0	0%
Swan St RT	163	5	3%
Swan St LT	179	6	3%
Swan ST SO	1220	29	2%
Rochdale Rd (N) SO	473	2	0%
Rochdale Rd (N) RT	260	2	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	30	3	9%
Ring Road SO	1050	20	2%
Ring Road RT	207	0	0%
Oldham Road LT	1110	13	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	70	2	2%
Great Ancoats St (E) LT	136	1	1%
Great Ancoats St (E) SO	1149	21	2%
Great Ancoats St (W) SO	965	11	1%
Great Ancoats St (W) RT	301	3	1%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV
Great Ancoats St (E) RT	4	0	0%
Great Ancoats St (E) SO	1315	23	2%
Great Ancoats St (W) LT	118	0	0%
Great Ancoats St (W) SO	987	11	1%
Central Retail Park LT	0	0	0%
Central Retail Park RT	3	0	0%
Laystall St SO	0	0	0%
Laystall St RT	116	1	1%
Laystall St LT	9	0	2%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	282	0	0%
Ring Road (E) SO	1308	23	2%
Ring Road (W) SO	1043	11	1%

Ring Road (W) RT	54	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	50	0	0%
Arm 1 Ring Road (W) SO	1274	14	1%
Pollard St LT	211	10	5%
Arm 2 Pollard St RT	106	0	0%
Ring Road (E) RT	74	0	0%
Arm 3 Ring Road (E) SO	1411	12	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	437	13	3%
Hyde Rd (E) LT	129	3	2%
Hyde Rd (E) SO	680	27	4%
Hyde Rd (E) RT	323	1	0%
A665 (N) LT	56	0	0%
A665 (N) SO	261	1	0%
A665 (S) RT	48	0	0%
A665 (S) SO	562	0	0%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	1	0	0%
Higher Ardwick to A6	88	0	0%
Higher Ardwick to Brunswick St	108	1	1%
Higher Ardwick to Ardwick Green South	31	0	1%
Higher Ardwick u-turn	1	0	0%
Hyde Rd to A6	10	0	0%
Hyde Rd to Brunswick St	231	4	2%
Hyde Rd to Ardwick Green S	388	21	5%
Hyde Rd to Higher Ardwick	10	0	0%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	70	5	7%
A6 to Ardwick Green S	418	6	1%
A6 to Higher Ardwick	65	0	0%
A6 to Hyde Rd	4	0	0%
A6 u-turn	3	0	0%
Brunswick St to Ardwick Green S	70	1	1%
Brunswick St to Higher Ardwick	230	3	1%
Brunswick St to Hyde Rd	63	1	1%
Brunswick St to A6	81	0	0%
Brunswick St u-turn	6	0	0%
Ardwick Green S to Higher Ardwick	70	6	8%
Ardwick Green S to Hyde Rd	373	13	3%
Ardwick Green S to A6	425	13	3%
Ardwick Green S to Brunswick St	132	2	2%
Ardwick Green S u-turn	5	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	19	0	0%
Portland St SO	97	1	1%
Portland ST RT	17	0	0%
Newton St LT	327	6	2%

Turn counts at node 166z - A6 Piccadilly / Ducie Street

	All Vehicles	HGV	% HGV
Auburn St SO	238	0	0%
Auburn St RT	67	2	4%
Auburn St LT	176	4	2%
Ducie St LT	49	1	1%
Piccadilly SO	449	6	1%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	137	1	1%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV
Fairfield St (W) SO	333	15	5%
Fairfield St (W) LT	297	7	2%
Fairfield St (E) SO	620	4	1%
Fairfield St (E) RT	9	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	310	10	3%
New Bridge St (E) SO	1059	39	4%
New Bridge St (E) RT	125	2	2%
A56 Great Ducie St (N) LT	196	0	0%
A56 Great Ducie St (N) SO	263	0	0%
A56 Great Ducie St (N) SO	342	25	7%
A56 Great Ducie St (S) RT	79	2	2%
A56 Great Ducie St (S) LT	0	0	0%
A56 Great Ducie St (S) SO	23	0	0%
Trinity Way SO	833	34	4%
Trinity Way RT	62	0	0%
Trinity Way LT	203	19	9%

Turn counts at node 428 - Chapel St / Victoria Bridge St			
	All Vehicles	HGV	% HGV
Victoria Bridge St RT	189	2	1%
Victoria Bridge St LT	3	1	20%
Chapel St (E) LT	436	8	2%
Chapel St (E) LT	83	0	0%
Chapel St (W) SO	92	4	4%
Chapel St (W) RT	58	0	0%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	172	3	2%
Deansgate (S) LT	144	3	2%
Blackfriars St LT	40	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	0	0	0%
St Mary's Gate LT	13	0	0%
St Mary's Gate SO	1	0	0%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	418	8	2%
Deansgate (N) RT	19	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	260	7	3%

Deansgate (S) RT	0	0	0%
Deansgate (S) LT	152	4	2%
Deansgate (N) LT	124	2	2%
Deansgate (N) SO	341	6	2%
Deansgate (N) RT	13	0	0%
Bridge St LT	37	0	0%
Bridge St SO	118	2	2%
John Dalton St LT	70	1	1%
John Dalton St SO	71	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	259	11	4%
Deansgate (S) RT	48	0	0%
Deansgate (S) LT	136	4	3%
Peter St RT	81	0	0%
Peter St LT	54	0	0%
Peter St SO	71	0	0%
Deansgate (N) LT	24	0	0%
Deansgate (N) SO	355	6	2%
Deansgate (N) RT	43	0	0%
Quay St LT	77	0	0%
Quay St SO	179	3	2%
Quay St RT	105	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	383	14	4%
Deansgate (S) RT	296	0	0%
Deansgate (N) LT	166	0	0%
Deansgate (N) SO	412	8	2%
Great Bridgewater St RT	27	0	1%
Great Bridgewater St LT	125	0	0%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	480	14	3%
Deansgate (S) LT	248	0	0%
Deansgate (N) SO	467	6	1%
Deansgate (N) RT	71	2	2%
Liverpool St RT	116	1	1%
Liverpool St LT	199	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	527	5	1%
Deansgate (S) RT	311	5	2%
Whitworth St West RT	197	9	5%
Whitworth St West LT	250	2	1%
Deansgate (N) LT	158	3	2%
Deansgate (N) SO	420	4	1%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV
Oxford St (S) SO	151	0	0%
Oxford St (S) LT	86	0	0%
Oxford St (N) SO	255	5	2%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St

	All Vehicles	HGV	% HGV
Albion St SO	535	6	1%
Albion St RT	337	0	0%
Albion St LT	127	5	4%
Great Bridgewater St (E) RT	6	0	0%
Great Bridgewater St (E) LT	48	0	0%
Great Bridgewater St (E) SO	49	0	0%
Lower Mosley St LT	20	0	0%
Lower Mosley St SO	147	0	0%
Lower Mosley St RT	34	0	0%
Great Bridgewater St (W) LT	20	0	0%
Great Bridgewater St (W) SO	69	0	0%
Great Bridgewater St (W) RT	28	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	45	0	0%
Albion St (N) SO	116	0	0%
Albion St (N) RT	63	0	0%
Whitworth St West (E) LT	108	0	0%
Whitworth St West (E) SO	211	5	2%
Whitworth St West (E) RT	281	8	3%
Albion St (S) LT	162	5	3%
Albion St (S) SO	560	3	0%
Albion St (S) RT	178	12	7%
Whitworth St West (W) LT	142	2	1%
Whitworth St West (W) SO	166	0	0%
Whitworth St West (W) RT	151	6	4%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	71	0	0%
Portland St (N) SO	232	0	0%
Portland St (N) RT	0	0	0%
Princess St (W) LT	16	0	0%
Princess St (W) SO	27	0	0%
Princess St (W) RT	2	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	347	3	1%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	157	5	3%
Oxford St (N) SO	71	1	1%
Oxford St (N) RT	33	0	0%
Portland St LT	29	0	0%
Portland St SO	96	0	0%
Portland St RT	221	0	0%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	16	0	0%
Oxford St (S) RT	113	0	0%
Chepstow St LT	0	0	0%
Chepstow St SO	91	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	64	1	1%

Oxford St (N) SO	35	0	0%
Whitworth St (E) LT	71	0	0%
Whitworth St (E) SO	393	10	2%
Oxford St (S) LT	167	0	0%
Oxford St (S) SO	123	0	0%
Whitworth St (W) LT	12	0	0%
Whitworth St (W) SO	543	18	3%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	25	0	0%
Princess St (N) SO	16	0	0%
Princess St (N) RT	76	0	0%
Whitworth St (E) LT	125	3	2%
Whitworth St (E) SO	264	0	0%
Whitworth St (E) RT	32	0	0%
Princess St (S) RT	168	4	2%
Princess St (S) LT	177	9	5%
Princess St (S) SO	182	2	1%
Whitworth St (W) LT	274	0	0%
Whitworth St (W) SO	256	16	6%
Whitworth St (W) RT	14	1	10%

Turn counts at node 87 - Whitworth St / Sackville St			
	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	96	0	0%
Whitworth St (E) SO	381	3	1%
Whitworth St (E) RT	155	0	0%
Sackville St (S) LT	47	0	0%
Sackville St (S) SO	147	0	0%
Sackville St (S) RT	227	1	1%
Whitworth St (W) LT	42	0	0%
Whitworth St (W) SO	395	20	5%
Whitworth St (W) RT	1	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	180	0	0%
Trinity Way (N) SO	1030	62	6%
Trinity Way (N) RT	33	0	0%
Blackfriars Rd (E) LT	26	0	0%
Blackfriars Rd (E) SO	8	0	0%
Blackfriars Rd (E) RT	20	0	2%
Trinity Way (S) LT	193	12	6%
Trinity Way (S) SO	1007	52	5%
Trinity Way (S) RT	41	5	12%
Blackfriars Rd (W) LT	165	2	1%
Blackfriars Rd (W) SO	269	0	0%
Blackfriars Rd (W) RT	336	28	8%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	50	0	0%
Trinity Way (N) SO	950	59	6%
Trinity Way (N) RT	322	31	10%
Chapel St (E) LT	105	3	3%

Chapel St (E) SO	264	0	0%
Chapel St (E) RT	14	0	0%
Trinity Way (S) SO	975	53	5%
Trinity Way (S) RT	195	18	9%
Trinity Way (S) LT	160	0	0%
Chapel St (W) LT	253	16	6%
Chapel St (W) SO	307	0	0%
Chapel St (W) RT	416	5	1%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	782	61	8%
Trinity Way (N) SO	619	3	0%
New Bailey access SO	0	0	0%
New Bailey access RT	9	0	0%
New Bailey access LT	0	0	0%
Irwell St RT	3	0	0%
Irwell St LT	31	0	0%
Irwell St SO	385	0	0%
Trinity Way (S) SO	9	0	0%
Trinity Way (S) RT	165	7	4%
Trinity Way (S) LT	779	0	0%

Turn_counts_at_node_1663,1150z,1028-A6042_Trinity_Way/A57_Regent_Road/A57_Dawson_Street			
	All Vehicles	HGV	% HGV
Trinity St (N) LT	383	0	0%
Trinity St (N) SO	20	0	0%
Trinity St (N) RT	379	0	0%
Dawson St (E) LT	8	0	0%
Dawson St (E) SO	1401	0	0%
Dawson St (E) RT	436	0	0%
Water St (S) LT	25	0	0%
Water St (S) SO	38	0	0%
Water St (S) RT	20	0	0%
Regent Rd (W) LT	364	24	6%
Regent Rd (W) SO	1702	44	3%

Turn counts (composite) at roundabout node 1000, 1002, 1003, 1005, 1162 - A56 Chester / A57 (M) / A5067 Chorlton Road			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (N)	152	7	4%
A57(M) EB off slip to A57(M) EB on slip	61	3	5%
A57(M) EB off slip to Chorlton Rd	149	8	5%
A57(M) EB off slip to Chester Rd (S)	86	14	16%
A57(M) EB off slip to A57(M) WB on slip	0	0	0%
Chester Rd (N) to A57(M) EB on slip	55	0	0%
Chester Rd (N) to Chorlton Rd	60	2	3%
Chester Rd (N) to Chester Road (S) via rbt	0	0	0%
Chester Rd (N) to A57(M) WB on slip	84	0	0%
Chester Rd (N) to Chester Road (N)	0	0	0%
A57(M) WB off slip to Chorlton Road	150	2	1%
A57(M) WB off slip to Chester Rd (S)	626	21	3%
A57(M) WB off slip to A57(M) WB on slip	187	0	0%
A57(M) WB off slip to Chester Rd (N)	190	0	0%
A57(M) WB off slip to A57(M) EB on slip	66	0	1%
Chorlton Rd to Chester Rd (S)	13	1	8%
Chorlton Rd to A57(M) WB on slip	54	10	19%

Chorlton Rd to Chester Rd (N)	73	2	3%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on slip	128	19	15%
Chester Rd (S) to Chester Rd (N) via rbt	94	2	2%
Chester Rd (S) to A57(M) EB on slip	356	20	6%
Chester Rd (S) to Chorlton Rd	22	2	7%
Chester Rd (S) to Chester Rd (S)	22	2	7%

Chester Road (N) SO	402	1	0%
Chester Road (S) SO	736	4	1%

Turn counts (composite) at roundabout node 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174 - A57 M / Princess Road / Medlock Street			
	All Vehicles	HGV	% HGV
Medlock St to A5103 link EB	7	0	0%
Medlock St to Princess Rd	286	2	1%
Medlock St to A57(M) WB on slip	27	0	0%
Medlock St to Medlock St	0	0	0%
A5103 link WB to Princess Rd	714	33	5%
A5103 link WB to A57(M) WB on slip	173	0	0%
A5103 link WB to Medlock St	105	2	2%
A5103 link WB to A5103 link EB	2	0	0%
Princess Rd to A57(M) WB on slip	351	4	1%
Princess Rd to Medlock St	1029	21	2%
Princess Rd to A5103 link EB	815	26	3%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	66	2	2%
A57(M) EB off slip to A5103 link EB	215	0	0%
A57(M) EB off slip to Princess Rd	341	0	0%
A57(M) EB off slip to A57(M) WB on slip	24	0	0%

A57 (M) WB	1932	46	2%
A57 (M) EB	2214	47	2%

Turn counts (composite) at roundabout node 563, 564, 567, 568, 570, 571, 575, 576 - Cambridge St Junction / A5103/ Higher Cambridge St / A57(M)			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	42	0	0%
Cambridge St to Higher Cambridge St	23	0	0%
Cambridge St to A5103 link WB	151	0	0%
Cambridge St to Cambridge St	0	0	0%
A57(M) WB off slip to Higher Cambridge St	388	8	2%
A57(M) WB off slip to A5103 link WB	644	34	5%
A57(M) WB off slip to Cambridge St	160	1	1%
A57(M) WB off slip to A57(M) EB on slip	85	3	4%
Higher Cambridge St to A5103 link WB	197	2	1%
Higher Cambridge St to Cambridge St	353	4	1%
Higher Cambridge St to A57(M) EB on slip	544	9	2%
Higher Cambridge St to Higher Cambridge St	0	0	0%
A5103 link EB to Cambridge St	337	6	2%
A5103 link EB to A57(M) EB on slip	517	20	4%
A5103 link EB to Higher Cambridge St	171	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126, 139, 100 - A57(M) / A34 / Brook Street			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	5	0	0%

A34 (N) SO	227	2.8	0%
Brook St to A34 (S)	377	4	0%
A34 (N) within junction to A57(M) WB	107	0	0%
A34(S) to A57(M) Westbound	847	12.2	0%
A34 (S) to SO	776	20.4	0%
A57(M) EB to Sackville Street	380	4	0%
A57(M) EB to Brook Street	455	5.4	0%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West			
	All Vehicles	HGV	% HGV
Oxford Road (N) LT	0	0	0%
Oxford Road (N) SO	57	0	0%
Oxford Road (N) RT	18	0	0%
Booth St East LT	0	0	0%
Booth St East SO	365	6	0%
Booth St East RT	0	0	0%
Oxford Road (S) LT	22	0	0%
Oxford Road (S) SO	95	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	23	0	0%
Booth St West SO	455	1.2	0%
Booth St West RT	12	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	283	0	0%
Upper Brook St (N) SO	771	18.6	0%
A5184 LT	14	1.2	0%
A5184 RT	448	4.8	0%
Upper Brook St (S) SO	1736	46.2	0%

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	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	50	0	0%
	London Rd (N) SO	277	3	1%
	London Rd (N) RT	129	3	2%
Arm 2	Fairfield St (E) LT	62	0	0%
	Fairfield St (E) SO	323	1	0%
	Fairfield St (E) RT	82	0	0%
Arm 3	London Rd (S) LT	275	0	0%
	London Rd (S) SO	470	1	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	14	1	7%
	Fairfield St (W) SO	274	15	5%
	Fairfield St (W) RT	19	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	% HGV
Arm 1	Station carpark LT	61	0	0%
	Station carpark RT	34	0	0%
Arm 2	Fairfield St (E) SO	438	1	0%
	Fairfield St (E) RT	101	0	0%
Arm 3	Fairfield St (W) LT	44	0	0%
	Fairfield St (W) SO	279	15	5%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St (N) LT	15	0	0%
	Travis St (N) SO	138	0	0%
	Travis St (N) RT	217	0	0%
Arm 2	Fairfield St (E) LT	70	0	0%
	Fairfield St (E) SO	214	1	1%
	Fairfield St (E) RT	54	1	1%
Arm 3	Travis St (S) LT	115	0	0%
	Travis St (S) SO	27	0	0%
	Travis St (S) RT	19	0	0%
Arm 4	Fairfield St (W) LT	191	4	2%
	Fairfield St (W) SO	40	0	0%
	Fairfield St (W) RT	107	11	10%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) SO	1385	47	3%
	Ring Rd (N) RT	131	1	1%
Arm 2	Fairfield St (E) LT	1246	28	2%
	Fairfield St (E) SO	127	1	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	89	0	0%
	Ring Rd (S) SO	872	22	2%
	Ring Rd (S) RT	558	18	3%
Arm 4	Fairfield St (W) LT	17	0	0%
	Fairfield St (W) SO	37	0	0%
	Fairfield St (W) RT	21	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St LT	107	0	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downing_Street (14)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd LT			
	London Rd SO	338	3	1%
	London Rd RT	140	0	0%
Arm 2	A57(M) LT	414	13	3%
Arm 3	Downing St LT	416	23	6%
	Downing St SO	380	0	0%
	Downing St RT			
Arm 4	A57(M) LT	294	1	0%
	A57(M) SO			
	A57(M) RT	561	24	4%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	113	4	4%
	London Rd (N) SO	458	6	1%
Arm 2	Store St LT	4	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) LT	56	1	2%
	Ring Rd (N) SO	931	9	1%
	Ring Rd (N) RT	16	0	0%
Arm 2	Old Mill St LT	373	5	1%
	Old Mill St SO	83	0	0%
	Old Mill St RT	184	13	7%
Arm 3	Ring Rd (S) LT	8	0	3%
	Ring Rd (S) SO	1375	6	0%
	Ring Rd (S) RT	133	4	3%
Arm 4	Store St LT	1	0	0%
	Store St SO	6	0	0%
	Store St RT	41	0	0%

	Turn_counts_at_node_1224-A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancellor_Lane/A635_Fairfield_Street (22)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow LT	69	0	0%
	Pin Mill Brow SO	429	1	0%
	Pin Mill Brow RT	0	0	0%
Arm 2	Ashton Old Rd LT	90	0	0%
	Ashton Old Rd SO	1054	27	3%
	Ashton Old Rd RT	161	5	3%
Arm 3	Chancellor Ln LT	326	2	1%
	Chancellor Ln SO	621	1	0%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	37	1	3%
	Fairfield St SO	533	17	3%

	Fairfield St RT	22	0	2%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow (N) SO	501	1	0%
	Pin Mill Brow (N) RT	1390	43	3%
Arm 2	Pin Mill Brow (S) LT	122	5	4%
	Pin Mill Brow (S) SO	694	2	0%
Arm 3	Ring Road SO	887	22	2%

	Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)			
		All Vehicles	HGV	% HGV
Arm 1	Great Ancoats St (N) SO	1024	22	2%
	Great Ancoats St (N) RT	495	0	0%
Arm 2	Great Ancoats St (S) LT	73	6	8%
	Great Ancoats St (S) SO	1300	10	1%
Arm 3	Adair St LT	194	0	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	705	15	2%
A6042 (W) LT	382	15	4%
A665 Cheetham Hill Rd (N) SO	497	9	2%
A665 Cheetham Hill Rd (N) RT	533	24	4%
Ring Road (S) LT	1023	26	3%
Ring Road (S) SO)	211	0	0%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	84	0	0%
Shude Hill LT	121	0	0%
Swan St RT	162	4	2%
Swan St LT	161	4	2%
Swan ST SO	1183	27	2%
Rochdale Rd (N) SO	464	2	0%
Rochdale Rd (N) RT	257	2	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	31	3	9%
Ring Road SO	978	16	2%
Ring Road RT	197	0	0%
Oldham Road LT	1105	13	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	66	1	2%
Great Ancoats St (E) LT	152	2	1%
Great Ancoats St (E) SO	1076	18	2%
Great Ancoats St (W) SO	1017	10	1%
Great Ancoats St (W) RT	272	3	1%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV

Great Ancoats St (E) RT	5	0	0%
Great Ancoats St (E) SO	1277	20	2%
Great Ancoats St (W) LT	112	0	0%
Great Ancoats St (W) SO	891	10	1%
Central Retail Park LT	0	0	0%
Central Retail Park RT	3	0	0%
Laystall St SO	0	0	0%
Laystall St RT	174	0	0%
Laystall St LT	8	0	5%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	278	0	0%
Ring Road (E) SO	1273	20	2%
Ring Road (W) SO	1011	10	1%
Ring Road (W) RT	48	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	46	0	0%
Ring Road (W) SO	1296	13	1%
Pollard St LT	218	9	4%
Pollard St RT	101	0	0%
Ring Road (E) RT	74	0	0%
Ring Road (E) SO	1413	10	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	431	13	3%
Hyde Rd (E) LT	118	4	3%
Hyde Rd (E) SO	736	26	4%
Hyde Rd (E) RT	313	1	0%
A665 (N) LT	38	0	1%
A665 (N) SO	282	0	0%
A665 (S) RT	50	0	0%
A665 (S) SO	572	1	0%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	0	0	0%
Higher Ardwick to A6	71	0	1%
Higher Ardwick to Brunswick St	120	1	1%
Higher Ardwick to Ardwick Green South	26	0	0%
Higher Ardwick u-turn	3	0	0%
Hyde Rd to A6	3	0	12%
Hyde Rd to Brunswick St	225	3	1%
Hyde Rd to Ardwick Green S	507	23	5%
Hyde Rd to Higher Ardwick	16	0	0%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	55	4	8%
A6 to Ardwick Green S	473	6	1%
A6 to Higher Ardwick	88	0	0%
A6 to Hyde Rd	1	0	0%
A6 u-turn	2	0	0%

Brunswick St to Ardwick Green S	62	1	1%
Brunswick St to Higher Ardwick	216	3	1%
Brunswick St to Hyde Rd	42	1	1%
Brunswick St to A6	74	0	0%
Brunswick St u-turn	2	0	0%
Ardwick Green S to Higher Ardwick	80	6	8%
Ardwick Green S to Hyde Rd	397	13	3%
Ardwick Green S to A6	486	14	3%
Ardwick Green S to Brunswick St	152	1	1%
Ardwick Green S u-turn	5	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	19	0	0%
Portland St SO	99	1	1%
Portland ST RT	19	0	0%
Newton St LT	324	7	2%

Turn counts at node 166z - A6 Piccadilly / Ducie Street			
	All Vehicles	HGV	% HGV
Auburn St SO	207	0	0%
Auburn St RT	85	3	4%
Auburn St LT	174	6	3%
Ducie St LT	41	0	0%
Piccadilly SO	455	7	1%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	137	1	1%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV
Fairfield St (W) SO	307	16	5%
Fairfield St (W) LT	295	9	3%
Fairfield St (E) SO	716	4	1%
Fairfield St (E) RT	9	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	296	9	3%
New Bridge St (E) SO	1030	36	3%
New Bridge St (E) RT	124	3	2%
A56 Great Ducie St (N) LT	192	0	0%
A56 Great Ducie St (N) SO	267	0	0%
A56 Great Ducie St (N) SO	339	24	7%
A56 Great Ducie St (S) RT	77	1	1%
A56 Great Ducie St (S) LT	0	0	0%
A56 Great Ducie St (S) SO	19	0	0%
Trinity Way SO	882	34	4%
Trinity Way RT	71	1	1%
Trinity Way LT	201	18	9%

Turn counts at node 428 - Chapel St / Victoria Bridge St			
	All Vehicles	HGV	% HGV
Victoria Bridge St RT	163	1	0%

Victoria Bridge St LT	3	0	14%
Chapel St (E) LT	429	8	2%
Chapel St (E) LT	74	0	0%
Chapel St (W) SO	101	3	3%
Chapel St (W) RT	96	0	0%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	165	1	1%
Deansgate (S) LT	330	3	1%
Blackfriars St LT	0	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	2	0	0%
St Mary's Gate LT	10	0	0%
St Mary's Gate SO	4	0	0%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	431	8	2%
Deansgate (N) RT	21	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	395	6	2%
Deansgate (S) RT	0	0	0%
Deansgate (S) LT	70	2	3%
Deansgate (N) LT	127	1	1%
Deansgate (N) SO	348	6	2%
Deansgate (N) RT	13	0	0%
Bridge St LT	88	0	0%
Bridge St SO	129	2	2%
John Dalton St LT	108	1	1%
John Dalton St SO	30	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	285	8	3%
Deansgate (S) RT	54	0	0%
Deansgate (S) LT	118	4	3%
Peter St RT	84	1	1%
Peter St LT	78	0	0%
Peter St SO	82	0	0%
Deansgate (N) LT	21	0	0%
Deansgate (N) SO	407	7	2%
Deansgate (N) RT	61	0	0%
Quay St LT	119	0	0%
Quay St SO	186	3	2%
Quay St RT	113	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	388	10	2%
Deansgate (S) RT	236	0	0%
Deansgate (N) LT	190	0	0%
Deansgate (N) SO	523	8	1%
Great Bridgewater St RT	19	1	3%

Great Bridgewater St LT	127	0	0%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	453	9	2%
Deansgate (S) LT	202	0	0%
Deansgate (N) SO	566	6	1%
Deansgate (N) RT	84	2	2%
Liverpool St RT	139	0	0%
Liverpool St LT	171	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	479	1	0%
Deansgate (S) RT	297	7	2%
Whitworth St West RT	175	8	5%
Whitworth St West LT	263	2	1%
Deansgate (N) LT	162	2	1%
Deansgate (N) SO	540	4	1%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV
Oxford St (S) SO	166	0	0%
Oxford St (S) LT	88	0	0%
Oxford St (N) SO	272	6	2%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Albion St SO	553	6	1%
Albion St RT	341	0	0%
Albion St LT	116	5	5%
Great Bridgewater St (E) RT	4	0	0%
Great Bridgewater St (E) LT	47	0	0%
Great Bridgewater St (E) SO	60	0	0%
Lower Mosley St LT	16	0	0%
Lower Mosley St SO	146	0	0%
Lower Mosley St RT	37	0	0%
Great Bridgewater St (W) LT	11	0	0%
Great Bridgewater St (W) SO	56	0	0%
Great Bridgewater St (W) RT	20	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	43	0	0%
Albion St (N) SO	112	0	0%
Albion St (N) RT	59	0	0%
Whitworth St West (E) LT	108	0	0%
Whitworth St West (E) SO	215	5	2%
Whitworth St West (E) RT	268	10	4%
Albion St (S) LT	156	6	4%
Albion St (S) SO	570	2	0%
Albion St (S) RT	162	13	8%
Whitworth St West (W) LT	143	2	1%
Whitworth St West (W) SO	169	0	0%
Whitworth St West (W) RT	139	6	5%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	86	0	0%
Portland St (N) SO	256	0	0%
Portland St (N) RT	0	0	0%
Princess St (W) LT	16	0	0%
Princess St (W) SO	41	0	0%
Princess St (W) RT	4	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	358	4	1%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	171	5	3%
Oxford St (N) SO	77	1	2%
Oxford St (N) RT	35	0	0%
Portland St LT	36	0	0%
Portland St SO	101	0	0%
Portland St RT	238	0	0%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	16	0	0%
Oxford St (S) RT	116	0	0%
Chepstow St LT	0	0	0%
Chepstow St SO	86	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	71	1	2%
Oxford St (N) SO	42	0	0%
Whitworth St (E) LT	83	0	0%
Whitworth St (E) SO	436	10	2%
Oxford St (S) LT	140	0	0%
Oxford St (S) SO	123	0	0%
Whitworth St (W) LT	12	0	0%
Whitworth St (W) SO	512	19	4%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	27	0	0%
Princess St (N) SO	27	0	0%
Princess St (N) RT	90	0	0%
Whitworth St (E) LT	124	3	3%
Whitworth St (E) SO	309	0	0%
Whitworth St (E) RT	31	0	0%
Princess St (S) RT	122	5	4%
Princess St (S) LT	173	10	6%
Princess St (S) SO	140	3	2%
Whitworth St (W) LT	269	0	0%
Whitworth St (W) SO	245	17	7%
Whitworth St (W) RT	13	2	12%

Turn counts at node 87 - Whitworth St / Sackville St

	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	99	1	1%
Whitworth St (E) SO	417	3	1%
Whitworth St (E) RT	199	0	0%
Sackville St (S) LT	48	0	0%
Sackville St (S) SO	218	1	0%
Sackville St (S) RT	218	2	1%
Whitworth St (W) LT	10	0	0%
Whitworth St (W) SO	374	22	6%
Whitworth St (W) RT	1	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	56	1	1%
Trinity Way (N) SO	1027	58	6%
Trinity Way (N) RT	24	0	1%
Blackfriars Rd (E) LT	72	0	0%
Blackfriars Rd (E) SO	8	0	0%
Blackfriars Rd (E) RT	81	0	0%
Trinity Way (S) LT	170	12	7%
Trinity Way (S) SO	1001	49	5%
Trinity Way (S) RT	47	5	10%
Blackfriars Rd (W) LT	149	3	2%
Blackfriars Rd (W) SO	222	0	0%
Blackfriars Rd (W) RT	336	25	7%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	54	0	0%
Trinity Way (N) SO	964	55	6%
Trinity Way (N) RT	327	27	8%
Chapel St (E) LT	92	1	1%
Chapel St (E) SO	217	1	1%
Chapel St (E) RT	0	0	0%
Trinity Way (S) SO	979	53	5%
Trinity Way (S) RT	227	20	9%
Trinity Way (S) LT	230	0	0%
Chapel St (W) LT	239	14	6%
Chapel St (W) SO	282	0	0%
Chapel St (W) RT	454	7	2%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	781	59	8%
Trinity Way (N) SO	633	2	0%
New Bailey access SO	0	0	0%
New Bailey access RT	11	0	0%
New Bailey access LT	0	0	0%
Irwell St RT	0	0	0%
Irwell St LT	34	0	0%
Irwell St SO	373	0	0%

Trinity Way (S) SO	10	0	0%
Trinity Way (S) RT	176	5	3%
Trinity Way (S) LT	953	0	0%

Turn_counts_at_node_1663,1150z,1028-A6042_Trinity_Way/A57_Regent_Road/A57_Dawson_Street			
	All Vehicles	HGV	% HGV
Trinity St (N) LT	736	13	2%
Trinity St (N) SO	19	0	0%
Trinity St (N) RT	394	33	8%
Dawson St (E) LT	10	0	0%
Dawson St (E) SO	1823	17	1%
Dawson St (E) RT	782	48	6%
Water St (S) LT	33	0	0%
Water St (S) SO	12	0	0%
Water St (S) RT	22	0	0%
Regent Rd (W) LT	299	23	8%
Regent Rd (W) SO	1447	45	3%

Turn counts (composite) at roundabout node 1000, 1002, 1003, 1005, 1162 - A56 Chester / A57 (M) / A5067 Chorlton Road			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (N)	145	8	6%
A57(M) EB off slip to A57(M) EB on slip	52	2	3%
A57(M) EB off slip to Chorlton Rd	140	8	6%
A57(M) EB off slip to Chester Rd (S)	133	14	10%
A57(M) EB off slip to A57(M) WB on slip	0	0	0%
Chester Rd (N) to A57(M) EB on slip	52	0	0%
Chester Rd (N) to Chorlton Rd	48	0	1%
Chester Rd (N) to Chester Road (S) via rl	0	0	0%
Chester Rd (N) to A57(M) WB on slip	311	0	0%
Chester Rd (N) to Chester Road (N)	0	0	0%
A57(M) WB off slip to Chorlton Road	151	1	1%
A57(M) WB off slip to Chester Rd (S)	651	20	3%
A57(M) WB off slip to A57(M) WB on sli	66	0	0%
A57(M) WB off slip to Chester Rd (N)	136	0	0%
A57(M) WB off slip to A57(M) EB on slip	48	0	0%
Chorlton Rd to Chester Rd (S)	13	1	6%
Chorlton Rd to A57(M) WB on slip	60	11	18%
Chorlton Rd to Chester Rd (N)	43	1	2%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on slip	152	21	14%
Chester Rd (S) to Chester Rd (N) via rbt	94	0	0%
Chester Rd (S) to A57(M) EB on slip	388	20	5%
Chester Rd (S) to Chorlton Rd	22	2	9%
Chester Rd (S) to Chester Rd (S)	22	2	9%

Chester Road (N) SO	495	1	0%
Chester Road (S) SO	763	3	0%

Turn counts (composite) at roundabout node 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174 - A57 M / Princess Road / Medlock Street			
	All Vehicles	HGV	% HGV

Medlock St to A5103 link EB	13	0	0%
Medlock St to Princess Rd	284	2	1%
Medlock St to A57(M) WB on slip	114	0	0%
Medlock St to Medlock St	0	0	0%
A5103 link WB to Princess Rd	738	36	5%
A5103 link WB to A57(M) WB on slip	197	1	1%
A5103 link WB to Medlock St	111	2	1%
A5103 link WB to A5103 link EB	0	0	0%
Princess Rd to A57(M) WB on slip	346	6	2%
Princess Rd to Medlock St	1037	22	2%
Princess Rd to A5103 link EB	869	24	3%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	93	1	1%
A57(M) EB off slip to A5103 link EB	207	0	0%
A57(M) EB off slip to Princess Rd	342	0	0%
A57(M) EB off slip to A57(M) WB on slip	26	0	0%

A57 (M) WB	1873	46	2%
A57 (M) EB	2388	45	2%

Turn counts (composite) at roundabout node 563, 564, 567, 568, 570, 571, 575, 576 - Cambridge St Junction / A5103/ Higher Cambridge St / A57(M)			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	33	0	0%
Cambridge St to Higher Cambridge St	26	0	0%
Cambridge St to A5103 link WB	188	0	0%
Cambridge St to Cambridge St	0	0	0%
A57(M) WB off slip to Higher Cambridge	392	7	2%
A57(M) WB off slip to A5103 link WB	650	35	5%
A57(M) WB off slip to Cambridge St	150	3	2%
A57(M) WB off slip to A57(M) EB on slip	71	2	3%
Higher Cambridge St to A5103 link WB	207	3	1%
Higher Cambridge St to Cambridge St	344	4	1%
Higher Cambridge St to A57(M) EB on sl	634	11	2%
Higher Cambridge St to Higher Cambrid	0	0	0%
A5103 link EB to Cambridge St	337	5	1%
A5103 link EB to A57(M) EB on slip	580	19	3%
A5103 link EB to Higher Cambridge St	161	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126, 139, 100 - A57(M) / A34 / Brook Street			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	1	0	0%
A34 (N) SO	226	3.4	0%
Brook St to A34 (S)	354	3.4	0%
A34 (N) within junction to A57(M) WB	107	0	0%
A34(S) to A57(M) Westbound	832	9.4	0%
A34 (S) to SO	743	23.8	0%
A57(M) EB to Sackville Street	428	5.2	0%
A57(M) EB to Brook Street	449	5.6	0%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West			
	All Vehicles	HGV	% HGV
Oxford Road (N) LT	0	0	0%

Oxford Road (N) SO	64	0	0%
Oxford Road (N) RT	20	0	0%
Booth St East LT	0	0	0%
Booth St East SO	356	7.2	0%
Booth St East RT	0	0	0%
Oxford Road (S) LT	15	0	0%
Oxford Road (S) SO	92	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	23	0	0%
Booth St West SO	448	0.8	0%
Booth St West RT	13	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	253	0	0%
Upper Brook St (N) SO	784	16.8	0%
A5184 LT	16	2.6	0%
A5184 RT	407	6.4	0%
Upper Brook St (S) SO	1642	45.4	0%

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	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	%HGV
Arm 1	London Rd (N) LT	17	0	0%
	London Rd (N) SO	274	1	0%
	London Rd (N) RT	174	1	0%
Arm 2	Fairfield St (E) LT	83	1	1%
	Fairfield St (E) SO	342	0	0%
	Fairfield St (E) RT	95	0	0%
Arm 3	London Rd (S) LT	152	0	0%
	London Rd (S) SO	256	0	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	3	0	0%
	Fairfield St (W) SO	471	0	0%
	Fairfield St (W) RT	152	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	%HGV
Arm 1	Station carpark LT	11	0	0%
	Station carpark RT	109	0	0%
Arm 2	Fairfield St (E) SO	429	1	0%
	Fairfield St (E) RT	16	0	0%
Arm 3	Fairfield St (W) LT	45	0	0%
	Fairfield St (W) SO	445	0	0%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	%HGV
Arm 1	Travis St (N) LT	28	0	0%
	Travis St (N) SO	102	0	0%
	Travis St (N) RT	170	0	0%
Arm 2	Fairfield St (E) LT	44	0	0%
	Fairfield St (E) SO	178	0	0%
	Fairfield St (E) RT	19	0	0%
Arm 3	Travis St (S) LT	107	1	1%
	Travis St (S) SO	63	0	0%
	Travis St (S) RT	39	1	2%
Arm 4	Fairfield St (W) LT	127	0	0%
	Fairfield St (W) SO	295	0	0%
	Fairfield St (W) RT	31	0	0%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	%HGV
Arm 1	Ring Rd (N) SO	1033	6	1%
	Ring Rd (N) RT	109	0	0%
Arm 2	Fairfield St (E) LT	508	6	1%
	Fairfield St (E) SO	94	0	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	47	0	0%
	Ring Rd (S) SO	737	6	1%

	Ring Rd (S) RT	640	12	2%
Arm 4	Fairfield St (W) LT	106	1	1%
	Fairfield St (W) SO	237	0	0%
	Fairfield St (W) RT	21	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	%HGV
Arm 1	Travis St LT	169	1	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downing_Street (14)			
		All Vehicles	HGV	%HGV
Arm 1	London Rd SO	521	0	0%
	London Rd RT	167	3	2%
Arm 2	A57(M) LT	328	3	1%
Arm 3	Downing St LT	270	6	2%
	Downing St SO	296	0	0%
Arm 4	A57(M) LT	118	0	0%
	A57(M) RT	696	17	2%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	%HGV
Arm 1	London Rd (N) LT	67	0	0%
	London Rd (N) SO	403	1	0%
Arm 2	Store St LT	51	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	%HGV
Arm 1	Ring Rd (N) LT	65	3	5%
	Ring Rd (N) SO	1328	3	0%
	Ring Rd (N) RT	26	0	0%
Arm 2	Old Mill St LT	119	2	2%
	Old Mill St SO	7	0	0%
	Old Mill St RT	66	0	0%
Arm 3	Ring Rd (S) LT	8	0	0%
	Ring Rd (S) SO	1215	6	1%
	Ring Rd (S) RT	245	4	1%
Arm 4	Store St LT	29	0	0%
	Store St SO	97	0	0%
	Store St RT	61	0	0%

	Turn_counts_at_node_1224-A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancellor_Lane/A635_Fairfield_Street (22)			
		All Vehicles	HGV	%HGV
Arm 1	Pin Mill Brow LT	197	0	0%
	Pin Mill Brow SO	365	0	0%
	Pin Mill Brow RT	0	0	0%
	Ashton Old Rd LT	127	0	0%

Arm 2	Ashton Old Rd SO	450	5	1%
	Ashton Old Rd RT	76	1	1%
Arm 3	Chancellor Ln LT	154	0	0%
	Chancellor Ln SO	604	7	1%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	48	1	1%
	Fairfield St SO	727	12	2%
	Fairfield St RT	101	0	0%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	%HGV
Arm 1	Pin Mill Brow (N) SO	563	0	0%
	Pin Mill Brow (N) RT	1034	5	1%
Arm 2	Pin Mill Brow (S) LT	124	1	1%
	Pin Mill Brow (S) SO	607	7	1%
Arm 3	Ring Road SO	835	6	1%

	Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)			
		All Vehicles	HGV	%HGV
Arm 1	Great Ancoats St (N) SO	1314	5	0%
	Great Ancoats St (N) RT	131	0	0%
Arm 2	Great Ancoats St (S) LT	7	0	0%
	Great Ancoats St (S) SO	1007	8	1%
Arm 3	Adair St LT	505	2	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	732	11	1%
A6042 (W) LT	361	4	1%
A665 Cheetham Hill Rd (N) SO	322	0	0%
A665 Cheetham Hill Rd (N) RT	500	9	2%
Ring Road (S) LT	1035	6	1%
Ring Road (S) SO)	303	3	1%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	279	1	0%
Shude Hill LT	107	2	2%
Swan St RT	165	2	1%
Swan St LT	119	0	0%
Swan ST SO	794	4	1%
Rochdale Rd (N) SO	196	0	0%
Rochdale Rd (N) RT	361	3	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	22	0	0%
Ring Road SO	786	7	1%
Ring Road RT	781	0	0%

Oldham Road LT	1198	6	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	78	0	0%
Great Ancoats St (E) LT	35	0	0%
Great Ancoats St (E) SO	1232	7	1%
Great Ancoats St (W) SO	1202	6	1%
Great Ancoats St (W) RT	113	0	0%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV
Great Ancoats St (E) RT	68	0	0%
Great Ancoats St (E) SO	1177	6	1%
Great Ancoats St (W) LT	17	0	0%
Great Ancoats St (W) SO	1171	6	1%
Central Retail Park LT	11	0	0%
Central Retail Park RT	56	0	0%
Laystall St SO	14	0	0%
Laystall St RT	256	0	0%
Laystall St LT	109	0	0%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	41	0	0%
Ring Road (E) SO	1255	7	1%
Ring Road (W) SO	1432	7	0%
Ring Road (W) RT	7	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	118	0	0%
Ring Road (W) SO	1359	5	0%
Pollard St LT	84	0	0%
Pollard St RT	61	0	0%
Ring Road (E) RT	60	0	0%
Ring Road (E) SO	1438	10	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	947	13	1%
Hyde Rd (E) LT	83	0	0%
Hyde Rd (E) SO	528	5	1%
Hyde Rd (E) RT	193	0	0%
A665 (N) LT	198	0	0%
A665 (N) SO	283	0	0%
A665 (S) RT	61	0	0%
A665 (S) SO	296	4	1%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	85	0	0%
Higher Ardwick to A6	245	0	0%
Higher Ardwick to Brunswick St	200	0	0%
Higher Ardwick to Ardwick Green South	22	0	0%
Higher Ardwick u-turn	0	0	0%
Hyde Rd to A6	17	0	0%
Hyde Rd to Brunswick St	131	0	0%
Hyde Rd to Ardwick Green S	359	5	1%
Hyde Rd to Higher Ardwick	17	0	1%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	40	1	2%
A6 to Ardwick Green S	311	1	0%
A6 to Higher Ardwick	106	0	0%
A6 to Hyde Rd	1	0	0%
A6 u-turn	2	0	0%
Brunswick St to Ardwick Green S	79	0	0%
Brunswick St to Higher Ardwick	350	0	0%
Brunswick St to Hyde Rd	244	1	0%
Brunswick St to A6	68	0	0%
Brunswick St u-turn	8	0	0%
Ardwick Green S to Higher Ardwick	33	0	0%
Ardwick Green S to Hyde Rd	617	12	2%
Ardwick Green S to A6	358	9	2%
Ardwick Green S to Brunswick St	40	0	0%
Ardwick Green S u-turn	2	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	18	0	0%
Portland St SO	99	0	0%
Portland ST RT	13	0	0%
Newton St LT	228	0	0%

Turn counts at node 166z - A6 Piccadilly / Ducie Street			
	All Vehicles	HGV	% HGV
Auburn St SO	221	1	0%
Auburn St RT	65	1	2%
Auburn St LT	151	0	0%
Ducie St LT	43	0	0%
Piccadilly SO	369	0	0%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	146	0	0%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV
Fairfield St (W) SO	636	0	0%

Fairfield St (W) LT	183	0	0%
Fairfield St (E) SO	658	1	0%
Fairfield St (E) RT	8	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	369	5	1%
New Bridge St (E) SO	952	10	1%
New Bridge St (E) RT	107	0	0%
A56 Great Ducie St (N) LT	273	0	0%
A56 Great Ducie St (N) SO	138	0	0%
A56 Great Ducie St (N) SO	341	11	3%
A56 Great Ducie St (S) RT	171	2	1%
A56 Great Ducie St (S) LT	103	0	0%
A56 Great Ducie St (S) SO	289	0	0%
Trinity Way SO	692	12	2%
Trinity Way RT	29	0	0%
Trinity Way LT	361	9	2%

Turn counts at node 428 - Chapel St / Victoria Bridge St			
	All Vehicles	HGV	% HGV
Victoria Bridge St RT	190	0	0%
Victoria Bridge St LT	24	0	0%
Chapel St (E) LT	511	5	1%
Chapel St (E) LT	43	0	0%
Chapel St (W) SO	147	1	1%
Chapel St (W) RT	114	2	2%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	206	0	0%
Deansgate (S) LT	154	1	1%
Blackfriars St LT	0	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	47	0	0%
St Mary's Gate LT	21	0	1%
St Mary's Gate SO	36	0	0%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	550	7	1%
Deansgate (N) RT	46	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	189	1	0%
Deansgate (S) RT	0	0	0%
Deansgate (S) LT	84	0	0%
Deansgate (N) LT	79	0	0%
Deansgate (N) SO	590	9	1%
Deansgate (N) RT	10	0	0%

Bridge St LT	107	1	1%
Bridge St SO	131	0	0%
John Dalton St LT	240	2	1%
John Dalton St SO	30	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	165	1	0%
Deansgate (S) RT	13	0	0%
Deansgate (S) LT	37	0	0%
Peter St RT	80	0	0%
Peter St LT	159	0	0%
Peter St SO	84	1	1%
Deansgate (N) LT	79	1	2%
Deansgate (N) SO	619	8	1%
Deansgate (N) RT	111	1	1%
Quay St LT	42	0	0%
Quay St SO	85	0	0%
Quay St RT	89	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	272	1	0%
Deansgate (S) RT	103	0	0%
Deansgate (N) LT	138	0	0%
Deansgate (N) SO	816	9	1%
Great Bridgewater St RT	33	0	0%
Great Bridgewater St LT	270	2	1%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	260	1	0%
Deansgate (S) LT	61	0	0%
Deansgate (N) SO	974	9	1%
Deansgate (N) RT	114	2	1%
Liverpool St RT	164	1	0%
Liverpool St LT	116	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	190	0	0%
Deansgate (S) RT	203	0	0%
Whitworth St West RT	132	1	1%
Whitworth St West LT	335	0	0%
Deansgate (N) LT	186	3	2%
Deansgate (N) SO	948	7	1%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV
Oxford St (S) SO	186	1	1%

Oxford St (S) LT	47	0	0%
Oxford St (N) SO	260	2	1%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Albion St SO	318	0	0%
Albion St RT	167	0	0%
Albion St LT	190	0	0%
Great Bridgewater St (E) RT	4	0	0%
Great Bridgewater St (E) LT	107	0	0%
Great Bridgewater St (E) SO	165	0	0%
Lower Mosley St LT	8	0	0%
Lower Mosley St SO	148	2	1%
Lower Mosley St RT	34	0	1%
Great Bridgewater St (W) LT	14	0	0%
Great Bridgewater St (W) SO	80	0	0%
Great Bridgewater St (W) RT	164	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	97	0	0%
Albion St (N) SO	239	2	1%
Albion St (N) RT	80	0	0%
Whitworth St West (E) LT	96	0	0%
Whitworth St West (E) SO	212	0	0%
Whitworth St West (E) RT	259	0	0%
Albion St (S) LT	194	1	0%
Albion St (S) SO	325	0	0%
Albion St (S) RT	124	0	0%
Whitworth St West (W) LT	99	2	2%
Whitworth St West (W) SO	90	0	0%
Whitworth St West (W) RT	195	1	1%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	190	0	0%
Portland St (N) SO	347	2	0%
Portland St (N) RT	0	0	0%
Princess St (W) LT	8	0	0%
Princess St (W) SO	130	0	0%
Princess St (W) RT	42	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	390	0	0%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	112	0	0%
Oxford St (N) SO	130	2	1%
Oxford St (N) RT	37	0	0%

Portland St LT	90	0	0%
Portland St SO	201	0	0%
Portland St RT	219	1	1%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	13	0	0%
Oxford St (S) RT	110	0	0%
Chepstow St LT	4	0	0%
Chepstow St SO	183	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	158	2	1%
Oxford St (N) SO	61	0	0%
Whitworth St (E) LT	84	0	0%
Whitworth St (E) SO	454	0	0%
Oxford St (S) LT	205	0	0%
Oxford St (S) SO	108	0	0%
Whitworth St (W) LT	10	0	0%
Whitworth St (W) SO	369	0	0%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	63	0	0%
Princess St (N) SO	224	0	0%
Princess St (N) RT	145	0	0%
Whitworth St (E) LT	146	1	1%
Whitworth St (E) SO	272	0	0%
Whitworth St (E) RT	7	0	0%
Princess St (S) RT	137	0	0%
Princess St (S) LT	100	0	0%
Princess St (S) SO	199	0	0%
Whitworth St (W) LT	56	0	0%
Whitworth St (W) SO	340	0	0%
Whitworth St (W) RT	95	2	2%

Turn counts at node 87 - Whitworth St / Sackville St			
	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	32	0	0%
Whitworth St (E) SO	408	1	0%
Whitworth St (E) RT	229	0	0%
Sackville St (S) LT	26	0	0%
Sackville St (S) SO	60	0	0%
Sackville St (S) RT	220	0	0%
Whitworth St (W) LT	22	0	0%
Whitworth St (W) SO	519	0	0%
Whitworth St (W) RT	1	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	7	0	0%
Trinity Way (N) SO	909	8	1%
Trinity Way (N) RT	235	10	4%
Blackfriars Rd (E) LT	196	1	0%
Blackfriars Rd (E) SO	275	0	0%
Blackfriars Rd (E) RT	51	0	0%
Trinity Way (S) LT	539	2	0%
Trinity Way (S) SO	1010	20	2%
Trinity Way (S) RT	109	0	0%
Blackfriars Rd (W) LT	16	0	0%
Blackfriars Rd (W) SO	40	0	0%
Blackfriars Rd (W) RT	41	1	3%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	18	0	0%
Trinity Way (N) SO	806	8	1%
Trinity Way (N) RT	397	3	1%
Chapel St (E) LT	104	3	3%
Chapel St (E) SO	213	0	0%
Chapel St (E) RT	13	0	0%
Trinity Way (S) SO	1164	11	1%
Trinity Way (S) RT	101	1	1%
Trinity Way (S) LT	156	0	0%
Chapel St (W) LT	492	9	2%
Chapel St (W) SO	112	0	0%
Chapel St (W) RT	217	0	0%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	974	13	1%
Trinity Way (N) SO	216	0	0%
New Bailey access SO	46	1	3%
New Bailey access RT	34	0	0%
New Bailey access LT	10	0	0%
Irwell St RT	0	0	0%
Irwell St LT	154	2	1%
Irwell St SO	355	0	0%
Trinity Way (S) SO	12	0	0%
Trinity Way (S) RT	68	0	0%
Trinity Way (S) LT	975	12	1%

Turn_counts_at_node_1663,1150z,1028- A6042_Trinity_Way/A57_Regent_Road/A57_Dawson_Street			
	All Vehicles	HGV	% HGV
Trinity St (N) LT	751	22	3%

Trinity St (N) SO	14	0	0%
Trinity St (N) RT	313	7	2%
Dawson St (E) LT	25	0	0%
Dawson St (E) SO	1584	17	1%
Dawson St (E) RT	763	4	0%
Water St (S) LT	4	0	0%
Water St (S) SO	4	0	0%
Water St (S) RT	2	0	0%
Regent Rd (W) LT	222	7	3%
Regent Rd (W) SO	1546	11	1%

Turn counts (composite) at roundabout node 1000, 1002, 1003, 1005, 1162 - A56 Chester / A57 (M) / A5067 Chorlton Road			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (N)	41	0	0%
A57(M) EB off slip to A57(M) EB on slip	56	2	3%
A57(M) EB off slip to Chorlton Rd	250	5	2%
A57(M) EB off slip to Chester Rd (S)	248	6	3%
A57(M) EB off slip to A57(M) WB on slip	0	0	0%
Chester Rd (N) to A57(M) EB on slip	218	1	0%
Chester Rd (N) to Chorlton Rd	188	1	0%
Chester Rd (N) to Chester Road (S) via rb	0	0	0%
Chester Rd (N) to A57(M) WB on slip	415	2	1%
Chester Rd (N) to Chester Road (N)	0	0	0%
A57(M) WB off slip to Chorlton Road	170	0	0%
A57(M) WB off slip to Chester Rd (S)	125	1	0%
A57(M) WB off slip to A57(M) WB on slip	220	0	0%
A57(M) WB off slip to Chester Rd (N)	18	0	0%
A57(M) WB off slip to A57(M) EB on slip	2	0	0%
Chorlton Rd to Chester Rd (S)	4	0	0%
Chorlton Rd to A57(M) WB on slip	71	2	3%
Chorlton Rd to Chester Rd (N)	11	0	0%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on slip	304	0	0%
Chester Rd (S) to Chester Rd (N) via rbt	52	0	0%
Chester Rd (S) to A57(M) EB on slip	425	10	2%
Chester Rd (S) to Chorlton Rd	12	0	0%
Chester Rd (S) to Chester Rd (S)	12	0	0%

Chester Road (N) SO	762	6	1%
Chester Road (S) SO	343	0	0%

Turn counts (composite) at roundabout node 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174 - A57 M / Princess Road / Medlock Street			
	All Vehicles	HGV	% HGV
Medlock St to A5103 link EB	49	0	0%
Medlock St to Princess Rd	588	4	1%
Medlock St to A57(M) WB on slip	18	1	7%

Medlock St to Medlock St	0	0	0%
A5103 link WB to Princess Rd	313	8	3%
A5103 link WB to A57(M) WB on slip	272	0	0%
A5103 link WB to Medlock St	141	0	0%
A5103 link WB to A5103 link EB	0	0	0%
Princess Rd to A57(M) WB on slip	271	1	0%
Princess Rd to Medlock St	696	1	0%
Princess Rd to A5103 link EB	370	7	2%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	79	0	0%
A57(M) EB off slip to A5103 link EB	124	0	0%
A57(M) EB off slip to Princess Rd	510	2	0%
A57(M) EB off slip to A57(M) WB on slip	12	0	0%

A57 (M) WB	1826	30	2%
A57 (M) EB	1438	13	1%

Turn counts (composite) at roundabout node 563, 564, 567, 568, 570, 571, 575, 576 - Cambridge St Junction / A5103/ Higher Cambridge St / A57(M)			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	175	1	1%
Cambridge St to Higher Cambridge St	231	0	0%
Cambridge St to A5103 link WB	61	0	0%
Cambridge St to Cambridge St	3	0	0%
A57(M) WB off slip to Higher Cambridge	455	3	1%
A57(M) WB off slip to A5103 link WB	353	8	2%
A57(M) WB off slip to Cambridge St	57	0	0%
A57(M) WB off slip to A57(M) EB on slip	42	0	0%
Higher Cambridge St to A5103 link WB	311	0	0%
Higher Cambridge St to Cambridge St	123	0	0%
Higher Cambridge St to A57(M) EB on sli	150	1	1%
Higher Cambridge St to Higher Cambridg	0	0	0%
A5103 link EB to Cambridge St	144	0	0%
A5103 link EB to A57(M) EB on slip	315	6	2%
A5103 link EB to Higher Cambridge St	80	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126, 139, 100 - A57(M) / A34 / Brook Street			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	3	0	0%
A34 (N) SO	712	3	0%
Brook St to A34 (S)	257	7	3%
A34 (N) within junction to A57(M) WB	180	0	0%
A34(S) to A57(M) Westbound	631	7	1%
A34 (S) to SO	445	0	0%
A57(M) EB to Sackville Street	201	0	0%
A57(M) EB to Brook Street	301	7	2%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West			
	All Vehicles	HGV	% HGV

Oxford Road (N) LT	0	0	0%
Oxford Road (N) SO	91	0	0%
Oxford Road (N) RT	25	0	0%
Booth St East LT	0	0	0%
Booth St East SO	444	0	0%
Booth St East RT	0	0	0%
Oxford Road (S) LT	14	0	0%
Oxford Road (S) SO	92	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	24	0	0%
Booth St West SO	393	1.4	0%
Booth St West RT	13	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	522	7	1%
Upper Brook St (N) SO	1017	11	1%
A5184 LT	29	1	2%
A5184 RT	320	3	1%
Upper Brook St (S) SO	1079	0	0%

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	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	50	0	0%
	London Rd (N) SO	326	3	1%
	London Rd (N) RT	144	4	3%
Arm 2	Fairfield St (E) LT	119	0	0%
	Fairfield St (E) SO	240	1	0%
	Fairfield St (E) RT	72	0	1%
Arm 3	London Rd (S) LT	210	0	0%
	London Rd (S) SO	470	2	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	10	1	10%
	Fairfield St (W) SO	267	3	1%
	Fairfield St (W) RT	57	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	% HGV
Arm 1	Station carpark LT	54	0	0%
	Station carpark RT	41	0	0%
Arm 2	Fairfield St (E) SO	396	2	0%
	Fairfield St (E) RT	72	0	0%
Arm 3	Fairfield St (W) LT	49	0	0%
	Fairfield St (W) SO	269	3	1%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St (N) LT	31	0	0%
	Travis St (N) SO	10	0	0%
	Travis St (N) RT	273	0	0%
Arm 2	Fairfield St (E) LT	27	0	1%
	Fairfield St (E) SO	179	2	1%
	Fairfield St (E) RT	72	0	0%
Arm 3	Travis St (S) LT	26	0	1%
	Travis St (S) SO	0	0	0%
	Travis St (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	201	3	2%
	Fairfield St (W) SO	55	0	0%
	Fairfield St (W) RT	62	0	0%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) SO	1369	43	3%
	Ring Rd (N) RT	77	2	2%
Arm 2	Fairfield St (E) LT	1225	31	3%
	Fairfield St (E) SO	169	0	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	62	0	0%
	Ring Rd (S) SO	858	25	3%
	Ring Rd (S) RT	572	18	3%
Arm 4	Fairfield St (W) LT	8	0	0%
	Fairfield St (W) SO	44	0	0%
	Fairfield St (W) RT	36	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St LT	132	0	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downing_Street (14			
		All Vehicles	HGV	% HGV
Arm 1	London Rd LT	110	0	0%
	London Rd SO	351	3	1%
	London Rd RT	169	0	0%
Arm 2	A57(M) LT	472	13	3%
Arm 3	Downing St LT	383	21	6%
	Downing St SO	341	0	0%
	Downing St RT	19	0	0%
Arm 4	A57(M) LT	341	2	1%
	A57(M) SO	116	4	3%
	A57(M) RT	445	25	6%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	141	5	4%
	London Rd (N) SO	517	8	2%
Arm 2	Store St LT	6	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) LT	59	0	1%
	Ring Rd (N) SO	952	9	1%
	Ring Rd (N) RT	27	0	0%
Arm 2	Old Mill St LT	361	3	1%
	Old Mill St SO	92	0	0%
	Old Mill St RT	194	13	7%
Arm 3	Ring Rd (S) LT	17	0	0%
	Ring Rd (S) SO	1309	7	1%
	Ring Rd (S) RT	137	3	2%
Arm 4	Store St LT	1	0	0%
	Store St SO	6	0	0%
	Store St RT	57	0	0%

	Turn_counts_at_node_1224-A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancellor_Lane/A63			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow LT	70	0	0%
	Pin Mill Brow SO	459	0	0%
	Pin Mill Brow RT	0	0	0%
Arm 2	Ashton Old Rd LT	90	0	0%
	Ashton Old Rd SO	1067	30	3%
	Ashton Old Rd RT	164	3	2%
Arm 3	Chancellor Ln LT	339	1	0%
	Chancellor Ln SO	612	0	0%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	6	0	3%
	Fairfield St SO	537	17	3%
	Fairfield St RT	70	0	1%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow (N) SO	530	0	0%
	Pin Mill Brow (N) RT	1336	42	3%
Arm 2	Pin Mill Brow (S) LT	104	3	3%
	Pin Mill Brow (S) SO	674	0	0%
Arm 3	Ring Road SO	865	25	3%

	Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)			
		All Vehicles	HGV	% HGV
Arm 1	Great Ancoats St (N) SO	973	20	2%
	Great Ancoats St (N) RT	483	0	0%
Arm 2	Great Ancoats St (S) LT	80	7	9%
	Great Ancoats St (S) SO	1249	11	1%
Arm 3	Adair St LT	177	0	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	707	17	2%
A6042 (W) LT	390	16	4%
A665 Cheetham Hill Rd (N) SO	521	9	2%
A665 Cheetham Hill Rd (N) RT	534	23	4%
Ring Road (S) LT	1009	24	2%
Ring Road (S) SO)	161	0	0%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	83	0	0%
Shude Hill LT	127	0	0%
Swan St RT	155	4	3%
Swan St LT	176	6	4%
Swan ST SO	1105	25	2%
Rochdale Rd (N) SO	468	1	0%
Rochdale Rd (N) RT	258	2	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	30	3	11%
Ring Road SO	911	18	2%
Ring Road RT	203	0	0%
Oldham Road LT	1133	14	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	76	2	3%
Great Ancoats St (E) LT	177	2	1%
Great Ancoats St (E) SO	993	18	2%
Great Ancoats St (W) SO	1068	10	1%
Great Ancoats St (W) RT	264	4	2%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV

Great Ancoats St (E) RT	4	0	0%
Great Ancoats St (E) SO	1223	21	2%
Great Ancoats St (W) LT	110	0	0%
Great Ancoats St (W) SO	921	9	1%
Central Retail Park LT	0	0	0%
Central Retail Park RT	3	0	0%
Laystall St SO	0	0	0%
Laystall St RT	181	0	0%
Laystall St LT	6	0	0%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	281	0	0%
Ring Road (E) SO	1218	21	2%
Ring Road (W) SO	1045	10	1%
Ring Road (W) RT	51	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	45	0	0%
Ring Road (W) SO	1318	12	1%
Pollard St LT	135	8	6%
Pollard St RT	112	0	0%
Ring Road (E) RT	77	0	0%
Ring Road (E) SO	1345	11	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	426	14	3%
Hyde Rd (E) LT	147	4	2%
Hyde Rd (E) SO	690	25	4%
Hyde Rd (E) RT	302	1	0%
A665 (N) LT	69	0	0%
A665 (N) SO	288	1	0%
A665 (S) RT	56	0	0%
A665 (S) SO	552	1	0%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	4	0	0%
Higher Ardwick to A6	104	0	0%
Higher Ardwick to Brunswick St	101	1	1%
Higher Ardwick to Ardwick Green Sou	21	0	0%
Higher Ardwick u-turn	0	0	0%
Hyde Rd to A6	5	0	0%
Hyde Rd to Brunswick St	197	3	2%
Hyde Rd to Ardwick Green S	419	19	5%
Hyde Rd to Higher Ardwick	12	0	0%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	59	4	7%
A6 to Ardwick Green S	388	5	1%
A6 to Higher Ardwick	77	0	0%
A6 to Hyde Rd	2	0	0%

A6 u-turn	5	0	0%
Brunswick St to Ardwick Green S	55	1	1%
Brunswick St to Higher Ardwick	188	2	1%
Brunswick St to Hyde Rd	75	1	1%
Brunswick St to A6	74	0	0%
Brunswick St u-turn	2	0	0%
Ardwick Green S to Higher Ardwick	78	7	9%
Ardwick Green S to Hyde Rd	348	14	4%
Ardwick Green S to A6	440	15	3%
Ardwick Green S to Brunswick St	151	1	1%
Ardwick Green S u-turn	16	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	20	0	0%
Portland St SO	112	2	2%
Portland ST RT	20	0	0%
Newton St LT	366	8	2%

Turn counts at node 166z - A6 Piccadilly / Ducie Street			
	All Vehicles	HGV	% HGV
Auburn St SO	200	0	0%
Auburn St RT	100	4	4%
Auburn St LT	199	6	3%
Ducie St LT	56	0	0%
Piccadilly SO	506	8	2%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	152	2	2%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV
Fairfield St (W) SO	340	4	1%
Fairfield St (W) LT	318	10	3%
Fairfield St (E) SO	588	5	1%
Fairfield St (E) RT	9	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	278	9	3%
New Bridge St (E) SO	1035	34	3%
New Bridge St (E) RT	123	2	1%
A56 Great Ducie St (N) LT	193	0	0%
A56 Great Ducie St (N) SO	271	0	0%
A56 Great Ducie St (N) SO	351	26	7%
A56 Great Ducie St (S) RT	81	1	2%
A56 Great Ducie St (S) LT	0	0	0%
A56 Great Ducie St (S) SO	23	0	0%
Trinity Way SO	880	34	4%
Trinity Way RT	81	0	0%
Trinity Way LT	198	17	9%

Turn counts at node 428 - Chapel St / Victoria Bridge St

	All Vehicles	HGV	% HGV
Victoria Bridge St RT	175	1	1%
Victoria Bridge St LT	3	1	19%
Chapel St (E) LT	450	8	2%
Chapel St (E) LT	57	0	0%
Chapel St (W) SO	103	3	3%
Chapel St (W) RT	87	0	0%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	181	2	1%
Deansgate (S) LT	328	4	1%
Blackfriars St LT	0	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	1	0	0%
St Mary's Gate LT	10	0	0%
St Mary's Gate SO	4	0	0%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	448	7	2%
Deansgate (N) RT	19	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	389	8	2%
Deansgate (S) RT	0	0	0%
Deansgate (S) LT	71	3	4%
Deansgate (N) LT	129	1	1%
Deansgate (N) SO	370	6	2%
Deansgate (N) RT	13	0	0%
Bridge St LT	91	0	0%
Bridge St SO	127	2	1%
John Dalton St LT	101	1	1%
John Dalton St SO	30	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	266	10	4%
Deansgate (S) RT	57	0	0%
Deansgate (S) LT	103	4	3%
Peter St RT	90	1	1%
Peter St LT	87	0	0%
Peter St SO	99	0	0%
Deansgate (N) LT	25	0	0%
Deansgate (N) SO	421	7	2%
Deansgate (N) RT	63	0	0%
Quay St LT	126	0	0%
Quay St SO	200	4	2%
Quay St RT	118	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	367	13	4%
Deansgate (S) RT	231	0	0%

Deansgate (N) LT	187	0	0%
Deansgate (N) SO	549	8	1%
Great Bridgewater St RT	20	0	1%
Great Bridgewater St LT	131	0	0%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	431	14	3%
Deansgate (S) LT	199	0	0%
Deansgate (N) SO	587	6	1%
Deansgate (N) RT	94	1	1%
Liverpool St RT	121	0	0%
Liverpool St LT	168	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West

	All Vehicles	HGV	% HGV
Deansgate (S) SO	473	3	1%
Deansgate (S) RT	315	2	1%
Whitworth St West RT	156	11	7%
Whitworth St West LT	268	2	1%
Deansgate (N) LT	169	2	1%
Deansgate (N) SO	540	5	1%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV
Oxford St (S) SO	204	0	0%
Oxford St (S) LT	88	0	0%
Oxford St (N) SO	289	6	2%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Albion St SO	540	6	1%
Albion St RT	344	0	0%
Albion St LT	128	5	4%
Great Bridgewater St (E) RT	4	0	0%
Great Bridgewater St (E) LT	57	0	0%
Great Bridgewater St (E) SO	48	0	0%
Lower Mosley St LT	11	0	0%
Lower Mosley St SO	152	0	0%
Lower Mosley St RT	43	0	0%
Great Bridgewater St (W) LT	11	0	0%
Great Bridgewater St (W) SO	49	0	0%
Great Bridgewater St (W) RT	25	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	43	0	0%
Albion St (N) SO	129	0	0%
Albion St (N) RT	62	0	0%
Whitworth St West (E) LT	118	0	0%
Whitworth St West (E) SO	201	6	3%
Whitworth St West (E) RT	268	10	4%
Albion St (S) LT	157	7	4%
Albion St (S) SO	552	2	0%

Albion St (S) RT	185	6	3%
Whitworth St West (W) LT	154	2	1%
Whitworth St West (W) SO	189	0	0%
Whitworth St West (W) RT	137	2	1%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	93	0	0%
Portland St (N) SO	278	0	0%
Portland St (N) RT	0	0	0%
Princess St (W) LT	16	0	0%
Princess St (W) SO	42	0	0%
Princess St (W) RT	4	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	384	4	1%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	176	5	3%
Oxford St (N) SO	92	1	1%
Oxford St (N) RT	34	0	0%
Portland St LT	38	0	0%
Portland St SO	104	0	0%
Portland St RT	271	0	0%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	21	0	0%
Oxford St (S) RT	120	0	0%
Chepstow St LT	0	0	0%
Chepstow St SO	89	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	86	1	1%
Oxford St (N) SO	44	0	0%
Whitworth St (E) LT	92	0	0%
Whitworth St (E) SO	373	10	3%
Oxford St (S) LT	158	0	0%
Oxford St (S) SO	128	0	0%
Whitworth St (W) LT	13	0	0%
Whitworth St (W) SO	525	9	2%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	36	0	0%
Princess St (N) SO	30	0	0%
Princess St (N) RT	87	0	0%
Whitworth St (E) LT	132	4	3%
Whitworth St (E) SO	247	0	0%
Whitworth St (E) RT	32	0	0%
Princess St (S) RT	158	6	4%
Princess St (S) LT	187	10	5%
Princess St (S) SO	164	2	1%

Whitworth St (W) LT	288	0	0%
Whitworth St (W) SO	254	7	3%
Whitworth St (W) RT	17	2	9%

Turn counts at node 87 - Whitworth St / Sackville St			
	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	89	0	0%
Whitworth St (E) SO	358	5	1%
Whitworth St (E) RT	160	0	0%
Sackville St (S) LT	56	0	0%
Sackville St (S) SO	259	0	0%
Sackville St (S) RT	215	1	0%
Whitworth St (W) LT	18	0	0%
Whitworth St (W) SO	424	14	3%
Whitworth St (W) RT	1	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	53	0	1%
Trinity Way (N) SO	991	58	6%
Trinity Way (N) RT	35	0	0%
Blackfriars Rd (E) LT	67	0	1%
Blackfriars Rd (E) SO	7	0	0%
Blackfriars Rd (E) RT	70	0	0%
Trinity Way (S) LT	176	11	6%
Trinity Way (S) SO	1004	49	5%
Trinity Way (S) RT	39	4	11%
Blackfriars Rd (W) LT	157	3	2%
Blackfriars Rd (W) SO	226	0	0%
Blackfriars Rd (W) RT	351	28	8%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	49	0	0%
Trinity Way (N) SO	971	58	6%
Trinity Way (N) RT	317	30	9%
Chapel St (E) LT	104	1	1%
Chapel St (E) SO	233	1	0%
Chapel St (E) RT	0	0	0%
Trinity Way (S) SO	970	51	5%
Trinity Way (S) RT	226	17	8%
Trinity Way (S) LT	228	0	0%
Chapel St (W) LT	254	15	6%
Chapel St (W) SO	281	0	0%
Chapel St (W) RT	444	7	2%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	790	62	8%
Trinity Way (N) SO	623	3	1%

New Bailey access SO	0	0	0%
New Bailey access RT	10	0	0%
New Bailey access LT	0	0	0%
Irwell St RT	0	0	0%
Irwell St LT	32	0	0%
Irwell St SO	370	1	0%
Trinity Way (S) SO	8	0	0%
Trinity Way (S) RT	181	5	3%
Trinity Way (S) LT	990	0	0%

Turn_counts_at_node_1663,1150z,1028-A6042_Trinity_Way/A57_Regent_Road/A57_Dawson_Street			
	All Vehicles	HGV	% HGV
Trinity St (N) LT	757	9	1%
Trinity St (N) SO	19	0	0%
Trinity St (N) RT	397	35	9%
Dawson St (E) LT	10	0	0%
Dawson St (E) SO	1767	16	1%
Dawson St (E) RT	792	43	5%
Water St (S) LT	37	0	0%
Water St (S) SO	9	0	0%
Water St (S) RT	21	0	0%
Regent Rd (W) LT	305	21	7%
Regent Rd (W) SO	1458	47	3%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (N)	137	5	4%
A57(M) EB off slip to A57(M) EB on sli	60	3	4%
A57(M) EB off slip to Chorlton Rd	130	8	6%
A57(M) EB off slip to Chester Rd (S)	133	12	9%
A57(M) EB off slip to A57(M) WB on s	0	0	0%
Chester Rd (N) to A57(M) EB on slip	57	0	0%
Chester Rd (N) to Chorlton Rd	51	1	2%
Chester Rd (N) to Chester Road (S) via	0	0	0%
Chester Rd (N) to A57(M) WB on slip	320	0	0%
Chester Rd (N) to Chester Road (N)	0	0	0%
A57(M) WB off slip to Chorlton Road	152	1	1%
A57(M) WB off slip to Chester Rd (S)	641	20	3%
A57(M) WB off slip to A57(M) WB on	45	0	0%
A57(M) WB off slip to Chester Rd (N)	167	0	0%
A57(M) WB off slip to A57(M) EB on s	89	1	1%
Chorlton Rd to Chester Rd (S)	13	1	8%
Chorlton Rd to A57(M) WB on slip	68	11	17%
Chorlton Rd to Chester Rd (N)	34	0	1%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on slip	147	19	13%
Chester Rd (S) to Chester Rd (N) via rb	89	0	0%
Chester Rd (S) to A57(M) EB on slip	391	20	5%
Chester Rd (S) to Chorlton Rd	22	2	8%
Chester Rd (S) to Chester Rd (S)	22	2	8%

Chester Road (N) SO	488	1	0%
Chester Road (S) SO	782	3	0%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Medlock St to A5103 link EB	16	0	0%
Medlock St to Princess Rd	323	2	1%
Medlock St to A57(M) WB on slip	118	0	0%
Medlock St to Medlock St	0	0	0%
A5103 link WB to Princess Rd	697	34	5%
A5103 link WB to A57(M) WB on slip	189	1	0%
A5103 link WB to Medlock St	105	2	2%
A5103 link WB to A5103 link EB	0	0	0%
Princess Rd to A57(M) WB on slip	437	6	1%
Princess Rd to Medlock St	1005	15	1%
Princess Rd to A5103 link EB	813	27	3%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	79	2	2%
A57(M) EB off slip to A5103 link EB	189	0	0%
A57(M) EB off slip to Princess Rd	325	0	0%
A57(M) EB off slip to A57(M) WB on s	23	0	0%

A57 (M) WB	2005	49	2%
A57 (M) EB	2357	43	2%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	36	0	0%
Cambridge St to Higher Cambridge St	27	0	0%
Cambridge St to A5103 link WB	138	0	0%
Cambridge St to Cambridge St	0	0	0%
A57(M) WB off slip to Higher Cambric	402	9	2%
A57(M) WB off slip to A5103 link WB	650	34	5%
A57(M) WB off slip to Cambridge St	156	2	1%
A57(M) WB off slip to A57(M) EB on s	70	4	5%
Higher Cambridge St to A5103 link W	199	3	1%
Higher Cambridge St to Cambridge St	350	5	1%
Higher Cambridge St to A57(M) EB on	614	10	2%
Higher Cambridge St to Higher Cambr	0	0	0%
A5103 link EB to Cambridge St	324	5	1%
A5103 link EB to A57(M) EB on slip	523	22	4%
A5103 link EB to Higher Cambridge St	154	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126, 139,			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	1	0	0%
A34 (N) SO	248	4	2%
Brook St to A34 (S)	403	5	1%
A34 (N) within junction to A57(M) WE	115	0	0%
A34(S) to A57(M) Westbound	848	11	1%
A34 (S) to SO	911	23	3%
A57(M) EB to Sackville Street	361	5	1%
A57(M) EB to Brook Street	483	7	1%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West

	All Vehicles	HGV	% HGV
Oxford Road (N) LT	0	0	0%
Oxford Road (N) SO	70	0	0%
Oxford Road (N) RT	23	0	0%
Booth St East LT	0	0	0%
Booth St East SO	359	7	2%
Booth St East RT	0	0	0%
Oxford Road (S) LT	15	0	0%
Oxford Road (S) SO	98	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	25	0	0%
Booth St West SO	456	1	0%
Booth St West RT	14	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	286	0	0%
Upper Brook St (N) SO	797	19	2%
A5184 LT	15	2	15%
A5184 RT	474	6	1%
Upper Brook St (S) SO	1717	46	3%

Turn counts at node 1228 - Fairfield Street / North Western St			
	All Vehicles	HGV	% HGV
North Western St LT	0	0	0%
North Western St RT	0	0	0%
Fairfield St (W) SO	85	0	0%
Fairfield St (W) RT	0	0	0%
Fairfield St (E) LT	0	0	0%
Fairfield St (E) SO	299	2	1%

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	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	%HGV
Arm 1	London Rd (N) LT	35	0	0%
	London Rd (N) SO	392	1	0%
	London Rd (N) RT	164	0	0%
Arm 2	Fairfield St (E) LT	110	0	0%
	Fairfield St (E) SO	298	0	0%
	Fairfield St (E) RT	104	0	0%
Arm 3	London Rd (S) LT	118	0	0%
	London Rd (S) SO	226	0	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	4	0	0%
	Fairfield St (W) SO	362	0	0%
	Fairfield St (W) RT	198	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	%HGV
Arm 1	Station carpark LT	11	0	0%
	Station carpark RT	111	0	0%
Arm 2	Fairfield St (E) SO	416	0	0%
	Fairfield St (E) RT	24	0	0%
Arm 3	Fairfield St (W) LT	43	0	0%
	Fairfield St (W) SO	354	0	0%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	%HGV
Arm 1	Travis St (N) LT	53	0	1%
	Travis St (N) SO	25	0	0%
	Travis St (N) RT	209	0	0%
Arm 2	Fairfield St (E) LT	27	0	0%
	Fairfield St (E) SO	187	0	0%
	Fairfield St (E) RT	35	0	0%
Arm 3	Travis St (S) LT	59	0	0%
	Travis St (S) SO	0	0	0%
	Travis St (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	90	0	0%
	Fairfield St (W) SO	261	0	0%
	Fairfield St (W) RT	11	0	0%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	%HGV
Arm 1	Ring Rd (N) SO	1025	7	1%
	Ring Rd (N) RT	112	0	0%
Arm 2	Fairfield St (E) LT	531	6	1%
	Fairfield St (E) SO	109	0	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	46	0	0%
	Ring Rd (S) SO	736	5	1%

	Ring Rd (S) RT	686	12	2%
Arm 4	Fairfield St (W) LT	63	0	1%
	Fairfield St (W) SO	213	0	0%
	Fairfield St (W) RT	48	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	%HGV
Arm 1	Travis St LT	337	2	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downi			
		All Vehicles	HGV	%HGV
Arm 1	London Rd LT	16	0	0%
	London Rd SO	744	0	0%
	London Rd RT	265	2	1%
Arm 2	A57(M) LT	362	3	1%
Arm 3	Downing St LT	274	5	2%
	Downing St SO	242	0	0%
	Downing St RT	4	0	0%
Arm 4	A57(M) LT	94	0	0%
	A57(M) SO	7	0	0%
	A57(M) RT	444	19	4%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	%HGV
Arm 1	London Rd (N) LT	83	0	0%
	London Rd (N) SO	522	1	0%
Arm 2	Store St LT	70	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	%HGV
Arm 1	Ring Rd (N) LT	69	3	5%
	Ring Rd (N) SO	1260	3	0%
	Ring Rd (N) RT	24	0	0%
Arm 2	Old Mill St LT	116	1	1%
	Old Mill St SO	10	0	0%
	Old Mill St RT	59	0	0%
Arm 3	Ring Rd (S) LT	22	0	0%
	Ring Rd (S) SO	1031	5	0%
	Ring Rd (S) RT	244	3	1%
Arm 4	Store St LT	21	0	0%
	Store St SO	91	0	0%
	Store St RT	60	0	0%

	Turn_counts_at_node_1224-A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancell			
		All Vehicles	HGV	%HGV
Arm 1	Pin Mill Brow LT	186	0	0%
	Pin Mill Brow SO	325	0	0%
	Pin Mill Brow RT	0	0	0%

Arm 2	Ashton Old Rd LT	105	0	0%
	Ashton Old Rd SO	469	6	1%
	Ashton Old Rd RT	84	1	1%
Arm 3	Chancellor Ln LT	172	0	0%
	Chancellor Ln SO	570	5	1%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	15	0	3%
	Fairfield St SO	728	11	2%
	Fairfield St RT	150	1	0%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	%HGV
Arm 1	Pin Mill Brow (N) SO	511	0	0%
	Pin Mill Brow (N) RT	1046	6	1%
Arm 2	Pin Mill Brow (S) LT	104	1	1%
	Pin Mill Brow (S) SO	571	6	1%
Arm 3	Ring Road SO	794	5	1%

	Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)			
		All Vehicles	HGV	%HGV
Arm 1	Great Ancoats St (N) SO	1244	5	0%
	Great Ancoats St (N) RT	153	0	0%
Arm 2	Great Ancoats St (S) LT	19	0	0%
	Great Ancoats St (S) SO	924	6	1%
Arm 3	Adair St LT	405	2	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	747	11	1%
A6042 (W) LT	370	3	1%
A665 Cheetham Hill Rd (N) SO	327	0	0%
A665 Cheetham Hill Rd (N) RT	512	8	2%
Ring Road (S) LT	1058	7	1%
Ring Road (S) SO)	295	3	1%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	277	1	0%
Shude Hill LT	118	4	3%
Swan St RT	168	2	1%
Swan St LT	112	1	1%
Swan ST SO	772	4	1%
Rochdale Rd (N) SO	209	0	0%
Rochdale Rd (N) RT	358	2	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	21	0	0%
Ring Road SO	739	7	1%

Ring Road RT	704	0	0%
Oldham Road LT	1220	7	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	99	1	1%
Great Ancoats St (E) LT	33	0	0%
Great Ancoats St (E) SO	1087	6	1%
Great Ancoats St (W) SO	1179	7	1%
Great Ancoats St (W) RT	117	0	0%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV
Great Ancoats St (E) RT	59	0	1%
Great Ancoats St (E) SO	978	5	1%
Great Ancoats St (W) LT	18	0	0%
Great Ancoats St (W) SO	1146	6	1%
Central Retail Park LT	12	0	0%
Central Retail Park RT	59	0	0%
Laystall St SO	15	0	0%
Laystall St RT	226	0	0%
Laystall St LT	136	0	0%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	50	0	0%
Ring Road (E) SO	1050	5	1%
Ring Road (W) SO	1360	6	0%
Ring Road (W) RT	28	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	109	0	0%
Ring Road (W) SO	1305	5	0%
Pollard St LT	89	0	0%
Pollard St RT	58	0	0%
Ring Road (E) RT	59	0	0%
Ring Road (E) SO	1259	8	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	902	14	2%
Hyde Rd (E) LT	93	0	0%
Hyde Rd (E) SO	516	5	1%
Hyde Rd (E) RT	198	0	0%
A665 (N) LT	229	1	0%
A665 (N) SO	286	0	0%
A665 (S) RT	79	0	0%
A665 (S) SO	288	3	1%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	95	0	0%
Higher Ardwick to A6	222	0	0%
Higher Ardwick to Brunswick St	170	0	0%
Higher Ardwick to Ardwick Green S	26	0	0%
Higher Ardwick u-turn	0	0	0%
Hyde Rd to A6	14	0	0%
Hyde Rd to Brunswick St	123	0	0%
Hyde Rd to Ardwick Green S	347	5	2%
Hyde Rd to Higher Ardwick	17	0	0%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	46	1	3%
A6 to Ardwick Green S	304	1	0%
A6 to Higher Ardwick	95	0	0%
A6 to Hyde Rd	0	0	0%
A6 u-turn	2	0	0%
Brunswick St to Ardwick Green S	73	0	0%
Brunswick St to Higher Ardwick	349	0	0%
Brunswick St to Hyde Rd	268	1	0%
Brunswick St to A6	66	0	0%
Brunswick St u-turn	8	0	0%
Ardwick Green S to Higher Ardwic	57	0	0%
Ardwick Green S to Hyde Rd	539	13	2%
Ardwick Green S to A6	391	9	2%
Ardwick Green S to Brunswick St	85	0	0%
Ardwick Green S u-turn	7	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	17	0	0%
Portland St SO	106	0	0%
Portland ST RT	13	0	0%
Newton St LT	250	0	0%

Turn counts at node 166z - A6 Piccadilly / Ducie Street			
	All Vehicles	HGV	% HGV
Auburn St SO	213	0	0%
Auburn St RT	107	1	1%
Auburn St LT	126	0	0%
Ducie St LT	80	0	0%
Piccadilly SO	437	0	0%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	139	0	0%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV

Fairfield St (W) SO	554	0	0%
Fairfield St (W) LT	209	0	0%
Fairfield St (E) SO	558	0	0%
Fairfield St (E) RT	8	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	376	3	1%
New Bridge St (E) SO	977	12	1%
New Bridge St (E) RT	118	0	0%
A56 Great Ducie St (N) LT	277	0	0%
A56 Great Ducie St (N) SO	148	0	0%
A56 Great Ducie St (N) SO	314	10	3%
A56 Great Ducie St (S) RT	188	2	1%
A56 Great Ducie St (S) LT	103	0	0%
A56 Great Ducie St (S) SO	293	0	0%
Trinity Way SO	698	10	1%
Trinity Way RT	33	0	0%
Trinity Way LT	351	8	2%

Turn counts at node 428 - Chapel St / Victoria Bridge St			
	All Vehicles	HGV	% HGV
Victoria Bridge St RT	197	0	0%
Victoria Bridge St LT	29	0	1%
Chapel St (E) LT	499	4	1%
Chapel St (E) LT	62	0	0%
Chapel St (W) SO	170	1	1%
Chapel St (W) RT	107	1	1%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	212	0	0%
Deansgate (S) LT	153	1	1%
Blackfriars St LT	0	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	56	0	0%
St Mary's Gate LT	25	0	0%
St Mary's Gate SO	34	0	1%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	529	5	1%
Deansgate (N) RT	60	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	200	0	0%
Deansgate (S) RT	0	0	0%
Deansgate (S) LT	95	0	0%
Deansgate (N) LT	94	0	0%
Deansgate (N) SO	569	7	1%

Deansgate (N) RT	11	0	0%
Bridge St LT	100	1	1%
Bridge St SO	123	0	0%
John Dalton St LT	236	1	1%
John Dalton St SO	28	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	180	0	0%
Deansgate (S) RT	16	0	0%
Deansgate (S) LT	46	0	0%
Peter St RT	65	0	0%
Peter St LT	162	0	0%
Peter St SO	62	2	3%
Deansgate (N) LT	79	1	1%
Deansgate (N) SO	590	7	1%
Deansgate (N) RT	86	1	1%
Quay St LT	44	0	0%
Quay St SO	128	1	0%
Quay St RT	105	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	294	0	0%
Deansgate (S) RT	107	0	0%
Deansgate (N) LT	139	0	0%
Deansgate (N) SO	773	7	1%
Great Bridgewater St RT	24	0	0%
Great Bridgewater St LT	284	1	0%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	287	0	0%
Deansgate (S) LT	65	0	0%
Deansgate (N) SO	962	6	1%
Deansgate (N) RT	93	2	2%
Liverpool St RT	159	1	1%
Liverpool St LT	115	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	211	0	0%
Deansgate (S) RT	198	0	0%
Whitworth St West RT	140	0	0%
Whitworth St West LT	326	0	0%
Deansgate (N) LT	187	4	2%
Deansgate (N) SO	931	4	0%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV

Oxford St (S) SO	163	2	1%
Oxford St (S) LT	51	0	0%
Oxford St (N) SO	297	1	0%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Albion St SO	287	0	0%
Albion St RT	205	0	0%
Albion St LT	184	0	0%
Great Bridgewater St (E) RT	2	0	0%
Great Bridgewater St (E) LT	108	0	0%
Great Bridgewater St (E) SO	181	0	0%
Lower Mosley St LT	8	0	0%
Lower Mosley St SO	135	1	1%
Lower Mosley St RT	33	0	0%
Great Bridgewater St (W) LT	9	0	0%
Great Bridgewater St (W) SO	78	0	0%
Great Bridgewater St (W) RT	175	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	116	0	0%
Albion St (N) SO	230	2	1%
Albion St (N) RT	71	0	0%
Whitworth St West (E) LT	90	0	0%
Whitworth St West (E) SO	230	0	0%
Whitworth St West (E) RT	260	0	0%
Albion St (S) LT	170	0	0%
Albion St (S) SO	320	0	0%
Albion St (S) RT	111	0	0%
Whitworth St West (W) LT	95	3	4%
Whitworth St West (W) SO	102	0	0%
Whitworth St West (W) RT	184	1	0%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	188	0	0%
Portland St (N) SO	321	2	1%
Portland St (N) RT	0	0	0%
Princess St (W) LT	7	0	0%
Princess St (W) SO	130	0	0%
Princess St (W) RT	41	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	432	0	0%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	124	0	0%
Oxford St (N) SO	159	2	1%

Oxford St (N) RT	35	0	0%
Portland St LT	72	0	0%
Portland St SO	215	0	0%
Portland St RT	195	2	1%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	15	0	0%
Oxford St (S) RT	110	0	0%
Chepstow St LT	3	0	0%
Chepstow St SO	221	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	159	2	1%
Oxford St (N) SO	66	0	0%
Whitworth St (E) LT	79	0	0%
Whitworth St (E) SO	382	0	0%
Oxford St (S) LT	189	0	0%
Oxford St (S) SO	110	0	0%
Whitworth St (W) LT	11	0	0%
Whitworth St (W) SO	345	0	0%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	69	0	0%
Princess St (N) SO	218	0	0%
Princess St (N) RT	122	0	0%
Whitworth St (E) LT	102	0	0%
Whitworth St (E) SO	221	0	0%
Whitworth St (E) RT	18	0	0%
Princess St (S) RT	128	0	0%
Princess St (S) LT	98	0	0%
Princess St (S) SO	231	0	0%
Whitworth St (W) LT	43	0	0%
Whitworth St (W) SO	316	0	0%
Whitworth St (W) RT	129	2	1%

Turn counts at node 87 - Whitworth St / Sackville St			
	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	29	0	0%
Whitworth St (E) SO	318	0	0%
Whitworth St (E) RT	209	0	0%
Sackville St (S) LT	32	0	0%
Sackville St (S) SO	94	0	0%
Sackville St (S) RT	180	0	0%
Whitworth St (W) LT	14	0	0%
Whitworth St (W) SO	501	0	0%

Whitworth St (W) RT	0	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	6	0	0%
Trinity Way (N) SO	887	12	1%
Trinity Way (N) RT	244	10	4%
Blackfriars Rd (E) LT	190	1	0%
Blackfriars Rd (E) SO	313	0	0%
Blackfriars Rd (E) RT	63	0	0%
Trinity Way (S) LT	567	1	0%
Trinity Way (S) SO	1012	18	2%
Trinity Way (S) RT	93	0	0%
Blackfriars Rd (W) LT	19	0	0%
Blackfriars Rd (W) SO	44	0	0%
Blackfriars Rd (W) RT	50	2	3%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	15	0	0%
Trinity Way (N) SO	758	11	1%
Trinity Way (N) RT	423	4	1%
Chapel St (E) LT	114	3	3%
Chapel St (E) SO	254	0	0%
Chapel St (E) RT	19	0	0%
Trinity Way (S) SO	1204	10	1%
Trinity Way (S) RT	93	1	1%
Trinity Way (S) LT	169	0	0%
Chapel St (W) LT	492	10	2%
Chapel St (W) SO	127	0	0%
Chapel St (W) RT	241	0	0%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	973	15	2%
Trinity Way (N) SO	236	1	0%
New Bailey access SO	46	1	2%
New Bailey access RT	35	0	0%
New Bailey access LT	10	0	0%
Irwell St RT	0	0	0%
Irwell St LT	147	2	1%
Irwell St SO	375	0	0%
Trinity Way (S) SO	12	0	0%
Trinity Way (S) RT	64	0	0%
Trinity Way (S) LT	955	10	1%

Turn_counts_at_node_1663,1150z,1028-A6042_Trinity_Way/A57_Regent_Road/A57_Daws			
	All Vehicles	HGV	% HGV
Trinity St (N) LT	677	19	3%

Trinity St (N) SO	15	0	0%
Trinity St (N) RT	314	7	2%
Dawson St (E) LT	21	0	0%
Dawson St (E) SO	1565	17	1%
Dawson St (E) RT	686	3	0%
Water St (S) LT	5	0	0%
Water St (S) SO	4	0	0%
Water St (S) RT	2	0	0%
Regent Rd (W) LT	231	5	2%
Regent Rd (W) SO	1564	13	1%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (N	54	0	0%
A57(M) EB off slip to A57(M) EB on	57	2	3%
A57(M) EB off slip to Chorlton Rd	247	5	2%
A57(M) EB off slip to Chester Rd (S	256	8	3%
A57(M) EB off slip to A57(M) WB o	0	0	0%
Chester Rd (N) to A57(M) EB on sli	203	2	1%
Chester Rd (N) to Chorlton Rd	207	0	0%
Chester Rd (N) to Chester Road (S)	0	0	0%
Chester Rd (N) to A57(M) WB on s	402	2	1%
Chester Rd (N) to Chester Road (N	0	0	0%
A57(M) WB off slip to Chorlton Ro	145	0	0%
A57(M) WB off slip to Chester Rd (	104	0	0%
A57(M) WB off slip to A57(M) WB	191	0	0%
A57(M) WB off slip to Chester Rd (	19	0	0%
A57(M) WB off slip to A57(M) EB o	29	0	0%
Chorlton Rd to Chester Rd (S)	4	0	0%
Chorlton Rd to A57(M) WB on slip	67	2	3%
Chorlton Rd to Chester Rd (N)	12	0	0%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on sl	289	0	0%
Chester Rd (S) to Chester Rd (N) vi	52	0	0%
Chester Rd (S) to A57(M) EB on sli	418	9	2%
Chester Rd (S) to Chorlton Rd	11	0	0%
Chester Rd (S) to Chester Rd (S)	11	0	0%

Chester Road (N) SO	761	4	1%
Chester Road (S) SO	331	0	0%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Medlock St to A5103 link EB	26	0	0%
Medlock St to Princess Rd	566	5	1%
Medlock St to A57(M) WB on slip	9	1	11%
Medlock St to Medlock St	0	0	0%
A5103 link WB to Princess Rd	280	8	3%
A5103 link WB to A57(M) WB on s	294	0	0%

A5103 link WB to Medlock St	105	0	0%
A5103 link WB to A5103 link EB	0	0	0%
Princess Rd to A57(M) WB on slip	249	1	0%
Princess Rd to Medlock St	582	0	0%
Princess Rd to A5103 link EB	271	5	2%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	87	0	0%
A57(M) EB off slip to A5103 link EB	104	0	0%
A57(M) EB off slip to Princess Rd	503	2	0%
A57(M) EB off slip to A57(M) WB c	7	0	0%

A57 (M) WB	1795	30	2%
A57 (M) EB	1302	11	1%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	150	0	0%
Cambridge St to Higher Cambridge	203	0	0%
Cambridge St to A5103 link WB	45	0	0%
Cambridge St to Cambridge St	0	0	0%
A57(M) WB off slip to Higher Cam	453	1	0%
A57(M) WB off slip to A5103 link V	378	9	2%
A57(M) WB off slip to Cambridge S	54	0	0%
A57(M) WB off slip to A57(M) EB c	69	1	1%
Higher Cambridge St to A5103 link	341	0	0%
Higher Cambridge St to Cambridge	93	0	0%
Higher Cambridge St to A57(M) EB	114	1	1%
Higher Cambridge St to Higher Car	0	0	0%
A5103 link EB to Cambridge St	107	0	0%
A5103 link EB to A57(M) EB on slip	235	6	3%
A5103 link EB to Higher Cambridge	70	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126,			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	7	0	0%
A34 (N) SO	776	3	0%
Brook St to A34 (S)	263	8	3%
A34 (N) within junction to A57(M)	186	0	0%
A34(S) to A57(M) Westbound	615	7	1%
A34 (S) to SO	579	0	0%
A57(M) EB to Sackville Street	168	1	0%
A57(M) EB to Brook Street	300	8	3%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West			
	All Vehicles	HGV	% HGV
Oxford Road (N) LT	0	0	0%
Oxford Road (N) SO	86	0	0%
Oxford Road (N) RT	24	0	0%
Booth St East LT	0	0	0%

Booth St East SO	444	0	0%
Booth St East RT	0	0	0%
Oxford Road (S) LT	15	0	0%
Oxford Road (S) SO	94	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	25	0	0%
Booth St West SO	422	1	0%
Booth St West RT	13	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	518	8	1%
Upper Brook St (N) SO	944	10	1%
A5184 LT	34	1	2%
A5184 RT	349	3	1%
Upper Brook St (S) SO	1099	3	0%

Turn counts at node 1228 - Fairfield Street / North Western St			
	All Vehicles	HGV	% HGV
North Western St LT	0	0	0%
North Western St RT	0	0	0%
Fairfield St (W) SO	314	1	0%
Fairfield St (W) RT	0	0	0%
Fairfield St (E) LT	0	0	0%
Fairfield St (E) SO	266	0	0%

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	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	55	0	0%
	London Rd (N) SO	394	3	1%
	London Rd (N) RT	155	3	2%
Arm 2	Fairfield St (E) LT	129	0	0%
	Fairfield St (E) SO	275	0	0%
	Fairfield St (E) RT	93	0	0%
Arm 3	London Rd (S) LT	159	0	0%
	London Rd (S) SO	433	1	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	14	1	6%
	Fairfield St (W) SO	277	4	1%
	Fairfield St (W) RT	76	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	% HGV
Arm 1	Station carpark LT	58	0	0%
	Station carpark RT	37	0	0%
Arm 2	Fairfield St (E) SO	465	0	0%
	Fairfield St (E) RT	72	0	0%
Arm 3	Fairfield St (W) LT	47	0	0%
	Fairfield St (W) SO	285	4	1%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St (N) LT	25	0	0%
	Travis St (N) SO	0	0	0%
	Travis St (N) RT	281	0	0%
Arm 2	Fairfield St (E) LT	27	0	0%
	Fairfield St (E) SO	245	0	0%
	Fairfield St (E) RT	47	0	0%
Arm 3	Travis St (S) LT	21	0	0%
	Travis St (S) SO	0	0	0%
	Travis St (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	202	3	2%
	Fairfield St (W) SO	67	0	0%
	Fairfield St (W) RT	66	0	0%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) SO	1360	48	4%
	Ring Rd (N) RT	96	0	0%
Arm 2	Fairfield St (E) LT	1312	28	2%
	Fairfield St (E) SO	212	0	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	52	0	0%
	Ring Rd (S) SO	827	23	3%

	Ring Rd (S) RT	579	19	3%
Arm 4	Fairfield St (W) LT	16	0	0%
	Fairfield St (W) SO	55	0	0%
	Fairfield St (W) RT	45	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	% HGV
Arm 1	Travis St LT	354	0	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downing_Str			
		All Vehicles	HGV	% HGV
Arm 1	London Rd LT	185	0	0%
	London Rd SO	500	3	1%
	London Rd RT	254	0	0%
Arm 2	A57(M) LT	455	13	3%
Arm 3	Downing St LT	319	20	6%
	Downing St SO	270	0	0%
	Downing St RT	24	0	0%
Arm 4	A57(M) LT	321	1	0%
	A57(M) SO	161	4	2%
	A57(M) RT	382	23	6%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	% HGV
Arm 1	London Rd (N) LT	155	5	3%
	London Rd (N) SO	582	6	1%
Arm 2	Store St LT	20	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	% HGV
Arm 1	Ring Rd (N) LT	58	1	1%
	Ring Rd (N) SO	936	11	1%
	Ring Rd (N) RT	36	0	0%
Arm 2	Old Mill St LT	371	4	1%
	Old Mill St SO	97	0	0%
	Old Mill St RT	201	13	6%
Arm 3	Ring Rd (S) LT	12	0	0%
	Ring Rd (S) SO	1315	8	1%
	Ring Rd (S) RT	130	4	3%
Arm 4	Store St LT	1	0	0%
	Store St SO	15	0	0%
	Store St RT	50	0	0%

	Turn_counts_at_node_1224-A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancellor_Lar			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow LT	68	0	0%
	Pin Mill Brow SO	420	0	0%
	Pin Mill Brow RT	0	0	0%
Arm 2	Ashton Old Rd LT	83	0	0%
	Ashton Old Rd SO	1107	28	2%

	Ashton Old Rd RT	168	5	3%
Arm 3	Chancellor Ln LT	427	1	0%
	Chancellor Ln SO	584	0	0%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	9	0	5%
	Fairfield St SO	535	18	3%
	Fairfield St RT	84	1	1%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	% HGV
Arm 1	Pin Mill Brow (N) SO	494	0	0%
	Pin Mill Brow (N) RT	1354	44	3%
Arm 2	Pin Mill Brow (S) LT	99	5	5%
	Pin Mill Brow (S) SO	661	0	0%
Arm 3	Ring Road SO	840	22	3%

	Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)			
		All Vehicles	HGV	% HGV
Arm 1	Great Ancoats St (N) SO	967	24	2%
	Great Ancoats St (N) RT	484	0	0%
Arm 2	Great Ancoats St (S) LT	90	6	7%
	Great Ancoats St (S) SO	1228	12	1%
Arm 3	Adair St LT	186	0	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	700	14	2%
A6042 (W) LT	404	16	4%
A665 Cheetham Hill Rd (N) SO	535	9	2%
A665 Cheetham Hill Rd (N) RT	571	25	4%
Ring Road (S) LT	1010	25	2%
Ring Road (S) SO)	173	0	0%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	84	0	0%
Shude Hill LT	128	0	0%
Swan St RT	171	4	2%
Swan St LT	163	6	4%
Swan ST SO	1094	25	2%
Rochdale Rd (N) SO	469	1	0%
Rochdale Rd (N) RT	270	2	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	24	2	10%
Ring Road SO	916	18	2%
Ring Road RT	218	0	0%
Oldham Road LT	1159	14	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	67	2	3%
Great Ancoats St (E) LT	184	1	1%
Great Ancoats St (E) SO	1015	18	2%
Great Ancoats St (W) SO	1067	11	1%
Great Ancoats St (W) RT	270	3	1%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV
Great Ancoats St (E) RT	4	0	0%
Great Ancoats St (E) SO	1232	20	2%
Great Ancoats St (W) LT	109	0	0%
Great Ancoats St (W) SO	928	11	1%
Central Retail Park LT	0	0	0%
Central Retail Park RT	3	0	0%
Laystall St SO	0	0	0%
Laystall St RT	163	1	0%
Laystall St LT	12	0	0%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	286	0	0%
Ring Road (E) SO	1228	20	2%
Ring Road (W) SO	1037	12	1%
Ring Road (W) RT	48	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	46	0	0%
Ring Road (W) SO	1307	15	1%
Pollard St LT	142	8	6%
Pollard St RT	116	0	0%
Ring Road (E) RT	76	0	0%
Ring Road (E) SO	1333	12	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	382	14	4%
Hyde Rd (E) LT	149	3	2%
Hyde Rd (E) SO	608	27	4%
Hyde Rd (E) RT	382	1	0%
A665 (N) LT	78	0	0%
A665 (N) SO	265	1	0%
A665 (S) RT	44	0	0%
A665 (S) SO	584	0	0%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	2	0	0%

Higher Ardwick to A6	89	0	0%
Higher Ardwick to Brunswick St	99	1	1%
Higher Ardwick to Ardwick Green	17	0	0%
Higher Ardwick u-turn	5	0	0%
Hyde Rd to A6	4	0	5%
Hyde Rd to Brunswick St	206	3	1%
Hyde Rd to Ardwick Green S	344	21	6%
Hyde Rd to Higher Ardwick	12	0	0%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	58	4	7%
A6 to Ardwick Green S	336	7	2%
A6 to Higher Ardwick	51	0	0%
A6 to Hyde Rd	5	0	0%
A6 u-turn	8	0	0%
Brunswick St to Ardwick Green S	39	0	1%
Brunswick St to Higher Ardwick	154	2	2%
Brunswick St to Hyde Rd	66	1	1%
Brunswick St to A6	64	0	0%
Brunswick St u-turn	5	0	0%
Ardwick Green S to Higher Ardwic	76	7	9%
Ardwick Green S to Hyde Rd	308	13	4%
Ardwick Green S to A6	474	14	3%
Ardwick Green S to Brunswick St	117	2	2%
Ardwick Green S u-turn	18	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	20	0	0%
Portland St SO	84	2	3%
Portland ST RT	17	0	0%
Newton St LT	397	6	2%

Turn counts at node 166z - A6 Piccadilly / Ducie Street			
	All Vehicles	HGV	% HGV
Auburn St SO	215	0	0%
Auburn St RT	108	4	4%
Auburn St LT	188	6	3%
Ducie St LT	81	0	0%
Piccadilly SO	554	7	1%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	122	2	2%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV
Fairfield St (W) SO	377	5	1%
Fairfield St (W) LT	313	10	3%
Fairfield St (E) SO	582	4	1%
Fairfield St (E) RT	9	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	279	9	3%
New Bridge St (E) SO	1081	36	3%
New Bridge St (E) RT	126	2	1%
A56 Great Ducie St (N) LT	230	0	0%
A56 Great Ducie St (N) SO	266	0	0%
A56 Great Ducie St (N) SO	357	26	7%
A56 Great Ducie St (S) RT	81	1	2%
A56 Great Ducie St (S) LT	0	0	0%
A56 Great Ducie St (S) SO	22	0	0%
Trinity Way SO	877	32	4%
Trinity Way RT	82	0	0%
Trinity Way LT	194	16	8%

Turn counts at node 428 - Chapel St / Victoria Bridge St			
	All Vehicles	HGV	% HGV
Victoria Bridge St RT	171	1	1%
Victoria Bridge St LT	4	1	22%
Chapel St (E) LT	456	7	2%
Chapel St (E) LT	47	0	0%
Chapel St (W) SO	103	4	4%
Chapel St (W) RT	86	0	0%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	184	2	1%
Deansgate (S) LT	309	4	1%
Blackfriars St LT	0	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	1	0	0%
St Mary's Gate LT	10	0	0%
St Mary's Gate SO	3	0	0%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	458	8	2%
Deansgate (N) RT	20	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	382	8	2%
Deansgate (S) RT	0	0	0%
Deansgate (S) LT	69	2	3%
Deansgate (N) LT	126	2	1%
Deansgate (N) SO	374	6	2%
Deansgate (N) RT	13	0	0%
Bridge St LT	81	0	0%
Bridge St SO	121	1	1%
John Dalton St LT	104	1	1%
John Dalton St SO	30	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	267	10	4%
Deansgate (S) RT	62	0	0%
Deansgate (S) LT	121	4	4%
Peter St RT	86	0	0%
Peter St LT	86	0	0%
Peter St SO	84	0	0%
Deansgate (N) LT	29	0	0%
Deansgate (N) SO	417	7	2%
Deansgate (N) RT	59	0	0%
Quay St LT	131	0	0%
Quay St SO	189	4	2%
Quay St RT	111	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	381	14	4%
Deansgate (S) RT	229	0	0%
Deansgate (N) LT	199	0	0%
Deansgate (N) SO	537	8	1%
Great Bridgewater St RT	29	0	1%
Great Bridgewater St LT	135	0	0%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	451	13	3%
Deansgate (S) LT	181	0	0%
Deansgate (N) SO	590	6	1%
Deansgate (N) RT	80	2	2%
Liverpool St RT	149	0	0%
Liverpool St LT	160	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West

	All Vehicles	HGV	% HGV
Deansgate (S) SO	475	2	0%
Deansgate (S) RT	337	2	1%
Whitworth St West RT	158	11	7%
Whitworth St West LT	267	2	1%
Deansgate (N) LT	168	2	1%
Deansgate (N) SO	570	5	1%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV
Oxford St (S) SO	185	0	0%
Oxford St (S) LT	88	0	0%
Oxford St (N) SO	291	7	2%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Albion St SO	524	6	1%

Albion St RT	330	0	0%
Albion St LT	129	5	4%
Great Bridgewater St (E) RT	5	0	0%
Great Bridgewater St (E) LT	48	0	0%
Great Bridgewater St (E) SO	53	0	0%
Lower Mosley St LT	19	0	0%
Lower Mosley St SO	147	0	0%
Lower Mosley St RT	39	0	0%
Great Bridgewater St (W) LT	16	0	0%
Great Bridgewater St (W) SO	71	0	0%
Great Bridgewater St (W) RT	24	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	42	0	0%
Albion St (N) SO	116	0	0%
Albion St (N) RT	61	0	0%
Whitworth St West (E) LT	126	0	0%
Whitworth St West (E) SO	216	6	3%
Whitworth St West (E) RT	274	9	3%
Albion St (S) LT	142	7	5%
Albion St (S) SO	519	1	0%
Albion St (S) RT	193	6	3%
Whitworth St West (W) LT	158	2	1%
Whitworth St West (W) SO	186	0	0%
Whitworth St West (W) RT	164	3	2%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	96	0	0%
Portland St (N) SO	254	0	0%
Portland St (N) RT	0	0	0%
Princess St (W) LT	15	0	0%
Princess St (W) SO	39	0	0%
Princess St (W) RT	3	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	413	4	1%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	184	5	3%
Oxford St (N) SO	93	1	2%
Oxford St (N) RT	29	0	0%
Portland St LT	41	0	0%
Portland St SO	98	0	0%
Portland St RT	253	0	0%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	20	0	0%
Oxford St (S) RT	117	0	0%
Chepstow St LT	0	0	0%

Chepstow St SO	118	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	84	1	2%
Oxford St (N) SO	49	0	0%
Whitworth St (E) LT	88	0	0%
Whitworth St (E) SO	381	11	3%
Oxford St (S) LT	164	0	0%
Oxford St (S) SO	127	0	0%
Whitworth St (W) LT	13	0	0%
Whitworth St (W) SO	564	10	2%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	28	0	0%
Princess St (N) SO	33	0	0%
Princess St (N) RT	91	0	0%
Whitworth St (E) LT	132	3	2%
Whitworth St (E) SO	248	0	0%
Whitworth St (E) RT	31	0	0%
Princess St (S) RT	177	6	4%
Princess St (S) LT	176	11	6%
Princess St (S) SO	181	2	1%
Whitworth St (W) LT	294	0	0%
Whitworth St (W) SO	282	8	3%
Whitworth St (W) RT	21	2	8%

Turn counts at node 87 - Whitworth St / Sackville St			
	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	107	0	0%
Whitworth St (E) SO	356	3	1%
Whitworth St (E) RT	140	0	0%
Sackville St (S) LT	54	0	0%
Sackville St (S) SO	187	0	0%
Sackville St (S) RT	215	1	1%
Whitworth St (W) LT	27	0	1%
Whitworth St (W) SO	456	14	3%
Whitworth St (W) RT	1	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	51	0	0%
Trinity Way (N) SO	1035	61	6%
Trinity Way (N) RT	18	0	0%
Blackfriars Rd (E) LT	64	0	0%
Blackfriars Rd (E) SO	6	0	3%

Blackfriars Rd (E) RT	71	0	0%
Trinity Way (S) LT	165	9	5%
Trinity Way (S) SO	991	46	5%
Trinity Way (S) RT	46	5	12%
Blackfriars Rd (W) LT	155	2	1%
Blackfriars Rd (W) SO	251	0	0%
Blackfriars Rd (W) RT	355	26	7%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	51	0	0%
Trinity Way (N) SO	1015	56	6%
Trinity Way (N) RT	325	30	9%
Chapel St (E) LT	92	1	1%
Chapel St (E) SO	211	1	0%
Chapel St (E) RT	1	0	0%
Trinity Way (S) SO	1012	47	5%
Trinity Way (S) RT	226	17	8%
Trinity Way (S) LT	223	0	0%
Chapel St (W) LT	192	13	7%
Chapel St (W) SO	237	0	0%
Chapel St (W) RT	461	7	2%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	822	59	7%
Trinity Way (N) SO	635	3	1%
New Bailey access SO	0	0	0%
New Bailey access RT	11	0	0%
New Bailey access LT	0	0	0%
Irwell St RT	0	0	0%
Irwell St LT	37	0	0%
Irwell St SO	373	0	0%
Trinity Way (S) SO	10	0	0%
Trinity Way (S) RT	174	6	3%
Trinity Way (S) LT	1000	0	0%

Turn_counts_at_node_1663,1150z,1028-A6042_Trinity_Way/A57_Regent_Road/A57_Dawson_St			
	All Vehicles	HGV	% HGV
Trinity St (N) LT	713	10	1%
Trinity St (N) SO	19	0	0%
Trinity St (N) RT	401	32	8%
Dawson St (E) LT	10	0	0%
Dawson St (E) SO	1776	15	1%
Dawson St (E) RT	819	42	5%
Water St (S) LT	32	0	0%
Water St (S) SO	14	0	0%
Water St (S) RT	21	0	0%

Regent Rd (W) LT	279	20	7%
Regent Rd (W) SO	1491	42	3%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (	134	6	4%
A57(M) EB off slip to A57(M) EB o	97	3	3%
A57(M) EB off slip to Chorlton Rd	134	7	5%
A57(M) EB off slip to Chester Rd (S	122	13	11%
A57(M) EB off slip to A57(M) WB (	0	0	0%
Chester Rd (N) to A57(M) EB on sl	46	0	0%
Chester Rd (N) to Chorlton Rd	57	1	2%
Chester Rd (N) to Chester Road (S	0	0	0%
Chester Rd (N) to A57(M) WB on s	332	0	0%
Chester Rd (N) to Chester Road (N	0	0	0%
A57(M) WB off slip to Chorlton Rd	156	2	1%
A57(M) WB off slip to Chester Rd	647	19	3%
A57(M) WB off slip to A57(M) WB	17	0	0%
A57(M) WB off slip to Chester Rd	164	0	0%
A57(M) WB off slip to A57(M) EB (	118	1	1%
Chorlton Rd to Chester Rd (S)	13	1	8%
Chorlton Rd to A57(M) WB on slip	61	11	17%
Chorlton Rd to Chester Rd (N)	47	1	2%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on s	158	20	13%
Chester Rd (S) to Chester Rd (N) v	104	1	1%
Chester Rd (S) to A57(M) EB on sli	383	20	5%
Chester Rd (S) to Chorlton Rd	23	2	10%
Chester Rd (S) to Chester Rd (S)	23	2	10%

Chester Road (N) SO	523	1	0%
Chester Road (S) SO	787	1	0%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Medlock St to A5103 link EB	12	0	0%
Medlock St to Princess Rd	323	2	1%
Medlock St to A57(M) WB on slip	110	0	0%
Medlock St to Medlock St	0	0	0%
A5103 link WB to Princess Rd	734	34	5%
A5103 link WB to A57(M) WB on s	176	1	0%
A5103 link WB to Medlock St	107	2	1%
A5103 link WB to A5103 link EB	0	0	0%
Princess Rd to A57(M) WB on slip	483	4	1%
Princess Rd to Medlock St	987	15	2%
Princess Rd to A5103 link EB	683	24	3%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	70	1	2%
A57(M) EB off slip to A5103 link E	168	0	0%

A57(M) EB off slip to Princess Rd	310	0	0%
A57(M) EB off slip to A57(M) WB	24	0	0%

A57 (M) WB	2018	45	2%
A57 (M) EB	2413	43	2%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	33	0	0%
Cambridge St to Higher Cambridg	27	0	0%
Cambridge St to A5103 link WB	134	0	0%
Cambridge St to Cambridge St	0	0	0%
A57(M) WB off slip to Higher Cam	414	6	2%
A57(M) WB off slip to A5103 link W	682	35	5%
A57(M) WB off slip to Cambridge	146	3	2%
A57(M) WB off slip to A57(M) EB	89	4	4%
Higher Cambridge St to A5103 link	195	2	1%
Higher Cambridge St to Cambridg	405	5	1%
Higher Cambridge St to A57(M) EB	505	9	2%
Higher Cambridge St to Higher Ca	0	0	0%
A5103 link EB to Cambridge St	277	4	1%
A5103 link EB to A57(M) EB on slip	446	20	4%
A5103 link EB to Higher Cambridg	143	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126,			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	1	0	0%
A34 (N) SO	278	4	1%
Brook St to A34 (S)	427	4	1%
A34 (N) within junction to A57(M)	141	0	0%
A34(S) to A57(M) Westbound	879	12	1%
A34 (S) to SO	960	24	3%
A57(M) EB to Sackville Street	284	3	1%
A57(M) EB to Brook Street	504	6	1%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West			
	All Vehicles	HGV	% HGV
Oxford Road (N) LT	0	0	0%
Oxford Road (N) SO	70	0	0%
Oxford Road (N) RT	23	0	0%
Booth St East LT	0	0	0%
Booth St East SO	343	6	2%
Booth St East RT	0	0	0%
Oxford Road (S) LT	15	0	0%
Oxford Road (S) SO	99	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	23	0	0%
Booth St West SO	454	1	0%
Booth St West RT	13	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	266	0	0%
Upper Brook St (N) SO	791	17	2%
A5184 LT	18	2	14%
A5184 RT	495	6	1%
Upper Brook St (S) SO	1674	46	3%

Turn counts at node 1228 - Fairfield Street / North Western St			
	All Vehicles	HGV	% HGV
North Western St LT	2	0	0%
North Western St RT	26	0	0%
Fairfield St (W) SO	88	0	0%
Fairfield St (W) RT	4	0	0%
Fairfield St (E) LT	31	0	0%
Fairfield St (E) SO	322	0	0%

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	Turn_counts_at_node_155-A6_London_Road/B6469_Fairfield_Street (1)			
		All Vehicles	HGV	%HGV
Arm 1	London Rd (N) LT	42	0	0%
	London Rd (N) SO	405	0	0%
	London Rd (N) RT	207	1	0%
Arm 2	Fairfield St (E) LT	126	0	0%
	Fairfield St (E) SO	303	0	0%
	Fairfield St (E) RT	122	0	0%
Arm 3	London Rd (S) LT	87	0	0%
	London Rd (S) SO	168	0	0%
	London Rd (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	1	0	0%
	Fairfield St (W) SO	435	0	0%
	Fairfield St (W) RT	196	0	0%

	Turn_counts_at_node_215-B6469_Fairfield_Street/Station_carpark (2)			
		All Vehicles	HGV	%HGV
Arm 1	Station carpark LT	13	0	0%
	Station carpark RT	104	0	0%
Arm 2	Fairfield St (E) SO	461	0	0%
	Fairfield St (E) RT	20	0	0%
Arm 3	Fairfield St (W) LT	37	0	0%
	Fairfield St (W) SO	441	0	0%

	Turn_counts_at_node_188-B6469_Fairfield_Street/Travis_Street (4)			
		All Vehicles	HGV	%HGV
Arm 1	Travis St (N) LT	52	1	1%
	Travis St (N) SO	0	0	0%
	Travis St (N) RT	197	0	0%
Arm 2	Fairfield St (E) LT	45	0	0%
	Fairfield St (E) SO	240	0	0%
	Fairfield St (E) RT	33	0	0%
Arm 3	Travis St (S) LT	51	0	0%
	Travis St (S) SO	0	0	0%
	Travis St (S) RT	0	0	0%
Arm 4	Fairfield St (W) LT	104	0	0%
	Fairfield St (W) SO	337	0	0%
	Fairfield St (W) RT	11	0	0%

	Turn_counts_at_node_1212-A635_Ring_Road/B6469_Fairfield_Street (9)			
		All Vehicles	HGV	%HGV
Arm 1	Ring Rd (N) SO	1003	7	1%
	Ring Rd (N) RT	114	0	0%
Arm 2	Fairfield St (E) LT	591	6	1%
	Fairfield St (E) SO	185	0	0%
	Fairfield St (E) RT	0	0	0%
Arm 3	Ring Rd (S) LT	39	0	0%
	Ring Rd (S) SO	618	5	1%

	Ring Rd (S) RT	629	12	2%
Arm 4	Fairfield St (W) LT	83	1	1%
	Fairfield St (W) SO	278	0	0%
	Fairfield St (W) RT	68	0	0%

	Turn_counts_at_node_1389-A6_London_Road/Travis_Street (11)			
		All Vehicles	HGV	%HGV
Arm 1	Travis St LT	515	1	0%

	Turn_counts_at_node_1193z,1194z,1195-A57(M)_Ring_Road/A6_London_Road/A6_Downi			
		All Vehicles	HGV	%HGV
Arm 1	London Rd LT	76	0	0%
	London Rd SO	855	0	0%
	London Rd RT	278	1	0%
Arm 2	A57(M) LT	299	2	1%
Arm 3	Downing St LT	199	4	2%
	Downing St SO	169	0	0%
	Downing St RT	20	0	0%
Arm 4	A57(M) LT	82	0	0%
	A57(M) SO	48	0	0%
	A57(M) RT	406	15	4%

	Turn_counts_at_node_170-A6_London_Road/Store_Street (19)			
		All Vehicles	HGV	%HGV
Arm 1	London Rd (N) LT	76	0	0%
	London Rd (N) SO	567	1	0%
Arm 2	Store St LT	78	0	0%

	Turn_counts_at_node_1243-A665_Ring_Road/Old_Mill_Street/Store_Street (21)			
		All Vehicles	HGV	%HGV
Arm 1	Ring Rd (N) LT	62	4	6%
	Ring Rd (N) SO	1230	3	0%
	Ring Rd (N) RT	37	0	0%
Arm 2	Old Mill St LT	121	1	1%
	Old Mill St SO	14	0	0%
	Old Mill St RT	67	0	0%
Arm 3	Ring Rd (S) LT	19	0	0%
	Ring Rd (S) SO	1047	6	1%
	Ring Rd (S) RT	237	3	1%
Arm 4	Store St LT	15	0	0%
	Store St SO	105	0	0%
	Store St RT	63	0	0%

	Turn_counts_at_node_1224-A665_Pin_Mill_Brow/A635_Ashton_Old_Road/A665_Chancell			
		All Vehicles	HGV	%HGV
Arm 1	Pin Mill Brow LT	180	0	0%
	Pin Mill Brow SO	348	0	0%
	Pin Mill Brow RT	0	0	0%

Arm 2	Ashton Old Rd LT	134	0	0%
	Ashton Old Rd SO	450	6	1%
	Ashton Old Rd RT	88	1	2%
Arm 3	Chancellor Ln LT	325	0	0%
	Chancellor Ln SO	613	6	1%
	Chancellor Ln RT	0	0	0%
Arm 4	Fairfield St LT	14	0	1%
	Fairfield St SO	682	12	2%
	Fairfield St RT	191	0	0%

	Turn_counts_at_node_1215; 1229-A665_Pin_Mill_Brow/A635_Ring_Road (23)			
		All Vehicles	HGV	%HGV
Arm 1	Pin Mill Brow (N) SO	531	1	0%
	Pin Mill Brow (N) RT	1006	5	1%
Arm 2	Pin Mill Brow (S) LT	132	1	1%
	Pin Mill Brow (S) SO	586	6	1%
Arm 3	Ring Road SO	698	6	1%

	Turn_counts_at_node_1239-A665_Great_Ancoats_Street/Adair_Street (24)			
		All Vehicles	HGV	%HGV
Arm 1	Great Ancoats St (N) SO	1233	4	0%
	Great Ancoats St (N) RT	140	0	0%
Arm 2	Great Ancoats St (S) LT	40	0	0%
	Great Ancoats St (S) SO	893	7	1%
Arm 3	Adair St LT	413	2	0%
	Adair St RT	0	0	0%

Turn counts at node 931 / 930 -Cheetham Hill Rd / Ring Road			
	All Vehicles	HGV	% HGV
A6042 (W) RT	750	10	1%
A6042 (W) LT	363	4	1%
A665 Cheetham Hill Rd (N) SO	327	1	0%
A665 Cheetham Hill Rd (N) RT	477	7	1%
Ring Road (S) LT	1014	6	1%
Ring Road (S) SO)	297	4	1%

Turn counts at node 541 - Ring Road_Rochdale Road			
	All Vehicles	HGV	% HGV
Shude Hill SO	256	1	0%
Shude Hill LT	114	3	2%
Swan St RT	181	2	1%
Swan St LT	116	0	0%
Swan ST SO	776	5	1%
Rochdale Rd (N) SO	202	0	0%
Rochdale Rd (N) RT	356	3	1%

Turn counts at node 612-Ring Road / Oldham Road			
	All Vehicles	HGV	% HGV
Ring Road LT	26	0	0%
Ring Road SO	778	6	1%

Ring Road RT	721	0	0%
Oldham Road LT	1215	8	1%

Turn counts at node 614- Ring Road / Netwton Street			
	All Vehicles	HGV	% HGV
Newton St LT	101	0	0%
Great Ancoats St (E) LT	39	0	0%
Great Ancoats St (E) SO	1128	6	1%
Great Ancoats St (W) SO	1158	7	1%
Great Ancoats St (W) RT	137	1	1%

Turn counts at node 1247- Ring Road / Central Retail Park			
	All Vehicles	HGV	% HGV
Great Ancoats St (E) RT	50	0	0%
Great Ancoats St (E) SO	1013	6	1%
Great Ancoats St (W) LT	17	0	0%
Great Ancoats St (W) SO	1112	7	1%
Central Retail Park LT	13	0	0%
Central Retail Park RT	54	0	0%
Laystall St SO	19	0	0%
Laystall St RT	236	0	0%
Laystall St LT	159	0	0%

Turn counts at node 1245 - Ring Road_Ducie Street			
	All Vehicles	HGV	% HGV
Ring Road (E) LT	46	0	0%
Ring Road (E) SO	1069	6	1%
Ring Road (W) SO	1336	7	1%
Ring Road (W) RT	25	0	0%

Turn counts at node 1241- Ring Road / Pollard Street			
	All Vehicles	HGV	% HGV
Ring Road (W) LT	108	0	0%
Ring Road (W) SO	1281	4	0%
Pollard St LT	91	0	0%
Pollard St RT	60	0	0%
Ring Road (E) RT	65	0	0%
Ring Road (E) SO	1244	9	1%

Turn counts at node 1322- Hyde Road / A665			
	All Vehicles	HGV	% HGV
Hyde Rd (W) SO	827	14	2%
Hyde Rd (E) LT	93	0	0%
Hyde Rd (E) SO	436	6	1%
Hyde Rd (E) RT	292	0	0%
A665 (N) LT	240	0	0%
A665 (N) SO	331	0	0%
A665 (S) RT	66	0	0%
A665 (S) SO	384	4	1%

Turn counts (composite) at roundabout node 1318a - Hyde Road / A6 Roundabout			
	All Vehicles	HGV	% HGV
Higher Ardwick to Hyde Rd	87	0	0%
Higher Ardwick to A6	215	0	0%
Higher Ardwick to Brunswick St	160	0	0%
Higher Ardwick to Ardwick Green S	22	0	0%
Higher Ardwick u-turn	0	0	0%
Hyde Rd to A6	11	0	0%
Hyde Rd to Brunswick St	118	0	0%
Hyde Rd to Ardwick Green S	269	5	2%
Hyde Rd to Higher Ardwick	18	0	0%
Hyde Rd u-turn	0	0	0%
A6 to Brunswick St	39	0	1%
A6 to Ardwick Green S	219	1	0%
A6 to Higher Ardwick	126	0	0%
A6 to Hyde Rd	0	0	0%
A6 u-turn	1	0	0%
Brunswick St to Ardwick Green S	66	0	0%
Brunswick St to Higher Ardwick	272	0	0%
Brunswick St to Hyde Rd	227	1	1%
Brunswick St to A6	36	0	1%
Brunswick St u-turn	9	0	0%
Ardwick Green S to Higher Ardwic	95	0	0%
Ardwick Green S to Hyde Rd	504	11	2%
Ardwick Green S to A6	348	7	2%
Ardwick Green S to Brunswick St	64	0	0%
Ardwick Green S u-turn	11	0	0%

Turn counts at node 0 - Newton Street / Piccadilly			
	All Vehicles	HGV	% HGV
Piccadilly (S) LT	18	0	0%
Portland St SO	111	0	0%
Portland ST RT	12	0	0%
Newton St LT	254	1	0%

Turn counts at node 166z - A6 Piccadilly / Ducie Street			
	All Vehicles	HGV	% HGV
Auburn St SO	243	0	0%
Auburn St RT	123	0	0%
Auburn St LT	142	0	0%
Ducie St LT	92	0	0%
Piccadilly SO	442	1	0%

Turn counts at node 6 - Portland Street / Aytoun Street			
	All Vehicles	HGV	% HGV
Aytoun St RT	143	0	0%

Turn counts at node 153 - Fairfield Street / A6			
	All Vehicles	HGV	% HGV

Fairfield St (W) SO	637	0	0%
Fairfield St (W) LT	199	0	0%
Fairfield St (E) SO	580	1	0%
Fairfield St (E) RT	8	0	0%

Turn counts at node 926 - A56 / New Bridge Street / Trinity Way			
	All Vehicles	HGV	% HGV
New Bridge St (E) LT	356	3	1%
New Bridge St (E) SO	908	10	1%
New Bridge St (E) RT	121	0	0%
A56 Great Ducie St (N) LT	278	0	0%
A56 Great Ducie St (N) SO	137	0	0%
A56 Great Ducie St (N) SO	316	11	3%
A56 Great Ducie St (S) RT	153	2	1%
A56 Great Ducie St (S) LT	109	0	0%
A56 Great Ducie St (S) SO	284	0	0%
Trinity Way SO	709	11	2%
Trinity Way RT	33	0	0%
Trinity Way LT	339	7	2%

Turn counts at node 428 - Chapel St / Victoria Bridge St			
	All Vehicles	HGV	% HGV
Victoria Bridge St RT	169	0	0%
Victoria Bridge St LT	38	0	0%
Chapel St (E) LT	443	4	1%
Chapel St (E) LT	58	0	0%
Chapel St (W) SO	157	1	0%
Chapel St (W) RT	90	2	2%

Turn counts at node 398 - St Mary's Gate / Deansgate			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	210	0	0%
Deansgate (S) LT	116	1	1%
Blackfriars St LT	0	0	0%
Blackfriars St SO	0	0	0%
Blackfriars St RT	0	0	0%
St Mary's Gate RT	55	0	0%
St Mary's Gate LT	26	0	0%
St Mary's Gate SO	24	0	1%
Deansgate (N) LT	0	0	0%
Deansgate (N) SO	479	6	1%
Deansgate (N) RT	43	0	0%

Turn counts at node 338 - Deansgate / John Dalton St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	157	1	0%
Deansgate (S) RT	0	0	0%
Deansgate (S) LT	75	0	0%
Deansgate (N) LT	94	0	0%
Deansgate (N) SO	524	7	1%

Deansgate (N) RT	7	0	0%
Bridge St LT	106	1	1%
Bridge St SO	139	0	0%
John Dalton St LT	213	2	1%
John Dalton St SO	27	0	0%

Turn counts at node 303 - Peter Street			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	138	0	0%
Deansgate (S) RT	15	0	0%
Deansgate (S) LT	37	0	0%
Peter St RT	60	0	0%
Peter St LT	167	0	0%
Peter St SO	76	1	1%
Deansgate (N) LT	81	0	0%
Deansgate (N) SO	516	7	1%
Deansgate (N) RT	98	2	2%
Quay St LT	28	0	0%
Quay St SO	133	1	1%
Quay St RT	85	1	1%

Turn counts at node 260 - Deansgate / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	223	0	0%
Deansgate (S) RT	115	0	0%
Deansgate (N) LT	129	0	0%
Deansgate (N) SO	697	7	1%
Great Bridgewater St RT	14	0	0%
Great Bridgewater St LT	268	1	1%

Turn counts at node 259 - Deansgate / Liverpool St			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	233	0	0%
Deansgate (S) LT	53	0	0%
Deansgate (N) SO	887	7	1%
Deansgate (N) RT	78	1	2%
Liverpool St RT	119	1	1%
Liverpool St LT	105	0	0%

Turn counts at node 256 - Deansgate / Whitworth St West			
	All Vehicles	HGV	% HGV
Deansgate (S) SO	182	0	0%
Deansgate (S) RT	225	0	0%
Whitworth St West RT	109	0	0%
Whitworth St West LT	286	0	0%
Deansgate (N) LT	173	3	2%
Deansgate (N) SO	827	6	1%

Turn counts at node 284 - A34 Oxford St / Lower Mosley St			
	All Vehicles	HGV	% HGV

Oxford St (S) SO	174	1	1%
Oxford St (S) LT	45	0	0%
Oxford St (N) SO	284	1	0%

Turn counts at node 261 - Lower Mosley St / Great Bridgewater St			
	All Vehicles	HGV	% HGV
Albion St SO	237	0	0%
Albion St RT	193	0	0%
Albion St LT	156	0	0%
Great Bridgewater St (E) RT	3	0	0%
Great Bridgewater St (E) LT	103	0	0%
Great Bridgewater St (E) SO	190	0	0%
Lower Mosley St LT	17	0	0%
Lower Mosley St SO	109	1	1%
Lower Mosley St RT	32	0	0%
Great Bridgewater St (W) LT	14	0	0%
Great Bridgewater St (W) SO	87	0	0%
Great Bridgewater St (W) RT	163	0	0%

Turn counts at node 238 - Whitworth St West			
	All Vehicles	HGV	% HGV
Albion St (N) LT	97	0	0%
Albion St (N) SO	221	2	1%
Albion St (N) RT	56	0	0%
Whitworth St West (E) LT	70	0	0%
Whitworth St West (E) SO	196	0	0%
Whitworth St West (E) RT	212	0	0%
Albion St (S) LT	163	0	0%
Albion St (S) SO	289	0	0%
Albion St (S) RT	120	0	0%
Whitworth St West (W) LT	85	2	3%
Whitworth St West (W) SO	101	0	0%
Whitworth St West (W) RT	200	0	0%

Turn counts at node 40 - A34_Princess St / A5103_Portland St			
	All Vehicles	HGV	% HGV
Portland St (N) LT	199	0	0%
Portland St (N) SO	378	2	0%
Portland St (N) RT	0	0	0%
Princess St (W) LT	9	0	0%
Princess St (W) SO	133	0	0%
Princess St (W) RT	42	0	0%
Portland St (S) LT	0	0	0%
Portland St (S) SO	439	0	0%
Portland St (S) RT	0	0	0%

Turn counts at node 67 - A5103_Portland St / A34_Oxford St / Chepstow St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	119	0	0%
Oxford St (N) SO	149	2	1%

Oxford St (N) RT	31	0	0%
Portland St LT	78	0	0%
Portland St SO	239	0	0%
Portland St RT	203	2	1%
Oxford St (S) LT	0	0	0%
Oxford St (S) SO	13	0	0%
Oxford St (S) RT	99	0	0%
Chepstow St LT	9	0	0%
Chepstow St SO	229	0	0%
Chepstow St RT	0	0	0%

Turn counts at node 75 - B6469_Whitworth St / A34_Oxford St			
	All Vehicles	HGV	% HGV
Oxford St (N) LT	161	1	1%
Oxford St (N) SO	61	0	0%
Whitworth St (E) LT	81	0	0%
Whitworth St (E) SO	342	0	0%
Oxford St (S) LT	169	0	0%
Oxford St (S) SO	98	0	0%
Whitworth St (W) LT	10	0	0%
Whitworth St (W) SO	394	0	0%

Turn counts at node 85 - B6469_Whitworth St / A34_Princess St			
	All Vehicles	HGV	% HGV
Princess St (N) LT	94	0	0%
Princess St (N) SO	220	0	0%
Princess St (N) RT	118	0	0%
Whitworth St (E) LT	120	1	1%
Whitworth St (E) SO	204	0	0%
Whitworth St (E) RT	7	0	0%
Princess St (S) RT	141	0	0%
Princess St (S) LT	87	0	0%
Princess St (S) SO	213	0	0%
Whitworth St (W) LT	53	0	0%
Whitworth St (W) SO	355	0	0%
Whitworth St (W) RT	130	2	1%

Turn counts at node 87 - Whitworth St / Sackville St			
	All Vehicles	HGV	% HGV
Sackville St (N) LT	0	0	0%
Sackville St (N) SO	0	0	0%
Sackville St (N) RT	0	0	0%
Whitworth St (E) LT	29	0	0%
Whitworth St (E) SO	306	1	0%
Whitworth St (E) RT	236	0	0%
Sackville St (S) LT	28	0	0%
Sackville St (S) SO	71	0	0%
Sackville St (S) RT	207	0	0%
Whitworth St (W) LT	22	0	0%
Whitworth St (W) SO	565	0	0%

Whitworth St (W) RT	2	0	0%

Turn counts at node 922 - A6042_Trinty Way / Blackfriars			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	5	0	0%
Trinity Way (N) SO	890	10	1%
Trinity Way (N) RT	275	11	4%
Blackfriars Rd (E) LT	175	1	1%
Blackfriars Rd (E) SO	303	0	0%
Blackfriars Rd (E) RT	52	0	0%
Trinity Way (S) LT	566	1	0%
Trinity Way (S) SO	1016	17	2%
Trinity Way (S) RT	87	0	0%
Blackfriars Rd (W) LT	22	0	0%
Blackfriars Rd (W) SO	48	0	0%
Blackfriars Rd (W) RT	47	1	2%

Turn counts at node 422 - Trinty Way / Chapel St			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	19	0	0%
Trinity Way (N) SO	750	9	1%
Trinity Way (N) RT	419	4	1%
Chapel St (E) LT	110	3	3%
Chapel St (E) SO	244	0	0%
Chapel St (E) RT	21	0	0%
Trinity Way (S) SO	1213	10	1%
Trinity Way (S) RT	109	1	1%
Trinity Way (S) LT	197	0	0%
Chapel St (W) LT	491	9	2%
Chapel St (W) SO	115	0	0%
Chapel St (W) RT	209	0	0%

Turn counts at node 955 - Trinity Way / Irwell Street			
	All Vehicles	HGV	% HGV
Trinity Way (N) LT	0	0	0%
Trinity Way (N) RT	923	13	1%
Trinity Way (N) SO	232	0	0%
New Bailey access SO	50	1	2%
New Bailey access RT	64	0	0%
New Bailey access LT	13	0	1%
Irwell St RT	0	0	0%
Irwell St LT	136	2	2%
Irwell St SO	406	0	0%
Trinity Way (S) SO	11	0	0%
Trinity Way (S) RT	71	0	0%
Trinity Way (S) LT	968	10	1%

Turn_counts_at_node_1663,1150z,1028-A6042_Trinity_Way/A57_Regent_Road/A57_Daws			
	All Vehicles	HGV	% HGV

Trinity St (N) LT	672	20	3%
Trinity St (N) SO	15	0	0%
Trinity St (N) RT	307	7	2%
Dawson St (E) LT	21	0	0%
Dawson St (E) SO	1564	17	1%
Dawson St (E) RT	703	4	1%
Water St (S) LT	5	0	0%
Water St (S) SO	3	0	0%
Water St (S) RT	3	0	0%
Regent Rd (W) LT	218	6	3%
Regent Rd (W) SO	1500	10	1%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
A57(M) EB off slip to Chester Rd (N	91	0	0%
A57(M) EB off slip to A57(M) EB on	56	2	3%
A57(M) EB off slip to Chorlton Rd	229	5	2%
A57(M) EB off slip to Chester Rd (S	243	6	2%
A57(M) EB off slip to A57(M) WB o	0	0	0%
Chester Rd (N) to A57(M) EB on sli	161	1	1%
Chester Rd (N) to Chorlton Rd	171	0	0%
Chester Rd (N) to Chester Road (S)	6	0	0%
Chester Rd (N) to A57(M) WB on s	374	2	0%
Chester Rd (N) to Chester Road (N	0	0	0%
A57(M) WB off slip to Chorlton Ro	167	0	0%
A57(M) WB off slip to Chester Rd (	123	0	0%
A57(M) WB off slip to A57(M) WB	225	0	0%
A57(M) WB off slip to Chester Rd (	16	0	0%
A57(M) WB off slip to A57(M) EB o	16	0	0%
Chorlton Rd to Chester Rd (S)	4	0	0%
Chorlton Rd to A57(M) WB on slip	65	2	3%
Chorlton Rd to Chester Rd (N)	8	0	0%
Chorlton Rd to A57(M) EB on slip	0	0	0%
Chorlton Rd to Chorlton Rd	0	0	0%
Chester Rd (S) to A57(M) WB on sl	299	0	0%
Chester Rd (S) to Chester Rd (N) vi	58	0	0%
Chester Rd (S) to A57(M) EB on sli	379	9	2%
Chester Rd (S) to Chorlton Rd	12	0	0%
Chester Rd (S) to Chester Rd (S)	12	0	0%

Chester Road (N) SO	669	5	1%
Chester Road (S) SO	344	0	0%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Medlock St to A5103 link EB	36	0	0%
Medlock St to Princess Rd	518	4	1%
Medlock St to A57(M) WB on slip	21	1	5%
Medlock St to Medlock St	0	0	0%

A5103 link WB to Princess Rd	331	8	2%
A5103 link WB to A57(M) WB on s	288	0	0%
A5103 link WB to Medlock St	99	0	0%
A5103 link WB to A5103 link EB	0	0	0%
Princess Rd to A57(M) WB on slip	235	1	0%
Princess Rd to Medlock St	558	1	0%
Princess Rd to A5103 link EB	256	5	2%
Princess Rd to Princess Rd	0	0	0%
A57(M) EB off slip to Medlock St	69	0	0%
A57(M) EB off slip to A5103 link EB	125	0	0%
A57(M) EB off slip to Princess Rd	413	2	0%
A57(M) EB off slip to A57(M) WB c	12	0	0%

A57 (M) WB	1601	28	2%
A57 (M) EB	1427	14	1%

Turn counts (composite) at			
	All Vehicles	HGV	% HGV
Cambridge St to A57(M) EB on slip	123	1	1%
Cambridge St to Higher Cambridge	172	0	0%
Cambridge St to A5103 link WB	37	0	0%
Cambridge St to Cambridge St	6	0	0%
A57(M) WB off slip to Higher Cam	441	2	0%
A57(M) WB off slip to A5103 link V	353	8	2%
A57(M) WB off slip to Cambridge S	63	0	0%
A57(M) WB off slip to A57(M) EB c	79	0	1%
Higher Cambridge St to A5103 link	335	0	0%
Higher Cambridge St to Cambridge	133	0	0%
Higher Cambridge St to A57(M) EB	126	1	1%
Higher Cambridge St to Higher Car	0	0	0%
A5103 link EB to Cambridge St	122	0	0%
A5103 link EB to A57(M) EB on slip	208	5	2%
A5103 link EB to Higher Cambridge	87	0	0%
A5103 link EB to A5103 link WB	0	0	0%

Turn counts at nodes 38, 126,			
	All Vehicles	HGV	% HGV
A34 (N) to Brook St	15	0	0%
A34 (N) SO	724	3	0%
Brook St to A34 (S)	232	8	3%
A34 (N) within junction to A57(M)	188	0	0%
A34(S) to A57(M) Westbound	623	6	1%
A34 (S) to SO	504	0	0%
A57(M) EB to Sackville Street	94	0	0%
A57(M) EB to Brook Street	266	8	3%

Turn counts at node 98 - Oxford Road / Booth Street East / Booth Street West			
	All Vehicles	HGV	% HGV
Oxford Road (N) LT	0	0	0%
Oxford Road (N) SO	88	0	0%

Oxford Road (N) RT	24	0	0%
Booth St East LT	0	0	0%
Booth St East SO	434	0	0%
Booth St East RT	0	0	0%
Oxford Road (S) LT	14	0	0%
Oxford Road (S) SO	92	0	0%
Oxford Road (S) RT	0	0	0%
Booth St West LT	23	0	0%
Booth St West SO	436	1	0%
Booth St West RT	11	0	0%

Turn counts at node 381, 629, 639 - A34 Upper Brook Street / A5184 Plymouth Grove			
	All Vehicles	HGV	% HGV
Upper Brook St (N) LT	560	6	1%
Upper Brook St (N) SO	906	9	1%
A5184 LT	38	1	2%
A5184 RT	278	3	1%
Upper Brook St (S) SO	976	3	0%

Turn counts at node 1228 - Fairfield Street / North Western St			
	All Vehicles	HGV	% HGV
North Western St LT	6	0	0%
North Western St RT	40	0	0%
Fairfield St (W) SO	386	1	0%
Fairfield St (W) RT	2	0	0%
Fairfield St (E) LT	12	0	0%
Fairfield St (E) SO	325	0	0%

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Appendix 7.2 Framework Travel Plan

BUROHAPPOLD ENGINEERING

Mayfield, Manchester

Framework Travel Plan

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4 October 2019

02

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Revision	Description	Issued by	Date	Checked
00	Draft Issue	NFM	06/09/19	CM
01	Final Draft Issue	NFM	24/08/19	CM
02	Final Issue	NFM	04/10/19	CM

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Date	**04/10/19**

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Figure 1.1 Site Location **6**

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1 Introduction

1.1 Background

1.1.1 BuroHappold have prepared this Framework Travel Plan on behalf of the Mayfield Development Partnership LP (the Applicant) for the Mayfield site in Manchester city centre.

1.1.2 The Mayfield Strategic Regeneration Framework (Mayfield SRF, the Site) sets out the design principles for the redevelopment of the Site, which lies to the south of Fairfield Street in Manchester city centre, in close proximity to Piccadilly mainline railway station. The Mayfield SRF area is bounded by Fairfield Street to the north; Temperance Street to the north-east; the Mancunian Way Ring Road (A635) to the south; and Baring Street / London Road (A6) to the west.

1.1.3 The maximum Mayfield SRF land use parameters are shown in Table 1.1.

Table 1.1 Mayfield SRF - Proposed Land Use Schedule

Land Use	Quantum
Commercial	154,800sqm GEA
Retail / Leisure	32,300sqm GEA
Hotel	650 rooms
Residential	1,500 units
Parking	700 spaces

1.1.4 Phase 1 of the development comprises the maximum land use quanta set out in Table 1.2.

Table 1.2 Phase 1 Proposals – Maximum Quantum

Land Use	Maximum Quantum
B1 Office - Baring Street Office 1	9,987sqm GEA
B1 Office - Baring Street Office 2	31,000sqm GEA
Baring Street Multi-Storey Car Park (MSCP)	543

1.1.5 Figure 1.1 shows the location of the wider SRF together with Phase 1 within the existing local context.

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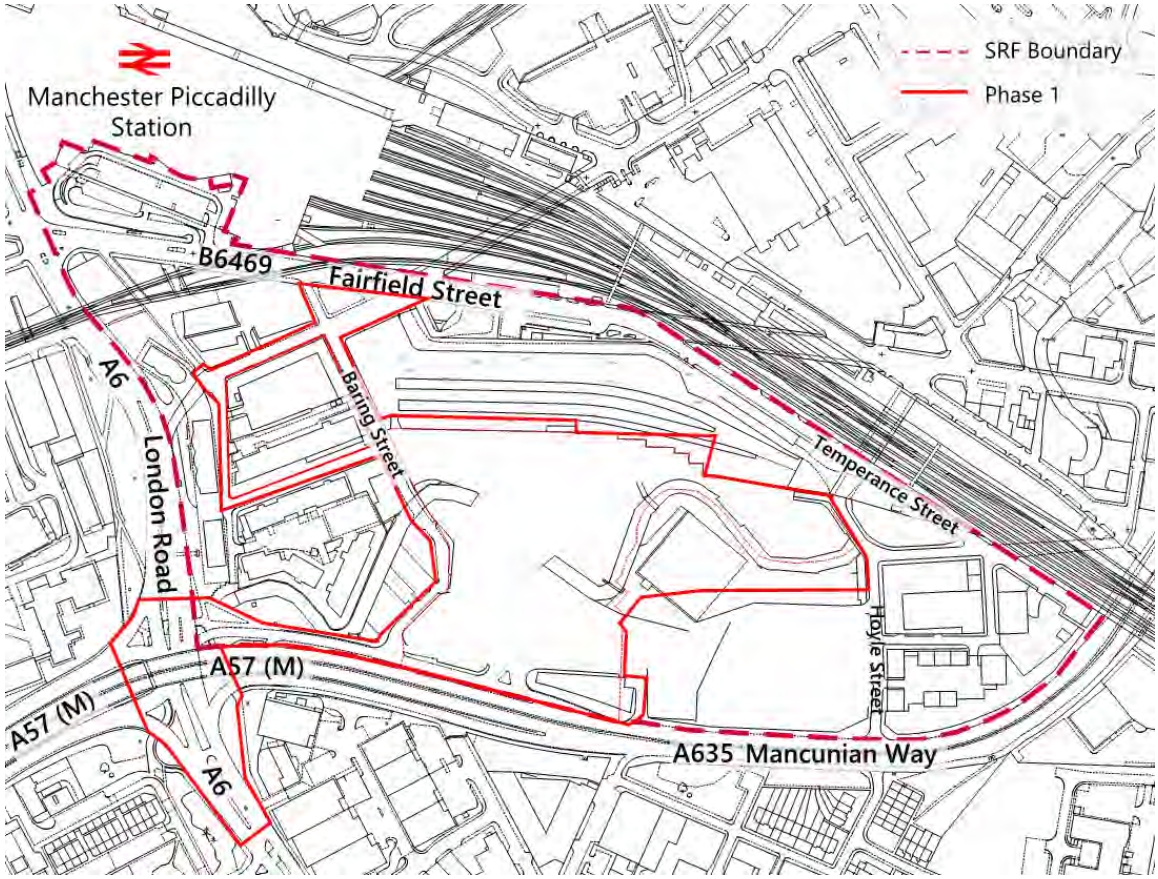


Figure 1.1 Site Location

1.1.6 The anticipated year of opening for Phase 1 is 2023 and for the full-build out Mayfield SRF it is 2030.

1.1.7 Phase 1 comprises two planning applications as follows:

Application 1

- Phased demolition and site clearance, earthworks including re-profiling and construction of retaining walls for the land bounded by the Mancunian Way to the south, Mayfield Depot to the north, Baring Street to the west and Hoyle Street to the east;
- Mayfield Park: provision of circa 6 acres (2.4 ha) of public park, including hard and soft landscaping to be delivered in phases with new bridges across the River Medlock;
- Baring Street Office (Block 1): nine-storey office development including ground, mezzanine and plant level comprising 9,987 sq. m. (GEA), including active ground floor uses (A1, A3, A4 or B1), public realm and riverside walkway;
- Baring Street MSCP: 10-storey including roof level MSCP for circa 543 car parking spaces; and associated
- Highways and Infrastructure Works: creation of new junction from London Road with required access to the MSCP and works to Baring Street, which will be delivered prior to the MSCP becoming operational.

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Application 2

- Baring Street Office (Block 2): 13-storey office development including ground and mezzanine floors comprising circa 31,000 sq. m. (GEA) with active ground floor uses, highways and associated access and public realm.

1.2 Purpose of Report

1.2.1 A Travel Plan is a long-term management strategy which encourages sustainable travel for new and existing developments. The key aim is to inform residents, employees and visitors of the alternatives to driving their cars to the Site, to increase awareness of and promote greener, cleaner modes of travel, to reduce reliance on the private car and create sustainable communities consistent with the overarching aims of the National Planning Policy Framework (NPPF).

1.2.2 Travel Plans are dynamic documents that evolve over time with changing travel needs. They are not meant to be onerous documents, but rather developed to enhance awareness of alternative modes of travel to the single occupancy private car.

1.2.3 TfGM's online Travel Plan Toolkit defines the following thresholds where a Travel Plan would be required:

- Over 1,500sqm B1 office use;
- Over 250sqm A1 food retail;
- Over 800sqm A1 non-food retail; and
- Over 500sqm D2 Assembly and Leisure.

1.2.4 Given that the proposed Mayfield SRF development is a mixed use development, a Framework Travel Plan has been prepared (sometimes referred as a site-wide or umbrella travel plan). These are generally appropriate for phased developments.

1.2.5 This Framework Travel Plan has been prepared to outline the general strategy for managing multi-modal access to the Site as a whole whilst focusing on promoting access by sustainable modes.

1.2.6 The aim of this Framework Travel Plan is to provide residents, employees and visitors with all the information they need to make sustainable travel choices easier from the outset before travel habits become entrenched.

1.2.7 This Framework Travel Plan comprises general (interim) site-wide measures, initiatives and targets, which would be led by the site-wide Principal Travel Plan Co-ordinator to encourage residents, employees and visitors to use more sustainable means of transport. It also includes initiatives aimed specifically at the occupying tenants ("Occupiers") and a commitment to prepare their own bespoke Workplace/Residential (Full) Travel Plan in line with the contents of this Framework Travel Plan.

1.2.8 The Applicant will be responsible for taking this Framework Travel Plan forward and for ensuring that the Occupiers at the Site sign up and comply with its contents.

1.2.9 Occupiers of the commercial development will each be required to prepare their own bespoke Workplace Travel Plan, which would be tailor-made to suit the specific requirements of their business and will be prepared in line with the general contents of this Framework Travel Plan including the adoption of the site-wide modal split targets.

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1.2.10 In terms of the residential development, it is envisaged that the Applicant (or where applicable any subsequent Owner and/or Site Manager of the residential development) would be responsible for preparing the Residential Travel Plan in line with the general contents of this Framework Travel Plan including the adoption of the site-wide modal split targets.

1.2.11 The effectiveness of each Travel Plan will be monitored at regular intervals through a series of travel surveys. The Travel Plan targets will then be reviewed, and any necessary amendments made within each Full Travel Plan as they are developed. This will ensure that each plan can be updated regularly to cater for any change in travel demand.

1.2.12 This framework document will also provide details of those personnel who need to be involved in the Travel Plan process and their role in formalising and implementing the Travel Plan, including requirement for a Site-Wide Travel Plan Co-ordinator.

1.2.13 This Framework Travel Plan relates to the whole Mayfield SRF masterplan site and should be read in conjunction with the Transport Assessment submitted with the planning applications, also produced by BuroHappold.

1.2.14 Whilst preparing this Framework Travel Plan, reference has been made to the following information sources:

- National Planning Policy Framework (NPPF) (2019);
- Manchester City Council's Core Strategy Development Plan (2012);
- Manchester City Council's Supplementary Planning Guidance (SPG) Guide to Development in Manchester (2007);
- Transport for Greater Manchester's online Travel Plan toolkit;
- Ministry of Housing, Communities & Local Government Guidance on Travel Plans, Transport Assessments and Statements (March 2014);
- Department for Transport (DfT) Cycle to Work Scheme Implementation Guidance (October 2011);
- ACT TravelWise - an organisation promoting and facilitating sustainable travel choices in the UK; and
- Campaign for Better Transport – an independent charity campaigning for green transport that is good for people and the environment.

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2 Planning Policy

2.1 National Policy - National Planning Policy Framework (NPPF 2019)

2.1.1 At the heart of the NPPF is the presumption in favour of sustainable development.

2.1.2 Transport issues should be considered from the earliest stages of plan-making and development proposals so that:

- The potential impacts of development on transport networks can be addressed;
- Opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;
- Opportunities to promote walking, cycling and public transport use are identified and pursued;
- The environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and
- Patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.

2.1.3 Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes.

2.1.4 At a more detailed level, the NPPF states that developments should be located and designed in order to:

- Give priority to pedestrian and cycle movements and have access to high quality public transport facilities;
- Address the needs of people with disabilities and reduced mobility;
- Enable charging of plug in and other ultra-low emission vehicles in safe, accessible and convenient locations; and
- Create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians.

2.1.5 A key tool to assist in facilitating all of the above will be through the provision of a Travel Plan. All developments which generate significant amounts of movement should be required to provide a Travel Plan.

2.2 Local Policy – Manchester City Council's Core Strategy (2012)

2.2.1 MCC require Travel Plans for all major applications and for any proposals where there are likely to be access or transport issues.

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2.3 Local Policy – MCC's SPG Guide to Development in Manchester (2007)

2.3.1 MCC's SPG Guide to Development in Manchester adopted in 2007 provides guidance for developers including parking/servicing guidelines, design and travel plans.

2.3.2 The guidance emphasises that priority is to be given to pedestrians, disabled people and cyclists above the needs of the car, and that this should be taken into consideration in the location and design of any parking facilities. A Travel Plan will be required where appropriate to encourage and support walking, cycling and public transport use. It also provides detailed guidance on how the need for car parking can be accommodated in the context of ensuring that priority is still given to the non-car user.

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3 Site Accessibility

3.1 Introduction

3.1.1 This chapter sets out the context of the Site in terms of accessibility.

3.2 Public Transport

Bus

3.2.1 The Site is well connected by bus, with 12 bus routes available within a 400m (5-minute) walk from the Site. The location of the existing bus services operating in close proximity to the Site are shown in Figure 3.1.

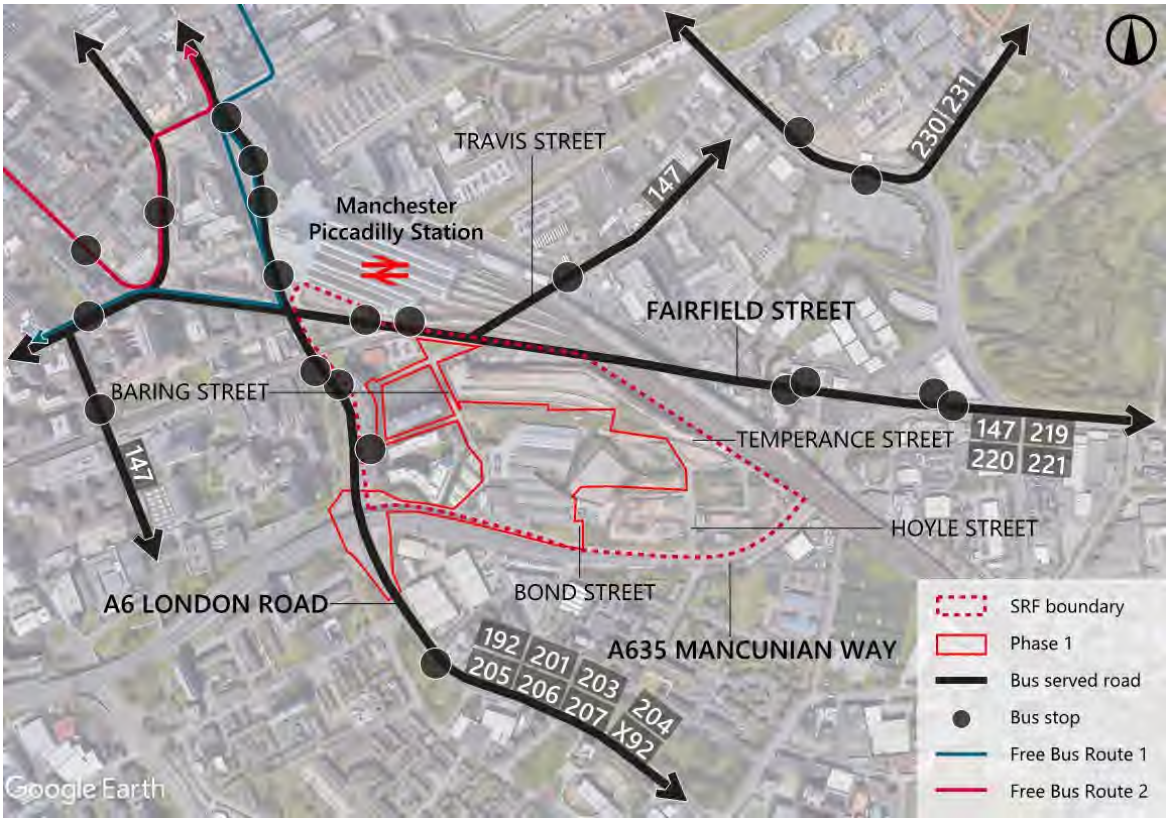


Figure 3.1: Local bus stops and bus routes

3.2.2 Table 3.1 shows the frequency of buses on each bus route per hour per direction. It shows that during the weekday peak, there are 45 bus services per hour per direction surrounding the Site.

Table 3.1: Local bus routes and frequencies

Bus Service	Route	Peak Frequency (buses per hour per direction)		
		Weekday	Saturday	Sunday
192 / X92	Hazel Grove - Stockport - Levenshulme - Manchester	17	18	-
201	Hattersley - Hyde - Denton - Manchester	6	6	2

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Bus Service	Route	Peak Frequency (buses per hour per direction)		
		Weekday	Saturday	Sunday
203	Stockport - Reddish - Belle Vue - Manchester	6	6	4
204	Hyde - Haughton Green - Denton - Belle Vue - Manchester	1	2*	2
205	Danton - Dane Bank - West Gorton - Manchester	2	2	1
206	Gee Cross - Hyde - Haughton Green - Denton - West Gorton - Manchester	2	2	-
219	Stalybridge - Ashton-under-Lyne - Guide Bridge - Audenshaw - Openshaw - Manchester	7	7	6
231	Ashton - Hartshead - Droylsden - Clayton - Manchester	3	-	-
TP	Derby - Matlock - Buxton - Stockport - Manchester	1	-	-
Total		**45**	**43**	**15**

** from 6pm onwards only*

3.2.3 There is also a Free Bus service (formerly known as the Metroshuttle), which links the city's train stations, shops and businesses. There are two routes providing a wide-range of connectivity around Manchester city centre as shown on Figure 3.2. The frequency of these two routes is summarised in Table 3.2.

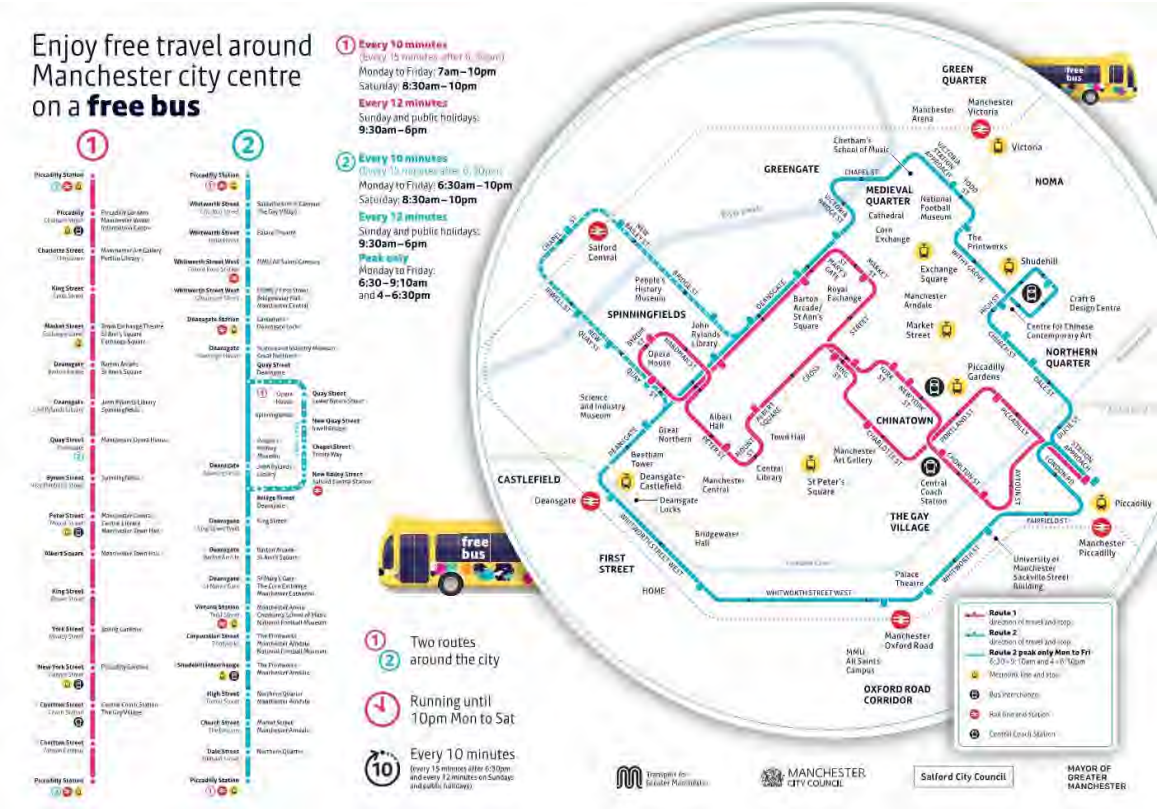


Figure 3.2: Free bus service in Manchester City (Source: TfGM)

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Table 3.2 Summary of free bus services

Route	Operating Hours	Frequency
1	Monday to Friday: 07:00-22:00 Saturday: 08:30-22:00	Every 10 minutes (Every 15 minutes after 18:30)
	Sunday and public holidays: 09:30-18:00	Every 12 minutes
2	Monday to Friday: 06:30-22:00 Saturday: 08:30-22:00	Every 10 minutes (Every 15 minutes after 18:30)
	Sunday and public holidays: 09:30-18:00	Every 12 minutes

Manchester Metrolink

3.2.4 The Metrolink is a tram/light rail service system serving Greater Manchester divided into fare zones. The Piccadilly Metrolink stop is one of the nine stops serving Manchester city centre within the system's zone 1 and it is the terminus for Metrolink services to Bury and Altrincham and for through services between Eccles and MediaCityUK and Ashton-under-Lyne. Table 3.3 summarises the tram services and frequencies found at the Piccadilly stop.

Table 3.3: Summary of Tram Services Times, and Frequencies

Reference	Service	Monday to Thursday	Friday	Saturday	Sunday and Public Holidays	Frequency
	Ashton-under-Lyne – MediaCity UK	07:15-19:30	07:15-19:30	09:30-18:00	-	12mins
	Ashton-under-Lyne – Eccles	07:15-19:30	07:15-19:30	09:30-18:00	-	12mins
	Altrincham - Piccadilly	07:15-19:30	07:15-19:30	09:30-18:00	-	12mins
	Bury – Piccadilly	06:00-23:30	06:00-00:30	06:00-00:30	07:00-22:30	12mins

3.2.5 The Metrolink trams and stops are accessible and each stop is provided with access ramps or lifts, tactile paving, high visibility handrails, disabled boarding points, and help points on the platform. Large areas within the trams are also available for wheelchair users and pushchairs. Mobility scooters are allowed on the trams provided they have a permit.

National Rail

3.2.6 Manchester Piccadilly railway station is directly adjacent to the SRF and it is approximately 4-minute walk (322m) walk north of the Phase 1 site. Manchester Piccadilly provides intercity and cross-country services as well as regional and local services around Northern England. The station has 12 terminus platforms and it is currently served by six train operators summarised in Table 3.4.

Table 3.4: Manchester Piccadilly Train Services and Frequencies

Destination	Line	Weekday AM	Weekday PM	Saturday	Sunday
Hadfield	Northern	3	3	2	2
Glossop	Northern	3	3	2	2

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Destination	Line	Weekday AM	Weekday PM	Saturday	Sunday
Marple	Northern	3	2	2	1
Rose Hill Marple	Northern	2	2	2	-
New Mills Central	Northern	2	2	2	1
Sheffield	Northern	3	3	3	3
Hazel Grove	Northern	4	3	3	1
Buxton	Northern	2	2	2	1
Crewe	Northern	4	4	4	3
Stoke-on-Trent	Northern	5	5	5	2
Chester	Northern	3	3	2	1
Liverpool Lime Street	Northern	4	4	4	3
Preston	Northern	4	4	4	3
Manchester Airport	Northern	7	8	9	6
Blackpool North	Northern	3	2	2	1
Llandudno	Transport for Wales	-	1	1	-
Bournemouth	CrossCountry	1	1	1	-
Bristol Temple Meads	CrossCountry	1	1	1	1
Norwich	East Midlands Train	1	-	1	-
Newcastle	TransPennine Express	1	1	1	1
Middlesborough	TransPennine Express	1	1	1	1
Hull	TransPennine Express	1	1	1	1
Cleethorpes	TransPennine Express	1	1	1	1
Edinburgh Waverley	TransPennine Express	1	-	2	1
London Euston	Virgin Trains	3	3	3	3
Total		**63**	**60**	**61**	**39**

3.2.7 The local rail and tramline network is illustrated in Figure 3.3.

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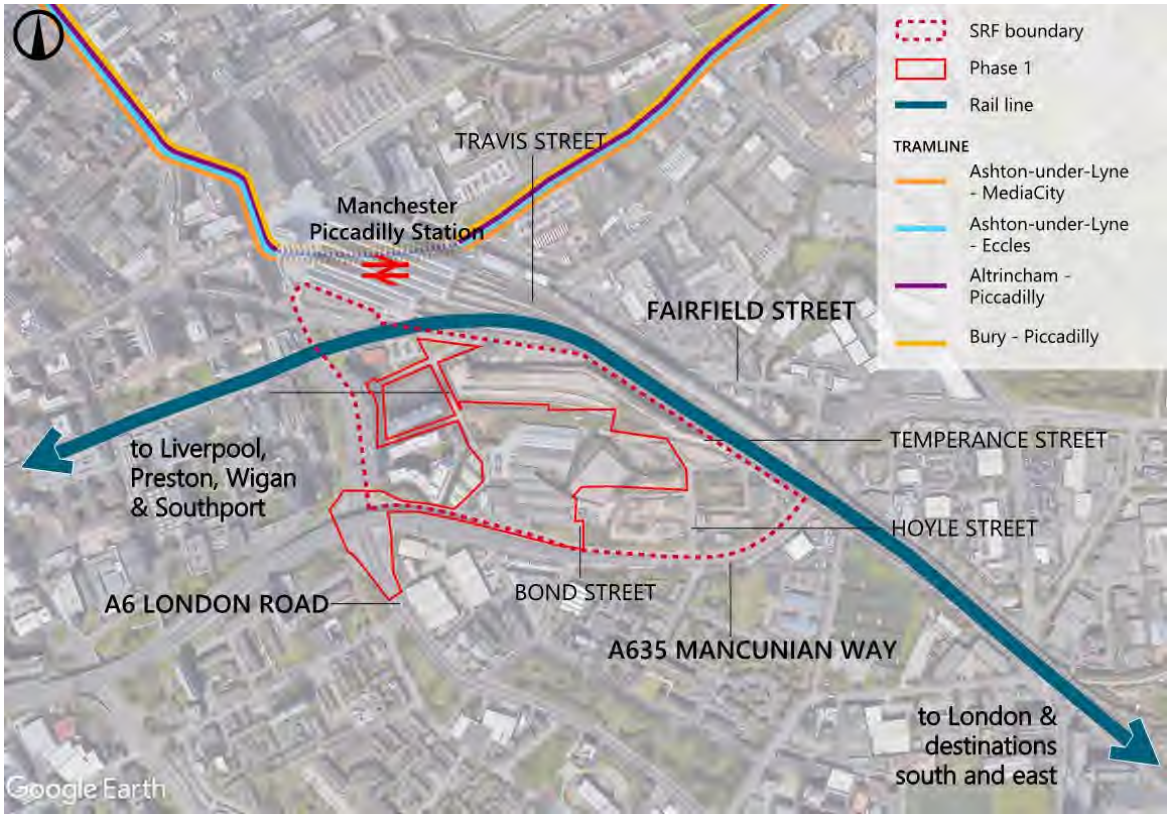


Figure 3.3 Local rail and tram network

3.3 Walking

3.3.1 There is extensive provision of pedestrian footways within and around the wider SRF site, as illustrated on Figure 3.4.

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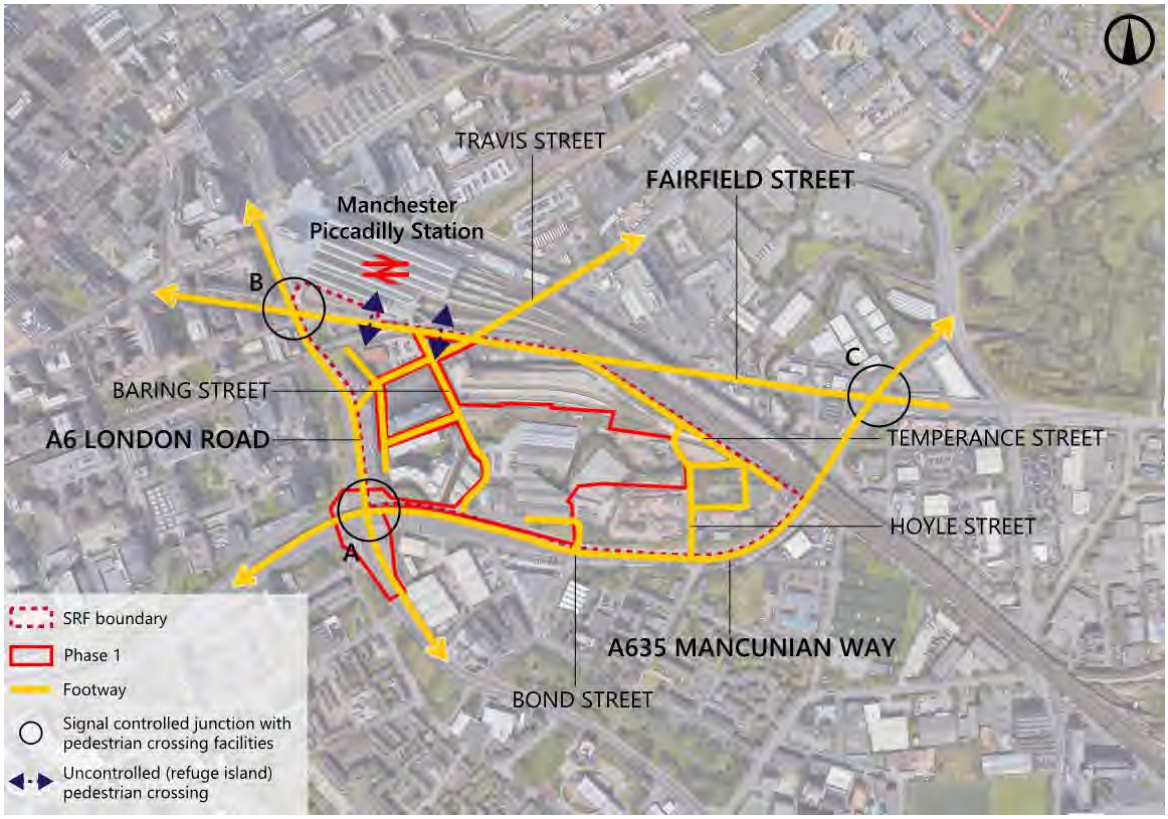


Figure 3.4 Pedestrian Infrastructure Surrounding the Site

3.3.2 The Site can be accessed through multiple locations and they are summarised in Table 3.5, along with its approximate footway width. Most of these locations are provided with pedestrian footways along both sides of the carriageway and are of good quality and are well-lit.

Table 3.5 Pedestrian access points to site

Direction	Location	Approximate width of footway
North	Fairfield Street / Baring Street	2.0m
	Fairfield Street / Cotswold Street	1.5m
	Fairfield Street / Wyre Street	1.5m
	Fairfield Street / Travis Street	3.0m
	Temperance Street / Hoyle Street	1.5m
	Temperance Street / Chapelfield Road	1.5m
	Temperance Street / Rachel Street	1.5m
South	A635 / Baring Street	1.5m
	A635 / Bond Street	1.5m
	A635 / Hoyle Street	2.0m
	A635 / Manor Street	2.0m
West	A6 London Road / Travis Street	3.0m

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3.3.3 There are signal controlled pedestrian crossings provided at the A6 London Road/Fairfield Street signal junction and the junction with A635 Mancunian Way approximately 320 metres further south. Figure 3.5 illustrates the type of pedestrian signal crossings available for each of the three main junctions referenced in Figure 3.4.



Figure 3.5 Junctions in reference with the pedestrian infrastructure surrounding the Site

3.3.4 On Fairfield Street adjacent to Piccadilly Station taxi rank entrance is a pedestrian refuge island, allowing pedestrians to stop in the middle of the road in order to split the crossing into two stages for each direction of traffic. Another pedestrian crossing is located approximately 85m further to the east of the station on the western arm of the junction between Fairfield Street and Travis Street. This crossing has a pedestrian refuge.

3.3.5 The northern SRF boundary is adjacent to Manchester Piccadilly Station and the Phase 1 boundary is approximately a 4-minute walk from the station and it can be accessed via Fairfield Street and Baring Street. Further up to the north-west, is the city centre which is approximately a 1.10km (15-minute) walk from the SRF, via the A6 London Road.

3.3.6 Walking routes from other directions are all of similar quality. Pedestrians originating from the south and south-east can cross Mancunian Way via the pedestrian crossings on the London Road and Fairfield Street junctions.

3.3.7 Figure 3.6 shows the walking accessibility for the Site in 5, 10 and 15 minute walk catchments.

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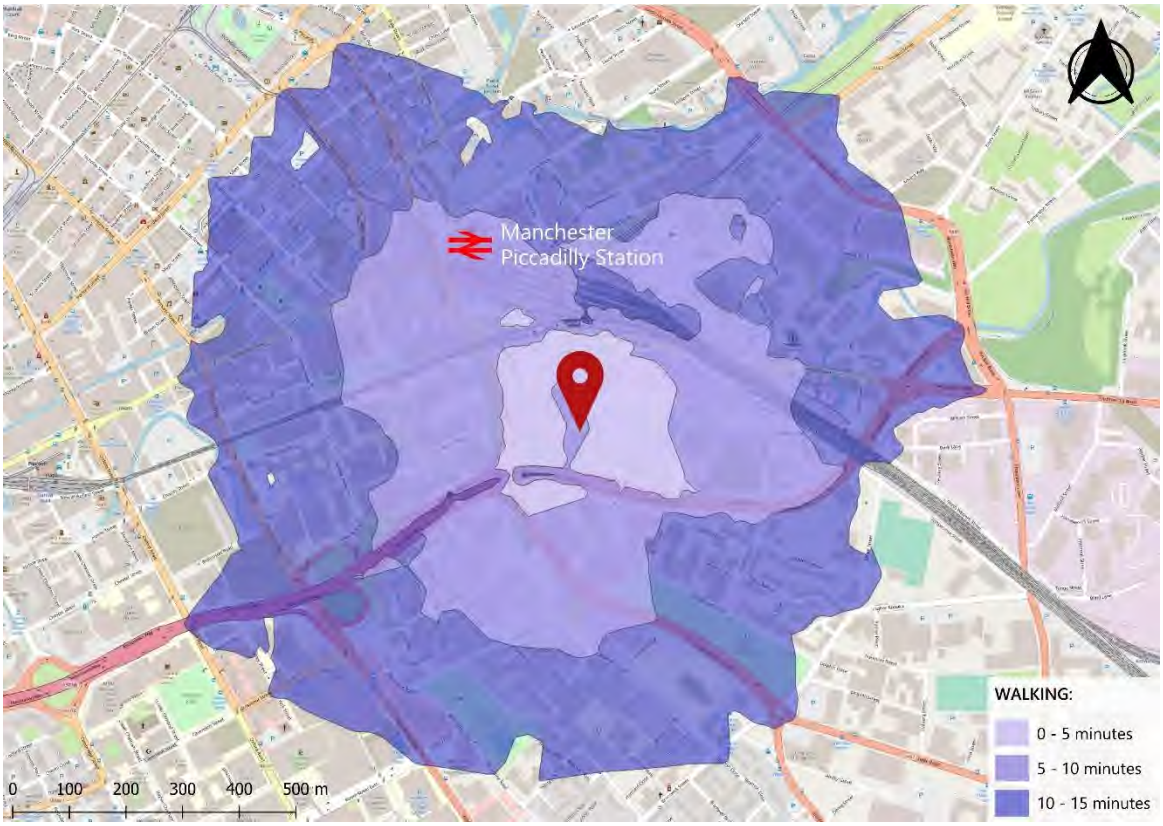


Figure 3.6 Walking Accessibility

3.3.8 There are a number of bus stops within a 10-minute walk of the Phase 1 site, located on Fairfield Street and A6 London Road. The University of Manchester is also accessible within a 10-minute to the west of the Site.

3.4 Cycling

3.4.1 MCC has developed strategic cycle routes throughout the city; to the north of the SRF is the National Cycle Network Route 66 (NCN) and to the west is the NCN 6. The NCN 6 connects Bury and Manchester as well as joining NCN 60 (Fallowfield Loop) at Chorlton-cum-Hardy. Regional Route 86 follows the River Medlock, which also connects to NCN 66.

3.4.2 Many of the roads surrounding the SRF boundary are recommended for cycling, and A6 London Road and Fairfield Street are designated as on road cycle routes. Dedicated cycle lanes are provided along the A6 London Road in both directions and advanced cycle stop lines are provided on all arms of the A6 London Road signal junction with B6469 Fairfield Street, which is located north-west of the SRF.

3.4.3 The nearest cycle parking to the SRF is at Piccadilly Station, where 43 spaces as Sheffield stands are provided on Fairfield Street. Furthermore, the city centre currently has 760 publicly available cycle parking spaces, and 2,460 across the University of Manchester Estate which is located south-west of the SRF.

3.4.4 On-street cycle facilities such as the "Bike Lockers User Club" (BLUC) are available. BLUC is a cycle parking scheme that allows members to access any locker in the club and use one's bicycle to travel to train stations, bus stops and Metrolink stations across Greater Manchester. However, it should be noted that Metrolink trams do not permit full-sized bicycles unless folded and fully covered.

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3.4.5 The nearest cycle hub is located in Piccadilly Gardens, which is approximately 1.3 km north of the SRF.

3.4.6 Figure 3.7 illustrates the cycle routes surrounding the SRF boundary.



Figure 3.7: Cycle Routes in the vicinity of the Site (Source: Manchester City Council)

3.4.7 Figure 3.8 illustrates the cycling accessibility for the Site within 10, 20, and 30-minute cycle ride.

3.4.8 The city centre is within a 10-minute cycle radius, whereas other areas within Greater Manchester such as Salford can be reached within a 10 to 20-minute cycle and 20 to 30-minute for Didsbury.

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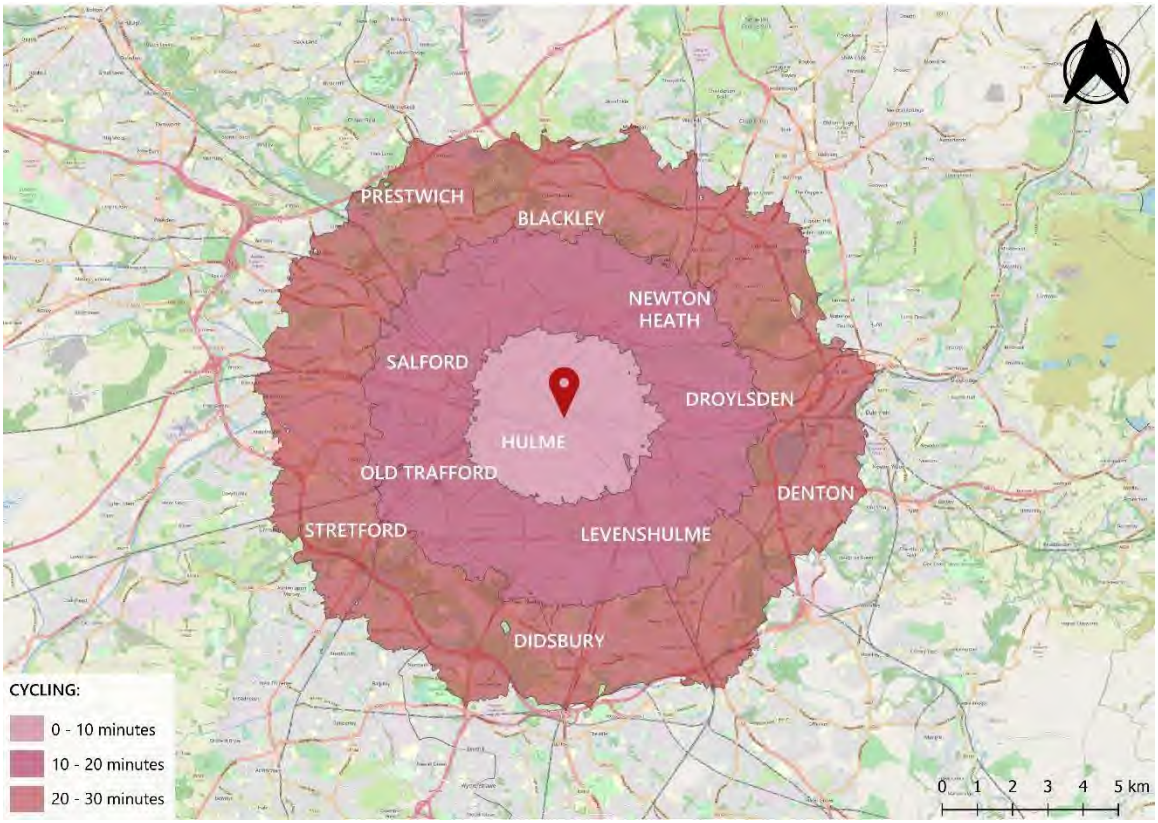


Figure 3.8 Cycling Accessibility

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4 Benefits and Objectives of the Travel Plan

4.1.1 The benefits of a Travel Plan are as follows:

- By encouraging walking and cycling it will provide opportunities to build healthy exercise into daily life;
- The local community can enjoy lower pollution levels, reduced congestion, reduced journey times, improved public transport services, energy savings and reduced overspill parking in residential areas;
- The environment generally can benefit from improved air quality, less noise, and reduced impact of other national and global environmental problems such as global warming; and
- A business/organisation can benefit from increased productivity generated by a healthier, more motivated workforce and improved access for employees, visitors and deliveries.

4.1.2 The Travel Plan is not designed to deny the freedom of car use. It seeks instead to reduce the potential for congestion, to improve air quality and to resolve parking issues that may affect the Site and its immediate surroundings.

4.1.3 Through a range of initiatives, the Travel Plan will help the Applicant and Occupiers to manage the travel needs of residents, employees and visitors and to increase the range of travel options by which the Site can be accessed. Moreover, the promotion of walking and cycling initiatives will bring environmental and health benefits that can help reduce reliance on taxis for local travel.

4.1.4 The objectives of the Travel Plan are to:

- Ensure the Site is accessible to all and respects the needs of vulnerable groups such as those with mobility problems;
- Minimise the impact of congestion, noise and pollution;
- Where appropriate, reduce the need for unnecessary travel and ensure that those that do have to travel do so in a way that is sustainable;
- Specify measures to encourage residents, employees and visitors to use travel modes other than the car;
- Minimise the number of single occupancy vehicle trips;
- Promote the use of public transport, car sharing, walking and cycling when getting to and from the Site;
- Reduce the environmental impact of travel demand by raising awareness amongst residents, employees and visitors and by encouraging environmentally conscious behaviour; and
- Minimise delivery vehicle trips by appropriate scheduling and/or through emission reduction initiatives.

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5 Travel Plan Management

5.1 Travel Plan Co-ordinator

5.1.1 Allocated time will be needed to set up and run the Travel Plan. This is best achieved by appointing a Travel Plan Co-ordinator who will be responsible for the management and maintenance of the Travel Plan.

5.1.2 The Travel Plan Co-ordinator will act as the promoter of the Travel Plan to secure its implementation, as well as being the key contact for residents and visitors to the development.

5.1.3 The Applicant will appoint a site-wide Principal Transport Co-ordinator ("PTC") 6 months prior to first occupation at the Site.

5.1.4 The PTC would generally be a nominated representative from the Applicant's Asset Management Company or alternatively an external company specialising in Travel Plans. The PTC would ideally be someone located either on-site or making regular visits to the Site. In this way, they can become a familiar face and someone known to 'champion' the sustainable travel measures of the development. This role is likely to be accommodated alongside other duties and may therefore require the appointment of an external consultant to assist with tasks required by the Travel Plan.

5.1.5 The Occupier(s) of the commercial development will appoint their own individual Travel Plan Co-ordinator ("Occupier's Travel Plan Co-ordinator") prior to occupation at the Site to take on the role in relation to their business and would be responsible for preparing a bespoke Workplace (full) Travel Plan for their business. This role does not need to be full time and can be carried out alongside an employee's existing job. Their role will include the responsibilities set out later in this section.

5.1.6 In terms of the residential development, it is envisaged that the Applicant (or where applicable, the subsequent Owner and/or Site Manager of the residential development) would also appoint their own Travel Plan Co-ordinator ("Occupier's Travel Plan Co-ordinator") prior to occupation at the Site who would be responsible for preparing a Residential (full) Travel Plan in line with the general contents of this Framework Travel Plan including the adoption of the site-wide modal split targets.

5.1.7 The Occupier's Travel Plan Co-ordinator will work closely with the PTC to ensure a co-ordinated approach to travel planning for the Site as a whole.

5.1.8 For B1 office units smaller than 1,500sqm in size or A1 non-food retail units smaller than 800sqm, where a full Travel Plan would not be required, the Occupier should appoint a Travel Plan Representative to liaise with the PTC in respect of the site-wide Travel Plan requirements. Their role will include the responsibilities set out later in this section.

5.1.9 The PTC will be responsible for:

- Designing and implementing effective site-wide measures and initiatives to encourage residents, employees and visitors to use more sustainable means of transport;
- Ensuring that the most up-to-date information relating to site is available to the Occupier's Travel Plan Co-ordinators/Representatives;

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- Being the main point of contact with MCC/TfGM as well as the Occupier's Travel Plan Co-ordinators/Representatives at the Site;
- Arranging regular "Green Group" forums with the Occupier's Travel Plan Co-ordinators/Representatives to discuss and share information relating to travel planning;
- Agree a standardised Travel Survey questionnaire format with MCC/TfGM and passing this information on to the Occupier's Travel Plan Co-ordinator; and
- Liaising with the Applicant to discuss/agree any measures/initiatives/targets and liaising with the Occupier's Travel Plan Co-ordinators/Representatives to ensure a co-ordinated approach to travel planning for the Site as a whole.

5.1.10 The Occupier's Travel Plan Co-ordinator will be responsible for:

- Ensuring the successful delivery of their bespoke Residential/Workplace (Full) Travel Plan through implementation of measures and effective monitoring;
- Obtaining the most up-to-date travel and marketing information from the PTC relating to site-wide measures and initiatives;
- Highlighting the objectives and philosophy of their bespoke Travel Plan to employees/residents as well as obtaining and maintaining commitment and support from senior managers within their organisation;
- Agree a Travel Survey questionnaire format in discussion with the PTC and MCC/TfGM and devise possible incentives for employees/residents to complete and return their questionnaires;
- Collation of all the Travel Survey information for residents/employees and review any measures/initiatives/targets;
- Liaising with the PTC to ensure a co-ordinated approach to travel planning for the Site as a whole; and,
- Producing annual monitoring reports as part of the Residential/Workplace Travel Plan for submission to MCC/TfGM and the PTC (as discussed in Section 8).

5.1.11 The Occupier's Travel Plan Representative will be responsible for:

- Obtaining the most up-to-date information relating to site-wide measures and initiatives from the PTC;
- Delivering measures and initiatives aimed specifically at the Occupier;
- Highlighting the objectives and philosophy of the Travel Plan to all their residents/employees as well as obtaining and maintaining commitment and support from senior managers within their organisation;
- Acting as a point of contact for all residents/employees requiring information as well as for exchanging ideas and best practice with the PTC; and,

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- Collation of any Travel Survey information that may be required for residents/employees and providing this information to the PTC.

5.2 Securing the Travel Plan and Funding

5.2.1 This Framework Travel Plan will be secured through a Section 106 Agreement. This will ensure the Applicant and Occupier's commitment to the Travel Plan strategy.

5.2.2 The estimated modal split set out in Section 6 will be reserved for agreement with MCC/TfGM after the initial baseline Travel Survey has been undertaken.

5.2.3 The Applicant will ensure that the PTC will be provided with sufficient funding to manage the Framework Travel Plan and co-ordinate travel planning at the Site as a whole.

5.2.4 Occupiers of the commercial uses and the Owner/Site Manager of the residential development will ensure that the Occupier's Travel Plan Co-ordinator will be provided with sufficient funding and resources to manage the Residential/Workplace (Full) Travel Plan.

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6 Modal Split and Targets

6.1 Baseline Modal Split of Trips

6.1.1 The estimated modal split of trips at the Site has been extracted from the Transport Assessment submitted as part of the planning applications and is set out below.

6.1.2 The trip generation and mode split for B1 office use is shown in Table 6.1.

Table 6.1 Site Wide Trips by Mode – Proposed Office (154,800sqm GEA)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	**18.5%**	704	48	752	48	701	749
Car Passenger	**3.7%**	141	10	151	10	140	150
Taxi	**0.6%**	23	2	25	2	23	25
Bus	**27.2%**	1034	71	1105	71	1029	1101
Tram	**23.5%**	893	61	954	61	889	950
Rail	**7.4%**	282	19	301	19	281	300
Pedestrians	**14.2%**	540	37	577	37	538	575
Cycle	**3.7%**	141	10	151	10	140	150
Motorcycle	**1.2%**	47	3	50	3	47	50
TOTAL	**100%**	**3805**	**262**	**4067**	**262**	**3789**	**4051**

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6.1.3 The trip generation and mode split for the proposed retail/leisure use is shown in Table 6.2.

Table 6.2 Site Wide Trips by Mode – Proposed Retail/Leisure (32,300sqm GEA)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	**0.5%**	7	7	14	11	11	22
Car Passenger	**0.0%**	0	0	0	0	0	0
Taxi	**0.0%**	0	0	0	0	0	0
Bus	**8.0%**	114	108	222	173	177	350
Tram	**11.0%**	157	148	306	238	243	481
Rail	**4.0%**	57	54	111	87	88	175
Pedestrians	**75.5%**	1080	1019	2099	1637	1668	3305
Cycle	**1.0%**	14	13	28	22	22	44
Motorcycle	**0.0%**	0	0	0	0	0	0
TOTAL	**100%**	**1430**	**1350**	**2780**	**2168**	**2209**	**4377**

6.1.4 The trip generation and mode split for the proposed hotel use is shown in Table 6.3.

Table 6.3 Site Wide Trips by Mode – Proposed Hotel (650 Rooms)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	**19%**	18	41	58	30	23	54
Car Passenger	**10%**	9	21	31	16	12	28
Taxi	**6%**	6	13	18	10	7	17
Bus	**4%**	4	9	12	6	5	11
Tram	**5%**	5	11	15	8	6	14
Rail	**5%**	5	11	15	8	6	14
Pedestrians	**50%**	47	107	154	80	61	141
Cycle	**1%**	1	2	3	2	1	3
Motorcycle	**0%**	0	0	0	0	0	0
TOTAL	**100%**	**94**	**213**	**307**	**159**	**123**	**282**

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6.1.5 The trip generation by mode for the 1,500 residential units is shown below in Table 6.4. This represents travel to work trips.

Table 6.4 Residential Trips by Mode (Travel to Work)

Mode	Mode Split (%)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Car Driver	**18%**	31	132	164	134	69	203
Car Passenger	**1%**	2	7	9	7	4	11
Taxi	**0%**	0	0	0	0	0	0
Bus	**11%**	19	81	100	82	42	124
Tram	**12%**	21	88	109	89	46	136
Rail	**4%**	7	29	36	30	15	45
Pedestrians	**52%**	90	382	473	387	200	587
Cycle	**2%**	3	15	18	15	8	23
Motorcycle	**0%**	0	0	0	0	0	0
TOTAL	**100%**	**174**	**735**	**909**	**744**	**386**	**1,130**

6.1.6 In terms of other trips made by residents, such as leisure, shopping and school journeys, the Travel Survey (discussed later in this section) would determine the modal split for this type of trip and any appropriate targets for increasing sustainable travel would be investigated at that time.

6.1.7 The modal split set out above represents the estimated baseline modal split for the purpose of this Framework Travel Plan. It is noted that this would be compared and reviewed with the actual modal split obtained as part of any baseline Travel Surveys undertaken upon occupation (discussed later in this section).

6.2 Targets

6.2.1 Modal travel targets provide the Occupier's Travel Plan Co-ordinator and MCC/TfGM means to measure the performance of the Travel Plan and to adjust the range of initiatives accordingly.

6.2.2 Table 6.5 shows the targets for Years 1, 3 and 5. It is noted that these are interim targets, which will be subject to review once the baseline Travel Surveys have been completed.

6.2.3 The targets are considered to be SMART (Specific; Measurable; Achievable; Realistic and Time-bound) and are in line with the primary objective to encourage the use of sustainable modes of travel when accessing the Site and reduce unnecessary vehicular trips, primarily single occupancy car travel where suitable alternative modes of travel are available.

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Table 6.5 Interim Mode Split Targets

Target	Target Modal Split		
	Year 0 (Baseline)	Year 3	Year 5
Office Employees			
Reduce car driver mode by 5%	18.5%	16%	13.5%
Increase Car Sharing by 5%	3.7%	6.2%	8.7%
Increase Cycling by 10%	3.7%	8.7%	13.7%
Retail/Leisure Employees			
Maintain car driver mode at 0.5%	0.5%	0.5%	0.5%
Increase Cycling by 10%	1%	6%	11%
Hotel Employees			
Reduce car driver mode by 5%	19%	16.5%	14%
Increase Cycling by 10%	1%	6%	11%
Residents			
Reduce car driver mode by 5%	18%	15%	13%
Increase Car Sharing by 5%	1%	3%	6%
Increase Cycling by 10%	2%	6%	12%

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7 Initiatives and Measures

7.1 Walking and Cycling

7.1.1 The Site is well located in relation to pedestrian and cycling routes and its proximity to key public transport interchanges/services.

7.1.2 The pedestrian environment within the Site will be of a high quality with the provision of well-maintained routes and the use of quality materials.

7.1.3 Encouraging employees, residents and visitors to walk and cycle gives opportunities to incorporate healthy exercise into daily life. It also reduces reliance on taxis and private hire vehicles for local travel. The PTC and the Occupier's Travel Plan Co-ordinator will investigate the creation of a Bicycle User Group (BUG) for employees and residents at the Site, to provide the opportunity for cyclists to meet informally and discuss cycling related issues.

7.1.4 The Applicant will provide a 75 cycle parking spaces for Baring Street Office 1. The cycle parking will be securely located within the building. Showers, changing rooms and locker facilities will also be provided for cyclists.

7.1.5 Around 6-10 short-stay cycle parking spaces will be provided at locations at the edge of the Park in visible, well-lit locations that have high levels of natural surveillance; this also includes at least six short-stay spaces adjacent to Baring Street Office 1 and 2.

7.1.6 Cycle parking for Baring Street Office 2 and subsequent phases of the SRF will aspire meet the standards set out in the MCC Core Strategy.

7.1.7 Essential maintenance facilities such as bicycle pumps will be available for use by residents and employees at the Site. It is proposed that these basic bicycle maintenance facilities would be stored in a box, which would be kept in a secure location within the building. The Occupier's Travel Plan Co-ordinator will regularly check that these facilities remain available for residents and employees.

7.1.8 The PTC and the Occupier's Travel Plan Co-ordinators/Representatives will encourage walking and cycling through promoting and providing information on the following:

- 'Bike Week' (www.bikeweek.org);
- National Walking Month, which includes 'walk to work' and 'walk to school' week (www.livingstreets.org.uk);
- The location of nearby cycle shops, cycle hire stations, and contact information of the nearest bike retail stores; and
- Cycle to work scheme. Cycling to work is encouraged by the Government's green transport plan, which introduced a tax exemption allowing employers to loan cycles and cyclists' safety equipment to employees as a tax-free benefit. Details of this are set out in the DfT's 'Cycle to Work Scheme implementation Guidance', which can be found on the DfT's website: www.gov.uk/government/publications/cycle-to-workscheme-implementation-guidance.

7.1.9 The PTC will endeavour to negotiate discounts/special deals for the Site with local cycle retailers.

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7.1.10 The Applicant will prepare a Travel Information Pack highlighting the objectives and philosophy of the Travel Plan, which will include all the previously mentioned promotional information in relation to cycling and walking, as well as details relating to public transport and local car share schemes discussed later in this section.

7.1.11 The production of the Travel Information Pack will be funded by the Applicant and will be prepared three months prior to opening. The PTC and the Occupier's Travel Plan Co-ordinators/Representatives will ensure that it is given to all residents/employees prior to occupation at the Site.

7.1.12 A key role of the Travel Information Pack will also be to raise awareness of the sustainable travel initiatives being implemented through the Travel Plan including:

- **Access initiatives**: A high quality map of the neighbourhood, showing cycling, walking and public transport routes to/from the Site, together with the locations of any key local facilities (such as shops, cashpoint etc.) within walking distance. Additional sources of further information such as TfGM's Journey Planner website will also be provided.
- **Promotion of key services and facilities at the Site**: Details regarding the location of cycle parking/maintenance facilities will be included within the Pack.
- **Promotion of car clubs and car sharing in London**: Details regarding car sharing and car club websites such as www.enterprisecarclub.co.uk will be included within the Pack.

7.2 Public Transport

7.2.1 The Travel Information Pack will include details on where to obtain current timetable information for local bus and rail services.

7.2.2 Community notice boards will also be placed in prominent locations within the building and will display travel and community information for residents and visitors. Maps of the immediate local area will also be displayed identifying the location of local cycle hire docking stations, car club spaces and public transport services and this information will be updated annually by the PTC/Occupier's Travel Plan Co-ordinator where appropriate.

7.2.3 The notice boards will also be used to inform residents and employees of any new travel initiatives or events organised as part of the Travel Plan.

7.2.4 Where appropriate, the PTC will encourage Occupiers to consider providing interest free season ticket loans for employees using public transport.

7.2.5 People who travel by train from a station inside Greater Manchester into Manchester city centre can also use the tram (Metrolink) network at no extra cost in the city zone (Zone 1). Passengers just request a 'Metrolink add-on' free of charge when purchasing their rail ticket.

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7.3 Proposed Improvements

7.3.1 In order to further encourage sustainable travel modes, the development proposes improvements to the walking and cycling network and public realm within and surrounding the Site, improving strategic connections to adjacent areas. In particular, the Mayfield Park and improved public realm throughout the masterplan will significantly enhance the east-west and north-south connections through the Site. Pedestrian access to the SRF site from the north will also be enhanced with a new pedestrian crossing on Fairfield Street directly adjacent to Piccadilly station. Three strategic cycle routes will also be created as part of the SRF masterplan; along Baring Street, Hoyle Street and parallel to Mancunian Way.

7.3.2 It is also envisaged that a 20mph zone will be introduced across the Mayfield Site and this will be enforced by design measures to reduce vehicle speeds and create quality spaces for pedestrians and cyclists.

7.3.3 It is also acknowledged also that there will be wider improvements implemented as part of TfGM's 'Made to Move' vision to create a joined up pedestrian/cycle network that spans the Manchester city region and to prioritise investment based on the measurement of people movement, rather than motor-traffic. The Beeline Strategy in particular proposes crossing and link improvements on the highway network surrounding the Mayfield SRF site, including Fairfield Street, London Road and Mancunian Way.

7.4 Car Sharing and Car Clubs

7.4.1 Initiatives like car sharing and car clubs can provide a great alternative to car ownership. They save on the associated running costs of a car and can also save on parking charges.

7.4.2 Car clubs work by giving member's access to a car on a short-term rental basis and charging by the hour or by the day. Members pay a membership fee, which entitles them to have access to a car when they need it.

7.4.3 Car sharing schemes aim to encourage individuals to share private vehicles for particular journeys. It includes informal arrangements for sharing trips between individuals at neighbourhood, workplace and even household level, as well as formal schemes with elaborate arrangements for trip matching, often focused on commuting journeys.

7.4.4 Where appropriate, the PTC and/or the Travel Plan Co-ordinator will encourage residents and employees to join a car-sharing/car club scheme. Car sharing will be promoted to minimise single occupancy vehicle trips.

7.5 Promote Electric Vehicles

7.5.1 In order to encourage the use of electric vehicles at the Site, 10% of car parking spaces will be provided with electric vehicle charging infrastructure in the proposed multi-storey car park. This provision will be reviewed over time by the PTC to ensure this provision meets the demand and to consider the provision of additional charging infrastructure should there be a demand for it.

7.6 Reducing the Need to Travel

7.6.1 It is recommended that the use of 'Smart Working Practices' be utilised wherever practical with a view to reducing the need to travel. This could include:

- The use of information technology (IT) in place of face-to-face meetings, e.g. teleconferencing and videoconferencing;

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- The use of IT to enable employees to work from home or remotely where possible;
- Raising awareness of the benefits of flexible working hours and arranging shift patterns to fit in with car sharing arrangements and public transport timetables; and
- Employing local based employee members where practical, where sustainable modes of travel are a viable alternative for travel to work.

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8 Monitoring and Review

8.1 Monitoring Surveys

8.1.1 A Travel Survey is an essential part of a Travel Plan. It is carried out to establish travel patterns at the Site and to ascertain what would encourage residents and employees to travel in a sustainable way.

8.1.2 The Travel Survey, which is generally undertaken by means of a self-completion questionnaire, helps to identify the proportion of residents and employees travelling by each mode of transport i.e. the modal split. An example of a workplace travel survey questionnaire is presented in Appendix A.

8.1.3 Within 6 months of occupation, or at 75% occupancy, whichever comes sooner, the Travel Plan Co-ordinator will arrange for the baseline Travel Survey to be undertaken.

8.1.4 Following the baseline Travel Survey, further Travel Surveys would be undertaken at Years Three and Five.

8.1.5 The baseline Travel Survey will be used to check against the mode share targets set out in Section 6 to determine if they are reasonable.

8.1.6 A minimum Travel Survey response rate of 30% is recommended in order to obtain a representative survey sample. An incentive, such as retail vouchers, will be considered to encourage residents and employees to complete and return their questionnaires to help maximise the response rate. Surveys should ideally be undertaken in a 'neutral' month, avoiding school holidays and should be completed at a similar time each year for consistency.

8.1.7 The survey results are used to formulate and monitor the implementation of the Travel Plan and to set and review baseline targets for promoting sustainable and healthy travel.

8.1.8 In order to assist with achieving a high response rate for the residential development, the Occupier's Travel Plan Co-ordinator will also consider delivering the Travel Survey details by hand to each residential dwelling and / or arranging an event to confirm the requirements of the Travel Survey and highlight any incentives being offered in return for completion of their questionnaire.

8.2 Reporting

8.2.1 The Travel Survey results are used to formulate and monitor the implementation of the Travel Plan and to set and review targets for promoting sustainable and healthy travel.

8.2.2 The monitoring programme starts with the initial baseline Travel Survey (triggered at 75% occupation) for both the residential and employment elements of the Site.

8.2.3 The Travel Survey information will be included in a Monitoring Report (also known as a Progress Report), which will be prepared annually and submitted to the MCC/TfGM for consideration.

8.2.4 This Monitoring Report should include the following:

- Organisation's name and address;
- Detailed information and evidence on the measures used and implemented to promote the Travel Plan and its objectives;

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- Travel Survey results with comparative data and analysis;
- Proposed Specific, Measurable, Achievable and Time bound (SMART) targets;
- Whether the travel habits of residents/employees are meeting the objectives and targets;
- Details on cycle parking usage;
- An Action Plan; and
- Details of any changes to the Site.

8.2.5 Where targets are not met, the Occupier's Travel Plan Co-ordinator, in consultation with the PTC and MCC/TfGM, will discuss and agree a plan of action, which will indicate how any deficiencies in the operation of the Travel Plan will be met.

8.2.6 The Travel Plan Co-ordinator shall review and monitor the Travel Plan at Years One, Three and Five setting out whether the travel habits of residents/employees are meeting the objectives and targets. This information will be included in the annual Monitoring Report.

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Appendix A – Example Residential / Workplace Travel Survey

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Residential Survey

Dear Resident

As part of the monitoring process for the Residential Travel Plan, we are currently conducting a Travel Survey. We would be grateful if one member of your household could complete this brief survey to help us understand your travel patterns, needs and how we may be able to assist with your travel requirements.

It will take about 5 minutes to complete and all responses will be treated confidentally. Thank you

1. What is your gender?

- ◯ Female
- ◯ Male

2. What is your age?

- ◯ 18 to 24
- ◯ 25 to 34
- ◯ 35 to 44
- ◯ 45 to 54
- ◯ 55 to 64
- ◯ 65 to 74
- ◯ 75 or older

3. How do you most frequently travel to and from your home? (Choose the mode of travel you use most often)

- ◯ Walk
- ◯ Cycle (own)
- ◯ Bus
- ◯ Train/tube
- ◯ Car (alone)
- ◯ Car Share (with other passengers)
- ◯ Motorcycle/Scooter
- ◯ Other

If Other please specify

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4. For each of the following activities which mode of travel do you use most frequently?

	Walk	Cycle	Bus	Train/Tube	Car (alone)	Car Share (with other passengers)	Motorcycle/Scooter	Other	N/A
Work	○	○	○	○	○	○	○	○	○
Shopping	○	○	○	○	○	○	○	○	○
Education (school/college/university)	○	○	○	○	○	○	○	○	○

If Other please specify

5. Have you changed your most common mode of transport since relocating to this development?

- ○ Yes
- ○ No

If Yes what was the main reason for this change?

6. Do you or any member of your household own a car?

- ○ Yes
- ○ No

If Yes how many in total?

7. How often do you travel by car?

- ○ Once a day or more
- ○ Once a week
- ○ Once a month
- ○ Less than once a month

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8. Which of the following changes would most encourage you to cycle for journeys in your local area? (if you already cycle, which would you most like to see?)

- Safer, better lit cycle paths in local area
- Improved signage for cyclists
- Increase cycle parking at the development
- Increase security of cycle parking at development
- Opportunity to undertake cycle training
- Discount on the cost of a bike and cycling equipment
- Improved Air Quality
- None of the above
- Other

Other (please specify)

9. Which of the following changes would most encourage you to walk for journeys in the local area (if you already walk, which would you most like to see?)

- Cleaner, better maintained footpaths
- Higher presence of security around the site
- Better lighting on footpaths
- Better signage
- More information on local walking routes
- More and/or improved pedestrian crossing points around the site
- Improved Air Quality
- None
- Other

Other (please specify)

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10. Did you know this development operated a Travel Plan?

- Yes
- No

11. Please use this box to provide any comments you wish to make in relation to travel in your local area.

12. Would you like to receive more information regarding the Travel Plan?

- Yes
- No
- If yes please provide a contact details

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Employee Survey

General information

1. Home postcode .....

2. Usual place of work (building and site)

.....
.....
.....
.....

3. Do you have a disability which affects your travel arrangements?

- ❑ Yes
- ❑ No

4. What time do you usually arrive at work?

- ❑ 7.00 – 7.30 am
- ❑ 7.30 – 8.00 am
- ❑ 8.00 – 8.30 am
- ❑ 8.30 – 9.00 am
- ❑ 9.00 – 9.30 am
- ❑ 10.00 – 10.30am
- ❑ Other (please specify) .....

.....

5. What time do you usually leave for home?

- ❑ 3.00 – 3.30 pm
- ❑ 3.30 – 4.00 pm
- ❑ 4.00 – 4.30 pm
- ❑ 4.30 – 5.00 pm
- ❑ 5.00 - 5.30 pm
- ❑ 5.30 – 6.00 pm
- ❑ 6.00 – 6.30 pm
- ❑ 6.30 – 7.00 pm
- ❑ 7.00 – 7.30 pm

Other (please specify)

.....

6. Do you work:

- ❑ Part time
- ❑ Full time

Other (please specify)

General travel information

7a How do you usually travel to work?

- ❑ Car (on your own)
- ❑ Car (with others)
- ❑ Bus
- ❑ Train
- ❑ Motorbike
- ❑ Walk
- ❑ Cycle
- ❑ Taxi

7b Why do you choose to travel in this way? (tick all that apply)

- ❑ Convenience
- ❑ Cost
- ❑ Health reasons
- ❑ Alternative not available
- ❑ Need to for work purposes
- ❑ Other (please specify) .....

.....

8. Do you ever use a different mode of transport?

- ❑ Yes
- ❑ No

If yes, how

- ❑ Car (on your own)
- ❑ Car (with others)
- ❑ Bus
- ❑ Train
- ❑ Motorbike
- ❑ Walk
- ❑ Cycle
- ❑ Taxi

.....

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9. How would you *prefer* to travel to work? (please tick only one)

- ❑ Car (on your own)
- ❑ Car (with others)
- ❑ Bus
- ❑ Train
- ❑ Motorbike
- ❑ Walk
- ❑ Cycle
- ❑ Taxi

10. Do you ever work from home?

- ❑ Yes
- ❑ No

11. If so, how often?

- ❑ more than once a week
- ❑ Once a week
- ❑ Once a fortnight
- ❑ Once a month
- ❑ Occasionally

12. How far do you travel to work?

- ❑ Less than one mile
- ❑ 1 – 2 miles
- ❑ 2 – 5 miles
- ❑ 6 – 10 miles
- ❑ 11 – 25 miles
- ❑ 26 miles or more

Please specify.....

.....

15. How would you get to work if your car broke down or it was being serviced?

- ❑ Car (with others)
- ❑ Bus
- ❑ Train
- ❑ Motorbike
- ❑ Walk
- ❑ Cycle
- ❑ Taxi
- ❑ Other (please specify).....

.....

16. What are your main reasons for driving to work (tick no more than 3)?

- ❑ Drop/collect a child off at school on the way
- ❑ Need car for other activities after work eg shopping, gym
- ❑ Distance from home too great to walk or cycle
- ❑ Need the car for work during the day
- ❑ No one to car share with
- ❑ No public transport or it would take too long
- ❑ Personal safety
- ❑ Car needed because of health (eg physical disability
- ❑ Cheaper than public transport
- ❑ More reliable than public transport
- ❑ Other (please specify):

17. Would you be prepared to car share?

- ❑ Yes
- ❑ No
- ❑ Already do

18. Are you prepared to pay for parking?

- ❑ Yes
- ❑ No

If yes, how much? ..... per day

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Appendix 8.1 Construction Assessment Methodology

Appendix 8-1 Supplied Traffic Data and Modelled Roads

Modelled Road ID	Supplied Road Link ID	Baseline			Do Nothing			Do Something		
		AADT	Speed (kph)	HDV%	AADT	Speed (kph)	HDV%	AADT	Speed (kph)	HDV%
LondonRdJnct*	18	14076	**24.1**	6.0	13355	**24.1**	6.0	14524	**24.1**	6.0
LondonRd2*	18	14076	39.1	6.0	13355	36.5	6.0	14524	36.7	6.0
Mancunian Way6	47	85859	64.2	2.9	88512	63.0	2.9	86795	61.1	3.0
GreatAncoatsSt3	14	46238	49.2	2.0	47358	48.9	1.9	45990	48.8	1.9
GreatAncoats	38	39212	39.3	1.3	38646	37.8	1.2	36488	31.8	1.2
Brook Street	41	10961	20.7	2.0	11033	21.3	2.4	11691	20.0	2.4
BrookStreetJnct	41	10961	**24.1**	2.0	11033	21.3	2.4	11691	20.0	2.4
BrrokStreetNF	42	29577	32.1	2.0	30602	29.5	2.0	33807	28.7	1.9
BrookStreetJnct2	42	29577	**24.1**	2.0	30602	**24.1**	2.0	33807	28.7	1.9
BrookStreetNF1	42	29577	32.1	2.0	30602	29.5	2.0	33807	28.7	1.9
DowningStreet2	8	16512	34.2	0.3	16561	34.1	0.4	18283	35.5	0.3
ManctoDowning1	110	5391	46.3	2.8	5388	64.8	3.0	6044	68.1	2.8
DowningtoManc	111	4762	19.0	6.9	7210	15.4	4.3	7949	16.2	3.8
ManctoLondon2	109	11642	16.4	3.7	12169	14.9	3.7	10458	6.7	5.1
FarifieldSt3	12	24242	35.7	2.8	25002	38.4	2.8	25753	32.8	2.8
Great Ancoats St	15	33798	37.6	1.8	34451	39.4	1.6	32714	36.4	1.6
GreatAncoatsSt2	14	46238	49.2	2.0	47358	48.9	1.9	45990	48.8	1.9
Mancunian WayJnct	14	46238	**24.1**	2.0	47358	**24.1**	1.9	45990	48.8	1.9
Mancunian Way2	11	31418	23.6	2.8	31902	23.3	2.7	30875	25.6	2.8
MancunianWayJnct2	1	45884	**24.1**	3.5	47463	**24.1**	3.4	47744	41.2	3.4
Mancunian Way3	2	45884	36.9	3.5	47463	39.6	3.4	47744	41.2	3.4

Mancunian Way4	40+2	45310	36.9	3.3	46964	39.6	3.2	46930	41.2	3.2
Mancunian Way5	40	44736	36.9	3.1	46464	39.6	3.0	46115	41.2	3.0
FarifieldSt	19	15981	20.7	1.3	17047	20.5	1.3	15191	20.9	0.7
FarifieldStJnct1	19	15981	20.7	1.3	17047	20.5	1.3	15191	20.9	0.7
FarifieldSt1	4	7517	50.5	0.5	7446	50.3	0.4	6823	48.4	0.4
FarifieldSt2	3	7796	51.9	0.5	7630	52.3	0.4	7251	51.9	0.4
FarifieldStJnct	12	24242	**24.1**	2.8	25002	**24.1**	2.8	25753	32.8	2.8
LondonRd*	22	8109	11.6	12.0	7562	6.9	12.0	9199	12.6	12.0
DowningStreet1	10	30229	35.9	3.1	30787	32.2	3.1	29774	36.3	3.2
DowningStreet3	9	19716	41.0	0.3	18553	43.7	0.3	22029	42.1	0.3
DowningStreet4	9	19716	41.0	0.3	18553	43.7	0.3	22029	42.1	0.3
OxfordRd1*	48	5834	15.2	40.4	6191	18.9	40.4	6324	15.2	40.4
OxfordRdJnct*	48	5834	15.1	40.4	6191	**24.1**	40.4	6324	15.2	40.4
OxfordRd2*	49	3004	36.4	40.4	3147	33.4	40.4	3243	35.1	40.4
MancunianWay3a	38	39212	39.3	1.3	38646	37.8	1.2	36488	31.8	1.2
GreatAncoatsJnct	1	45884	**24.1**	3.5	47463	**24.1**	3.4	47744	41.2	3.4
GreatAncoatsNF	37	41214	34.0	1.3	40881	31.4	1.2	38961	28.5	1.2
OxfordRdJnct2*	48	5834	15.2	40.4	6191	18.9	40.4	6324	15.2	40.4
WhitworthSt	54	14779	25.5	2.0	15566	23.9	1.9	14512	30.8	1.4
WhitworthStJnct	54+55	14825	16.1	2.1	15676	25.4	2.0	14681	30.2	1.5
OxfordRd3*	48	5834	15.2	40.4	6191	18.9	0.0	6324	15.2	0.0
PeterSt1*	96	6921	19.0	5.0	7347	22.9	5.0	7789	22.7	5.0
PeterStJnct*	96	6921	19.0	5.0	7347	22.9	5.0	7789	22.7	5.0
PeterSt2*	96	6921	19.0	5.0	7347	22.9	5.0	7789	22.7	5.0
PeterStJnct2*	96	6921	19.0	5.0	7347	22.9	5.0	7789	22.7	5.0
PeterSt3	94	4060	33.5	0.5	4323	30.9	0.8	4595	30.5	0.7
PeterStJnct3	94	4060	**24.1**	0.5	4323	**24.1**	0.8	4595	**24.1**	0.7

OxfordRd4*	56	4081	39.1	40.4	4291	36.5	0.8	4528	36.7	0.7
PortlandStJnct*	46	11257	18.4	21.0	12283	18.7	21.0	12772	18.7	21.0
PortlandSt*	46	11257	18.4	21.0	12283	18.7	21.0	12772	18.7436	21.0
PortlandSTJnct2*	46	11257	18.4	21.0	12283	18.7	21.0	12772	18.7	21.0
PortlandStJnct3*	46	11257	18.4	21.0	12283	18.7	21.0	12772	18.7	21.0
AytounSt*	24	8955	21.2	17.0	8651	23.8	17.0	8994	26.9	17.0
AytounSt2	20	6732	24.8	0.5	6643	23.0	0.4	6397	23.8	0.6
Picadilly1*	27	8193	21.4	9.0	8352	25.2	9.0	9204	27.0	9.0
NewtonSt*	28	2076	44.2	27.0	1944	25.8	27.0	2090	29.4	27.0
NewtonSt1	29	5544	22.9	1.4	5437	15.3	1.6	6048	17.4	2.0
NewtonStJnct	29	5544	22.9	1.4	5437	15.3	1.6	6048	17.4	2.0
NewtonSt2	72	6065	29.9	1.0	5134	23.5	1.4	5503	23.6	1.8
StoreStJnct	21	634	**24.1**	0.0	421	**24.1**	0.0	570	**24.1**	0.0
StoreSt	21	634	25.5	0.0	421	26.8	0.0	570	27.3	0.0
PlymouthGrove	44	11442	42.1	1.5	11343	43.7	1.9	12261	38.6	1.8
DucieSt1	26	4105	20.1	0.2	3745	20.0	0.2	4012	24.8	0.0
DucieStJnct	26	4105	20.1	0.2	3745	20.0	0.2	4012	24.8	0.0
DucieSt2	69	2577	20.1	0.0	2646	20.0	0.0	2923	24.8	0.1
WhitworthSt2	55	14871	22.9	2.1	15786	26.8	2.1	14850	29.6	1.6
WhitworthJnct2	23	19039	22.5	1.4	19831	25.9	1.6	18103	25.5	1.2
WhitworthSt3	23	19039	22.5	1.4	19831	25.9	1.6	18103	25.5	1.2
WhitworthJnct3	23	19039	22.5	1.4	19831	25.9	1.6	18103	25.5	1.2
WhitworthSt4	23	19039	22.5	1.4	19831	25.9	1.6	18103	25.5	1.2
WhitworthJnct4	23	19039	22.5	1.4	19831	25.9	1.6	18103	25.5	1.2
PrincessSt	41	10961	20.7	2.0	11033	21.3	2.4	11691	20.0	2.4
PrincessStJnct	45	3377	18.5	0.0	3838	18.5	0.0	3867	18.5	0.0
PrincessSt2	45	3377	45.0	0.0	3838	43.0	0.0	3867	40.9	0.0

PrincessStJnct2	89	1411	18.4	0.0	1791	18.5	0.0	1786	18.7	0.0

**Indicates HDV% has been taken from DFT counts*

Speeds in bold have been manually decreased to account for junctions within model.

Appendix 8.2 Construction Mitigation Measures

Appendix 8-2 Construction assessment methodology

Assessing the risk of dust impacts

A) Defining the potential dust emission magnitude

The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large.

Demolition: Example definitions for demolition are:

- **Large**: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- **Medium**: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- **Small**: Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks: Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. Example definitions for earthworks are:

- **Large**: Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes;
- **Medium**: Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes; and
- **Small**: Total site area <2 ,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.

Construction: The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s) / infrastructure, method of construction, construction materials, and duration of build. Example definitions for construction are:

- **Large**: Total building volume >100, 000 m^3, on site concrete batching, sandblasting;
- **Medium**: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- **Small**: Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout: Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology and duration. As with all other potential sources, professional judgement must be applied when classifying trackout into one of the dust emission magnitude categories. Example definitions for trackout are:

- **Large**: >50 HDV (>3.5t) outward movements[1] in any one day[2], potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;

[1] A vehicle movement is a one way journey. i.e. from A to B, and excludes the return journey.

[2] HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

- **Medium**: 10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and
- **Small**: <10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

These numbers are for vehicles that leave the site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

B) Defining the sensitivity of the area

The sensitivity of the area takes account of a number of factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Examples of sensitivities of various receptors to dust soiling, elevated PM_{10} and ecological effects are shown in Table 1.

For the sensitivity of people and their property to soiling, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the general principles in the table below.

For the sensitivity of people to the health effects of PM_{10}, the IAQM recommends that the air quality practitioner assumes that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period, consistent with the Defra's advice for local air quality management.

With regards to ecological effects, it is advised to seek the advice of an ecologist to determine the need for an assessment of dust impacts on sensitive habitats and plants. Professional judgement is required to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the likely effect and the value of the ecological asset. A habitat may be highly valuable but not sensitive, alternatively it may be less valuable but more sensitive to dust deposition. Consequently, specialist ecological advice should also be sought to determine the sensitivity of the ecological receptors to dust impacts. In general most receptors will either be of high sensitivity or low sensitivity i.e. either sensitive or not to dust deposition.

Table 1 Examples of receptor sensitivities for various construction effects

Receptor sensitivity	**Effects**		
	Dust soiling	**Elevated PM_{10}**	**Ecological**
High	• Users can reasonably expect a enjoyment of a high level of amenity • The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include	• locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include residential properties. Hospitals, schools and	• locations with an international or national designation and the designated features may be affected by dust soiling; or • location where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain

Receptor sensitivity	Effects		
	Dust soiling	**Elevated PM_{10}**	**Ecological**
	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms.	residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• an indicative example is a Special Area of Conservation (SAC) designated for acid heathlands adjacent to the demolition of a large site containing concrete (alkali) buildings or for the presence of lichen.
Medium	• users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • the appearance, aesthetics or value of their property could be diminished by soiling; or • the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • indicative examples include parks and places of work.	• locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • indicative examples may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • Locations with a national designation where the features may be affected by dust deposition. • Indicative examples include a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	• the enjoyment of amenity would not reasonably be expected; or • there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or • there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	• locations where human exposure is transient. • indicative examples public footpaths, playing fields, parks and shopping streets.	• locations with a local designation where the features may be affected by dust deposition. • Indicative example is a local Nature Reserve with dust sensitive features.

Additional factors to consider when determining the sensitivity of the area include the following

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and the receptors;

- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which the works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and
- Any known specific receptor sensitivities which are considered go beyond the classifications given.

The following tables show how the sensitivity of an area can be determined for the various potential impacts. For each potential impact the highest level of sensitivity should be recorded.

Table 2 Sensitivity of the area to dust soiling effects on people and property

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 3 Sensitivity of the area to human health impacts

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3 (>18 µg/m^3 in Scotland)	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3 (16-18 µg/m^3 in Scotland)	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3 (14-16 µg/m^3 in Scotland)	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
	(<14 µg/m^3 in Scotland)	10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 4 Sensitivity of the area to ecological impacts

Receptor sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

C) Defining the risks of impacts

Dust emission magnitude determined at step A) should be combined with the sensitivity of the area determined at step B) in order to determine the risk of impacts with no mitigation applied. The following matrices provide a method of assigning the level of risk for each activity. For those cases where the risk category is 'negligible', no mitigation measures beyond those required by legislation will be required.

Table 5 Risk of dust impacts – demolition

Sensitivity of area	Dust emission magnitude		
	Large	**Medium**	**Small**
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible

Table 6 Risk of dust impacts – earthworks

Sensitivity of area	Dust emission magnitude		
	Large	**Medium**	**Small**

High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table 7 Risk of dust impacts – construction

Sensitivity of area	**Dust emission magnitude**		
	Large	**Medium**	**Small**
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table 8 Risk of dust impacts – trackout

Sensitivity of area	**Dust emission magnitude**		
	Large	**Medium**	**Small**
High	High risk	Medium risk	Low risk
Medium	Medium risk	Low risk	Negligible
Low	Low risk	Low risk	Negligible

Appendix 9.1 Ecology Glossary

Appendix 9-1 Glossary and Legislation & Policy

Glossary

Term	Definition
BAP	Biodiversity Action Plan
BCT	Bat Conservation Trust
BoCC	Birds of Conservation Concern
BNG	Biodiversity Net Gain
CBD	Convention on Biological Diversity
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CRoW Act	Countryside and Rights of Way Act 2000
DEFRA	Department for Environment, Food and Rural Affairs
EPS	European Protected Species
ES	Environmental Statement
GI	Green Infrastructure
GMBP	Greater Manchester Biodiversity Project
GMEF	Greater Manchester Ecological Framework
GMEU	Greater Manchester Ecology Unit
GMGIF	Greater Manchester Green Infrastructure Framework
GMSF	Greater Manchester Spatial Framework
HMP	Habitat Management Plan
HPI	Habitats of Principal Importance
HSR	Conservation of Habitats and Species Regulations 2017
IEA	Institute of Environmental Assessment
INNS	Invasive Non-native Species
JNCC	Joint Nature Conservation Committee
LNR	Local Nature Reserve
MAGIC	The Multi-Agency Geographical Information for the Countryside
MCC	Manchester City Council
Natura 2000	European designation of important site for ecology – in the UK either a Special Protection Area (SPA) designated for birds, or a Special Area of Conservation (SAC) designated for presence of important habitats or species, or both.
NE	Natural England
NERC Act	Natural Environment and Rural Communities Act 2006
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
ODPM	Office of the Deputy Prime Minister
OMH	Open Mosaic Habitat
PEA	Preliminary Ecological Appraisal
Phase 1 habitat survey	Standardised ecology survey to define the habitats on a site (follows JNCC 2010)
PPG	Planning Practice Guidance
PRA	Preliminary Roost Assessment

Term	Definition
RIGS	Regionally Important Geological/Geomorphological Site
S41 NERC	Section 41 of the NERC Act which lists priority habitats and species for England
SAC	Special Area of Conservation
SBI	Sites of Biological Interest
SINC	Site of Importance for Nature Conservation
SPI	Species of Principal Importance
SSP	Steel sheet piling
SSSI	Site of Special Scientific Interest
TfL	Transport for London
UKCP09	2009 UK Climate Projections
WCA	Wildlife and Countryside Act 1981 as amended
ZoI	Zone of Influence

Legislation & Planning

1.1 The following legislation and policy is relevant to and has had an influence on the assessment or mitigation proposed in the ES:

International legislation, agreements and conventions

United Nations Convention on Biological Diversity (1992)

1.2 The UN Convention on Biological Diversity (CBD) focuses on the conservation of all species and ecosystems. It requires the development of national strategies, plans or programmes for the conservation and sustainable use of biodiversity. The 'UK Post-2010 Biodiversity Framework' (JNCC *et al.,* 2012), is the result of a change in strategic thinking following the publication of the CBD's 'Strategic Plan for Biodiversity 2011–2020' (CBD, 2010).

1.3 Biodiversity 2020: A strategy for England's wildlife and ecosystem services' (DEFRA, 2011) underpins the UK Post-2010 Biodiversity Framework. Relevant key targets include:

- No net loss of priority habitats and an increase in the overall extent of priority habitats; and
- Overall improvement in the status of our wildlife and prevention of further human-induced extinctions of known threatened species.

1.4 European Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (the Habitats Directive) (European Council, 1992) requires Member States to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest (i.e. those listed in Annexes I, II, IV and/or V of the Directive).

Member States are also required to contribute to a coherent European ecological network of protected sites by designating SACs for the natural habitat types listed in Annex I and habitats

of the species listed in Annex II. In England, the Directive is implemented through the Conservation of Habitats and Species Regulations 2017 (discussed in national legislation section).

The Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar Convention)

1.5 The Ramsar Convention covers all aspects of wetland conservation and wise use. It requires the designation and protection of wetlands of international importance as Ramsar sites, the promotion of the wise use of wetlands, and international co-operation between countries to further the wise use of wetlands.

1.6 The UK has chosen to underpin the designation of its Ramsar sites through prior notification of these areas as Sites of Special Scientific Interest (SSSI). Accordingly, these receive statutory protection under the Wildlife and Countryside Act (WCA) 1981 (as amended).

1.7 Policy statements issued by the Government also extend the same protection at policy level to listed Ramsar sites in respect of new development as that afforded to sites which have been designated under the European Council (EC) Birds and Habitats Directives.

European Council Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive)

1.8 The European Union (EU) Birds Directive (European Union, 2009 – the 'Directive') requires Member States to take the requisite measures to maintain the population of all species of naturally occurring wild birds in the States' European territory at a level that corresponds to various requirements.

1.9 Member States shall take special conservation measures concerning the habitat of species mentioned in Annex I of the Directive, and shall take similar measures for regularly occurring migratory species that are not listed in Annex I. Under the Directive, the most suitable areas for the conservation of these species (whether on land or at sea) are classified as Special Protection Areas (SPAs).

1.10 In England and Wales, the Directive is implemented under the WCA 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010 (as amended), as well as other legislation related to the uses of land and sea.

National Legislation

Conservation of Habitats and Species Regulations (2017)

1.11 The Habitat Regulations transpose the EU Habitats Directive and EU Birds Directive in the UK and provide for the designation and protection of European sites and the protection of European protected species (EPS). For those animal species listed in Schedule 2, it is an offence to deliberately capture, kill, or disturb/take/destroy the eggs of an EPS. Additionally, it is an offence to damage or destroy a breeding site or resting place of an EPS.

1.12 It is also an offence under the Habitat Regulations to deliberately pick, collect, cut, uproot or destroy a wild plant listed in Schedule 5. However, these actions can be made lawful through the

granting of licences by the appropriate authorities (Natural England (NE) in England) where deemed appropriate.

Wildlife & Countryside Act (1981 as amended)

1.13 The Wildlife & Countryside Act (WCA) is the principle mechanism for the legislative protection of wildlife in Great Britain and provides for the designation, protection and management of SSSIs and for the establishment of National Nature Reserves (NNRs) in England and Wales for their flora, fauna or geological interests.

1.14 Under the Act, it is an offence to:

"intentionally kill, injure or take any wild animal listed on Schedule 5; intentionally or recklessly damage, destroy or obstruct access to any structure or place used by a Schedule 5 species for shelter or protection; or to disturb them while using such a place".

1.15 The WCA also provides for the legal protection of wild birds. All nesting birds, including their nests, eggs and young, are protected from killing, injury, taking or selling with additional protection offered to species listed on Schedule 1. For these species, adult birds and their young are protected from intentional or reckless disturbance while at or near the nest. It is an offence to intentionally pick, uproot or destroy any wild plant included in Schedule 8.

1.16 The Act is also the principal mechanism for preventing the spread of non-native plant and animal species listed under Schedule 9, such as Japanese knotweed, which may be detrimental to native wildlife.

Countryside and Rights of Way Act (2000)

1.17 The Countryside and Rights of Way Act (CRoW) Act amended and strengthened the protection given to certain species under the WCA and introduced the offence of "reckless" actions in regards to these species to the Act.

Natural Environment & Rural Communities (NERC) Act (2006)

1.18 Section 40 of the NERC Act 2006 places a duty on all public authorities in England to have regard, in the exercise of their functions, to the purpose of conserving biodiversity. A list of habitats and species of principal importance in England, drawn up under Section 41 (S.41), is used to guide local and regional authorities in implementing their biodiversity duty.

Protection of Badgers Act (1992)

1.19 The Protection of Badgers Act makes it an offence to kill, injure or take a badger, or to damage or interfere with a sett unless a licence is obtained from NE.

Hedgerows Regulation (1997)

1.20 The Hedgerows Regulations (HM Government, 1997) make it an offence to remove or destroy certain hedgerows without the permission of the local planning authority.

National planning policy and guidance

National Planning Policy Framework (MHCLG, 2019)

1.21 The revised National Planning Policy Framework (NPPF), published in July 2018 and updated in February 2019, sets out the Government's planning policies for England and how these should be applied. The revised NPPF continues to stress the importance of the local authority contribution to improving and protecting the environment through development of a systematic approach to enhancing biodiversity, minimising waste and pollution, and mitigation/adaptation to climate change impacts.

1.22 Chapter 15 requires that local planning authorities, when considering planning applications, should aim to conserve and enhance biodiversity by applying the following principles:

- 'Planning policies and decisions should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes and sites of biodiversity, (in a manner commensurate with their statutory status or identified quality)… and minimising impacts and providing net gains for biodiversity by establishing coherent ecological networks that are more resilient to current and future pressures';

- 'To protect and enhance biodiversity and geodiversity, plans should identify and map components of local wildlife-rich habitats and wider ecological networks including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them… and promote the conservation, restoration, and re-creation of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity';

- 'If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused';

- 'Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists'; and

- 'Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity'.

1.23 Biodiversity Net Gain (BNG) requirements are already embedded in the National Planning Policy Framework and in most local planning frameworks. Several documents have been issued including the following:

- Net Gain Consultation proposals (Defra, 2018) - under the proposals, developers would be required to ensure that all new development leaves the biodiversity of the site in a measurably better state than before development. The standardised, mandatory approach

aims to a quantitative rather than qualitative approach to enhance biodiversity while developing sites. The consultation paper requires application of the mitigation hierarchy and proposes a minimum 10% biodiversity net gain target for new developments with a tariff system where offsets are the last remaining option.

- BNG Good practice principles for development (CIRIA, CIEEM and IEMA, 2016) - these principles provide a framework to improve the UK's biodiversity by contributing towards strategic priorities to conserve and enhance nature while progressing with sustainable development and provide a way for industry to show that projects followed good practice.

    - BNG Good practice principles for development: A practical guide (CIRIA, CIEEM and IEMA, 2019) - this guide offers practical advice to achieve BNG in the UK. It is based on the UK's good practice principles for BNG and applies to all types and scales of development, at all stages in the life cycle of development. It is relevant to developers and all other stakeholders wishing to promote, facilitate and deliver BNG.

Planning Practice Guidance 2014 (MHCLG, updated 2018)

1.24 Planning Practice Guidance (PPG) states that:

- "The NPPF is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieving net gains for nature, and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution";

- "Biodiversity enhancement in and around development should be led by a local understanding of ecological networks, and should seek to include habitat restoration, re-creation and expansion; improved links between existing sites; buffering of existing important sites; new biodiversity features within development; and securing management for long term enhancement.";

- "Where a development cannot satisfy the requirements of the 'mitigation hierarchy', planning permission should be refused as per paragraph 118 of the NPPF."; and

- "Sufficient green infrastructure should be designed into a development to make the proposal sustainable. If this green infrastructure helps to mitigate any significant harm to biodiversity (among other benefits) then this should be taken into account in deciding whether compensation may also be needed."

Office of the Deputy Prime Minister Circular 06/2005, (ODPM, 2005)

1.25 This circular provides further guidance with regards to statutory obligations relating to biodiversity within the planning system. It sets out the considerations to be taken into account when planning decisions may have a significant effect on protected sites and species.

Draft Planning Practice Guidance (2018) (Draft PPG)

1.26 The draft PPG states that "planning policies and decisions should be based on up-to-date information about the natural environment and other characteristics of the area and together

with Local Nature Partnerships, where appropriate, this should include an assessment of existing and potential components of ecological networks."

Regional planning policy and guidance

Greater Manchester Strategy 2009–20

1.27 The strategy sets out Greater Manchester's vision for 2020 as one where 'we will have pioneered a new model for sustainable economic growth based around a more connected, talented and greener city region in which the prosperity secured is enjoyed by the many and not the few.'

Greater Manchester Spatial Framework (Draft, 2019) (GMSF)

1.28 This draft plan, currently in consultation, sets out how Greater Manchester should develop up until 2037. A key change to the rewritten plan is that it focuses more heavily on the environment including protecting the important environmental assets across the city region.

1.29 The plan seeks to deliver a net gain in biodiversity assets over the plan period and protect and enhance biodiversity and green infrastructure in line with the UK's 25 Year Environment Plan. The plan seeks to deliver major, quantifiable BNG for all developments through the application of the mitigation hierarchy and habitat protection, creation and improvement in connectivity between sites.

1.30 Relevant policies include:

- GM-G2 – Green infrastructure network;
- GM-G9 – Standards for a Greener Greater Manchester, including a GM "Green Factor" which sets out the level of on-site green infrastructure that new developments are expected to provide so as to meet their occupants' needs and contribute to the extent and interconnectedness of the wider network; and
- GM-G10 – A Net Enhancement of Biodiversity and Geodiversity, which requires that development follows the mitigation hierarchy (avoid, minimise, mitigate, compensate and finally offset) and delivers major biodiversity net gain. This could involve protection and improvement of existing habitats, creation of new habitats, and/or strengthening connections between them. The existing Defra metric will initially be used as the basis for calculating net gains, supported by best practice guidance (97). This will be superseded by a more locally-specific Greater Manchester biodiversity metric, which will be adopted as supplementary guidance to the GMSF.

Manchester's Local Development Framework Core Strategy Development Plan Document (MCC, 2012)

1.31 Manchester's Core Strategy is the key document in the Manchester Local Plan and covers the period 2012 – 2027. It sets the out the long term strategic policies for Manchester's development and forms the framework that planning applications will be assessed against.

1.32 There are six Spatial Objectives contained within the Core Strategy, including S06 Environment.

This aims to protect and enhance the natural and built environment of the city and ensure the sustainable use of natural resources in order to mitigate and adapt to climate change, support biodiversity and wildlife, improve air, water and land quality, recreational opportunities, and provide networks of high quality green infrastructure. The development of networks of green infrastructure across the city and city region is key.

1.33 Relevant policies include:

- EN 9 Green Infrastructure - New development will be expected to maintain existing green infrastructure ('GI') in terms of its quantity, quality and multiple function. Where the opportunity arises and in accordance with current Green Infrastructure Strategies developers should enhance the quality and quantity of green infrastructure, improve the performance of its functions and create and improve linkages to and between areas of green infrastructure. Where the benefits of a proposed development are considered to outweigh the loss of an existing element of green infrastructure, the developer will be required to demonstrate how this loss will be mitigated in terms of quantity, quality, function and future management.
    - EN9 Indicator: Increased levels of GI. Target: In line with emerging GM GI Strategy.
- EN 15 Biodiversity and Geological Conservation - seeks to maintain or enhance sites of biodiversity and geological value throughout the city. Developers should identify and implement reasonable opportunities to enhance, restore or create new biodiversity, either on-site or adjacent to the site, contributing to linkages between valuable or potentially valuable habitat areas where appropriate, with reference to [*inter alia]*:
    - Manchester Biodiversity Strategy, which provides further details of priority habitats within Manchester and opportunities for biodiversity enhancement including corridors such as the Mersey, Medlock and Irk river valleys, the canals and disused railway lines and areas of managed greenspace particularly in parks; and
    - Green Infrastructure Framework for Greater Manchester, which encompasses an ecological framework that seeks to guide and inform habitat creation and repair.
    - EN15 Indicator: BAP priority habitats and species. Target: Increase.

Local biodiversity strategies and action plans

1.34 Both Greater Manchester and Manchester City Council have adopted documents with their commitments to progress biodiversity conservation locally and focus on the priorities for biodiversity in Manchester. These include:

- Greater Manchester Biodiversity Action Plan ('BAP', 2009);
- Wild about Manchester Biodiversity Strategy (2005); and
- Manchester Biodiversity Action Plan 2012–2016

- Valuing Manchester's Nature (2012).

1.35 Priority habitats found within Manchester, as listed in the Manchester Biodiversity Strategy and/or the GM BAP, of relevance to the site include rivers (Medlock) and urban managed greenspace.

1.36 Local priority species of relevance to the Mayfield site include bats with specific mention of pipistrelle bats in the Manchester Biodiversity Strategy and black redstart listed in the GM BAP. In addition, several bat species including Daubenton's are of local conservation concern and thus merit conservation work locally.

Greater Manchester Green Infrastructure Framework ('GMGIF')

1.37 The GMGIF sets out four priorities for investment in green infrastructure: the Strategic Green Infrastructure Network, Economic Centres and Growth Points, Regeneration Priority Areas, and an Active Travel Network. The framework provides the means for co-ordinating green infrastructure activity, ensuring that it will be targeted towards the areas of greatest need and that this investment will provide the maximum return in relation to Greater Manchester's social, economic and environmental objectives.

1.38 Sites of biodiversity value, and linkages between them, also form part of the multi-functional Green Infrastructure network. In Manchester, the river valleys including the Medlock and canal corridors form an important element of the 'ecological framework' within the GI Framework. They also present opportunities for further landscape and habitat enhancement and creation including the restoration of sections of channelised river and the opening up of culverted sections such as the Medlock on the Mayfield site.

Greater Manchester Ecological Framework (GMEF)

1.39 The GMEF provides detail on how the GM's natural environment support a broad variety of wildlife. It is based on broad habitat types, which also form part of the priority green infrastructure network, that are considered to be the most important in Greater Manchester. Analysis of the extent and distribution of habitats and land uses in GM has shown that although the city region is biologically diverse, habitats generally occur in small patches and can be fragmented.

Urban Pioneer /Natural Capital Account and Investment Plan

1.40 Greater Manchester has been selected by DEFRA as the 'Urban' pioneer to inform the development and implementation of the 25 Year Environment Plan. Through the Urban Pioneer, Greater Manchester partners have made a commitment to embed a biodiversity net gain approach to the planning system across Greater Manchester and explore and demonstrate how this will deliver wider natural capital net gains and benefits to people's health, wellbeing, prosperity and growth.

1.41 A natural capital account and investment plan has been developed for Greater Manchester to measure the benefits provided by the city region's natural assets and to encourage investment in the natural environment to secure financial and social returns.

Manchester's Great Outdoors – a Green and Blue Infrastructure Strategy for Manchester 2015 – 2025 and Stakeholder Implementation Plan 2015-2018 (MCC, 2015)

1.42 Manchester's green and blue infrastructure strategy sets out how the city will increase the quality, function and quantity of green infrastructure (the green and blue spaces that exist within and between urban areas) as part of plans for the city's ongoing growth and regeneration.

1.43 The four key objectives are to enhance existing GI, to deliver new GI by embedding it in development projects, to improve access to and understanding of the benefits of GI. The Implementation Plan sets out the key strategic actions and an initial set of medium to large scale projects that are required to begin to translate the GI strategy into reality over the period 2015-18. Restoration of the Medlock and improvements to biodiversity and water quality as well as reducing flood risk are a headline action.

Appendix 9.2 Ecological Assessment Report, August 2019

BUROHAPPOLD ENGINEERING

Mayfield Regeneration Development

Ecological Assessment and Bat Inspection

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29 November 2017

Revision 01

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Glossary

Term	Definition
BAP	Biodiversity Action Plan
CRoW	Countryside and Rights of Way
EU	European Union
GMEU	Greater Manchester Ecology Unit
NERC	Natural Environment and Rural Communities
NPPF	National Planning Policy Framework
PAA	Penny Anderson Associates Ltd
SAC	Special Area of Conservation
SBI	Site of Biological Importance
SSSI	Site of Special Scientific Interest
WCA	Wildlife and Countryside Act

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1 Introduction

1.1 Background

BuroHappold Engineering was instructed to carry out an ecological assessment of a site in central Manchester at and around the former Mayfield Station complex (hereafter referred to as the 'site').

The site is proposed for re-development, including demolition of the majority of existing structures on the site, refurbishment of some of the older remedial works, and modification of the retaining walls along the River Medlock.

This report details the results of a desk study and site survey and evaluates the results in context of the proposed re-development of the site, making recommendations for mitigation and/or any further survey work as required.

1.2 Site Description

The site boundary includes an area approximately 9.1ha, comprising a series of buildings that are predominantly commercial or light industrial units and associated areas of hard and soft landscaping. Some of the existing buildings are still occupied whilst others have been disused for many years.

The site is surrounded on all sides by dense urban development, with tall buildings and busy roads. Manchester Piccadilly rail station is immediately to the north and the River Medlock flows west to east through the centre of the site.

1.3 Legislative Context

A range of international and national legislation has been established in the UK to protect important nature conservation sites and priority species. At the international level, European Union (EU) Directives require individual member states to implement their conservation provisions nationally for the benefit of Europe as a whole. These Directives have been transposed into UK law by the Conservation of Habitats and Species Regulations 2010[1] (further amended in 2011 and 2012); further details can be obtained from the Joint Nature Conservation Committee (JNCC) website at www.jncc.defra.gov.uk.

Other international conventions include the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979), which requires the maintenance of populations of wild flora and fauna, giving particular protection to endangered and vulnerable species; and the Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979), which requires the protection of migratory species throughout their entire range. The above conventions are implemented in England and Wales via the Wildlife and Countryside Act (WCA) (1981) (as amended) and Countryside and Rights of Way (CRoW) Act 2000. This legislation also protects important habitats and sites such as Sites of Special Scientific Interest (SSSI).

[1] *Please note: the text provides a brief summary of the legislation in England and Wales and the original Acts and any amendments should be referred to for the precise wording.*

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At the national level, the UK Post-2010 Biodiversity Framework published in 2012 is the Government's response to the Convention on Biological Diversity (2010). It describes the UK's biological resources, commits a detailed plan for the protection of these resources within the UK's devolved framework across England, Wales, Scotland and Northern Ireland. The document identifies future priorities for nature conservation and adopts a more strategic approach, including ecosystem services and sustainability alongside biodiversity. Despite administrative changes following devolution, there is still an underlying objective of protecting and enhancing a range of priority species and habitats, often still based on the objectives and classifications of the original UK Biodiversity Action Plan (BAP). Biodiversity 2020 is England's national biodiversity strategy. Building on the Natural Environment White Paper published in 2011, this provides a means of delivering the international and EU commitments to biodiversity. Under Biodiversity 2020, Priority Species and Habitats referred to are those of 'Principal Importance' for the conservation of biodiversity in England listed on Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006.

Finally, the National Planning Policy Framework (NPPF), published in 2012 provides guidance for local authorities on the content of the Local Plans and is a material consideration in determining planning applications. The NPPF has replaced much existing planning policy guidance, including Planning Policy Statement 9: Biological and Geological Conservation. Briefly, with an overall focus on sustainable development, the NPPF states that developments should aim to engender positive outcomes for biodiversity, with a particular focus on the maintenance and creation of ecological networks. Furthermore, the NPPF also states that any planning proposals for which significant negative impacts on biodiversity cannot be avoided, mitigated or compensated should be refused. The NPPF states that the planning system should contribute to and enhance the natural environment through a range of actions, including:

- protecting and enhancing valued landscapes, geological interests and soils;
- recognising the wider benefits of ecosystem services; and
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

1.3.1 Protected Species

Details of the protected species legislation relevant to this site can be found in Appendix C.

1.3.2 Invasive Species

Certain non-native species that have been introduced into the UK are regarded as being a threat to native biodiversity. Legislative measures have, therefore, been put in place to prevent the spread of these invasive species in the wild.

Under section 14 of the WCA 1981 (as amended), it is illegal to introduce plants listed under Part II of Schedule 9 of the WCA into the wild or sell these species. Offences include causing the spread of viable plant material or neglecting to contain or appropriately manage non-native species.

Commonly introduced Schedule 9 species include non-native cotoneaster species, specifically, small-leaved cotoneaster *(Cotoneaster microphylla*) and wall cotoneaster (*C. horizontalis*), Himalayan balsam *(Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*).

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2 Methods

2.1 Desk Study

The desk study consisted of a consultation exercise to gather local and site-specific ecological information, the data from which, along with survey results, was used to assess the potential likely effect of the proposed development on habitats and protected species at the site and the surrounding areas.

A request for records of protected and notable species and wildlife sites within 1km of the centre of the site was made to Greater Manchester Ecology Unit (GMEU). A Site Check Report was also undertaken using the online magic.gov website to identify any statutory designated sites within the same radius.

In addition to this, two previous survey reports prepared for the Mayfield Station area of the site by BuroHappold (2009 and 2010) were reviewed for any information that may be relevant to the current assessment.

It is important to note that the desk study results provide an indication of the species present in and around the site, but do not confirm current presence or absence of any particular species. Protected species are often under-recorded in county wildlife databases.

2.2 Phase 1 Habitat Survey

An initial habitat survey was undertaken by experienced ecologists Victoria Burton (ACIEEM)[2] and Hazel Robson (MCIEEM)[3] on 24th November 2016. This is outside the recommended Phase 1 Habitat Survey period of March to October. Some plant species and habitats are not readily identifiable in the winter period. For this reason, walkover habitat surveys were repeated in May and June 2017 to assess if the habitats had changed significantly and identify any vernal and summer species that were not apparent in November 2016.

The survey followed standard methods as set out in the Handbook for Phase 1 Habitat Survey (JNCC 2010) for classifying and mapping British habitats based on the identification of individual plant species. The plant species within the site and their relative abundances are listed in Appendix E, which shows both common and scientific names according to Stace (2010); common names only are referred to in the text.

The extent of each habitat type was mapped in the field, with target notes to highlight any features of particular ecological interest.

2.3 Protected Species Assessment

The survey was 'extended' (Institute of Environmental Assessment 1995, CIEEM 2013) to include a general assessment for the presence or potential presence of protected species, noting any areas of suitable habitat, along with the location and type of any incidental field signs of protected species. In particular, this component of the field survey focused on the potential presence of bats and breeding birds, taking into account any contemporary, relevant desk study records.

[2] *Associate Member of the Chartered Institute of Ecology and Environmental Management.*
[3] *Full Member of the Chartered Institute of Ecology and Environmental Management.*

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In the case of bats, the survey followed current good practice guidelines published by The Bat Conservation Trust (Collins 2016) and was led by ecologist Hazel Robson MCIEEM (Natural England Class 2 Survey Licence: WML-CL18 2015-12600-CLS-CLS).

The survey comprised an assessment of features on each structure that could be used by roosting bats such as small holes and crevices and also features that would provide entry/exit points for bats to access internal areas such as roof voids. A search was made for any evidence of bat presence, such as accumulations of droppings and feeding remains or sightings of the animals themselves. Where safe access was available, the inspection included both internal and external inspection of each structure.

Binoculars (Avian F 8x42), torch (Clulite 1 million candlepower) and endoscope (Rigid Micro CA300) were used to inspect potential roost features where necessary.

The assessment of suitability was based on the broad criteria outlined in Table 2—1 below (Collins 2016), combined with the professional judgement and experience of the surveyor in recognising suitable habitat features and field signs of bats.

Table 2—1 Bat Roost Assessment Criteria (Collins 2016)

Suitability	Description
Negligible	Negligible habitat features on site likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically, but does not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats. (i.e. unlikely to be suitable for maternity or hibernation.)
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost type of high conservation significance.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
Confirmed Roost	A structure with evidence of bat presence, i.e. droppings, feeding remains, audible bat calls heard during daytime survey or sightings of the animals themselves, existing record of bats roosting at the location.

2.4 Limitations

Access into the channel of the River Medlock, which flows through the centre of the site, was limited due to 5m high vertical walls of brick and stone along the entire stretch of the river. The river is also culverted in two sections within the boundary of the site. The river channel could only be observed from a distance from a small number of vantage points, therefore the entire length of the river channel was not observed.

The majority of the structures were fully accessible for inspection. However, several were not, due to health and safety considerations or lack of permission from tenants. At least a partial external assessment was possible in all cases and where further investigation is required to provide a robust assessment this is discussed in the evaluation and recommendations sections.

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3 Results

3.1 Desk Study

Desk study data for designated sites, habitats and species are described in further detail under the sub-headings below, with maps to illustrate locations of various features provided in Appendix D.

3.1.1 Statutory Protected Sites

3.1.1.1 Special Area of Conservation

Special Areas of Conservation (SACs) are protected sites with strict conservation protection, designated under Article 3 of the European Commission Habitats Directive.

There are no SACs in the 1km search area for the site. However, certain stretches of the Rochdale Canal, which is approximately 400m to the north of the site, have been designated a SAC and SSSI (Site of Special Scientific Interest) because it supports the European Protected Species floating water plantain (*Luronium natans*)[4]. It also has a population of white-clawed crayfish (*Austropotamobius pallipes*), which has some legal protection and American pondweed (*Potamogeton epihydrus*), which is a red data book species[5]. Furthermore, sections of the Ashton Canal to the north of the site have floating water plantain and the nationally scarce grasswrack pondweed (*Potamogeton compressus*), both of which are UK Biodiversity Priority Species (refer to Appendix D Maps 1, 2 and 5).

3.1.1.2 Site of Special Scientific Interest

SSSIs are statutory sites designated to support species of plants and animals that find it more difficult to survive in the wider environment. They represent a selection of this country's best wildlife and geological sites, and cover approximately 7% of the terrestrial area of the country (with over 4,000 separate sites in England).

There are no SSSIs in the search zone for the site, although note Section 3.1.1.1.

3.1.2 Non-Statutory Protected Sites

3.1.2.1 Site of Biological Interest

Sites of Biological Interest (SBIs) have no legal protection, but do receive some protection through different policies and they must be taken into consideration by the planning authority when planning applications affect the site. SBIs are assigned one of three grades:

- Grade A SBIs are of county or regional importance (assumes a presumption against development);
- Grade B SBIs are those of district importance; and
- Grade C SBIs are those of local importance.

[4] *Floating water-plantain is protected under Schedule 8 of the WCA 1981. It is also protected under the European Communities Directive 92/43/EEC, on the Conservation of Natural Habitats and of Wild Fauna and Flora - the Habitats Directive and is a S41 priority species.*

[5] *The IUCN Red List of Threatened Species (also known as the IUCN Red List or Red Data List) is an inventory of the global conservation status of biological species.*

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Rochdale Canal, Stott's Lane - Ducie Street Basin and Ashton Canal approximately 400m to the north are both Grade A SBIs. As stated earlier the Rochdale Canal supports regionally important aquatic habitat and species, including internationally important populations of floating water plantain and the Ashton Canal is recognised as important for its submerged aquatic flora (refer to Appendix D Map 1).

3.1.2.2 Regionally Important Geological and Geomorphological Sites (RIGS)

Regionally Important Geological and Geomorphological Sites (RIGS) are locally designated sites of local, regional and national importance for geodiversity and protect important Earth Science and landscape features. They are conserved and protected from development as a material consideration through the planning system.

There are no RIGS within the search zone for the site.

3.1.3 Protected and Notable Species

3.1.3.1 Badgers

There are two records of unspecified badger signs within the search area. Please note that information related to badgers and their setts is confidential and the map provided by GMEU showing the location of the signs is not included in the appendices for this reason.

3.1.3.2 Bats

Table 3—1 shows the number of each species of bat recorded in the search zone and the proximity to the site of the closest roost for each. The most recorded species in the area are common pipistrelle (*Pipistrellus pipistrellus*) and unspecified pipistrelle species (*Pipistrellus* sp.), and a pipistrelle roost is the closest roost to the site (refer to Appendix D Map 4).

Table 3—1 Bat Records Provided by GMEU

Species		No. Roosts	Closest Record of Roost (m)	No. other Signs	Closest Record of Sign (m)
Common Name	**Latin Name**				
Common pipistrelle	*Pipistrellus pipistrellus*	2	850	13	80
Daubenton's bat	*Myotis daubentonii*	0	n/a	1	850
Soprano pipistrelle	*Pipistrellus pygmaeus*	1	370	0	n/a
Pipistrelle species	*Pipistrellus sp.*	6	On site	7	500
Bat species	*Chiroptera sp.*	0	n/a	3	80

The majority of the records returned are for pipistrelle species. There are two native species - common pipistrelle and soprano pipistrelle (*Pipistrellus pygmaeus*). The common pipistrelle is one of the UK's most common bat species, found in a wide range of habitats including suburban and urban habitats. Soprano pipistrelle is also widely distributed across the UK. The soprano pipistrelle record is close to the Rochdale Canal, which is consistent with its preferred feeding habitat by water and the invertebrates it attracts. Where the distinction between the two species has not been made, they are recorded as pipistrelle species. Daubenton's bat (*Myotis daubentonii*) characteristically flies and forages over water, and the record is close to the Ashton Canal to the north of the site.

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There is a record for a pipistrelle roost within the site in the old station (grid reference SJ 8503 9768) and two records of pipistrelle roosts immediately to the north of the site.

3.1.4 Section 41 Species

Some of the rarest and most threatened species are listed under Section 41 (S41) of the 2006 Natural Environment and Rural Communities (NERC) Act and Species of Principal Importance. The Government's Biodiversity 2020 strategy has an ambition to ensure that by 2020 there will be an overall improvement in the status of wildlife and further extinctions of known threatened species. To achieve this, a range of actions have been identified to help in the recovery of S41 species.

3.1.4.1 West European Hedgehog

West European hedgehog (*Erinaceus europaeus*) is classed as a Species of Principal Importance under Section 41 of the NERC Act 2006. Surveys in urban and rural areas indicate falling numbers of hedgehog.

There is a single record for West European hedgehog in the search area, approximately 300m to the south-west of the site, close to the Mancunian Way (refer to Appendix D Map 5).

3.1.4.2 Birds

There are five records for dunnock (*Prunella modularis*), which is also an Amber[6] listed species. They prefer gardens, parks and greenspace and the records are largely from parks and the grounds of buildings. There are four records for Red listed house sparrow (*Passer domesticus*) and common starling (*Sturnus vulgaris*) and two records for song thrush (*Turdus philomelos*). These species were listed because of a decline in the UK population of over 50%. However, they are relatively common species (refer to Appendix D Map 5).

3.1.4.3 Schedule 1 Bird Species

All breeding birds are protected under Section 1 of the Wildlife and Countryside Act (WCA) 1981 (as amended). This protection extends to killing and injuring, and to the destruction of nests, eggs or chicks. Additional protection is offered to bird species listed in Schedule 1 of the WCA 1981, which are protected, for example, from disturbance whilst nesting or attempting to make a nest. The Countryside and Rights of Way (CRoW) Act 2000 makes it an offence to recklessly disturb, in addition to intentionally disturb, Schedule 1 species.

Records of three Schedule 1 species have been provided by GMEU in the search area: black redstart (*Phoenicurus ochruros*), common kingfisher (*Alcedo atthis*) and little ringed plover (*Charadrius dubius*) (refer to Appendix A Figure 1 and Appendix D Map 2).

A section of the site falls within the Black Redstart Priority Area. This identifies an area in central Manchester where the black redstart has been recorded. This species is a rare breeder, passage migrant and winter visitor with a small population concentrated in London and the West Midlands. There are also records of black redstarts attempting to breed in the Piccadilly Basin area of Greater Manchester. A Species Action Plan (Greater Manchester Biodiversity Project 2009) aims to maintain a breeding population in Greater Manchester.

[6] *The UK's birds can be split in to three categories of conservation importance - red, amber and green. Red is the highest conservation priority, with species needing urgent action. Amber is the next most critical group, followed by green.*

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There are 12 records for black redstart largely to the north-west of the site, the closest being approximately 300m to the north. Appendix A Figure 1 shows the location of records for black redstart based on data provided by GMEU. The Manchester Birding Forum website has, over the late spring and summer of 2016, reported many records of black redstart in the city centre both as sightings and birds heard singing. Some of the locations include the Town Hall, Albert and Lincoln Square and the Manchester Art Gallery (Manchester Birding Forum 2016).

There is a single record of common kingfisher in the search area. Common kingfisher is found by still and slow-flowing water, such as canals and rivers, and they nest in holes tunnelled into earth banks. The closest record is about 900m to the west of the site on a canal branch off the Rochdale Canal next to the Bridgewater Hall.

There is a single record for little ringed plover at a brownfield site by Ancoats Canal Basin approximately 800m to the north of the site. Little ringed plover first bred in the UK in 1938. They are summer visitors and breed in unvegetated man-made habitats such as industrial and post-industrial land, gravel pits and shingle river banks.

3.1.4.4 Plant Species

Grass-wrack pondweed is a Species of Principal Importance. It has been recorded at the Ashton Canal and in one of the canal's branches, approximately 600m and 800m to the north of the site (refer to Appendix D Map 5).

European Protected Species floating water plantain is recorded in the Ashton Canal approximately 800m to the north-east of the site.

3.1.5 Other Protected Species

No other records were returned for protected species e.g. otter, invertebrates, reptiles or amphibians.

3.2 Phase 1 Habitat Survey

3.2.1 Main Habitat Types Present

The site chiefly comprises the following habitats, as shown on the Extended Phase 1 Habitat map (Appendix A Figure 2):

- hardstanding;
- buildings;
- spoil;
- ephemeral short perennial vegetation;
- broadleaved scattered trees;
- scattered scrub;
- tall ruderal;
- semi-improved neutral grassland;
- introduced shrub;
- amenity grassland;

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- hedgerow;
- broadleaved semi-natural woodland; and
- running water (River Medlock).

Plant species recorded are listed in Appendix E, and a selection of illustrative photographs of the site are presented in Plates 1 to 16 (Appendix F).

The site is broadly separated into three main areas. The northern boundary is occupied by a former railway station building, platform and associated track bed. This area is at a raised level compared to the rest of the site. Immediately to the south of the former railway station complex is an area known as Colourgates Yard, which is at street level. The remainder of the site is a complex of buildings, mainly warehouses.

Built Structures and Hardstanding

A large proportion of the site is flat hardstanding. In the northern section, this reflects the site's former use as a railway station. Throughout the remainder of the site there are roads, pavements and car parks.

The site has a number of built structures of varying ages and styles. For ease of reference, these have been numbered B1, B2, B3 etc. as illustrated on Appendix A Figure 2: Phase 1 Habitat Plan and Appendix A Figure 3: Bat Roost Assessment Plan.

The structures are described in further detail in relation to their potential use by roosting bats and nesting birds within those sections of this report.

Spoil

Towards the south-eastern corner of the site is an Aggregate Recycling Yard, which is in constant use, and consequently no vegetation is present on the spoil mounds.

Ephemeral - Short Perennial Vegetation

Throughout the site, small patches of ephemeral short perennial vegetation have developed within gaps and crevices in the hardstanding. The vegetation is most extensive where surfaces have fallen into disrepair.

The vegetation is not dominated by any particular species, instead comprising a mixture of mostly low-growing species, such as willowherb, Mugwort and Michaelmas-daisy. The vegetation consists of both widespread and common species that are typically found in wasteland habitats.

Scattered Broadleaved Trees

A number of broadleaved trees are present, ranging from immature to mature and comprising a variety of species, including ash, sycamore and willow. The most mature trees occur along the south-eastern boundary with the Mancunian Way, where there is a row of planted poplars. They are approximately 15m in height and appear to be in good condition.

The River Medlock runs through the centre of the site and the edges of the river corridor are lined with a range of tree species, including ash, sycamore and elder.

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Tall Ruderal Vegetation

Scattered mainly throughout the southern section of the site are areas of tall ruderal vegetation that have developed in areas that have not been in use or managed for some time, including the frontages and footprints of former buildings. Tall ruderal vegetation is most extensive within Colourgates Yard, immediately south of the former railway station complex. The vegetation is not dominated by any particular species and includes common nettle, creeping thistle and rose-bay willowherb. The vegetation composition is not species-rich and consists of common and widespread species.

Scattered Scrub

There are small patches of scattered scrub, dominated by bramble, throughout the site that are associated with similar areas to the tall ruderal vegetation, as shown on the Phase 1 Habitat map (Appendix A Figure 2).

Semi-improved Neutral Grassland

Within the southern section of the site, small patches of semi-improved neutral grassland are present. This has developed in Colourgates Yard, which has remained undeveloped for some time and also within the wider part of the site, where areas of the hardstanding have degraded. The most dominant grass is creeping bent, with Yorkshire fog locally abundant and cock's-foot locally occasional. There are a variety of forbs present, including dandelion, creeping buttercup, colt's-foot and evening primrose, some of which suggest that the grassland is a succession habitat from ephemeral short perennial vegetation. The grassland is not species-rich.

Introduced Shrub

Throughout the site butterfly-bush occurs frequently. It has established within gaps in the hardstanding surface, resulting in a scattered occurrence across the entire site, including the former railway platform. It is also present within gaps in the mortar of walls and buildings. It frequently occurs within other semi-natural habitat types, including the edges of the river corridor.

There are a small number of amenity planting areas, associated with the buildings in the southern section of the site, dominated by non-native shrubs comprising cherry laurel and Oregon-grape.

Amenity Grassland

There are a small number of blocks of amenity grassland within the southern part of the site and the north-western corner. These formal landscaping areas are associated with car parks and buildings and are regularly mown. The species composition is poor and typical of sown grasslands, with perennial rye-grass abundant and few forbs present.

Hedgerow

There is a solitary cherry laurel hedge planted towards the north-west corner of the site, which provides one of the boundaries to a car park.

Semi-Natural Broadleaved Woodland

Within the former railway station complex, the southern edge of the platform supports young birch woodland. The trees are a similar age and height. There is very little understorey, with some bramble present.

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Another small area of birch woodland is present on the southern border that appears to have remained undeveloped for some time and is bordered on all sides by a combination of walls and fences. The trees are more mature and less dense than those within the railway platform and are approximately 10m in height. Silver birch is dominant with a small number of saplings present as an understorey of sycamore and holly. The understorey is sparse and dominated by bramble.

A block of woodland has developed within the footprint and immediate surroundings of a demolished building, of which only some of the external walls remain. A mixture of mature and semi-mature trees are present including sycamore, ash and willow. The woodland is quite dense, with little understorey.

Running Water

The River Medlock runs through the centre of the site. It is heavily engineered, with 5m high vertical walls of brick and stone and there are two culverts. Because of this, the river was difficult to survey, but from limited observation the river appeared to be fast-flowing, with no in-channel vegetation. There are silt banks on the inside of the meanders, which are colonised mainly with Japanese knotweed.

3.2.2 Invasive Non-native Species

Four species listed on Schedule 9 are present within the site: Japanese knotweed, Himalayan balsam, wall cotoneaster and Himalayan cotoneaster. The locations of these species are shown in the Phase 1 Habitat map (Appendix A Figure 2) as Target Notes 1 to 3.

Japanese knotweed is present on the silt banks of the River Medlock in a number of locations. As access to the river was limited, the full extent of Japanese knotweed is likely to be greater than is shown on the Phase 1 Habitat map. Japanese knotweed was not found to be present in any area of the site outside of the river channel.

Himalayan balsam was observed in a variety of locations within Colourgates Yard, including the top of the river corridor. There was also an individual plant growing within a gap in the hardstanding at the north-western corner of B3. There are no large stands of Himalayan balsam, with either individual plants or clusters of several plants noted. However, as access to the River Medlock was limited, the possibility of Himalayan balsam along the river channel cannot be excluded, particularly as it was recorded in this location in previous surveys of the site in 2010.

Three individual plants of wall cotoneaster are located towards the southern edge of the former railway platform. Two further cotoneaster plants are located in two separate locations within the southern section of the site. The exact species could not be confirmed as there are many similar species of cotoneaster, and both flowers and fruits are required for positive identification. However, the species within the hedgerow is likely to be Himalayan cotoneaster, which is a Schedule 9 species.

3.3 Protected Species Assessment

The potential of habitats on site to support protected species or notable are set out below.

3.3.1 Birds

The site visit was carried out at a time of year when bird activity is generally low and summer visitors are absent. Nevertheless, a small level of activity was observed during the site visit. Two grey wagtails (*Motacilla cinerea*) were observed flying over the River Medlock, close to the road bridge at Baring Street, and the dilapidated retaining walls along the river corridor are likely to provide nesting opportunities.

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A wren (*Troglodytes troglodytes*) was singing within the vegetation to the north-west of B3. In addition, a feral pigeon (*Columba livia*) was seen flying within the lower level of B2.

The semi-natural habitats and some of the buildings provide suitable foraging and nesting habitat for a range of species. In particular, the river corridor and the areas of woodland and scattered trees, within which disused birds' nests, likely corvids, were observed indicating previous breeding (see Appendix A Figure 2 Target Note 4). The former railway station buildings (B1 and B2) and also B7, in the south-western corner of the site offered potential nesting areas, in particular for feral pigeons.

It is considered the site provides suitable habitat for black redstart, a rare protected species known to breed within Manchester city centre, and part of the site is within the Black Redstart Priority Area. The species has a Manchester Species Action Plan and has bred or attempted to breed within the Piccadilly Basin area, approximately 500m north of the site, every year between 1992 and 2007 except for 2003.

The River Medlock provides suitable foraging habitat for common kingfisher, another protected species, and the tenant of B6, which is adjacent to the river, related having found a common kingfisher inside the warehouse.

Much of the brick and stone retaining walls along the banks within the site were considered unlikely to offer nesting opportunities for common kingfisher, which burrow into mud on vertical banks. However, in several areas where the retaining walls were in poor condition or partially collapsed there were gaps between the blocks that may provide access to the earth behind and therefore potential nesting sites.

3.3.2 Badger

No signs of badger were observed during the survey. A small number of partially used mammal holes were located within the birch woodland towards the southern edge of the former railway platform (Target Note 6 on the Phase 1 Habitat map and Plate 4). These were considered likely to be used by fox, with one observed in the immediate vicinity during the survey. A strong smell of fox was detected in the area and the holes are not of the typical size and shape of badger sett entrances.

Previous surveys of the site in 2009 and 2010 highlighted a possible badger sett entrance within the same birch woodland though subsequent monitoring revealed no evidence of use by badgers.

3.3.3 Otter and Water Vole

No signs of water vole or otter, such as burrows, latrines or spraints were found on the sections of the River Medlock. However, as noted earlier access to the river channel was limited and a comprehensive survey of the river channel could not be conducted. Given the engineered character of the river in this area, it is unlikely there would be any otter holts present, although there is the possibility that otters could use the river for commuting.

There were few obvious opportunities for water voles to create burrows due to the brick and stone retaining walls, with limited suitable vegetation for feeding, little cover and culverted sections. The site was considered to provide very poor habitat for water vole.

3.3.4 Bats

The majority of the trees are relatively immature and none provide potential roost features such as woodpecker holes or crevices in dead wood that could be used by bats.

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Of the built structures illustrated on the site plan the majority were light industrial or commercial buildings with open plan warehouse style interiors and no roof voids. These provide no potential roost features for bats within the roof structure or interiors. The external walls of some of the units did have crevice features (B8, B10a and B6) suitable for use by species such as pipistrelle bats.

B13 to B17 are relatively modern structures of brick and metal with no features suitable for use by bats on the interior or exterior.

The former Mayfield Station complex (B1 and B2) has crevice features and internal areas that could be used by bats. There is also an existing record of a pipistrelle roost on B2, although the exact location is not specified within the data this was considered likely to be on the external façade. Due to health and safety considerations, the interior rooms of B1 were not accessible for inspection.

B23, situated at the eastern end of B2 at the platform level, has crevice features and access to the interior, which was not accessible for inspection.

B7 has features suitable for crevice-dwelling bat species, including gaps in the brickwork, behind damaged fascia boards and also access to the internal rooms and basement, although no evidence of bat droppings or feeding remains was found inside.

The culvert over the River Medlock (B24) also provides potential roost habitat for bats, considered likely to be similar to conditions to a known common pipistrelle roost location within a culvert at a nearby site that has been surveyed by Penny Anderson Associates (PAA).

The buildings with roost potential are briefly identified in Table 3—2 below, and full notes on all of the structures surveyed are provided in Appendix F.

Table 3—2 Summary of Buildings with Bat Roost Potential

Building No.	Description	Roost Status
B1	Mayfield Station	High Potential
B2	Mayfield station platforms and warehouses	Confirmed Pipistrelle Roost (desk study record) High Potential throughout rest of structure
B6	Northern wall of industrial unit above retaining wall on River Medlock	High Potential
B7a	Disused industrial units (former Towbar Centre)	Moderate Potential
B7b	Disused industrial units (former Towbar Centre)	Negligible Potential
B7c*	Industrial unit used by church group as a meeting room/place of worship.	Negligible Potential
B8*	Brick warehouse/office units with pitched slate roof	Moderate Potential
B10a*	Brick warehouse/office units with pitched slate roof	Moderate Potential
B23*	Small brick building at end of station platforms	High Potential
B24**	Culvert	High Potential
B26**	Culvert	High Potential

*These buildings were subject to external assessment only due to lack of access permission for internal inspection. Full inspection will be required to establish presence and/or suitability of roof voids and other potential roost features.

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**If feasible, an inspection of the interior of the culvert would be useful to identify the nature of any potential roost features within the structure and to search for evidence of bat presence.

3.3.5 Other Protected Species

The River Medlock has some suitable habitat for white-clawed crayfish (Austropotamobius pallipes) as the river is fast-flowing and boulders and large stones are present within the river bed. However, no records of white-clawed crayfish were returned from the desk study.

Brownfield sites in urban areas can sometimes provide suitable habitat for reptiles. The semi-natural habitats surrounding the former railway station complex, including Colourgates Yard immediately to the south, provide some habitats suitable for reptiles for foraging and also potential refuge and hibernacula features. However, given the isolation by urban development, it is considered highly unlikely that reptiles are present within the site.

There are no records of great crested newt (GCN) within 1km of the site. There are no suitable breeding ponds within or near to the site and the site is isolated by urban development and the river, which would present a barrier GCN dispersal. It is therefore considered unlikely that the site supports GCN.

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4 Evaluation

4.1 Designated Sites

The desk study identified a number of protected sites within the search area. However, these were considered to be sufficiently distant and isolated from the site not to be impacted by the development proposals.

4.2 Habitats and Botanical Interest

The Phase 1 Habitat Survey highlighted no areas of habitat of nature conservation interest. Plant species recorded were common, some of which are typical of urban brownfield sites

Previous surveys of the site in 2009 and 2010 identified a sizeable colony (approximately 300 flowering spikes) of southern marsh orchid (*Dactylorhiza praetermissa*) growing on ballast south of the southernmost platform of the former railway station. No orchids were found during the November 2016 Phase 1 Habitat Survey but many southern marsh-orchids were found to be present between June and August 2017 where they had been recorded before. Although orchids are prized for their appearance they are not afforded special protection.

4.3 Protected Species

4.3.1 Birds

Some potential for foraging and nesting birds, including black redstart, was identified on site with a small number of disused birds' nests observed.

All breeding birds, their nests, eggs and dependent young are protected by law, which may have implications for the scheduling of site clearance activities. In addition to this, black redstart and common kingfisher receive additional protection under Schedule 1 of the Wildlife and Countryside Act 1982 (as amended), and if either species are nesting on site then works affecting the nests may be licensable.

The semi-natural habitats and some of the buildings were considered to provide suitable foraging and nesting habitat for a range of species, including black redstart and common kingfisher. The distribution of breeding black redstart is concentrated in city centre areas notably London, Birmingham, Sheffield and Manchester. The black redstart is a rare passage migrant, one of the rarest breeders in the UK and a Schedule 1 species afforded special protection. They are known to breed in small numbers in Greater Manchester and the site provides potential foraging and nesting habitat.

4.3.2 Otter

The section of the River Medlock that flows through the site has the potential to support commuting otters. Otters are protected under the Wildlife and Countryside Act (WCA) 1981 and are also European Protected Species (EPS) and so are protected under the Conservation of Habitats and Species Regulations 2010.

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4.3.3 Bats

Several of the built structures within the site were considered to provide potential roost features for bats. Due to the urban location and the nature of the potential roost features, the most likely species to be present would be common pipistrelle. In addition to this, there is an existing record of a pipistrelle roost on B2 and it is considered unlikely that the refurbishment of this structure could take place without impacting on the roost.

Where roosting bats are present in these structures, their demolition or refurbishment could result in disturbance or loss of the roost(s) as well as presenting a risk of causing harm to individual bats, all of which would be an offence under current wildlife legislation.

The mosaic of vegetated areas was considered to provide an island of semi-natural habitats within the densely development urban landscape, with the river corridor providing a link to other suitable areas within the city. Bat surveys carried out by PAA at other sites within central Manchester have revealed the network of rivers and canals to be a well-used foraging and commuting resource for bats.

Modification of the habitats within the site and in particular any increase in artificial lighting could reduce the value of these areas to foraging bats and potentially fragment the important river corridor that links bat habitats throughout the city.

Section 5 of this report recommends additional survey effort that would be required to provide sufficient information to inform the impact assessment and, if necessary, an appropriate mitigation strategy.

4.3.4 Other Protected/Notable Species

Due to a lack of suitable habitat and/or isolation from other potential habitats, no other protected species are anticipated to be affected by the proposals.

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5 Recommendations

5.1 Further Survey Effort

The following additional surveys are recommended to enable a full assessment of the likely impacts arising from the proposals on protected species, to inform suitable mitigation strategies and highlight any need for licensing by Natural England.

All surveys must follow best practice methods that are relevant at the date of survey and must be undertaken within the correct survey season by appropriately experienced and equipped ecologists.

5.1.1 Bats

In line with current good practice guidelines (Collins 2016), obligations under national planning policy and current wildlife legislation, when assessing any planning application, the Local Planning Authority will require a detailed evaluation of the predicted impacts on bats that would arise from the proposals, including the type of any roost(s) present and the number and species of bats using the roost(s).

Structures B1, B7a, B8, B10a, B23, B24 and part of B6 have been assessed as providing Moderate/High suitability for bats and there is an existing record of a bat roost on B2. Therefore, the following additional surveys are recommended to confirm presence/likely absence of roosting bats, to determine the exact location of the roost previously identified on B2 and to characterise the nature of any roost, including species present and approximate number of individuals.

- Two/three dusk emergence or dawn re-entry surveys for each structure during the bat active season May to September (inclusive), with at least two of the visits before the end of August.

The following additional activity surveys are recommended to investigate the value of the site to foraging and commuting bats and to identify any key flight routes that may be adversely impacted by fragmentation caused by factors such as new lighting.

- Two walked transect surveys, to be carried out during the spring and summer periods; and
- Monitoring using automated detectors for periods of at least 10 nights during the spring and summer periods.

In the context of bat surveys, spring is typically considered to be April/May and summer June/July/August.

5.1.2 Breeding Birds

It is recommended that surveys for breeding birds are carried out, including sufficient effort to detect presence of common kingfisher and black redstart.

The breeding bird survey should follow standard methods based on those devised jointly by the British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservancy Council (JNCC) (Gilbert et al. 1998) and breeding evidence categories (EOAC 1979).

Black redstart is subject to a Species Action Plan in Greater Manchester and in the circumstances where there is a habitat suitable for breeding a survey protocol is prescribed (Greater Manchester Biodiversity Project 2008).

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- Black Redstart - walked transect to be carried out two hours before dawn on three separate occasions between April and July with each visit being at least one week apart; and
- Breeding Bird Survey - walked transect to be made immediately after dawn on three separate occasions late-March and early-July, with at least two hours survey effort and at least four weeks between each survey.

It should be feasible to combine these transects to three site visits, commencing with survey for black redstart before dawn and then continuing with the main breeding bird survey immediately after.

5.1.3 Otter

There is currently no published methodology for undertaking otter surveys, although a range of publications relating to otter ecology and conservation do exist (e.g. Environment Agency 1999; Highways Agency 2001; Chanin 2003). Otter surveys can be undertaken at any time of year, although surveys should not take place immediately after spate conditions, as field signs such as spraint and footprints may be washed away.

One survey visit is required to determine the possible use of the site by otters, comprising a search of suitable features within the river corridor where otters may leave spraints and/or footprints. Consideration should be given in the development design if otter are using the site for commuting to ensure that this can continue.

5.1.4 Other Protected Species and Habitats

Additional surveys or special measures for other protected species are not considered necessary.

The River Medlock is currently a highly engineered watercourse with a consequent reduction in morphological diversity. The physical character of a river and ecological value are linked in that a diverse geomorphology in terms of features and processes supports a greater biodiversity. The re-development of the site offers opportunities to reinstate natural features to increase biodiversity and aesthetic appeal. It is recommended that a river habitat survey is completed to achieve a better understanding of the present condition of the channel and fluvial processes that operate to inform an improved design as an element of the redevelopment

5.1.5 Invasive Non-native Species

It is recommended that advice is sought to implement the safe removal and disposal of Japanese knotweed, Himalayan balsam and cotoneaster as they are invasive Schedule 9 species. Similarly, if any other invasive, non-native species colonise the site, appropriate control and eradication measures to prevent spread of the species would need to be implemented.

5.1.6 Summary of Recommended Additional Survey Effort

Based on the survey results, some further survey effort will be required to fully investigate presence/likely absence of protected species. This information is necessary to inform the assessment of impacts arising from the proposals and to enable an appropriate mitigation strategy to be devised. A summary of these additional surveys are provided in the Table 5—1.

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Table 5—1 Summary of Recommended Additional Survey Effort

Species / Subject	Survey Type and Rationale	Survey Season
Bat roosts	Emergence / re-entry surveys to confirm presence / likely absence of these EPS.	May to September (inclusive)
Bat foraging/ commuting activity	Walked transect / automatic detectors to establish foraging/commuting use of site	April to October (inclusive)
Black redstart	Establish whether this protected species is nesting within the site.	April-July
River Habitat Survey	River habitat survey and fluvial audit to determine present state and inform river restoration design.	Anytime but best when vegetation is not too dense

5.2 Licensing

As there is an existing record of a pipistrelle bat roost in B2, works to this structure may require licensing by Natural England, depending on the nature of the impacts to the roost. In the event that bat roosts are confirmed on any other structures, works affecting those roost(s) may also require licensing.

In the event that black redstarts are confirmed to be breeding on site, any works affecting the nest sites may require a licence from Natural England.

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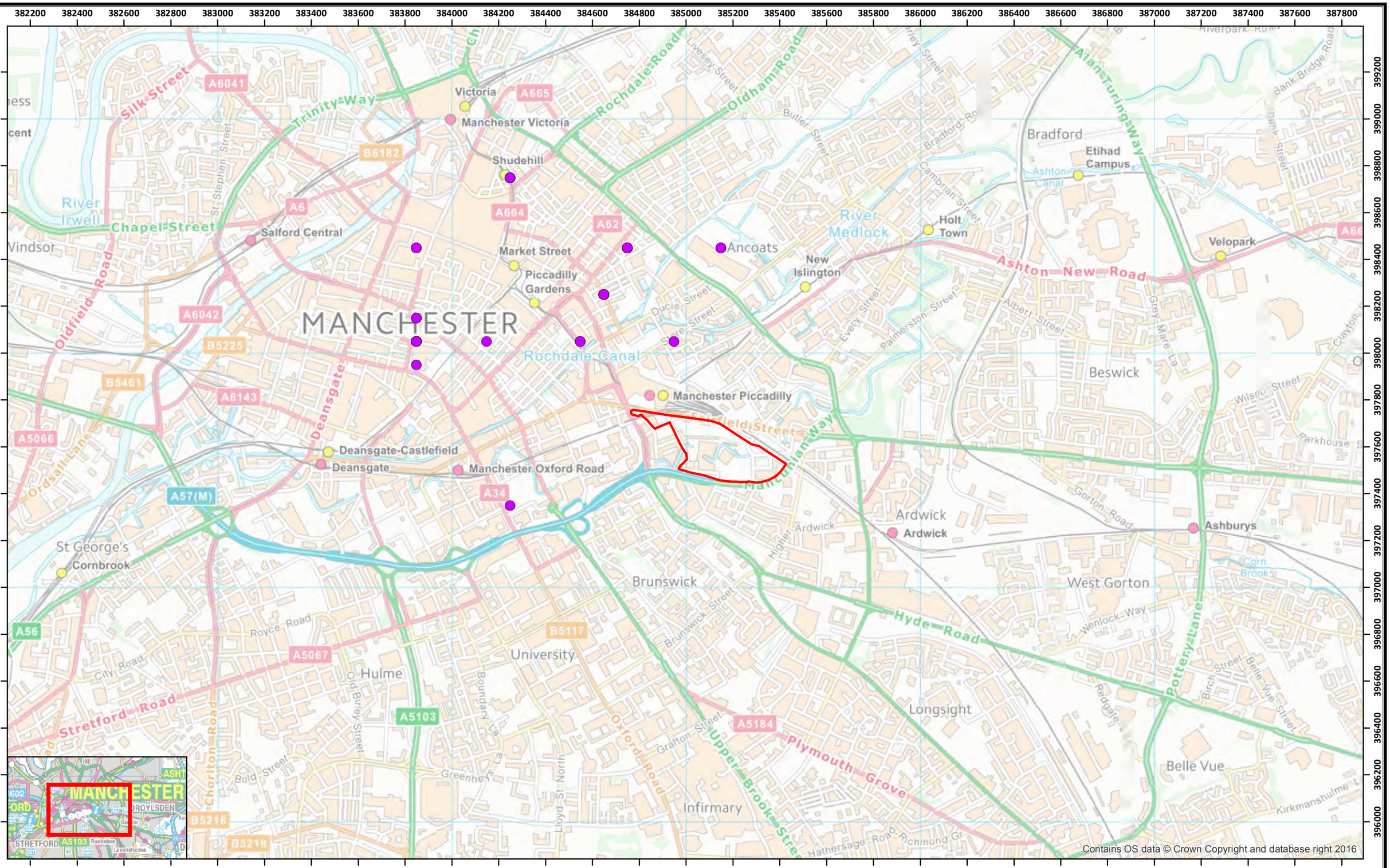
Appendix A - Plans

Figure 1: Black Redstart

Figure 2: Phase 1 Habitat Map

Figure 3: Bat Roost Assessment

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399200 399000 398800 398600 398400 398200 398000 397800 397600 397400 397200 397000 396800 396600 396400 396200 396000

BUROHAPPOLD ENGINEERING

N

British National Grid
Projection: Transverse Mercator
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False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

Metres

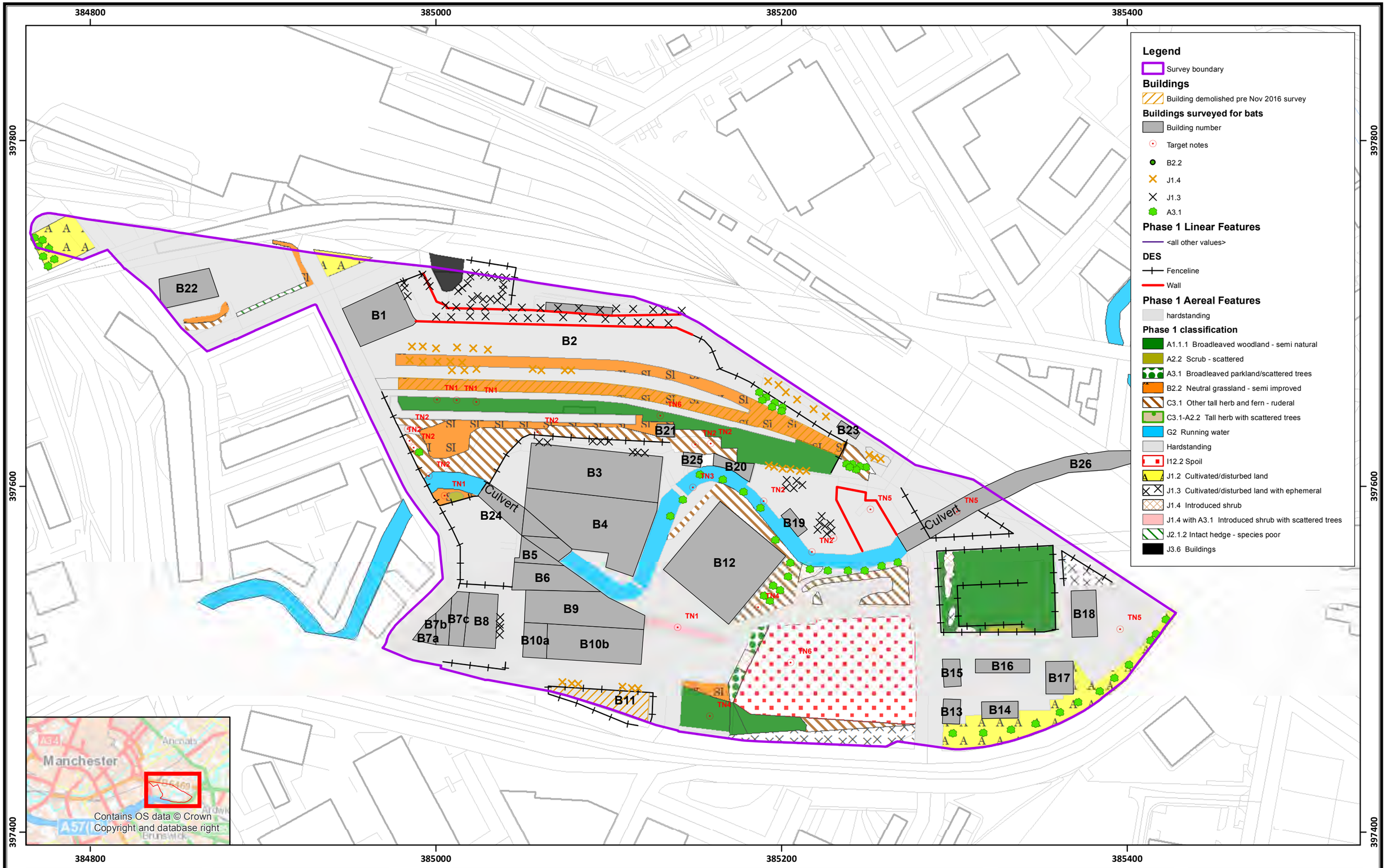
Legend

- Site_Boundary
- XYMayfield_Black_Redstart

Title:

BLACK REDSTART

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:15,000	Drawing No.	Figure 1
Drawn By	CC	Originator VB	Date JAN 2007
PAA Ref.	G:\PRLG01_Middlewich_Rd_Northwich\Maps	Revision	A



BUROHAPPOLD ENGINEERING

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

N

ISO A3

Metres

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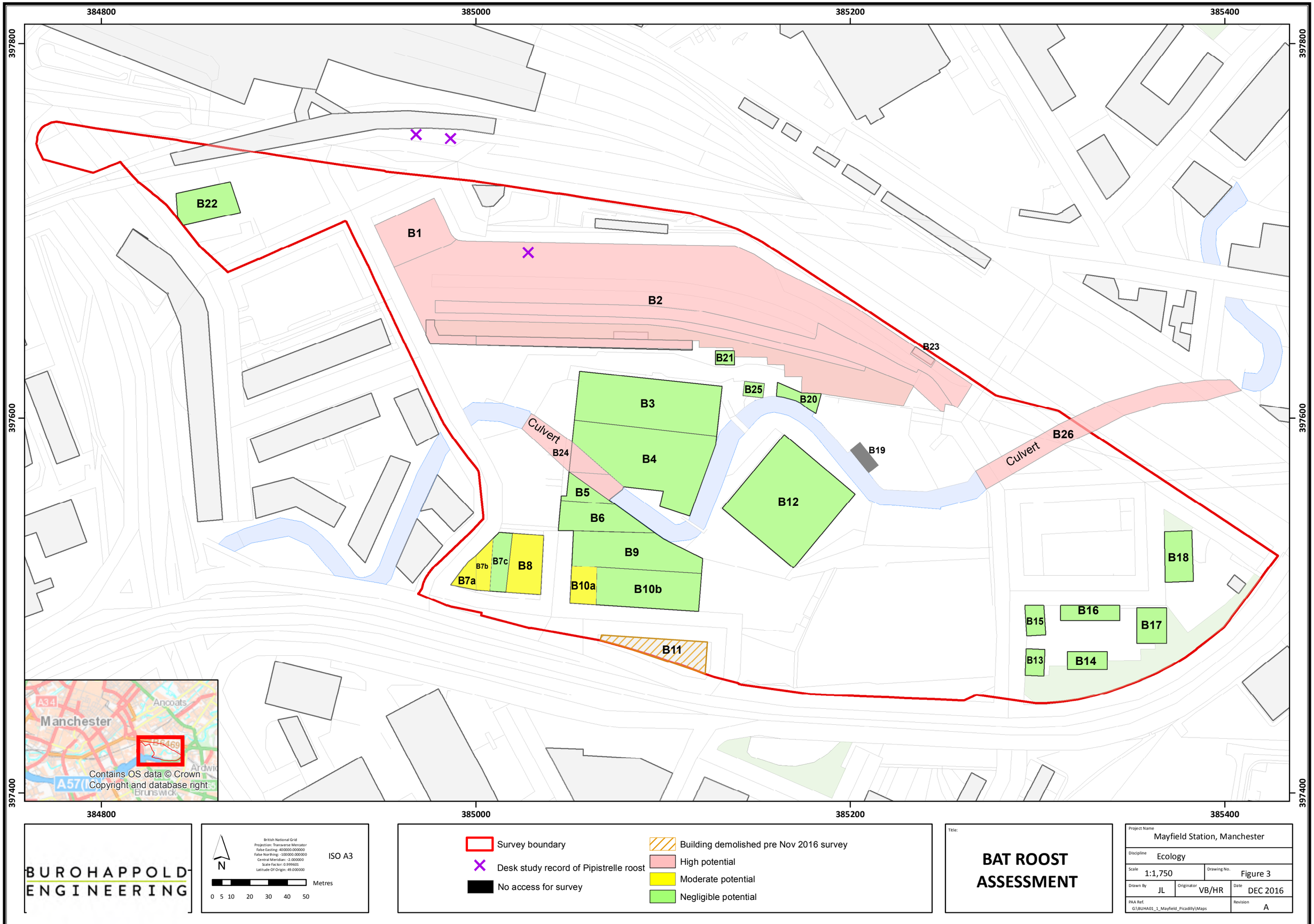
TARGET NOTES:

TN1 - Cotoneaster
TN2 - Himalayan balsam
TN3 - Japanese knotweed
TN4 - Old birds nest
TN5 - Scrap yard
TN6 - Aggregate recycling yard

Title:

PHASE 1 HABITAT MAP

Project Name	Mayfield Station, Manchester
Discipline	Ecology
Scale	1:2,000
Drawing No.	Figure 2
Drawn By	JL
Originator	VB/HR
Date	DEC 2016
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps
Revision	A



BUROHAPPOLD ENGINEERING

N

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

0 5 10 20 30 40 50 Metres

- Survey boundary
- Desk study record of Pipistrelle roost
- No access for survey
- Building demolished pre Nov 2016 survey
- High potential
- Moderate potential
- Negligible potential

Title:

BAT ROOST ASSESSMENT

Project Name	Mayfield Station, Manchester
Discipline	Ecology
Scale	1:1,750
Drawing No.	Figure 3
Drawn By	JL
Originator	VB/HR
Date	DEC 2016
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps
Revision	A

Appendix B - Plates

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Plate 1 - North western corner, looking north west



Plate 2 - Western section of the former railway station platform, looking east



Plate 3 - Vegetated former railway tracks, looking towards dense birch woodland



Plate 4 - Partially used fox hole within birch woodland of the former railway platform



Plate 5 - Wall cotoneaster within birch woodland of the former railway platform



Plate 6 - Eastern section of the former railway station platform, looking east



Plate 7 - View of Colourgates Yard, looking east



Plate 8 - Himalayan balsam within Colourgates Yard



Plate 9 - Typical view within the southern section of the site, showing a mix of hardstanding, buildings and scattered vegetation



Plate 10 - Himalayan cotoneaster within the southern section of the site



Plate 11 - Typical view of the semi-natural habitats present within the southern section of the site



Plate 12 - A section of the River Medlock towards the centre of the site, with Japanese knotweed on the banks



Plate 13 - Northern edge of the silver birch woodland on the southern site boundary



Plate 14 - Disused birds' nests within the silver birch woodland



Plate 15 - Northern edge of the woodland towards the south eastern corner of the site



Plate 16 - Mature poplars along the south eastern boundary

Appendix C - Summary Legislation Relating to Badgers, Bats, Black Redstart, Breeding Birds, Otters and Reptiles

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SUMMARY OF THE LEGISLATION RELATING TO BADGERS AND THEIR SETTS

Badgers (*Meles meles*) are not an endangered species but have a long history of persecution and cruelty. As such, badgers and their setts are protected under the Protection of Badgers Act 1992 (as amended), which makes it illegal for any person to kill, injure or take a badger. It is also an offence to destroy, damage or obstruct a badger sett, or to disturb a badger whilst it is within a sett. There are also additional offences relating to possession of, buying and selling a dead badger, or anything derived from a badger, and causing a dog to enter a sett.

The Act defines a sett as 'any structure or place which displays signs of current use by a badger'. Setts are defined by English Nature (1995) as 'usually underground tunnel systems providing shelter for badgers, but may include other structures used by badgers such as hay bales, drainage culverts, or cellars'. 'Current use' is more difficult to define but is usually interpreted by the presence/absence of badger field signs over several observations of the sett (Natural England 2006).

Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System* in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to consider the likelihood of any proposed development adversely affecting badgers' foraging territory, or links between them, or significantly increasing the likelihood of road or rail casualties amongst badger populations. The planning guidance for Wales, Technical Advice Note (Wales) 5, identifies the need to comply with the Protection of Badgers Act 1992.

English Nature, 1995. *Species Conservation Handbook*. English Nature, Peterborough.

Natural England, 2006. *Guidance on 'Current Use' in the definition of a badger sett*. Natural England, Peterborough.

Please note: the above text provides a brief summary of the legislation in relation to badgers for England and Wales and the original Act and amendments should be referred to for the precise wording.

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SUMMARY OF THE LEGISLATION RELATING TO BATS

All wild species of bat are protected under the Wildlife and Countryside Act (WCA) 1981, which has also been amended by later legislation, including the Countryside and Rights of Way (CRoW) Act 2000 and the Conservation of Habitats and Species Regulations 2010, and this legislation is applicable to England and Wales. Bats are listed on Schedule 5 of the WCA and are therefore subject to some the provisions of Section 9 which, with the amendments, make it an offence to:

- Intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for shelter or protection (S9:4b).
- Intentionally or recklessly obstruct access to any structure or place used for shelter or protection by a bat (S9:4c).

There are additional offences in relation to buying and selling (S9:5) any live or dead animal of this species or anything derived from them.

Bat species are also listed under Annexes IIa and IVa of the EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2010.

The Conservation of Habitats and Species Regulations 2010[1] state that a person commits an offence if they:

(a) deliberately capture, injure or kill any wild animal of a European protected species,

(b) deliberately disturb wild animals of any such species, in such a way as –

  (i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong;

(c) deliberately take or destroy the eggs of such an animal, or

(d) damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead bat or part of such an animal.

In addition, seven native British bat species, including the soprano pipistrelle (*Pipistrellus pygmaeus*) and the brown long-eared bat (*Plecotus auritus*), that are frequently found in buildings, are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006. Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and*

[1] *These regulations have been slightly amended by The Conservation of Habitats and Species Regulations 2012*

Geological Conservation - Statutory Obligations and Their Impact within the Planning System in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Please note: the above text provides a brief summary of the legislation in relation to bats in England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

SUMMARY OF LEGISLATION RELATING TO BLACK REDSTART

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000.

Black redstarts (*Phoenicurus ochruros*) are additionally protected as they are listed on Schedule 1 of the WCA. Therefore, black redstarts, their nests, eggs and young are fully protected at all times throughout England and Wales.

Part 1 (Section 1:1) of the WCA states that:

'If any person intentionally,

(a) kills, injures or takes any wild bird;

(b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or

(c) takes or destroys an egg of any wild bird,

he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) states that:

'If any person intentionally or recklessly,

(a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or

(b) disturbs dependent young of such a bird,

he shall be guilty of an offence and liable to a special penalty.'

In addition, the black redstart is identified as a bird species of moderate conservation concern ('Amber' listed) due to its declining breeding population and its rarity as a breeding species within Britain.

Please note: the above text provides a brief summary of the legislation in relation to black redstart for England and Wales and the original Act and any amendments should be referred to for the precise wording.

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SUMMARY OF THE LEGISLATION RELATING TO BREEDING BIRDS

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000. This legislation applies in England and Wales.

Part 1 (Section 1:1) of the WCA states that:

> 'If any person intentionally,
>
> (a) kills, injures or takes any wild bird;
>
> (b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or
>
> (c) takes or destroys an egg of any wild bird,
>
> he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) refers to specific birds listed on Schedule 1 of the WCA, and states that:

> 'If any person intentionally or recklessly,
>
> (a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or
>
> (b) disturbs dependent young of such a bird,
>
> he shall be guilty of an offence and liable to a special penalty.'

Schedule 1 includes birds such as barn owl (*Tyto alba*), black redstart (*Phoenicurus ochruros*), wood lark (*Lullula arborea*) and Cetti's warbler (*Cettia cetti*). Please refer to the WCA for a complete list of Schedule 1 species.

Some provisions are made to allow the killing and taking of certain species under certain circumstances, as follows:

- Birds listed on Schedule 2 (Part 1) of the Act may be taken or killed outside of the 'close season' for each individual species (the 'close season' is defined by the Act). This includes various wild duck and geese species.
- Birds listed on Schedule 2 (Part 2) of the Act may be killed or taken by authorised persons at all times. This includes species such as carrion crow (*Corvus corone*), black-billed magpie (*Pica pica*), feral pigeon (*Columba livia*) and greater Canada goose (*Branta canadensis*). An 'authorised person' is defined as a person who has written authorisation to undertake the act from the relevant statutory authority. The written authority is in the form of a licence, either a general licence which covers a number of the more typical 'pest' species, or an individual licence for other individual species. In England these licences are issued by Natural England and in Wales by the Welsh Assembly Government.

Please note: the above text provides a brief summary of the legislation in relation to breeding birds in England and Wales and the original Act and any amendments should be referred to for the precise wording.

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SUMMARY OF THE LEGISLATION RELATING TO OTTERS

Otters (*Lutra lutra*), also known as European otters, are protected under the Wildlife and Countryside Act (WCA) 1981, which has also been amended by various later legislation including the Countryside and Rights of Way (CRoW) Act 2000 and the Conservation of Habitats and Species Regulations 2010, and this legislation is applicable to England and Wales. Otters are listed on Schedule 5 of the WCA and are, therefore, subject to some the provisions of Section 9 which, with the amendments, make it an offence to:

- Intentionally or recklessly disturb an otter while it is occupying a structure or place which it uses for shelter or protection (S9:4b).
- Intentionally or recklessly obstruct access to any structure or place used for shelter or protection by an otter (S9:4c).

There are additional offences in relation to buying and selling (S9:5) any live or dead animal of this species or anything derived from them.

Otters are also listed under Annexes IIa and IVa of EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2010[1].

The Conservation of Habitats and Species Regulations 2010 state that a person commits an offence if they:

(a) deliberately capture, injure or kill any wild animal of a European protected species,

(b) deliberately disturb wild animals of any such species, in such a way as –

  (i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong;

(c) deliberately take or destroy the eggs of such an animal, or

(d) damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place, whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead otter or part of such an animal.

In addition, otters are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006. Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System* in respect of statutory obligations for biodiversity and geodiversity conservation.

[1] *These regulations have been slightly amended by The Conservation of Habitats and Species Regulations 2012*

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Please note: the above text provides a brief summary of the legislation in relation to otters for England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

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SUMMARY OF THE LEGISLATION RELATING TO REPTILES

All six of the native British reptile species are afforded varying degrees of protection under the Wildlife and Countryside Act (WCA) 1981, as amended by various later legislation, and this legislation is applicable to England and Wales. All six species are listed on Schedule 5 of the WCA.

The four widespread species, common lizard (*Zootoca vivipara*), slow-worm (*Anguis fragilis*), grass snake (*Natrix natrix*) and adder (*Vipera berus*) are afforded part protection under Section 9(1), making it an offence to intentionally kill or injure any of these species of reptile. The two rarer species, sand lizard (*Lacerta agilis*) and smooth snake (*Coronella austriaca*), are subject to a greater degree of protection under Section 9(4) which, with the amendments, make it (in brief) an offence to:

- Intentionally or recklessly disturb a sand lizard or smooth snake while it is occupying a structure or place used for shelter or protection (S9:4b); or
- Intentionally or recklessly obstruct access to any structure or place a sand lizard or smooth snake uses for shelter or protection (S9:4c).

All six species are afforded protection from buying, selling or exchange under Section 9(5) of the WCA.

Sand lizard and smooth snake are also listed under Annexes IIa and IVa of EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2010.

The Conservation of Habitats and Species Regulations 2010 state that a person commits an offence if they:

(a) deliberately capture, injure or kill any wild animal of a European protected species,

(b) deliberately disturb wild animals of any such species, in such a way as –

  (i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong;

(c) deliberately take or destroy the eggs of such an animal, or

(d) damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead sand lizard or smooth snake or part of such an animal.

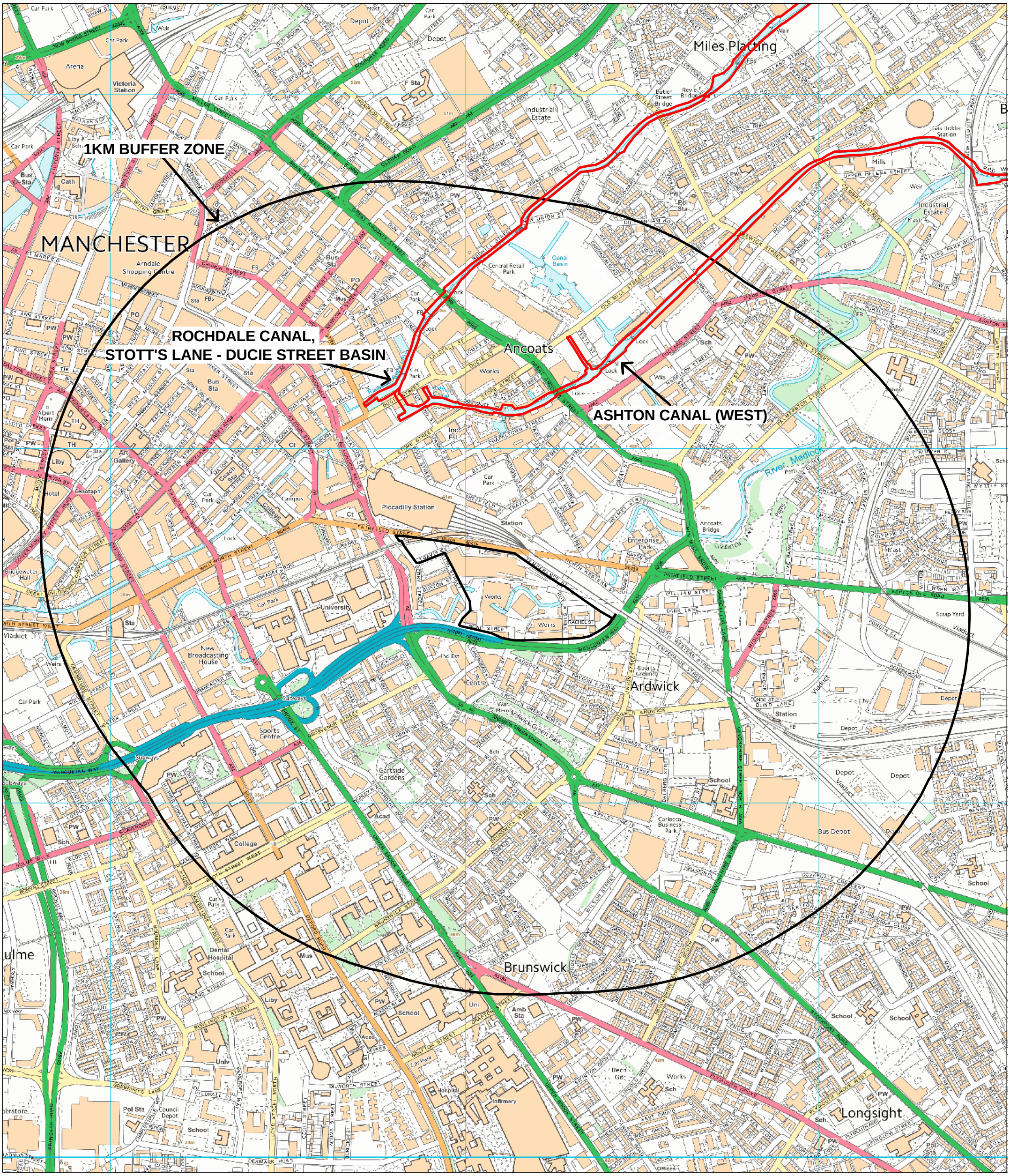
In addition, all six reptile species are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006. Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System* in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Please note: the above text provides a brief summary of the legislation in relation to reptiles for England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

Appendix D - Desk Study Data from Greater Manchester Ecology Unit and Greater Manchester Bird Recording Group

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KEY

SITE OF BIOLOGICAL IMPORTANCE

SBI BOUNDARY

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 1

SCALE 1:10,000

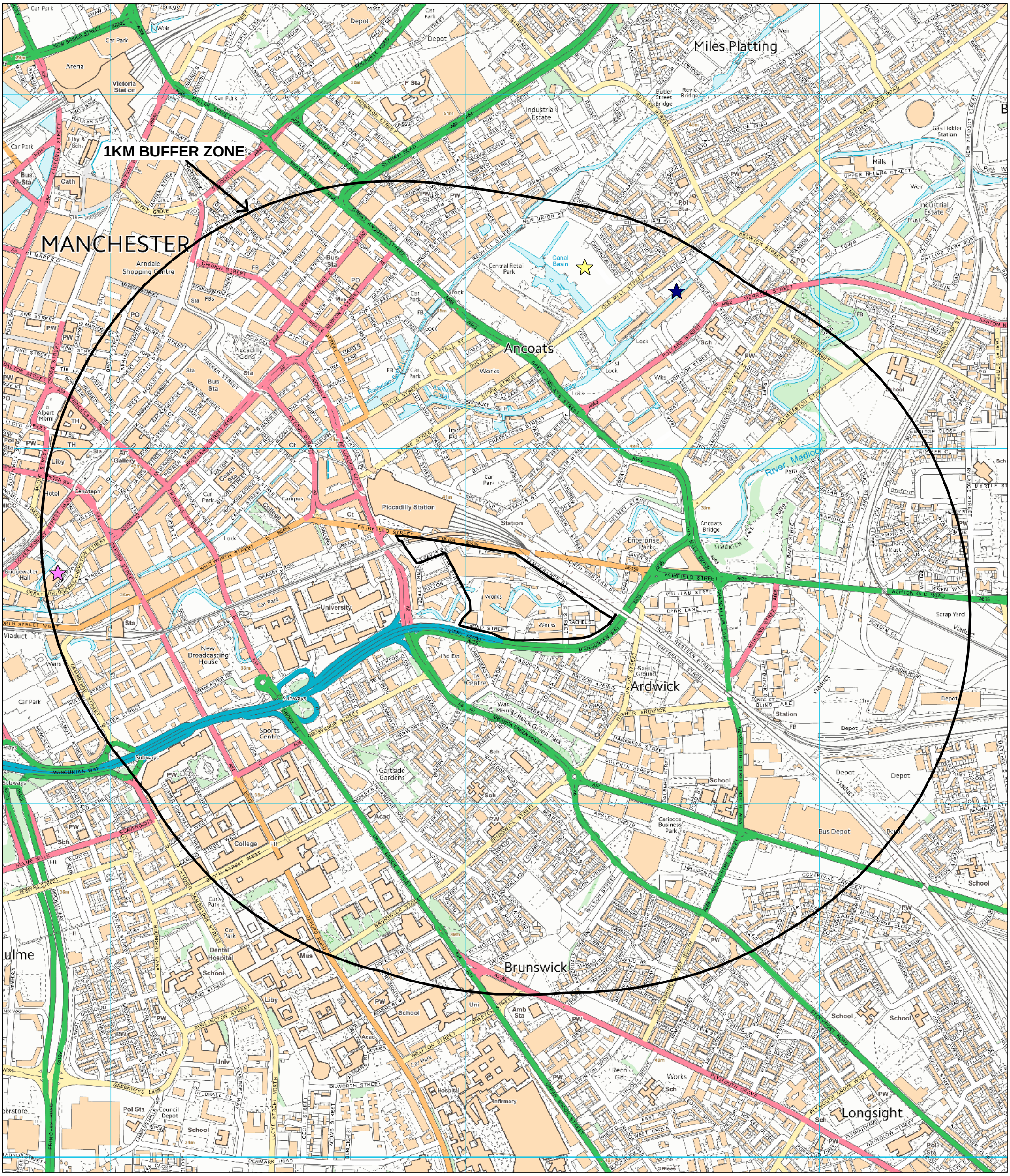
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TAMESIDE MBC LICENCE NO LA100022697, 2016

Greater Manchester Ecology Unit

Telephone 0161 342 3723
Email: gmeu@tameside.gov.uk

Date Produced: 28/11/2016



KEY

PROTECTED SPECIES

- ★ **FLOATING WATER-PLANTAIN**
- ★ **KINGFISHER**
- ★ **LITTLE RINGED PLOVER**

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 2

SCALE 1:10,000

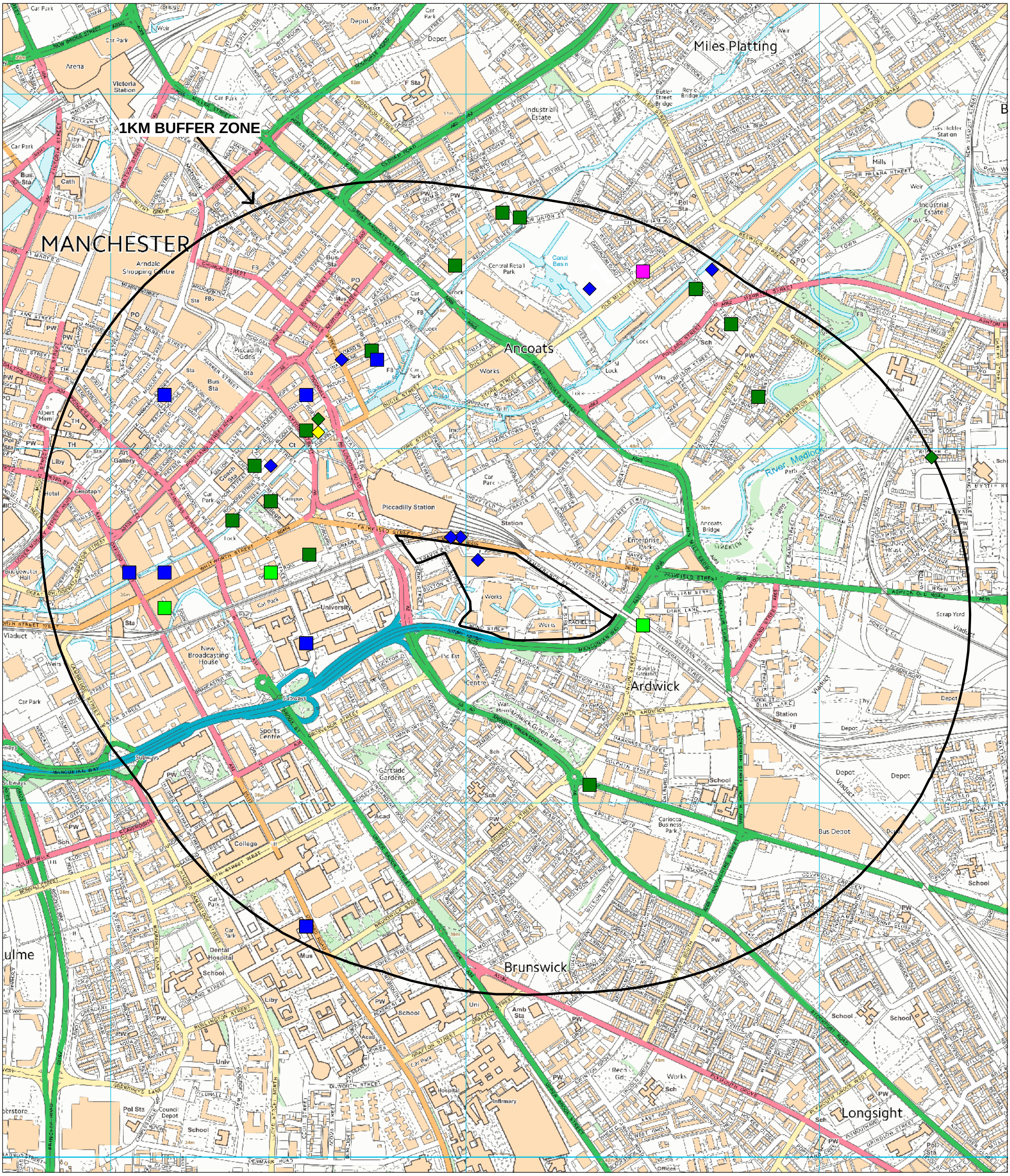
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TAMESIDE MBC LICENCE NO LA100022697, 2016

Greater Manchester Ecology Unit

Telephone 0161 342 3723
Email: gmeu@tameside.gov.uk

Date Produced: 28/11/2016



KEY

BAT ROOSTS

- COMMON PIPISTRELLE
- PIPISTRELLE SP
- SOPRANO PIPISTRELLE

BATS OTHER SIGNS

- BAT SP
- COMMON PIPISTRELLE
- DAUBENTON'S BAT
- PIPISTRELLE SP

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 4

SCALE 1:10,000

BAT DATA COURTESY OF SOUTH LANCS BAT GROUP

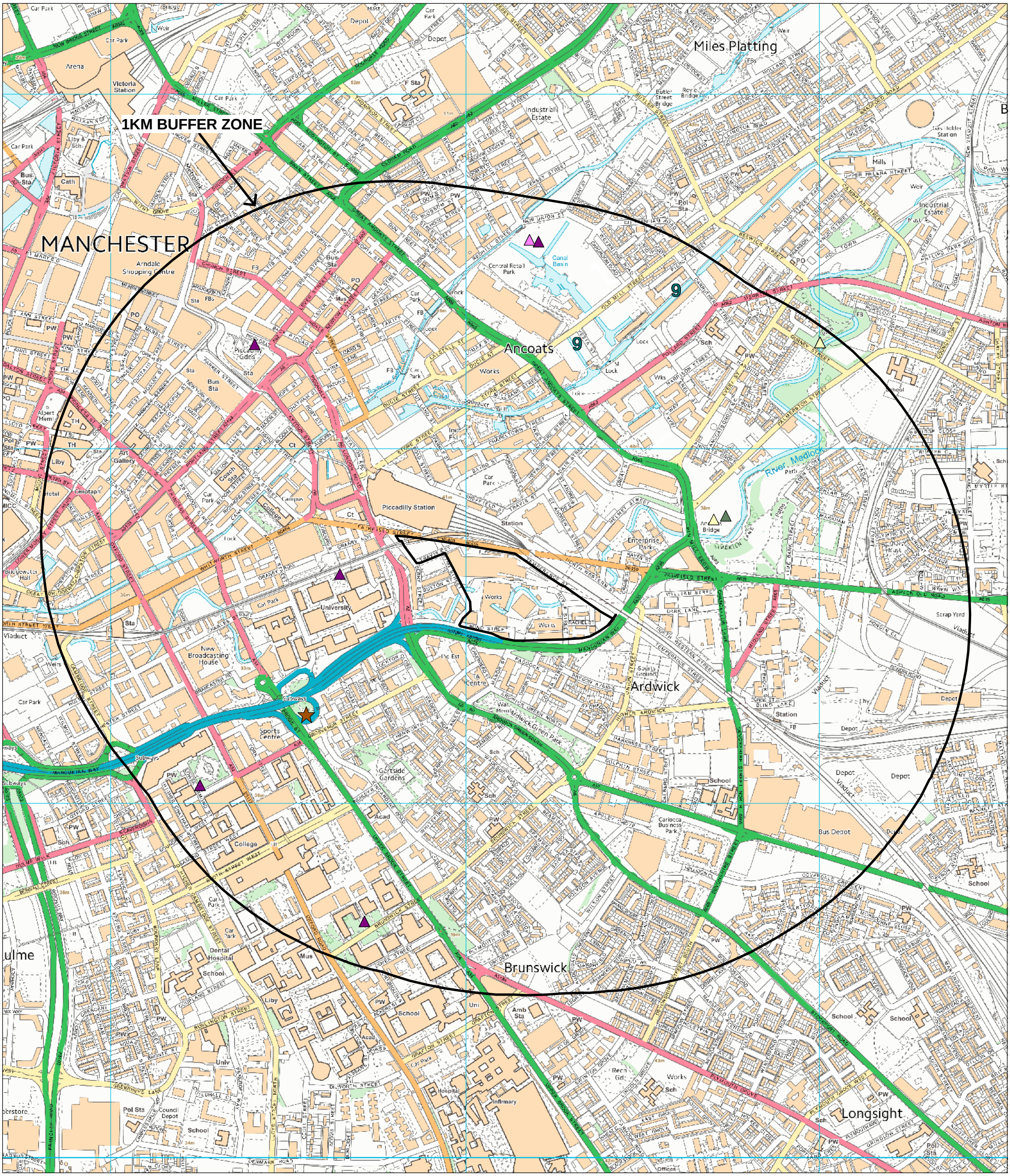
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Date Produced: 28/11/2016



KEY

SECTION 41 SPECIES

- △ BULLFINCH
- ▲ DUNNOCK
- 9 GRASS-WRACK PONDWEED
- ▲ HERRING GULL
- ▲ HOUSE SPARROW
- △ SONG THRUSH
- ▲ STARLING
- ★ WEST EUROPEAN HEDGEHOG

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 85130 97593
MAYFIELD - MAP 5

SCALE 1:10,000

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Greater Manchester Ecology Unit

Telephone 0161 342 3723
Email: gmeu@tameside.gov.uk

Date Produced: 28/11/2016

GMBRG Black Redstart Dest Study Data

commonName	scientificName	schedule1	redList	site	siteGridRef	easting	northing	startDate	endDate	abundance	sex	stage	status	method	comment	gmbrgRef
Black Redstart	Phoenicurus ochruros	y	y	Albert Square Manchester	SJ838981	383850	398150	09/06/2015	09/06/2015	1			Probable Breeder T - permanent Territory	Field record / observation		sfmc3bkg & 297
Black Redstart	Phoenicurus ochruros	y	y	Albert Square Manchester	SJ838981	383850	398150	08/06/2015	08/06/2015	1		Adult		Field record / observation	On roof of building opposite Manchester Town Hall	ljq9fbwb & 261
Black Redstart	Phoenicurus ochruros	y	y	Canal St/Minshull St Courts (Manchester City Centre)	SJ845980	384550	398050	17/06/2009	17/06/2009	1	male	Adult	Possible Breeder H - in suitable nesting Habitat	Field record / observation	m heard at 0740 and on 19th at 0805hrs	c1q5m5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Canal St/Minshull St Courts (Manchester City Centre)	SJ845980	384550	398050	04/06/2009	04/06/2009	1		Adult	Possible Breeder H - in suitable nesting Habitat	Field record / observation	probable female	5bvij5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Central Retail Park Ancoats	SJ851984	385150	398450	02/06/2008	02/06/2008	1		Adult		Field record / observation	probable female	c7h435ng & 113
Black Redstart	Phoenicurus ochruros	y	y	Central Retail Park Ancoats	SJ851984	385150	398450	11/04/2008	11/04/2008	1		Adult		Field record / observation	singing in a tree there	vml2u5ng & 113
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	19/07/2009	19/07/2009	2		Adult	Probable Breeder P - Pair in suitable nesting habitat	Field record / observation		3n4j65ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	14/07/2009	14/07/2009	2		Adult	Probable Breeder P - Pair in suitable nesting habitat	Field record / observation		qd0db5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	13/07/2009	13/07/2009	1	male	Adult	Probable Breeder T - permanent Territory	Field record / observation		vvl8q5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	12/07/2009	12/07/2009	1		Adult		Field record / observation	still about but difficult	hlvv05ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	05/07/2009	05/07/2009	1		Adult	Confirmed Breeder ON - Occupied Nest	Field record / observation	failed. Nest in I beam over doorway.	zn6nd5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	16/06/2009	16/06/2009	3		Adult	Probable Breeder D - courtship and Display	Field record / observation	2 males fighting, one flew off towards Arndale, other found a female and mating observed	b8u125ng & -133
Black Redstart	Phoenicurus ochruros	y	y	China Lane Manchester city centre	SJ846982	384650	398250	16/06/2009	16/06/2009	2		Adult		Field record / observation		tmuih5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Chinatown, Manchester city centre	SJ841980	384150	398050	25/06/2010	25/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	nothing at Spear St all week	ud0895nk & 165
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	08/10/2015	08/10/2015	1			Probable Breeder T - permanent Territory	Field record / observation		c8b80bkg & 297
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	12/06/2015	12/06/2015	1		Adult	Probable Breeder T - permanent Territory	Field record / observation	Sang around 0745	3chchbty & 313
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	08/04/2015	08/04/2015	1			Possible Breeder S - Singing male	Field record / observation		wpg7kbkg & 297
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	26/09/2013	26/09/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	ui872bkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	01/08/2013	01/08/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	1q8mqbkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	25/07/2013	25/07/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	blvw9bkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	03/07/2013	03/07/2013	1			Probable Breeder T - permanent Territory	Field record / observation	adult male	f4wmhbkg & 217
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	03/06/2011	03/06/2011	1	male			Field record / observation		9892o5ng & 119
Black Redstart	Phoenicurus ochruros	y	y	Manchester Town Hall	SJ838980	383850	398050	07/06/2010	07/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	roof, 1400 - 1430	l7vfc5nk & -165
Black Redstart	Phoenicurus ochruros	y	y	Oxford Rd Manchester	SJ842973	384250	397350	18/05/2012	18/05/2012	1			Possible Breeder S - Singing male	Field record / observation	on Ackers Street (off Oxford Road) between the Catholic Church and Stopford Building	0t3r1bkg & 121
Black Redstart	Phoenicurus ochruros	y	y	Piccadilly Station Manchester	SJ849980	384950	398050	01/08/2009	01/08/2009	1	female	Adult		Field record / observation	Store St opp bottom of Jutland St	jrz655ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	03/08/2009	03/08/2009	1	male		Possible Breeder H - in suitable nesting Habitat	Field record / observation		t59wt5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	15/07/2009	15/07/2009	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	this is bird from China Lane	61iz15ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	28/06/2009	28/06/2009	2			Possible Breeder H - in suitable nesting Habitat	Field record / observation		1cvmq5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Port St Manchester city centre	SJ847984	384750	398450	21/06/2009	21/06/2009	1	female	Adult	Possible Breeder H - in suitable nesting Habitat	Field record / observation	f.	zfjpf5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Shudehill Manchester City Centre	SJ842987	384250	398750	29/06/2009	29/06/2009	1		Adult	Possible Breeder S - Singing male	Field record / observation	Roman St/Edgehill St	i86nv5ng & -133
Black Redstart	Phoenicurus ochruros	y	y	Shudehill Manchester City Centre	SJ842987	384250	398750	27/05/2008	27/05/2008	1		Adult		Field record / observation	Male singing on Dantzic St, flew to Shudehill station	zqnc65ng & 113
Black Redstart	Phoenicurus ochruros	y	y	Shudehill Manchester City Centre	SJ842987	384250	398750	09/06/2010	09/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	Newmarket, back of Arndale	m0t0v5nk & 165
Black Redstart	Phoenicurus ochruros	y	y	St. Ann's Square Manchester city centre	SJ838984	383850	398450	11/06/2015	11/06/2015	1		Adult	Probable Breeder T - permanent Territory	Field record / observation	Singing near Mr Thomas's chop house	ldcjubty & 313
Black Redstart	Phoenicurus ochruros	y	y	St. Ann's Square Manchester city centre	SJ838984	383850	398450	14/06/2010	14/06/2010	1	male	Adult	Possible Breeder S - Singing male	Field record / observation	0950hr	zppw05nk & 165
Black Redstart	Phoenicurus ochruros		y	St. Peter's Square Manchester City Centre	SJ838979	383850	397950	14/05/2008	14/05/2008	1		Adult		Field record / observation	Male, opposite Peter House (7th Floor) on office blocks	or4ks5ng & -131

Appendix E - Plant Species Recorded on the Application Site

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Appendix E Plant Species Recorded on the Application Site

Common Name	Latin Name	Habitat Type with Phase 1 Codes								
		Ephemeral/Short Perennial (J1.3)	Broadleaved Scattered Trees (A3.1)	Tall Ruderal (C3.1)	Scattered Scrub (A2.2)	Semi-improved Neutral Grassland (B2.2)	Introduced Shrub - Scattered/ Amenity planting (J1.4)	Amenity Grassland (J1.2)	Broadleaved Semi-natural Woodland (A1.1.1)	Hedgerow (J2.1.2)
Trees and Shrubs										
Alder	*Alnus glutinosa*		R							
An apple	*Malus* sp.		R							
Ash	*Fraxinus excelsior*		F						O - F	
Birch species	*Betula* sp.								LF	
Broom	*Cytisus scoparius*			R						
Butterfly bush	*Buddleja davidii*						D		R - LO	
Cherry laurel	*Prunus laurocerasus*						LO			D
Cherry species	*Prunus* sp.		R						R	
Dogwood	*Cornus sanguinea*								LO	
Elder	*Sambucus nigra*		O - LD							
Holly	*Ilex aquifolium*								R	
Poplar species	*Populus* sp.		LO - LF							
Silver birch	*Betula pendula*								A - LD	
Swedish whitebeam	*Sorbus intermedia* agg.		R							
Sycamore	*Acer pseudoplatanus*		O - F						O - F	
Willow sp.	*Salix* sp.		R - O						R	
Herbs, Grasses and Ferns										
Annual meadow-grass	*Poa annua*					R				
Black medick	*Medicago lupulina*							LF		
Bracken	*Pteridium aquilinum*			LR						
Bramble	*Rubus fruticosus* agg.	O		O - LF	D	LO	LF		LD	
Canadian fleabane	*Conyza canadensis*	O - F								
Cleavers	*Galium aparine*			LO						
Cock's-foot	*Dactylis glomerata*					R - LO				
Colt's-foot	*Tussilago farfara*					R				
Common bent	*Agrostis capillaris*	F						O		
Common cat's-ear	*Hypochaeris radicata*					O-F				
Common centaury	*Centaurium erythraea*					O-F				
Common figwort	*Scrophularia nodosa*	R								
Common mouse-ear	*Cerastium fontanum*	R						R - O		
Common nettle	*Urtica dioica*	F		O - LD						
Common ragwort	*Senecio jacobaea*	O - F				O		R - O		
Cotoneaster species	*Cotoneaster sp. cf Cotoneaster simonsii*			R			R			
Cow parsley	*Anthriscus sylvestris*			R						
Crane's-bill species	*Geranium* sp.							R		
Creeping bent	*Agrostis stolonifera*					F - LD				
Creeping buttercup	*Ranunculus repens*	R				O		O		
Creeping cinquefoil	*Potentilla reptans*	O-F								
Creeping thistle	*Cirsium arvense*	R		O - F						
Dandelion	*Taraxacum officinale agg.*	O - F				O		O - F		
Dock species	*Rumex* sp.	O		R		R		R		
Evening primrose species	*Oenothera* sp.					R				
Eyebright	*Euphrasia nemorosa*					O-F				
Fern species	*Dryopteris* sp.			O - LF						
Field horsetail	*Equisetum arvense*					O				
Garden lady's-mantle	*Alchemilla mollis*					LR				
Garlic mustard	*Alliaria petiolata*	R		R						
Goat's-beard	*Tragopogon pratensis*	O-F				O-F				
Goldenrod	*Solidago virgaurea*			O - F		R				
Greater plantain	*Plantago major*	O								
Groundsel	*Senecio vulgaris*	R - O								
Hart's-tongue	*Asplenium scholopendrium*	R								
Hawkweed species	*Hieracium* sp.					O-F				
Hedge bindweed	*Calystegia sepium*			LR						

Appendix E Plant Species Recorded on the Application Site

Common Name	Latin Name	Habitat Type with Phase 1 Codes								
		Ephemeral/Short Perennial (J1.3)	Broadleaved Scattered Trees (A3.1)	Tall Ruderal (C3.1)	Scattered Scrub (A2.2)	Semi-improved Neutral Grassland (B2.2)	Introduced Shrub - Scattered/ Amenity planting (J1.4)	Amenity Grassland (J1.2)	Broadleaved Semi-natural Woodland (A1.1.1)	Hedgerow (J2.1.2)
Hedge mustard	*Sisymbrium officinale*	R								
Hemp agrimony	*Eupatorium cannabinum*			O-F	O-F					
Herb-Robert	*Geranium robertianum*	R								
Himalayan balsam	*Impatiens glandulifera*					LO				
Hogweed	*Heracleum sphondylium*			LO						
Ivy	*Hedera helix*	LO								
Knotgrass	*Polygonum aviculare*	R								
Maidenhair spleenwort	*Asplenium trichomanes*	R								
Michaelmas-daisy species	*Aster novi-belgii* agg.	O - F								
Mugwort	*Artemisia vulgaris*	F - LA		O		O				
Nipplewort	*Lapsana communis*	R - O								
Oregon-grape	*Mahonia aquifolium*						LA			
Oxford ragwort	*Senecio squalidus*					R				
Pendulous sedge	*Carex pendula*	R								
Perennial rye-grass	*Lolium perenne*							A		
Perennial sow-thistle	*Sonchus arvensis*	O-F								
Perforate St. John's wort	*Hypericum perforatum*					R				
Polypody species	*Polypodium* sp.	R								
Red clover	*Trifolium pratense*	R				R		R		
Red fescue	*Festuca rubra*	O						O		
Redshank	*Persicaria maculosa*	R								
Ribwort plantain	*Plantago lanceolata*					O		R		
Rosebay willowherb	*Chamerion angustifolium*			O - F						
Scentless mayweed	*Tripleurospermum inodorum*	R								
Shepherd's-purse	*Capsella bursa-pastoris*	R								
Smooth sow-thistle	*Sonchus oleraceus*	O								
Soft-rush	*Juncus effusus*					LR				
Southern marsh-orchid	*Dactylorhiza praetermissa*	LF								
Spear thistle	*Cirsium vulgare*	LR		LO						
Tufted hair-grass	*Deschampsia caespitosa*					LR				
Vetch species	*Vicia* sp.					R		LR		
Wall cotoneaster	*Cotoneaster horizontalis*								LR	
Wavy bitter-cress	*Cardamine flexuosa*	R - O				LF				
White clover	*Trifolium repens*					O		LF		
Willowherb species	*Epilobium* sp.(annual)	F		O - F		R		R		
Yorkshire fog	*Holcus lanatus*					O - LA		R		

Key

D = dominant
A = abundant
F = frequent
O = occasional
R = rare
L = locally

Appendix F - Bat Roost Assessment Data

Reference	Picture	Description	Potential Bat Roost Features and Evidence of Roosting	Assessed Roost Status
B1		Former Mayfield Station. Brick façade with stone parapet and stone lintels to windows. Large decoratively tiled stairwell and offices/warehouse at ground floor, offices and station concourse at second floor. No roof structure remaining. All windows and doors boarded up. **No access to interior due to presence of asbestos & lead paint.**	Damaged wooden fascia boards on external façade providing access to cavity behind. Small crevices in brickwork and around stone lintels on external façade. Unglazed window into stairwell providing potential bat access to internal rooms.	High Potential
B2a		Former station platforms and warehouses. Brick façade with two large internal warehouses. Concrete floor, flat roof supported by concrete pillars. Narrow enclosed ramp from ground level to platforms on southern elevation, supported by metal framework and covered with corrugated sheets. Open ramp on northern elevation. Series of large brick arches beneath platforms at eastern end, each enclosed with wooden boarding and used as warehouse/industrial units.	Crevices on the external façade. Broken windows and gaps around roller shutter doors providing access to internal warehouses. Very limited roost potential within these rooms but considered likely to be used as sheltered foraging site during poor weather conditions. Existing record of pipistrelle roost on northern side, potentially on external façade or at platform level.	Confirmed Roost High Potential on rest of structure

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B3		Industrial unit occupied as warehouse. Brick walls with pitched roof covered with corrugated asbestos cement sheets and numerous plastic skylights. Roof supported by metal framework, open to ridge with no roof voids. Concrete floor.	None	Negligible Potential
B4		Industrial unit occupied by Fedex as warehouse and distribution centre. Brick walls with corrugated metal sheets on front elevation. Pitched roof of corrugated asbestos sheets with numerous plastic skylights. Open to ridge with no roof void.	None	Negligible Potential
B5		Office unit of warehouse complex occupied by Fedex. Metal sheet walls to front elevation, brick walls with pitched roof of corrugated sheets to rest of building. No roof voids.	None	Negligible Potential

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B6		Industrial unit used as storage warehouse together with B9 and B10b. Brick with pitched roof covered with asbestos cement sheets. Roof supported by metal framework, open to ridge with no roof voids. Concrete floor. Large basement, also used for storage.	Crevices on brickwork on northern elevation above River Medlock. Basement provided no obvious crevice features and was too light and disturbed for potential hibernation use.	High Potential
B7a		Disused industrial units, part of former Towbar and Trailer Centre. Two-storey section, brick with pitched slate roof, clay ridge tiles and wooden bargeboards at gable ends. Underside visible from interior - open to ridge and appeared to be lined with wooden or metal boards. Two-storey section at SE corner, brick with pitched roof covered with bitumen felt. **No access for internal inspection on this section, potentially a roof void present.** Single storey section with flat bitumen felt roof. Concrete floors throughout and single glazed windows boarded up or secured with wire mesh.	Numerous crevices in brickwork. Crevices around windows providing bat access to interior of two storey sections. Crevices beneath barge boards, potentially providing access to space between slates and lining beneath. Dilapidated fascia boards at eaves on single storey section.	Moderate Potential

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B7b		Disused industrial units, part of former Towbar and Trailer Centre. Brick walls with pitched roof covered with metal sheets. Wooden ceiling with roof void above – no obvious hatches to provide access for inspection. Underside of roof partially visible at rear of building (adjacent to two-storey section visible in photo for B7a), supported by wooden rafters and fully lined with membrane. Underground basement.	Basement provided no obvious crevice features but was dark and likely to provide relatively stable temperature conditions. In use until relatively recently and therefore likely to have been too disturbed for hibernation use; however, could potentially be used in future now that the building is disused.	Negligible Potential
B7c		Industrial unit, occupied as religious premises. Brick walls with pitched roof covered with bitumen felt and clay ridge and hip tiles. Skylights on roof suggesting no roof void present. Small section at front with flat roof covered with bitumen felt and narrow wooden fascia boards at eaves. **No access permission for inspection.**	None apparent from areas visible.	Full inspection required.
B8a		Industrial/office units. Two-storey brick building, two separate pitched slate roofs with hipped gables. **No access permission for internal inspection.**	Potentially two roof voids. Crevices on external brickwork.	Moderate Potential Full inspection required

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B8b		Industrial units. Two-storey flat roofed building with brick walls with metal sheeting at upper level. **No access permission for internal inspection.**	Unlikely to be any roof void. No obvious crevices on external façade.	Negligible Potential
B9		Industrial unit occupied as factory and storage warehouse, together with B10b and B6. Brick with pitched roof of asbestos cement sheets. Roof supported by metal framework, open to ridge with no roof voids. Concrete floor. Large basement beneath, used for storage.	No roof void. Basement provided no obvious crevice features and was too light and disturbed for potential hibernation use.	Negligible Potential
B10a		Two-storey brick building with brick parapet at front elevation. Four ridges to the roof, covered with slates and clay ridge tiles.	No access for internal inspection	Moderate Potential Full inspection required

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B10b		Industrial unit occupied as factory and storage warehouse, together with B9 and B6. Brick with pitched roof of asbestos cement sheets. Open to ridge with no roof void.	None	Negligible Potential
B11	Previously demolished, site of this building is now amenity grass.			N/a
B12		Industrial unit used as a storage/distribution warehouse. Brick walls with corrugated metal sheeting towards roof level. Shallow pitched roof covered with corrugated sheets, open to ridge with no roof void.	None	Negligible Potential
B13		Industrial unit. Two-storey building with brick walls at ground level and metal sheeting at first floor level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential

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B14		Industrial unit. Two-storey building with brick walls at ground level and metal sheeting at first floor level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential
B15		Industrial unit. Two-storey building with brick walls at ground level and metal sheeting at first floor level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential
B16		Industrial units. Single-storey building with brick walls at ground level and metal sheeting towards roof level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential

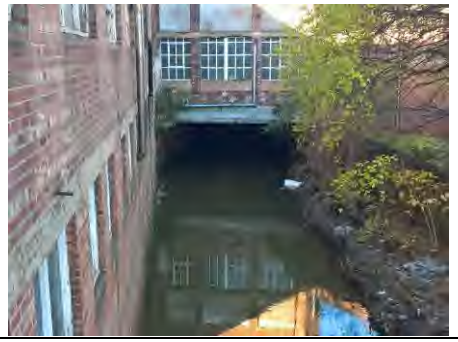
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B17		Industrial unit. Brick walls at ground level and metal sheeting towards roof level. Shallow pitched roof covered with metal sheets.	None	Negligible Potential
B18		Warehouse/industrial unit, used as storage and recycling facility. Brick walls with pitched roof of asbestos cement sheets, open to the ridge with no roof void. Interior very cluttered.	None	Negligible Potential
B19	No access permission for inspection.			Full inspection required
B20		Two-storey brick structure with sloping roof covered with corrugated sheets. Unlikely to have roof void. Narrow wooden fascia board at eaves. **No access permission for inspection.**	None apparent from visible areas	Negligible potential

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B21		Small lean-to structure adjoined to B2. Corrugated metal walls with roller shutter door and sloping metal roof.	None	Negligible Potential
B22		Electricity substation. Metal walls. Pitched roof with metal sheet covering.	None	Negligible Potential
B23		Single-storey brick building. Pitched slate roof with clay ridge tiles and overhanging eaves with wooden soffit and bargeboards at gable ends. Metal roller shutter door (locked) on southern elevation, door and window on eastern gable end boarded up. No access permission for internal inspection.	Gaps between brickwork and soffit providing potential access to cavity within soffit and/or interior of building. Gap beneath end ridge tile at eastern gable end. Gap above roller shutter door.	High Potential

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B24		Culverted section of River Medlock. Length approx. 60m, width approx. 4m, height approx. 2.5-3m above water level. No access for internal inspection.	Bats known to roost in a similar culvert on another nearby site in Manchester.	High Potential
B25		Pair of open fronted garages with brick walls and flat concrete roof. Used for storage but appeared relatively undisturbed.	None	Negligible Potential
B26	No good vantage point to take photograph.	Culverted section of the River Medlock at east of site. Length approx. 60m within the site and extending for at least the same distance beyond the site boundary. **Poor visibility for assessment.**	Bats known to roost in a similar culvert on another nearby site in Manchester.	High Potential

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Appendix 9.3 Bat Survey Report, September 2019

BUROHAPPOLD ENGINEERING

Mayfield Regeneration Development

Bat Surveys

035548

29 November 2017

Revision 00

MRP-BHE-XX-XX-RP-YM-0001

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Revision	Description	Issued by	Date	Checked
00	Bat survey	GH	29/11/2017	PO

O:\035548 Mayfield Regeneration Development\F32 Environmental\03 Reports\Ecology Survey Reports WIP\Bat Surveys WIP\MRP-BHE-XX-XX-RP-YM-0001.docx

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date	**29/11/2017**

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Figure 3—1 Chart illustrating the overall pattern of bat calls detected between sunset and sunrise for the period 21st – 25th July 15

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1 Introduction

1.1 Background

BuroHappold Engineering was instructed to carry out an ecological assessment of a site in central Manchester at and around the former Mayfield Station complex (hereafter referred to as the 'site').

The site is proposed for re-development, including demolition of the majority of existing structures on the site, refurbishment of some of the older remedial works, and replacement/modification of the retaining walls along the River Medlock.

This report details the results of bat surveys to assess how the site is being used by bats. It evaluates the results in context of the proposed re-development of the site, making recommendations for mitigation and/or any further survey work as required.

1.2 Site Description

The site boundary includes an area approximately 9.1ha, comprising a series of buildings that are predominantly commercial or light industrial units and associated areas of hard and soft landscaping. Some of the existing buildings are still occupied whilst others have been disused for many years.

The site is surrounded on all sides by dense urban development, with tall buildings and busy roads. Manchester Piccadilly rail station is immediately to the north and the River Medlock flows west to east through the centre of the site.

1.3 Bat Biology

There are 17 species of breeding native bats known to be in the British Isles. British bats feed entirely on insects and have developed a complex sonar system, known as echolocation, which enables them to find prey and navigate around their environment at night.

Habitat requirements vary widely, both on an individual and species level, although certain features such as woodland, parkland, traditional pasture, marshes and areas of freshwater are often focal points for foraging, as insects are plentiful in these areas (Mitchell-Jones 2004). Bats use linear features such as rivers, hedgerows, roads and woodland edges as landmarks in order to commute from one location to another (Schofield and Mitchell-Jones 2003).

Bats utilise different roosts at different times of the year. Between late October and March, bats hibernate. This requires an unexposed roost with a stable temperature, typically a cave, cellar or tunnel. Around March, the bats emerge and gradually move to their summer roosts, typically within man-made structures or suitable crevices in trees. During the spring and summer period female bats gather together at maternity roosts to give birth and rear their young. Most births occur between late June and mid-July, with the young able to fly within three to five weeks (Altringham 2003; Waters and Warren 2003). By the end of August, most of the young bats are independent and the colony begins to break up (Schofield and Mitchell-Jones 2003). Mating takes place between August and December, either at the winter hibernation site or at autumn breeding sites. The numbers of bats utilising these roosts can vary from single bats to hundreds of bats in a nursery colony or hibernation site (Altringham 2003).

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Bats play an important role in many environments around the world, including pollination and insect control. In the UK, bats can tell us a lot about the state of the environment because they are top predators of common nocturnal insects and are extremely sensitive to changes in their surroundings, e.g. climate, landscape, agricultural intensification, development and habitat fragmentation. Populations of British bats have suffered severe declines in the past century, influenced by these factors.

1.4 Legislative Context

All wild species of bat are protected under the Wildlife and Countryside Act (WCA) 1981 as amended, which has also been amended by later legislation, including the Countryside and Rights of Way (CRoW) Act 2000; this legislation is applicable to England and Wales.

Bat species are also listed under Annexes IIa and IVa of the EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2010 as amended.

Under this legislation it is an offence to kill or injure a bat, disturb a bat while it is roosting, and obstruct, damage or destroy a breeding site or resting place, whether the animal is in occupation or not. There are additional offences relating to possession, control and sale of a live or dead bat or part of such an animal.

In addition, seven native British bat species including the soprano pipistrelle (*Pipistrellus pygmaeus*) and the brown long-eared bat (*Plecotus auritus*) that are frequently found in buildings are listed as a 'Priority Species' under England's biodiversity strategy: Biodiversity 2020: A strategy for England's wildlife and ecosystem services and in the UK Post-2010 Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England within Section 74 of the CRoW Act 2000, and Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006.

Section 11 of the National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (by locating the development on an alternative site with less harmful impacts), adequately mitigated or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England in Section 40 of the NERC Act 2006.

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2 Methods

2.1 Overview

All surveys followed current good practice guidelines published by The Bat Conservation Trust (Collins 2016).

The survey programme was led by licensed bat ecologist Hazel Robson[1] MCIEEM[2], with a team of competent surveyors employed to undertake the fieldwork. All members of the survey team were appropriately qualified for their assigned tasks, based on the CIEEM competency framework (CIEEM 2013).

Weather conditions were recorded at the start and end of each survey. Temperature and humidity were measured using a hygro-thermometer (810-190 www.etiltd.com). Wind was estimated using the Beaufort Wind Force Scale, ranging from 0 calm to 5 moderate breeze (NB while the scale extends to force 12 hurricane, 6 or higher would be unsuitable conditions for survey). Cloud cover was estimated using the standard meteorological scale of oktas (eighths), where 0/8 is a completely clear sky and 8/8 is completely overcast.

The dates and weather conditions of each survey visit are provided in Appendix B. Further details of methodology for the various survey techniques are provided under the individual sub-headings below.

2.2 Dusk Emergence/Dawn Re-entry Surveys

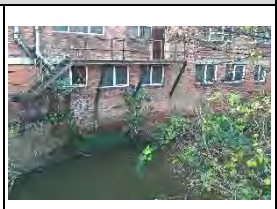
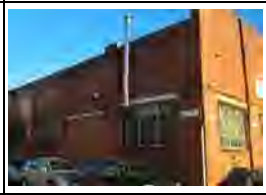
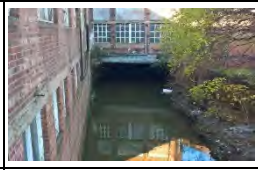
Based on the results of the daytime inspections, which are reported separately within the Ecological Assessment and Bat Inspection Report (BuroHappold Engineering 2016), a series of dusk emergence and dawn re-entry surveys were carried out to confirm presence/likely absence of roosting bats and to highlight roost entrances and enable bat roost characterisation where roosts were confirmed. The assessed roost status and subsequent survey effort for the various buildings is summarised in Table 2—1 below.

Table 2—1 Survey Effort for Built Structures

Structure		Assessed Roost Status	Survey Effort
B1		High potential	3 nights
B2		High potential/confirmed roost (previous record of bat roost in this structure)	3 nights

[1] *Natural England class licence registration number 2015-10504-CLS-CLS, survey level 2 (WML-CL18)*
[2] *Full Member of Chartered Institute of Ecology and Environmental Management*

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Structure		Assessed Roost Status	Survey Effort
B6		Moderate	2 nights
B7		Moderate	2 nights
B8		Moderate	2 nights
B10a		Moderate	2 nights
B23		High	3 nights
B24		High	3 nights
B26		High	3 nights

Each survey lasted for at least 1.5 hours, with emergence surveys commencing at least 15 minutes prior to sunset and re-entry surveys concluding at approximately 15 minutes after sunrise to take in the most likely periods when bats would be observed at a roost site. Start and end times in relation to sunset/sunrise were adjusted as necessary for individual structures, based on the bat species and timings of activity observed during the earlier visits, to maximise the likelihood that any bat emergence could be observed on subsequent visits.

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Surveyors were positioned at vantage points close to the target structures to observe any bats entering or exiting potential roost features. Each was equipped with a Batbox Duet bat detector to aid detection in the field and an Anabat SD1 to record all calls and enable sonogram analysis for confirmation of species identification. The size of the team on any given night varied depending on the number of potential roost features to be surveyed.

Surveys were undertaken within the recommended survey season and on days with weather conditions forecast to be suitable. Survey dates, timings and weather conditions are detailed on the survey schedule provided in Appendix B.

2.3 Walked Transect

To investigate bat foraging and commuting activity at the site, a combination of active and passive survey techniques was employed. Bat activity was sampled during two monitoring periods to help build a picture of bat activity across a broader range of their active season.

A transect route was devised that included a representative sample of the habitats across as wide an area of the site as possible. The surveyors walked at a relatively slow and constant speed along the planned route, recording observations of bat activity such as number of bats seen together, flight direction, flight height and behaviour such as feeding buzzes and social calling. Spot counts were undertaken for periods of three minutes at various locations along the transect route.

The surveys commenced at sunset and continued for approximately two hours. The timings and weather conditions of each survey visit are provided in Table 2—2 below.

Table 2—2 Dates and Weather Conditions of Transect Surveys

Date	Sunset (start)	End Time	Weather Conditions
04/07/17	21:40	22:52	Dry and calm, some light drizzle for 10 minutes. Temperature 21.8ºC, decreasing to 18.2ºC. Relative humidity 55%, increasing to 65% by end. Cloud cover 8/8 throughout.
17/08/17	20:34	21:53	Dry and calm. Temperature 19.4ºC increasing to 19.8ºC. Relative humidity remained at 32% throughout survey. Cloud cover 7/8 throughout.

2.4 Automated Monitoring

An Anabat Express bat detector was deployed to monitor for bat activity for five nights along the river corridor in the central part of the site. It was attached to the underside of the fire escape at the rear of building B6 where it would detect calls in and around this area.

The detector was programmed to record from approximately 30 minutes before sunset until 30 minutes after sunrise each night. The dates and conditions for each of the monitoring periods are provided in Table 2—3 below.

The Anabat Express detector records a data file each time the detector is triggered by a sound within the broad frequency range of bat echolocation calls. For the purposes of analysis, each of these data files is considered to be one detection. Where more than one species is recorded on a single file, detection for each species would be logged.

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Table 2—3 Dates and Conditions for Automated Monitoring

Date	Sunset	Sunrise	Weather
21/07/17 to 26/07/17	21:22	05:08	Mostly dry and calm but with some scattered showers. Temperature highs of 22°C during the day and lows of 13°C during the nights.

2.5 Data Analysis

Recorded bat calls from each of the surveys were analysed using specialist sound analysis software AnalookW published by Titley Scientific. Based on parameters such as peak frequency and call duration, each call was assigned to a particular bat species.

Sonograms analysis can also be used to investigate the type of bat calls, including echolocation, social calls and feeding buzzes as well as providing an indication of whether more than one individual is present at a time. Sonograms illustrating samples of calls recorded at site are provided in Appendix E.

2.6 Limitations to Survey Techniques

For the majority of visits, there was full access to the target areas for survey. Where access was unavailable for any reason, the survey results were reviewed and additional nights of survey were undertaken to ensure sufficient confidence in the assessment of roost status.

The majority of visits were undertaken during the main period of the bat active season (May to August inclusive), enabling appropriate characterisation of roost types.

Visual observation of bat activity is constrained by light levels. While surveyors may be able to see bats silhouetted against the sky, individuals flying against a background of dark buildings are much more difficult to spot. The use of bat detectors to hear echolocation calls helps to ensure that activity is not missed. However, in low light conditions it is not always possible to ascertain details such as direction of flight.

GPS locations of bat calls recorded during transects reflects the location of the detector at that time and not the location of the bat, which may be anywhere within the approximately 20m detection range. The data plotted on the survey results figures has been adjusted to reflect the observations of the surveyors and thereby provide a more detailed picture of the habitat features associated with bat activity.

Automated detectors record all bat calls within range of the detector. Whilst analysis of sonograms generated from the recorded data can illustrate activity such as feeding buzzes, social calls and where more than one bat is present at the same time, it cannot provide any information about the direction of flight, and therefore cannot fully contextualise the data in relation to actual numbers of bats. For example, 10 bat calls recorded over a period of several minutes could be one individual passing 10 times or 10 individuals each passing once.

Given the constraints outlined above, the survey techniques and equipment used were consistent with the currently accepted standards for bat survey (Collins 2016) and the results are considered to provide a suitably robust picture of bat activity during the survey period.

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3 Results

3.1 Emergence/Re-entry Surveys

Common pipistrelle was the only species detected during emergence and re-entry surveys at the site and roosts were confirmed in some of the buildings, as indicated in Table 3—1. Activity levels varied across the site, with surveyors consistently detecting frequent activity along the river corridor and on the south side and upper level of the depot buildings (B1 and B2), but very little activity away from these areas.

Table 3—1 Summary of Roosting Activity

Structure	Roosting Activity	Roost Feature
B1	Day roost used by 1 common pipistrelle bat	Crevice in brickwork on NE facing external wall.
B2	Day roost used by 3-4 common pipistrelle bats	S side of building, precise roost entrance not yet confirmed.
B6	Day roost used by 1 common pipistrelle bat	Crevice in brickwork on external wall below metal fire escape on NE side above river.
B7	None	
B8	None	
B10a	None	
B23	Day roost used by 1 common pipistrelle bat	Gap between brick wall and wooden soffit on S side.
B24	Day roost used by 5 common pipistrelle bats	Inside culvert, precise roost entrance not confirmed.
B26	Day roost used by 5 common pipistrelle bats	Inside culvert, precise roost entrance not confirmed.

At the vicinity of roost sites bats were active within approximately 10 minutes of sunset/sunrise, but not detected until later in other areas. A maximum of 4-5 bats were seen together at any one time by any individual surveyor of bats foraging in the river corridor.

The weather conditions recorded during each of the survey visits are provided on the survey schedule in Appendix B and more detailed descriptions of the activity observed are given in Appendix C with plates in Appendix D.

3.2 Walked Transect

Common pipistrelle was the only species encountered during the two transect surveys.

Bats were seen and heard from approximately 5 minutes after sunset during the first survey (July), and from approximately 12 minutes after sunset during the second survey (August).

On both occasions, activity levels within the site as a whole were relatively low with a maximum of two individuals seen in flight together at any one time. As illustrated on – Plans 2 and 3, bats were predominantly detected around the depot buildings (B2 and B2) and along the river corridor. Where bats were detected away from these areas, the flight observed and calls heard indicated commuting behaviour rather than sustained foraging activity.

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3.3 Automated Monitoring

A total of 2051 files were recorded by the automated detector. With the exception of a single Daubenton's bat (*Myotis daubentonii*) call recorded on one night, the remainder of the data was for common pipistrelle bats. Activity was fairly consistent at between 200 and 300 calls recorded for each of the first three nights, then an increase to over 600 calls for the final two nights of the monitoring period.

Table 3—2 Total Bat Activity During Automated Monitoring Period

Date	Number of Calls	
	Common Pipistrelle	Daubenton's
21st July 2017	213	0
22nd July 2017	250	0
23rd July 2017	291	0
24th July 2017	641	0
25th July 2017	655	1

Combining figures for each night to get an averaged picture of nightly bat activity during the monitoring period, the pattern of activity is illustrated in Table 3—2. This shows that bat activity was relatively consistent throughout the night with between 100 and 150 detections during each 30 minute period between sunset and sunrise, with a peak of activity at approximately 1-1.5hrs after sunset.

The sonograms typically illustrated long sequences of echolocation calls with numerous feeding buzzes, although there were also shorter sequences of echolocation that suggested commuting behaviour.

The majority of the data illustrated calls of individual bats, but there were also instances where calls of at least two bats were apparent. Social calling was encountered occasionally throughout the monitoring period but most frequently coinciding with the peak time of bat activity between sunset and midnight.

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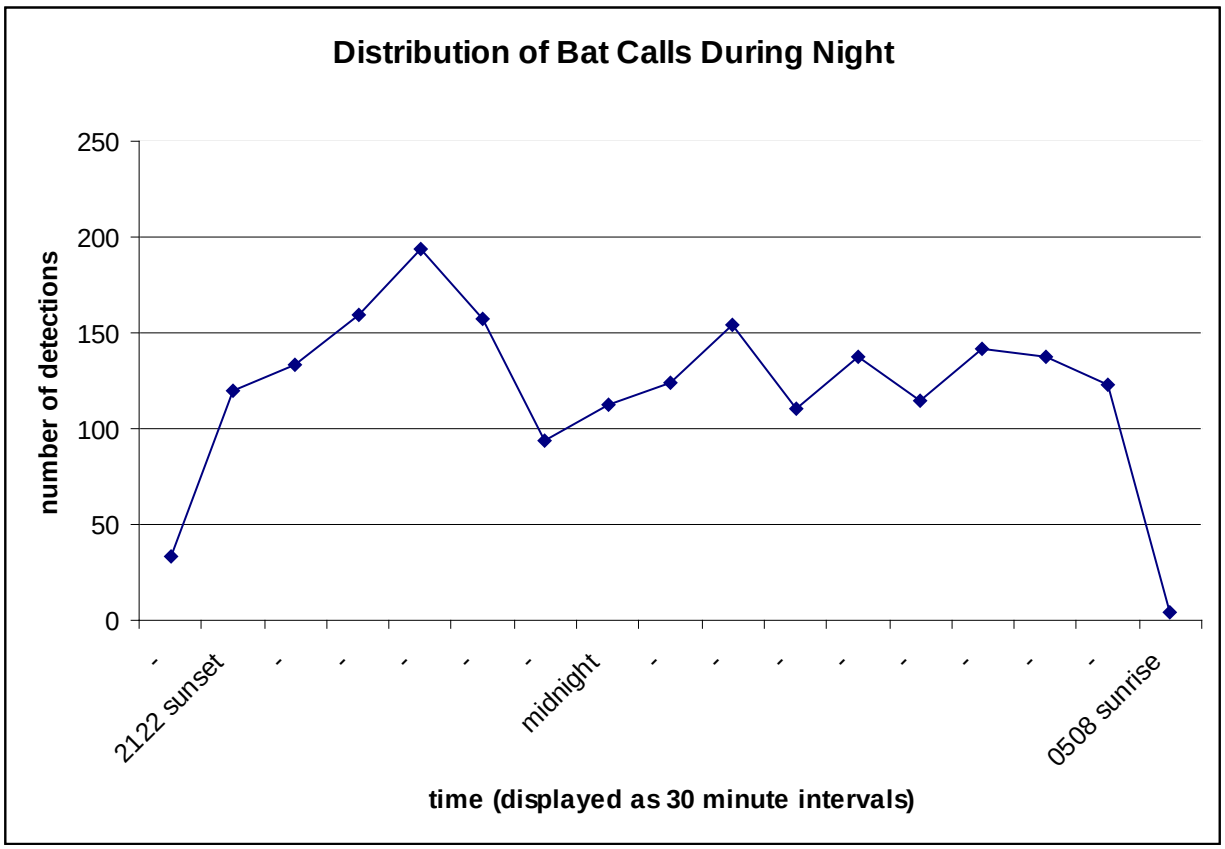


Figure 3—1 Chart illustrating the overall pattern of bat calls detected between sunset and sunrise for the period 21st – 25th July

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4 Evaluation

4.1 Foraging and Commuting Activity

Other than a single record of Daubenton's bat commuting along the river corridor, the only species encountered during the entire suite of surveys was common pipistrelle bat. This lack of species diversity is attributable to the city centre location, as the tall buildings, lack of vegetated habitats and disturbance resulting from noise and extensive artificial lighting in densely developed urban areas typically provide very poor conditions for bats and wholly unsuitable habitat for the majority of UK species.

Although common pipistrelle bats are the most frequently encountered species in urban areas and are more tolerant of artificial lighting than many other species, it was noticeable that even for this species activity was greatest along the river corridor. There was some activity in and around the dark and sheltered areas at the upper level and to the south of the depot buildings (B1 and B2) but from surveyor observations in other parts of the site where there was little green habitat and high levels of artificial lighting, bat activity was mainly limited to occasional individuals commuting.

The river channel is heavily engineered, with the water flowing at least 4m below surrounding ground level within brick or stone retaining walls. Crevices in the more dilapidated sections of the retaining walls and also silt banks within the channel support tall herb vegetation and even occasional trees, resulting in a mainly dark and sheltered habitat corridor and a ready source of the small midges that pipistrelle bats feed upon.

Based on the overall levels and distribution of bat activity observed during the surveys, the river corridor is considered to be the most important habitat for bats within the site. It forms an important resource within the site itself, but is also a component of a wider network of riparian habitat that allows bats to disperse through and live within the otherwise inhospitable urban landscape. Development of the river corridor has the potential to reduce the value of this area as foraging and commuting habitat, and any increase in artificial lighting is likely to be particularly detrimental.

Reduced habitat quality along the river corridor will have impacts on bats within the site itself, but is also likely to result in fragmentation effects for bat populations at a wider scale within the city.

4.2 Roosting Activity

Roosts were confirmed in several structures at the site including culverts (B24 and B26), a wall directly above the river (B6) and the old station depot buildings (B1, B2 and B23). Based on the relatively low numbers of individuals observed entering or exiting roost features at each of these locations, they are all considered to be day roosts[3].

By comparing results recorded by surveyors positioned at vantage points at either end of each culvert, it was possible to confirm numbers of bats exiting at sunset or entering at sunrise rather than simply commuting through. However, it has not been possible to determine the exact roost features used within the two structures. Based on the type of structure and the known roost habits of common pipistrelle bats it is considered likely that the roosts comprise one or more small crevice features between the bricks/stones.

[3] *Day roost – a place where individual bats, or small groups of males, rest or shelter in the day but are rarely found by night in the summer.*

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Demolition, refurbishment or structural works to these buildings would be likely to result in modification or destruction of bat roosts, which would be an offence under current wildlife legislation. All British bats hibernate during the winter and therefore have very different habitat requirements depending on the season. This means that although bats do typically use the same roost sites annually, the majority of roosts are used for only part of each year. For this reason it should be noted that a bat roost remains fully protected by law regardless of whether or not bats are present at that time.

Depending on the time of year, works to structures used by roosting bats could also present a risk of disturbance or causing harm to bats, which would result in additional offences.

Appropriate mitigation and avoidance measures will need to be implemented to minimise disturbance, avoid harm and offset the loss of any roost sites. Recommendations are presented in the Section 5.

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5 Recommendations

5.1 Introduction

In line with current good practice, if development has not begun within two years of this report the bat surveys should be repeated to re-assess bats' usage of the site and confirm the location and nature of any roosting activity at that time.

Based on the current survey results and proposals for the site, the following recommendations are made.

5.2 Licence Application

Upon receipt of planning consent, a licence application to Natural England will be required for any works affecting the roosts. A standard licence application typically takes at least 30 days for Natural England to process and requires the completion of several documents:

- Application form (providing details of the site, applicant and named ecologist);
- Method statement (providing a detailed description of predicted impacts and mitigation strategy);
- Reasoned statement (setting out the planning context); and
- Work schedule (setting out the timescale for the proposed work).

5.3 Mitigation Strategy

A mitigation strategy will be required to avoid or compensate for impacts on roosting bats, and the following points will need to be considered, with examples of actions that may be appropriate for implementation of the strategy:

- Measures to minimise unnecessary disturbance of bats in a roost, e.g.:
    - scheduling works for periods when bats may be absent.
- Measures to avoid causing harm to individual bats during the course of the works, e.g.:
    - toolbox talk for contractors to brief them on presence of bats and provisions of the mitigation strategy;
    - supervision of 'at risk' activities by a licensed bat ecologist; and
    - destructive search of roost features.
- Provision of alternative roost habitat for common pipistrelle bats to offset the loss of the existing roosts, e.g.:
    - bat boxes in dark, sheltered locations; and
    - incorporating potential roost features into new structures.
- Avoiding fragmentation of important bat foraging and commuting habitats, e.g.:
    - sensitive lighting design for the scheme that minimises illumination of the river corridor;

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- lighting specification that uses narrow spectrum light sources with low ultra-violet, blue or white wavelength component to minimise insect attraction at lamps; and
- incorporating areas of soft landscaping into the development masterplan and ensuring connectivity between any new habitats and the existing river corridor.

Further guidance on lighting specifications is provided in publications available via the Bat Conservation Trust website, such as the impacts of different types of lighting (RCEP 2009), effects of artificial lighting on bat behaviour (Stone 2013) and guidelines for mitigation (BCT 2014).

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Appendix A – Plans

Figure 1: Bat Roost Assessment

Figure 2: Bat Transect Results (July 2017)

Figure 3: Bat Transect Results (September 2017)

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384800 384900 385000 385100 385200 385300 385400 385500

397800 397700 397600 397500 397400

B1 - Day roost for 1 common pipistrelle bat

B2 - Day roost for 3-4 common pipistrelle bats

B23 - Day roost for 1-2 common pipistrelle bats

B26 (culvert) Day roost for approx. 5 common pipistrelle bats

B24 (culvert) Day roost for approx. 5 common pipistrelle bats

B6 - Day roost for 1 common pipistrelle bat

B22 B1 B2 B21 B23 B25 B20 B3 B4 B24 B5 B6 B19 B26 B12 B9 B7a B7b B7c B8 B10a B10b B18 B15 B16 B17 B13 B14 B11



384800 384900 385000 385100 385200 385300 385400 385500

BUROHAPPOLD ENGINEERING

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

N

ISO A3

0 10 20 40 60 80 Metres

Legend

- Site boundary
- Confirmed roost
- No evidence of roosting
- No access for survey
- Building no longer present
- Roost entrance
- Roost entrance area, precise feature not confirmed
- Location of bat droppings found in 2012

Title:

BAT ROOST ASSESSMENT

Project Name	Mayfield, Manchester
Discipline	Ecology
Scale	1:2,000
Drawing No.	Figure 1
Drawn By	CC
Originator	HR
Date	27/10/2017
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps\Figures
Revision	A

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384900 385000 385100 385200 385300 385400

397700

397600

397500

B22 B1 B2 B21 B23 B25 B20 B3 B4 B24 B5 B6 B7a B7b B7c B8 B9 B10a B10b B11 B12 B19 B26 B18 B15 B16 B17 B13 B14

1 START 2 3 4 5 6 7



384900 385000 385100 385200 385300 385400

BUROHAPPOLD ENGINEERING

N

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

0 10 20 40 60 Metres

Legend

- Site boundary
- Buildings
- Transect route - July 2017
- Point count location
- Areas where bat calls were detected (Common pipistrelle)

Title:

BAT TRANSECT RESULTS (JULY 2017)

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:1,500	Drawing No.	Figure 2
Drawn By	CC	Originator HR	Date 27/10/2017
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps\Figures	Revision	A

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384900 385000 385100 385200 385300 385400

397700 397600 397500

B22 B1 B2 B3 B4 B5 B6 B7a B7b B7c B8 B9 B10a B10b B11 B12 B18 B19 B20 B21 B23 B24 B25 B26 B13 B14 B15 B16 B17

START

1 2 3 4 5 6 7



384900 385000 385100 385200 385300 385400

BUROHAPPOLD ENGINEERING

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

N

ISO A3

0 10 20 40 60 Metres

Legend

- Site boundary
- Buildings
- Transect route - Sep 2017
- Point count location
- Areas where bat calls were detected (Common pipistrelle)

Title:

BAT TRANSECT RESULTS (SEPTEMBER 2017)

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:1,500	Drawing No.	Figure 3
Drawn By	CC	Originator HR	Date 27/10/2017
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps\Figures	Revision	A

Ordnance Survey © Crown copyright and database right 2017

Appendix B - Dates of Surveys and Weather Conditions

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APPENDIX B DATES OF SURVEYS, AND WEATHER CONDITIONS

Date	Survey Type	Start Time	Sunrise/ Sunset	End Time	Weather	Target Buildings
24/05/17	Dusk Emergence	2100	2117	2245	Dry with light wind. Temperature 17.5ºC dropping to 14.9ºC by the end. Relative humidity 73%, increasing to 93%. Cloud cover 0/8 throughout.	B1 and B2 (platform level) B23
14/06/17	Dusk Emergence	2124	2139	2255	Dry and calm, increasing to light wind by the end. Temperature 20ºC throughout. Relative humidity 42%, decreasing to 41%. Cloud cover 8/8 throughout.	B26
20/06/17	Dusk emergence	2125	2139	2255	Dry with light wind. Temperature 18ºC, decreasing to 17ºC. Relative humidity 60%, increasing to 67%. Cloud cover 1/8 throughout.	B1 and B2 (platform level) B23 B8
21/06/17	Dawn re-entry	0335	0440	0455	Dry with light wind. Temperature 16ºC, dropping to 15ºC by end. Relative humidity 68%, increasing to 72%. Cloud cover 1/8, increasing to 2/8.	B1 & B2 (ground level)
04/07/17	Dusk emergence	2125	2140	2250	Dry and calm, some light drizzle for 10 minutes. Temperature 21.8 ºC, decreasing to 18.2 ºC. Relative humidity 55%, increasing to 65%. Cloud cover 8/8 throughout.	B24 (culvert) B26 (culvert)
05/07/17	Dawn re-entry	0320	0448	0505	Light rain and light wind. Dry by the end of survey. Temperature 14.8 ºC, decreasing to 14.4 ºC. Relative humidity 88% increasing to 100%. Cloud cover 8/8 throughout.	B7 B8
12/07/17	Dusk emergence	2126	2134	2250	Dry and calm, Temperature 15ºC decreasing to 14 ºC. Relative humidity not recorded. Cloud cover 1/8 throughout.	B8 B10a

Date	Survey Type	Start Time	Sunrise/ Sunset	End Time	Weather	Target Buildings
20/07/17	Dusk emergence	2100	2124	2248	Dry and calm. Temperature 20.5ºC decreasing to 15.2 ºC. Relative humidity 34% increasing to 54%. Cloud cover 6/8 increasing to 8/8.	B1 and B2 (platform level) B23
21/07/17	Dawn re-entry	0350	0508	0525	Dry with light wind. Temperature 14ºC decreasing to 13 ºC. Relative humidity 70% increasing to 75%. Cloud cover 8/8 decreasing to 7/8.	B24 (culvert) B26 (culvert)
26/07/17	Dusk emergence	2100	2116	2230	Dry with light wind, becoming heavy rain and strong wind by the end of the survey. Temperature 18ºC decreasing to 14ºC. Relative humidity 57% increasing to 81%. Cloud cover 4/8 increasing to 8/8.	B7
10/08/17	Dawn re-entry	0425	0540	0555	Dry and calm. Temperature 7.7ºC decreasing to 6.6 ºC. Relative humidity remained at 98%. Cloud cover 0/8 throughout.	B23
17/08/17	Dusk emergence	2015	2035	2200	Dry and calm. Temperature 19.4ºC increasing to 19.8ºC. Relative humidity remained at 32%. Cloud cover 7/8 throughout.	B24 (culvert)
23/08/17	Dusk emergence	2000	2019	2125	Dry and calm. Temperature 20ºC decreasing to 17ºC. Relative humidity 44%, decreasing to 36%. Cloud cover 1/8, clearing to 0/8 by end.	B26 (culvert)
25/08/17	Dawn re-entry	0430	0606	0620	Dry and calm. Temperature 13.5ºC decreasing to 11.2ºC. Relative humidity 60%, decreasing to 80%. Cloud cover 1/8 throughout.	B1 and B2 (platform level)
01/09/17	Dawn re-entry	0505	0618	0630	Dry and calm. Temperature 11ºC throughout. Relative humidity 75%, increasing to 85%. Cloud cover 0/8 throughout.	B1 and B2 (ground level)
21/09/17	Dusk emergence	1839	1909	1939	Dry and calm. Temperature 15ºC, decreasing to 10ºC by end. Relative humidity 57%, increasing to 80%. Cloud cover 6/8, clearing to 2/8 by end.	B2 (ground level – south side only)

Appendix C - Emergence/Re-entry Survey Data

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APPENDIX C EMERGENCE/RE-ENTRY SURVEY DATA

Date	Survey Type	Target Buildings		Bat Emergence/ Re-entry Observed
24/05/17	Dusk emergence	B1 & B2 (platform level)	Common pipistrelle (*Pipistrellus pipistrellus*) bats were first detected approximately 20 minutes after sunset and then seen and heard foraging around the station concourse frequently throughout the survey. A maximum of two individuals were seen together at any one time. No bats were seen to emerge from or enter any potential roost feature. No other bat species were seen or heard during the survey.	No
		B23	Common pipistrelle bats were seen and heard from approximately 45 minutes after sunset and then were recorded foraging around the building frequently throughout the remainder of the survey. A maximum of two individuals were seen together at any one time. At approximately 50 minutes after sunset, and again five minutes later, a single bat was seen to fly up to the eaves on the southern elevation. On both occasions the bat was not seen to fly away, and echolocation calls stopped at the point where it reached the roof; it was therefore considered likely to have entered a potential roost feature building. No other bat species were seen or heard during the survey.	Yes
14/06/17	Dusk emergence	B26	Common pipistrelle bats were seen and heard from approximately five minutes after sunset. There was frequent bat foraging and commuting activity along the river corridor throughout the survey with a maximum of two individuals seen together at any one time. No bats were seen to emerge from or enter any potential roost feature. No other bat species were seen or heard during the survey.	No
20/06/17	Dusk emergence	B1 & B2 (platform level)	Common pipistrelle bats were first detected from approximately 10 minutes after sunset and then seen and heard foraging frequently throughout the rest of the survey. A maximum of 2 individuals were seen together at any one time. No bats were seen to emerge from or enter any potential roost feature. No other bat species were seen or heard during the survey.	No

Date	Survey Type	Target Buildings		Bat Emergence/ Re-entry Observed
20/06/17	Dusk emergence	B23	Common pipistrelle bats were seen and heard from approximately 50 minutes after sunset, foraging around the building and over the nearby scrub vegetation. A maximum of two individuals were seen together at any one time. No bats were seen entering or exiting any potential roost feature; however, two bat droppings were found stuck to the wall on the south side directly below a crevice feature where the soffit meets the wall. No other bat species were seen or heard during the survey.	No
		B8	Common pipistrelle bats were first detected at approximately 35 minutes after sunset and then seen and heard occasionally throughout the rest of the survey. No bats were seen entering or exiting any potential roost feature. No other bat species were seen or heard during the survey.	No
21/06/17	Dawn re-entry	B1 & B2 (ground level)	Common pipistrelle bats were seen and heard foraging along the river corridor to the south of the building, with near constant activity by at least five individuals, some well down in the channel close to the water level and others higher at street level and along the bankside vegetation. Bats were also occasionally seen foraging over the construction compound between the building and the river. By approximately 20 minutes before sunrise only a single bat remained foraging at this location, remaining until 10 minutes before sunrise. None of the bats were seen to leave the river corridor; however, due to the tall bankside vegetation their flight path could not be seen further than approximately 10m further than the bridge on Baring St. Individual common pipistrelle bats were occasionally seen around the other sides of the building during the survey, but activity levels were generally low. No bats were seen entering or exiting any potential roost feature; however, due to access limitations during this visit there was very poor visibility of most of the southern side of the building. No other bat species were seen or heard during the survey.	No (NB note limitations to survey coverage on this visit)
04/07/17	Dusk emergence	B24 (culvert)	Bats were noted to already be active at the time survey commenced. At approximately three minutes after sunset a single common pipistrelle was seen to fly away from the wall below the fire escape on B6 where the surveyor was positioned to view the eastern end of the culvert. Common pipistrelle bats were seen and heard frequently throughout survey, flying in and out of the culvert from both the east and west and foraging over the nearby trees. A maximum of five individuals were seen flying together at any one time. No other bat species were seen or heard during the survey.	Yes (B6) No (B24 culvert) (NB bats were already active before survey started)

Date	Survey Type	Target Buildings		Bat Emergence/ Re-entry Observed
04/07/17	Dusk emergence	B26 (culvert)	Bats were noted to already be active at the time survey commenced. Common pipistrelle bats seen and heard frequently throughout the survey, foraging up and down the river corridor and occasionally entering the culvert. A maximum of four individual bats seen together at any one time.	No (NB bats were already active before survey started)
05/07/17	Dawn re-entry	B7	Common pipistrelle bats were seen and heard very occasionally during the survey, on each occasion commuting through this area of the site. The last bat detected at approximately 55 minutes before sunrise. No other bat species were seen or heard during the survey. No bats were seen entering or exiting any potential roost feature.	No
12/07/17	Dusk emergence	B8	A single common pipistrelle bat was detected at just over one hour after sunset. No other bat species were seen or heard during the survey. No bats were seen entering or exiting any potential roost feature.	No
		B10a	No bats were seen or heard during the survey. No bats were seen entering or exiting any potential roost feature.	No
20/07/17	Dusk emergence	B1 & B2 (ground level)	At approximately 10 minutes after sunset a single common pipistrelle bat was seen to emerge from a small gap beneath decorative stonework on the eastern side of B1, close to the top of the wall. This individual bat was observed to re-enter and emerge from the same feature several times during the survey. Common pipistrelle bats were occasionally seen and heard foraging along the north side of B1 and B2 and between the arches on Temperance Street. At approximately 15 minutes after sunset on the south side of B2, three to four common pipistrelle bats were suddenly detected foraging in the sheltered space between the side of the depot and the adjacent walkway. The bats were considered likely to have emerged from roost in this location, although the precise roost entrance was not identified. No other bat species were seen or heard during the survey.	Yes
		B23	Common pipistrelle bats were seen to forage and commute occasionally along the railway tracks. No other bat species were seen or heard during the survey. No bats were seen entering or exiting any potential roost feature.	No

Date	Survey Type	Target Buildings		Bat Emergence/ Re-entry Observed
21/07/17	Dawn re-entry	B24 (culvert)	Surveyors at both the eastern and western end of the culvert recorded near constant foraging and commuting activity by common pipistrelle bats during the survey, with a maximum of three individuals seen in flight together at any one time. At the eastern side activity continued until approximately 20 minutes before sunrise, when three individuals were seen to enter the culvert and did not re-emerge. Activity continued at the western end for approximately another 10 minutes. No other bat species were seen or heard during the survey.	Yes
		B26 (culvert)	Several common pipistrelle bats were first recorded approximately 80 minutes before sunrise. They were observed to be foraging along the river corridor, flying in and out of the culvert entrances. At approximately 20 minutes before sunrise, a common pipistrelle bat was observed to re-enter a roost feature on the wall of the north side of the culvert. No bat activity was recorded after 10 minutes before sunrise on the south entrance, whilst bat activity of an individual common pipistrelle was recorded up to 10 minutes after sunrise.	Yes
26/07/17	Dusk emergence	B7	A common pipistrelle bat was recorded foraging on the north side of B7 approximately 30 minutes after sunset. No bats were seen entering or exiting any potential roost feature. No other bat species were seen or heard during the survey.	No
10/08/17	Dawn re-entry	B23	No bat species were seen or heard during the survey. No bats were seen entering or exiting any potential roost feature.	No
17/08/17	Dusk emergence	B24 (culvert)	At approximately 12 minutes after sunset two common pipistrelle bats were seen emerging from the eastern end of the culvert, followed by a further one individual from the western end a minute or so later. After this time, surveyors at both ends of the culvert observed fairly constant bat foraging and commuting activity within the river corridor, with a maximum of two individuals seen together at	Yes
23/08/17	Dusk emergence	B26 (culvert)	Three common pipistrelle bats were seen emerging from the western entrance to the culvert at approximately 10 minutes after sunset. At around the same time a further one individual was seen to emerge from the eastern end of the culvert. After this time there was fairly constant foraging and commuting activity in the river corridor at the western side of the culvert, with a maximum of five individuals seen flying together at any one time. Activity at the eastern side was detected throughout the survey, but to a lesser extent.	Yes

Date	Survey Type	Target Buildings		Bat Emergence/ Re-entry Observed
25/08/17	Dawn re-entry	B1 & B2 (platform)	Common pipistrelle bats were seen and heard occasionally during the survey with maximum of one bat seen at any one time. The last individuals were detected at approximately 50 minutes before sunrise. No bats were seen entering or exiting any potential roost feature.	No
01/09/17	Dawn re-entry	B1 & B2 (ground level)	Common pipistrelle bats were seen and heard occasionally during the survey, both to the south of the building and on at the ramp on the north side. A maximum of one bat was seen at any one time and the last individuals were detected at approximately 35 minutes before sunrise. No bats were seen entering or exiting any potential roost feature.	No
21/09/17	Dusk emergence	B2 (south side)	Common pipistrelle bats were seen and heard occasionally during the survey from approximately 30 minutes after sunset. No bats were seen entering or exiting any potential roost feature.	No

Appendix D - Plates

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Plate 1

Building B23 – two bats seen entering during dusk survey (yellow). Also several fresh bat droppings found stuck to wall (blue).



Plate 2

Building B1 – a single common pipistrelle was seen emerging during dusk survey (yellow).



Plate 3

Southern side of B2 – 3-4 bats seen close to building at sunset during dusk surveys, considered likely to be roosting but exact roost feature not identified.



Plate 4

Southern side of B2 – roost entrance identified towards end of ramp identified during earlier survey work undertaken by other consultants during 2014.



Plate 5

Eastern entrance to B24 (culvert). Bats confirmed roosting but precise roost feature inside culvert could not be determined at this stage.



Plate 6

Western entrance to B24 (culvert).



Plate 7

B26 (culvert), viewed looking eastwards from river level. Bats confirmed to be roosting during dusk and dawn surveys but exact roost entrance not identified.



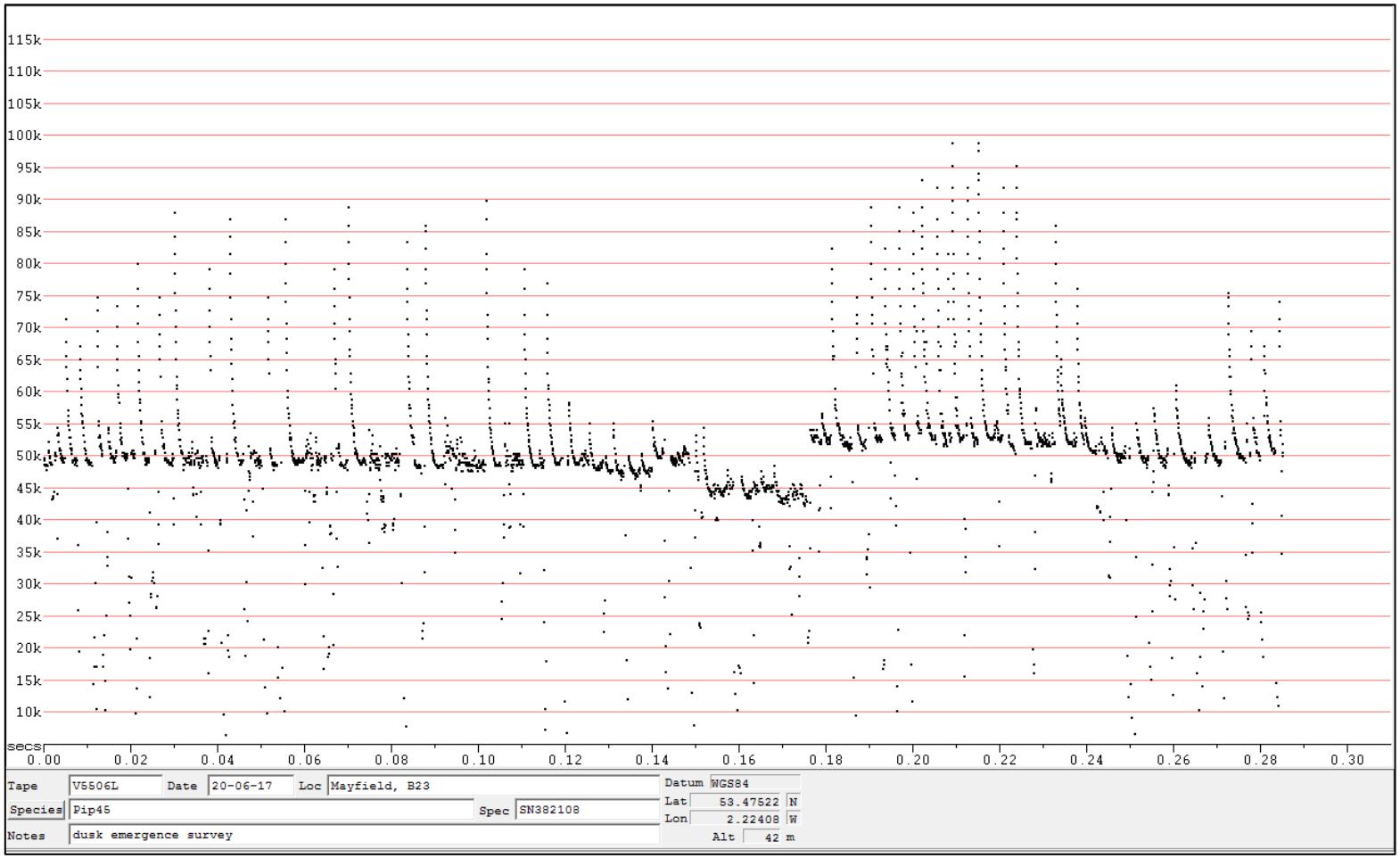
Plate 8

Building B6 – 1 bat confirmed emerging from roost on wall below fire escape during dusk survey, exact roost feature not identified.

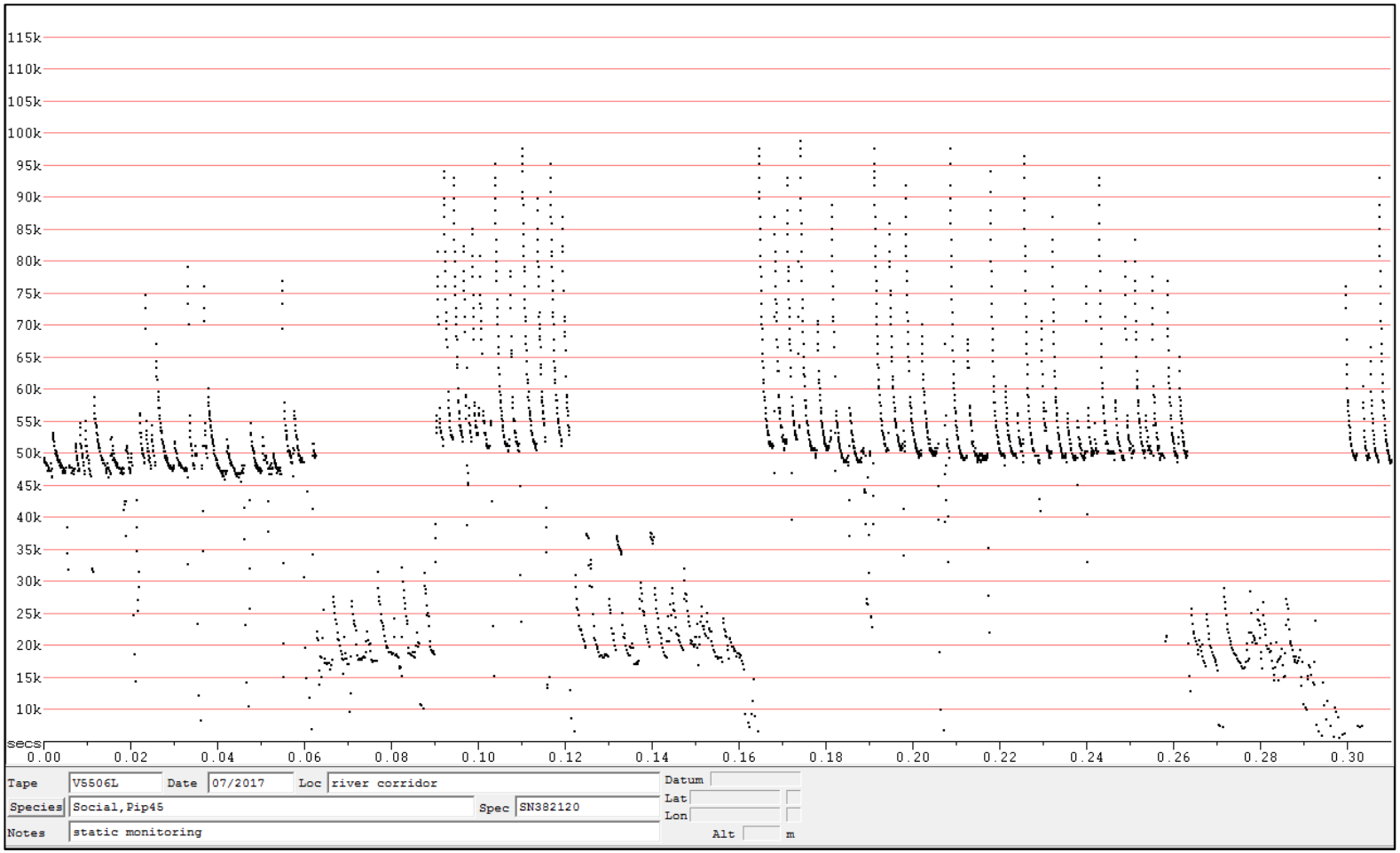
Appendix E - Sonograms

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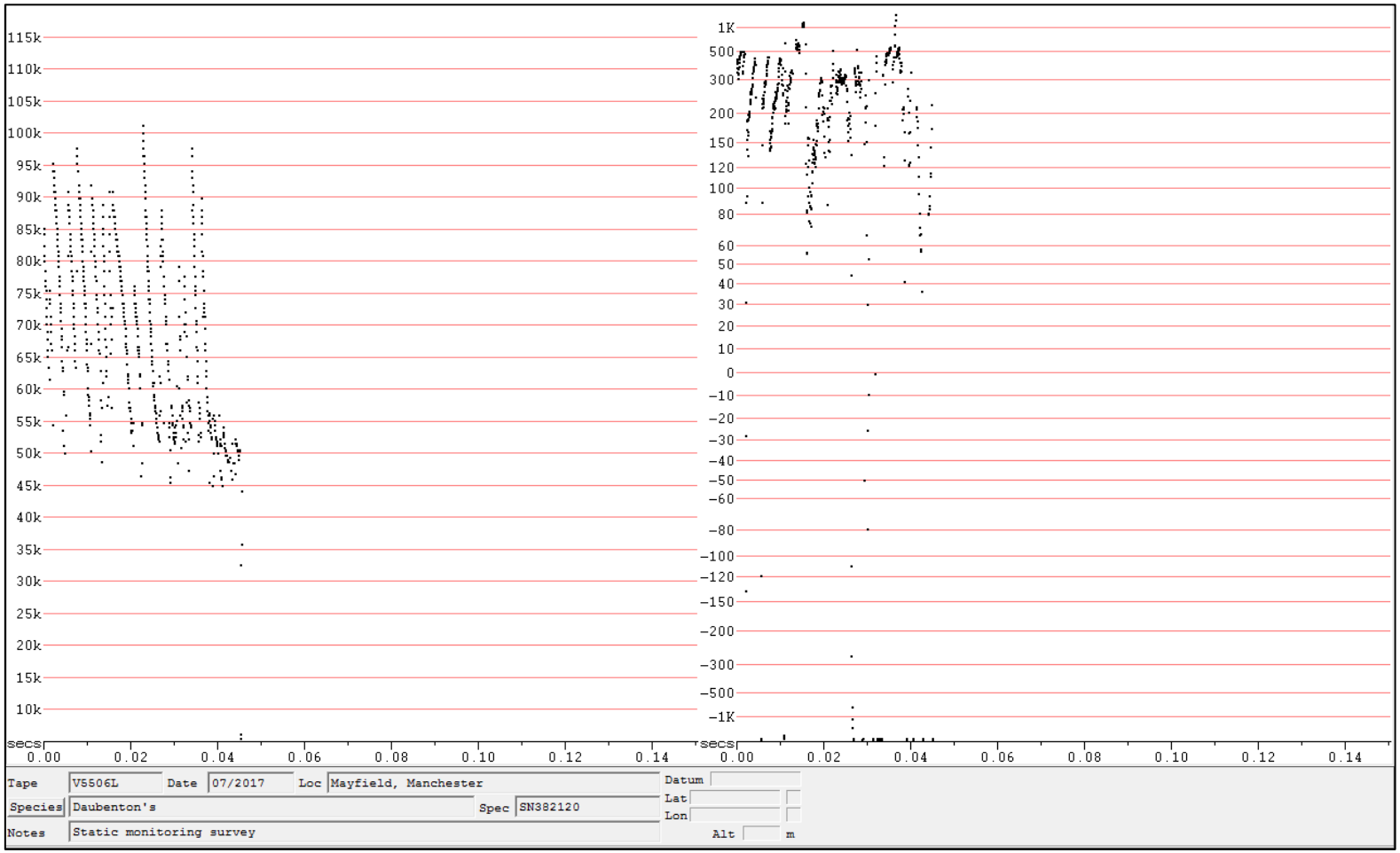
Sonogram 1: Echolocation calls of common pipistrelle bat recorded during dusk emergence survey at the site.
Recorded by Anabat SD1 and analysed using AnalookW (view: F7 compressed, frequency only).



Sonogram 2: Echolocation and social calls of common pipistrelle bats recorded during automated monitoring at the site.
Recorded by Anabat Express and analysed using AnalookW (view: F7 compressed, frequency only).



Sonogram 3: Echolocation calls of Daubenton's bat recorded during automated monitoring along the river corridor.
Recorded by Anabat Express and analysed using AnalookW (view: F7 compressed, frequency and slope).



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Appendix 9.4 Breeding Bird Survey Report, November 2017

BUROHAPPOLD ENGINEERING

Mayfield Regeneration Development

Black Redstart and Breeding Bird Survey Report

035548

29 November 2017

Revision 00

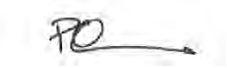
MRP-BHE-XX-XX-RP-YM-0002

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Revision	Description	Issued by	Date	Checked
00	Black Redstart and Breeding Bird Survey Report	GH	29/11/2017	PO

O:\035548 Mayfield Regeneration Development\F32 Environmental\03 Reports\Ecology Survey Reports WIP\Mayfield BR_Breeding Bird Survey WIP\MRP-BHE-XX-XX-RP-YM-0002.docx

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author	**Gerard Hawley**
date	**16/11/2017**
approved	**Pernille Olsen**
signature	
date	**29/11/2017**

..

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Appendix B - Results

Appendix C - Legislation Summary

Appendix D - EOAC and BTO Guidelines

Appendix E - GMEU Black Redstart Records

Table of Tables

Table 3—1 Location of Records for Black Redstart in Manchester City Centre within a 1km Radius (GMEU) 12

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Glossary

Term	Definition
BBS	Breeding Bird Survey
BTO	British Trust for Ornithology
CIEEM	Chartered Institute of Ecology and Environmental Management
CRoW	Countryside and Rights of Way
GMEU	Greater Manchester Ecology Unit
JNCC	Joint Nature Conservation Committee
NERC	Natural Environment and Rural Communities
RSPB	Royal Society for the Protection of Birds
WCA	Wildlife and Countryside Act

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1 Introduction

1.1 Background

BuroHappold Engineering was instructed to carry out an ecological assessment that included a black redstart survey and breeding bird survey of a site in central Manchester at and around the former Mayfield Station complex, hereafter referred to as the 'site'.

The site is proposed for re-development, including demolition of the majority of existing structures on the site, refurbishment of some of the older buildings, and modification of the retaining walls along the River Medlock.

The site partially falls within the Black Redstart Priority Area. This identifies an area in central Manchester where the black redstart (*Phoenicurus ochruros*) has been recorded. This species is a rare breeder, passage migrant and winter visitor with a small population concentrated in London, Sheffield, Liverpool and the West Midlands. There are also records of black redstarts breeding in central Manchester. A Species Action Plan (Greater Manchester Biodiversity Project 2009) aims to maintain a breeding population in Greater Manchester.

This report details the results of the black redstart and breeding bird survey and evaluates the results in the context of the proposed re-development of the site, making recommendations for mitigation and/or any further survey work as required.

1.2 Site Description

The site boundary includes an area of approximately 9.1ha, comprising a series of buildings that are predominantly commercial or light industrial units and associated areas of hard and soft landscaping. Some of the existing buildings are still occupied whilst others, including the station, have been disused for many years.

The site is surrounded on all sides by dense built-up areas, with tall buildings and busy roads. Manchester Piccadilly rail station is immediately to the north and the River Medlock flows east to west through the centre of the site.

1.3 Aims

The purpose of the black redstart and breeding bird surveys were to:

- determine if black redstart are using the site for breeding and/or foraging;
- obtain an understanding of the sites function for breeding birds;
- evaluate the assemblage of birds; and
- evaluate the impact construction works and redevelopment would have on breeding birds.

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1.4 Legislative and Policy Context

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000. This legislation applies in England and Wales.

Part 1 (Section 1:1) of the WCA states that:

'If any person intentionally,

(a) kills, injures or takes any wild bird;

(b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or

(c) takes or destroys an egg of any wild bird,

he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) refers to specific birds listed on Schedule 1 of the WCA, and states that:

'If any person intentionally or recklessly,

(a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or

(b) disturbs dependent young of such a bird,

he shall be guilty of an offence and liable to a special penalty.'

Schedule 1 includes birds such as barn owl (*Tyto alba*), black redstart, wood lark (*Lullula arborea*) and Cetti's warbler (*Cettia cetti*). Please refer to the WCA for a complete list of Schedule 1 species.

Please note: the above text provides a summary of the legislation in relation to birds and the original Acts and amendments should be referred to for complete details. A summary of relevant legislation is presented in Appendix C.

1.5 Conservation Status

A number of criteria are available to determine the conservation status of species recorded. These include:

1.5.1 Birds of Conservation Concern 4 (Eaton et al. 2015)

Under this approach bird populations are assessed using quantitative criteria to determine the population status of each species, and then placed on one of three lists: red, amber or green. Red list species are of high conservation concern, having declined by 50% or more in population or breeding range in the last 25 years. Amber listed species are of medium conservation concern, having suffered between 25% and 49% reduction in breeding or non-breeding populations, breeding or wintering ranges. Green list species have a favourable conservation status.

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1.5.2 Section 41 Priority Species (former Biodiversity Action Plan species) (UK Biodiversity Steering Group 1995)

Local, regional and national biodiversity targets identify habitats and species, including birds, of conservation concern for which Action Plans have been devised to help safeguard the most threatened species. Of particular relevance to this survey are species listed within the Greater Manchester priority species lists.

1.5.3 Quality of Life Indicator Species

The Quality of Life index is a UK Government scheme to measure the changes in 15 headline indicators of sustainable development and quality of life. Within these 15 indicators are population, economic growth, health and the state of the environment. The wild bird index is a summary of the population trends of the more common native species that breed in the UK and is divided in to species groups, namely farmland and woodland species. The UK Government is committed to reversing these declines by 2020 and will use this indicator to assess its performance.

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2 Methods

2.1 Desk Study

Records of protected species within 1km of the site, including birds, were obtained from the Greater Manchester Ecology Unit (GMEU), which hold biological records for the ten district councils that make up Greater Manchester. In addition, and more specifically concerning the black redstart, the website of the Manchester Birding Forum (2017) was consulted, which has recent sightings of black redstart listed.

2.2 Breeding Bird Survey

The breeding bird survey was carried out by Principal Ecologist Paul Fisher (MCIEEM[1]) and Assistant Ecologist Abigail Case.

The survey methodology was based on the breeding bird survey (BBS) methodology devised jointly by the British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservancy Council (JNCC) (Gilbert *et al*. 1998). This methodology requires three visits to be made between late March and early July, with each visit being at least four weeks apart. The start and finish dates for a particular site will vary depending upon latitude and altitude. The first of these visits is required to scope the site, record the habitats and set up a route and survey approach. This was completed as part of an earlier scoping exercise, which established the distribution of habitat types and identified their potential function for breeding birds, allowing an appropriate survey methodology to be applied.

On each of the survey visits the following details were recorded:

- bird numbers, species, age and sex;
- habitats being used; and
- bird behaviour, e.g. singing, feeding, paying particular attention to evidence of breeding.

In keeping with the methodology, surveys began early in the morning and avoided poor weather conditions, which reduce visibility and can suppress bird activity.

The survey area was surveyed using a combination of transects and point observations. This involved following a predetermined route at a slow walking pace and longer periods of observations were made at strategic points. Sightings were registered on a basemap using standard BTO codes.

2.3 Black Redstart Survey

Black redstarts' breeding habitat includes industrialised sites, and built-up and/or derelict surroundings. The Mayfield site has many features that favour black redstart whose preferred feeding habitat is small sparsely vegetated areas with rubble, close to slow moving water and an area that is relatively undisturbed. The buildings are also ostensibly suitable as nesting habitat with vertical features and ledges as well as high singing posts.

[1] Full Member of the Chartered Institute of Ecology and Environmental Management

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The Greater Manchester Biodiversity Project (2009) proposed survey guidelines for habitat suitable for breeding. This requires three visits of two-hour survey effort, with at least one week between each visit in the optimum survey season (April to July inclusive) to establish evidence of breeding, which would be:

- nest site with young;
- fledged young; and
- singing males.

The survey method involves timing visits when weather conditions are favourable, e.g. warm and windless days and to start one hour before dawn, as they sing at this time often from high perching positions.

The black redstart survey was conducted at the same time as the breeding bird survey by Principal Ecologist Paul Fisher (MCIEEM) and Assistant Ecologist Abigail Case.

2.4 Visit Details

The three survey visits for the black redstart and breeding bird surveys were conducted on the following dates:

- Visit 1 – 28 April 2017;
- Visit 2 – 26 May 2017; and
- Visit 3 – 16 June 2017.

2.5 Determination of Breeding Status

The breeding status of each species can be classified into four categories: confirmed breeder, probable breeder, possible breeder and non-breeder. The behaviour, sex, age and location of individual birds allow conclusions to be drawn about breeding status, based on categories devised by the European Ornithology Atlas Committee (EOAC 1979) and the BTO. Breeding evidence used in this report follows EOAC guidelines 1979 and BTO guidelines (see Appendix D).

The four categories: confirmed, probable, possible and non-breeders are used to indicate the likely breeding status within the survey area.

2.6 Survey Limitations

The conditions were suitable on each survey day being calm, warm and clear. Access was restricted to some parts of the site although it is considered that reasonable coverage was available, and that the survey results have enabled a robust assessment of the breeding bird assemblage to be undertaken

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3 Results

3.1 Desk Study

A number of bird species of conservation interest have been recorded within the 1km search radius. The majority of these records were recent and within the last decade. GMEU returned records for a number of Section 41 species[2] including common bullfinch (*Pyrrhula pyrrhula*), dunnock (*Prunella modularis*), herring gull (*Larus argentatus*), house sparrow (*Passer domesticus*), song thrush (*Turdus philomelos*) and common starling (*Sturnus vulgaris*).

There is a single record of common kingfisher (*Alcedo atthis*) in the 1km search area. Common kingfishers are found by still and slow-flowing water, such as canals and rivers, and they nest in holes tunnelled into earth banks. The closest record is about 900m to the west of the site on a side branch of the Rochdale Canal.

There is a single record for little ringed plover (*Charadrius dubius*) at a brownfield site approximately 800m to the north-east at Ancoats, in an area close to a branch of the Ashton Canal. Little ringed plovers first bred in the UK in 1938. They are summer visitors and breed in unvegetated man-made habitats such as industrial and post-industrial land, gravel pits and shingle river banks.

GMEU returned a number of records for black redstart supplied by the Greater Manchester Bird Recording Group, all recorded within the last ten years and within 1km of the site. The closest sighting is at Piccadilly Station approximately 200m to the north of the site. The full list is presented in Appendix E and an abridged table presented as Table 3—1 listing the location and number of records in Manchester City centre up until 2016.

Table 3—1 Location of Records for Black Redstart in Manchester City Centre within a 1km Radius (GMEU)

Location	Number
Albert Square	2
Canal St Minshull St Courts	2
Central Retail Park Ancoats	2
China Lane	7
Chinatown	1
Manchester Town Hall	9
Oxford Road	1
Piccadilly Station	1
Port Street	4
Shudhill	3
St Anne's Square	2
St Peter's Square	1

The Manchester Birding Forum website (http://manchesterbirding.activeboard.com/) has a number of records of sightings and calling records for black redstart up until June 2017 at Lloyd Street (900m to north-east), Albert Square (800m to north-east) and Newton Street (350m to the north).

[2] *Under Section 41 of the Natural Environment and Rural Communities (NERC) Act, the Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity*

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3.2 Field Survey

3.2.1 Black Redstart

There were no sightings of black redstart. However, this is not to discount the possibility of black redstart using the site at times.

3.2.2 Breeding Bird Assemblage

A total of 18 species were recorded during the three site visits. Five Birds of Conservation Concern (BoCC) were recorded including amber-listed common bullfinch and dunnock, and red-listed common starling.

The common bullfinch is more commonly associated with gardens, scrub and woodland. UK common bullfinch populations have declined by 36% since 1967 believed to be related to the deterioration of habitat quality caused by agricultural intensification and the reduction in woodland diversity (BTO 2017).

The dunnock is a resident breeder and passage winter visitor. The amber status for the dunnock is because of a more recent population decline in both the breeding and winter population as well as a decline in the range. The cause of the decline is unknown (BTO 2017).

The willow warbler is a summer visitor placed on the amber list owing to a recent decline in numbers, particularly in southern England. The cause is thought to be a deterioration of habitat in its wintering grounds in Africa and changes in woodland management in Britain (Wildlife Trust 2017).

The mallard is a familiar duck, commonly seen on lakes in city parks and along rivers. The mallard has been amber-listed because of a recent breeding population decline as well as a breeding range and winter range decline (Wildfowl and Wetlands Trust 2017).

Despite the common starling being relatively conspicuous and widespread, there has been a decline in the breeding population and decline in the breeding and winter range. It was red-listed following its population being halved over three decades and in Greater Manchester common starlings have declined by 41% over the past two decades (RSPB 2017).

3.2.3 Evidence of Breeding

Following EOAC guidelines (1979) and BTO guidelines, 11 of the species recorded were assessed as breeding within the site, five as probable breeders and two as possible breeders. Please refer to Appendix A, Figures 1, 2 and 3, which use BTO abbreviation codes to identify the species' location and behaviour.

The majority of species classified as confirmed breeders were recorded at each site survey visit and were displaying and singing in a habitat where nesting and foraging opportunities were present. Please refer to the table in Appendix B.

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4 Discussion and Recommendations

4.1 Evaluation of Breeding Assemblage

The breeding assemblage consisted primarily of common and widespread species. The undisturbed nature of the habitat and the development of scrub and ruderal sparse vegetation across the site has attracted a relatively diverse yet small number of species. Nevertheless, the assemblage in terms of numbers and diversity most likely compares favourably with other sites within central Manchester.

Black redstart was not recorded during the surveys but the site contains suitable habitats for both foraging and nesting black redstart.

4.2 Recommendations

All wild birds, their nests and eggs are protected under the WCA 1981 (as amended). It is, therefore, recommended that potential breeding bird habitats within the application site including buildings, trees, scrub and dense vegetation are removed outside the breeding season, which runs from March to September (inclusive).

If this is not possible, a suitably experienced ecologist must check the vegetation no more than 48 hours prior to site clearance to ensure no active nests are present. If nesting birds are confirmed to be present then works would be postponed until young have fledged and/or nesting had been completed. It may be necessary to cordon off the nest and monitor it until it is completed. This approach is recommended to minimise the risk of destroying active nests and, therefore, any infringement of the wildlife legislation.

The final design for the redevelopment has yet to be produced. However, redevelopment of the site presents an opportunity to increase biodiversity and add ecological value, including for black redstart. Below are a number of general considerations and enhancement measures that would benefit birds and other wildlife.

4.2.1 Native Species

Planting schemes used in urban environments often include non-native species. These may be selected for their aesthetic appeal, pollution tolerance, evergreen foliage and low maintenance, and many nectar-bearing exotic species do support insects and provide foraging and nesting opportunities for birds. However, native species, preferably of local provenance, tend to support greater biodiversity as they have evolved to the local conditions. It is recommended that, wherever practical, native trees and shrubs are selected for landscape designs. However, there are limitations to the strict adherence to an all-native landscaping scheme as it does restrict plant choices. Across the site it may be more productive to use a combination of native and exotic species (although the latter should constitute a small fraction of the total planted, particularly if BREEAM accreditation is being sought for the development) to maximise the range of annual and perennial, deciduous and evergreen, foliage and flowering, climbing and creeping species.

4.2.2 Green and Brown Roofs

Green roofs (living roofs) are intrinsically of greater benefit to biodiversity than more traditional roofing methods. Green roofs can vary in their appearance and character. They can be designed to support low-growing mosses and sedums, wildflowers and grasses.

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Sedums are widely-used plants for living roofs as they have many advantages in terms of hardiness and frost resistance. Sedums are succulents and actively store water in their tissues, increasing drought tolerance and it has been demonstrated that sedum roofs provide a number of ecological benefits.

Commonly used species on living roofs include non-native white stonecrop (*Sedum album)* and native biting stonecrop (*Sedum acre*). White stonecrop and biting stonecrop have some of the most impressive flowering displays and are very attractive to bees, butterflies and other insects. Sedum can also form a closed sward that is colonised by mosses and ruderal species. Surveys of sedum roofs at Canary Wharf found they supported a wide range of notable and scarce invertebrate species (Jones 2002).

Brown roofs have a similar construction to green roofs and also aim to encourage biodiversity and can be designed to support specific species. In this instance the target species could be the black redstart, which is known to breed in central Manchester. Brown roofs make use of local soils and spoil, and colonisation by local plant species generally forms a bigger component of the habitat. The Black Redstart Species Action Plan (2009) provides advice on habitat creation to replace the brownfield areas lost in Manchester as a consequence of redevelopment.

Research on the black redstart has demonstrated that the best breeding habitat has a number of key features:

- Small areas of sparsely vegetated rubble and rocky terrain that promote the kind of plants that support invertebrates on which black redstart feed;
- Holes and ledges at various heights within structures that act as nesting sites; and
- Built structures with vertical features that mimic the natural cliff faces and gorges of the black redstart's natural habitat that also provide protection from predators, nesting sites and singing posts.

4.2.3 Species Composition and Planting

Native species, such as ivy (*Hedera helix*), dog rose (*Rosa canina*), old man's beard (*Clematis vitalba*), common hop (*Humulus lupulus*) and honeysuckle (*Lonicera periclymenum*), all provide important food and nesting resources. Although native species are more likely to attract wildlife, some exotic species are also effective in this respect, such as Virginia creeper (*Parthenocissus quinquefolia*) and wisteria (*Wisteria* sp.).

The aspect of a climbing plant on a wall can have significant ancillary effects, such as insulation and moisture retention. For example, north-facing walls are more suitable for supporting native herbs and a wider range of plants due to the higher moisture regime. Care must also be taken when using ivy if there are cavities in the walls, as the root systems may cause damage (www.livingroofs.com).

Plants that do well in a stone wall are varied in nature - from small, delicately leaved, creeping plants such as woolly creeping thyme (*Thymus pseudolanuginosus*) or prostrate rosemary (*Rosmarinus officinalis*), to drought-tolerant plants with minimal root systems such as hens and chicks (*Echeveria 'Imbricata'*) or other succulents. Other candidate species include annuals such as wallflowers (*Erysimum cheiri*), trailing lobelia (*Lobelia erinus)* and snapdragons (*Antirrhinum majus*) that re-seed themselves from year to year. As a general rule, young, drought tolerant plant species, whose roots will easily fit in the planting pockets, should be used.

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4.2.4 Bird Boxes

It is recommended that a variety of bird boxes should be installed, targeted towards species currently known to utilise the site and its surrounds, to potentially accommodate a range of small birds. Traditional nest boxes should be attached in various locations around the site on the south-west or south-eastern side of trees and buildings, near to foraging areas but away from disturbance.

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Appendix A – Plans

Figure 1: Breeding Bird Survey Visit 1 – 28/04/2017

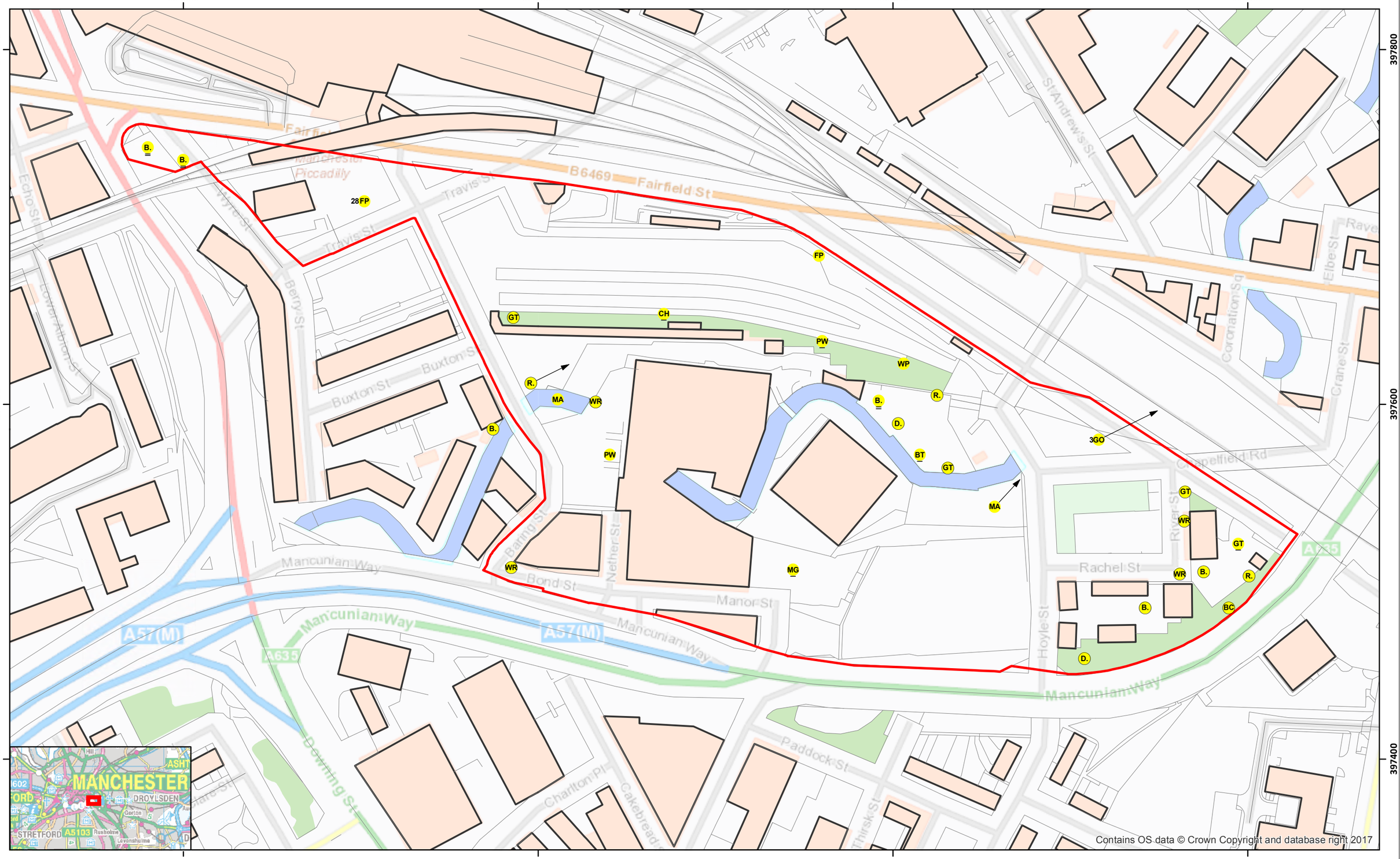
Figure 2: Breeding Bird Survey Visit 2 – 26/05/2017

Figure 3: Breeding Bird Survey Visit 3 – 16/06/2017

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384800 385000 385200 385400

397800 397600 397400



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False Northing: -100000.000000
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ISO A3

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Legend

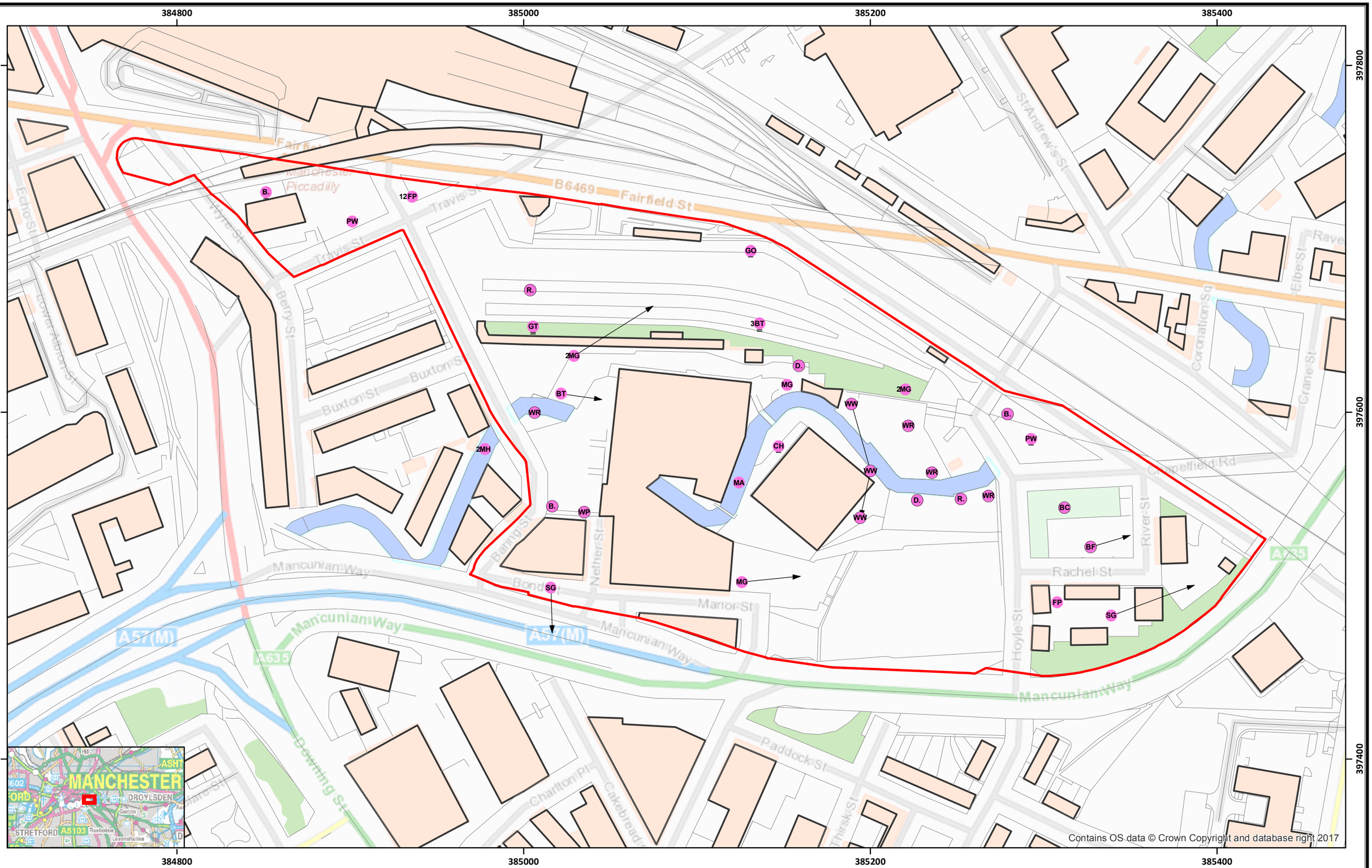
- Site boundary
- Survey Results
  - Bird registration
  - Bird singing
  - Bird calling
  - Bird alarm calling
  - Bird flight

B.	Blackbird	MA	Mallard
BC	Blackcap	MG	Magpie
BT	Bluetit	PW	Pied wagtail
CH	Chaffinch	R.	Robin
D.	Dunnock	WP	Woodpigeon
FP	Feral pigeon	WR	Wren
GO	Goldfinch		
GT	Great tit		

Title:

BREEDING BIRD SURVEY VISIT 1 - 28/04/17

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:2,000	Drawing No.	Figure 1a
Drawn By	CC	Originator GJH	Date 13/07/2017
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps\Figures\BBS_July_2017		Revision A



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British National Grid
Projection: Transverse Mercator
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Latitude Of Origin: 49.000000

N

ISO A3

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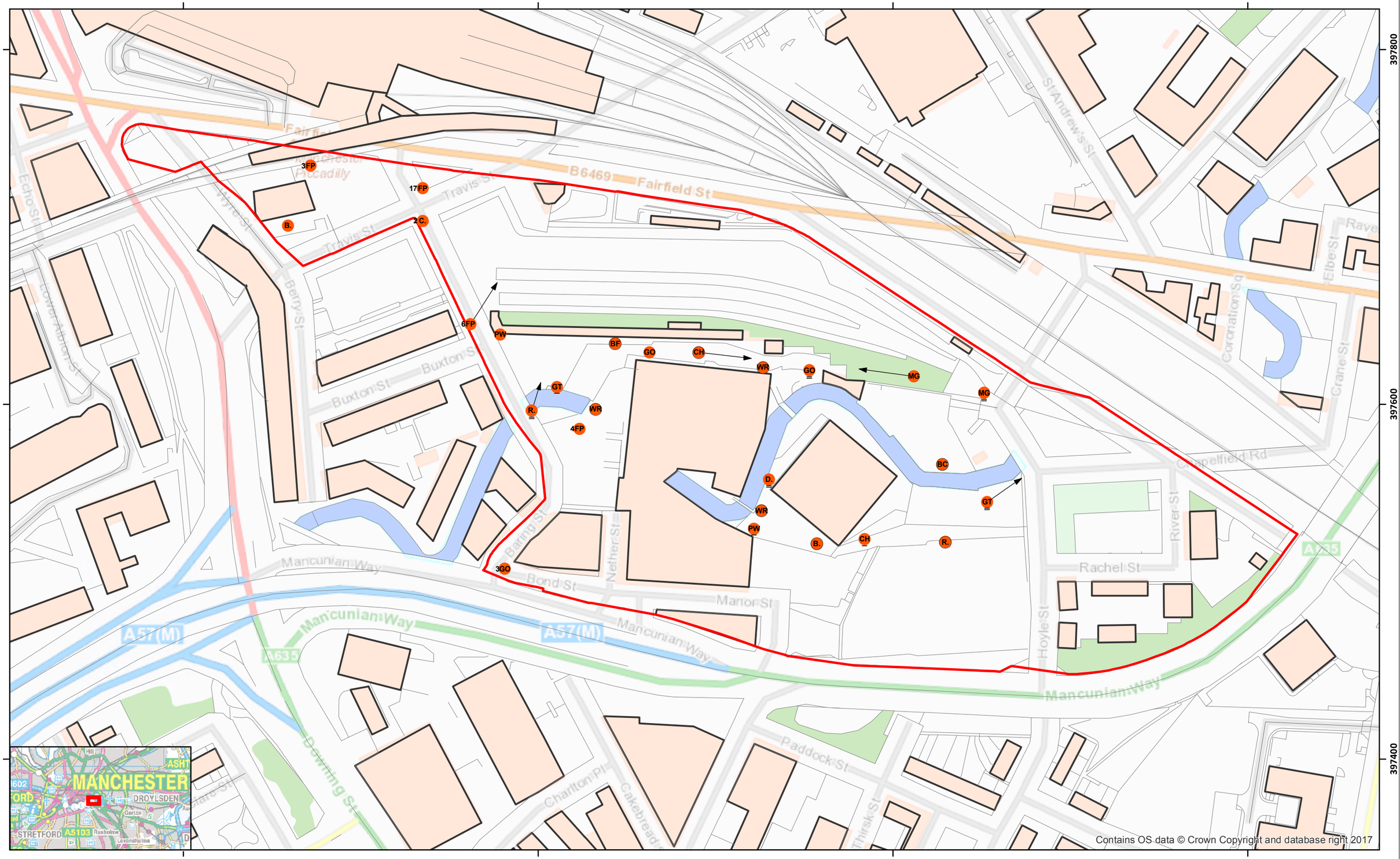
- Site boundary
- Survey Results
  - Bird registration
  - Bird singing
  - Bird calling
  - Bird alarm calling
  - Bird flight

B.	Blackbird	GT	Great tit	WR	Wren
BC	Blackcap	MA	Mallard	WW	Willow warbler
BF	Bullfinch	MG	Magpie		
BT	Bluetit	MH	Moorhen		
CH	Chaffinch	PW	Pied wagtail		
D.	Dunnock	R.	Robin		
FP	Feral pigeon	SG	Starling		
GO	Goldfinch	WP	Woodpigeon		

Title:

BREEDING BIRD SURVEY VISIT 2 - 26/05/17

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:2,000	Drawing No.	Figure 1b
Drawn By	CC	Originator	GJH
Date	13/07/2017		
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps\Figures\BBS_July_2017	Revision	A



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British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

N

ISO A3

0 10 20 40 60 80 Metres

Legend

- Site boundary
- Survey Results
  - Bird registration
  - Bird singing
  - Bird calling
  - Bird alarm calling
  - Bird flight

B.	Blackbird	GT	Great tit
BC	Blackcap	MG	Magpie
BF	Bullfinch	PW	Pied wagtail
C.	Carrion crow	R.	Robin
CH	Chaffinch	WR	Wren
D.	Dunnock		
FP	Feral pigeon		
GO	Goldfinch		

Title:

BREEDING BIRD SURVEY VISIT 3 - 16/06/17

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:2,000	Drawing No.	Figure 1c
Drawn By	CC	Originator GJH	Date 13/07/2017
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps\Figures\BBS_July_2017	Revision	A

Appendix B - Results

Common Name*	Scientific Name	V1 28/04/17	V2 26/05/17	V3 16/06/17	Conservation Status			Breeding Status		
					Red	Amber	Sch. 1	CO	PR	PO
Black-billed magpie [MG]	*Pica pica*	x	x	x					x	
Blackcap [BC]	*Sylvia atricapilla*	x	x	x				x		
Blue tit [BT]	*Cyanistes caeruleus*	x	x	x					x	
Carrion crow [C]	*Corvus corone*			x						x
Chaffinch [CH]	*Fringilla coelebs*	x	x	x				x		
Common blackbird [B]	*Turdus merula*	x	x	x				x		
Common bullfinch [BF]	*Pyrrhula pyrrhula*		x	x		x		x		
Common starling [SG]	*Sturnus vulgaris*	x	x	x	x				x	
Common woodpigeon [WP]	*Columba palumbus*								x	
Dunnock [D]	*Prunella modularis*	x	x	x		x		x		
European goldfinch [GO]	*Carduelis Carduelis*	x	x	x					x	
European robin [R]	*Erithacus rubecula*	x	x	x				x		
Feral pigeon [FP]	*Columba livia domestica*	x	x	x				x		
Great tit [GT]	*Parus major*	x	x	x				x		
Mallard [MA]	*Anas platyrhynchos*	x	x	x		x				x
White wagtail [PW]	*Motacilla alba*	x	x	x				x		
Willow warbler [WW]	*Phylloscopus trochilus*		x			x		x		
Winter wren [WR]	*Troglodytes troglodytes*	x	x	x				x		

Key: CO = Confirmed Breeder; PR = Probable Breeder; PO = Possible Breeder; *BTO species code in brackets

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Appendix C - Legislation Summary

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SUMMARY OF LEGISLATION RELATING TO BLACK REDSTART

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000.

Black redstarts (*Phoenicurus ochruros*) are additionally protected as they are listed on Schedule 1 of the WCA. Therefore, black redstarts, their nests, eggs and young are fully protected at all times throughout England and Wales.

Part 1 (Section 1:1) of the WCA states that:

'If any person intentionally,

(a) kills, injures or takes any wild bird;

(b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or

(c) takes or destroys an egg of any wild bird,

he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) states that:

'If any person intentionally or recklessly,

(a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or

(b) disturbs dependent young of such a bird,

he shall be guilty of an offence and liable to a special penalty.'

In addition, the black redstart is identified as a bird species of moderate conservation concern (‘Amber’ listed) due to its declining breeding population and its rarity as a breeding species within Britain.

Please note: the above text provides a brief summary of the legislation in relation to black redstart for England and Wales and the original Act and any amendments should be referred to for the precise wording.

SUMMARY OF THE LEGISLATION RELATING TO BREEDING BIRDS

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000. This legislation applies in England and Wales.

Part 1 (Section 1:1) of the WCA states that:

> 'If any person intentionally,
>
> (a) kills, injures or takes any wild bird;
>
> (b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or
>
> (c) takes or destroys an egg of any wild bird,
>
> he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) refers to specific birds listed on Schedule 1 of the WCA, and states that:

> 'If any person intentionally or recklessly,
>
> (a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or
>
> (b) disturbs dependent young of such a bird,
>
> he shall be guilty of an offence and liable to a special penalty.'

Schedule 1 includes birds such as barn owl (*Tyto alba*), black redstart (*Phoenicurus ochruros*), wood lark (*Lullula arborea*) and Cetti's warbler (*Cettia cetti*). Please refer to the WCA for a complete list of Schedule 1 species.

Some provisions are made to allow the killing and taking of certain species under certain circumstances, as follows:

- Birds listed on Schedule 2 (Part 1) of the Act may be taken or killed outside of the 'close season' for each individual species (the 'close season' is defined by the Act). This includes various wild duck and geese species.
- Birds listed on Schedule 2 (Part 2) of the Act may be killed or taken by authorised persons at all times. This includes species such as carrion crow (*Corvus corone*), black-billed magpie (*Pica pica*), feral pigeon (*Columba livia*) and greater Canada goose (*Branta canadensis*). An 'authorised person' is defined as a person who has written authorisation to undertake the act from the relevant statutory authority. The written authority is in the form of a licence, either a general licence which covers a number of the more typical 'pest' species, or an individual licence for other individual species. In England these licences are issued by Natural England and in Wales by the Welsh Assembly Government.

Please note: the above text provides a brief summary of the legislation in relation to breeding birds in England and Wales and the original Act and any amendments should be referred to for the precise wording.

Appendix D - EOAC and BTO Guidelines

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Appendix D Categories of Breeding Bird Evidence

Class	Category of Evidence
Non-breeding	Flying over
	Species observed but suspected to be still on migration
	Species observed but suspected to be summering non-breeder
Possible Breeding	Species observed in breeding season in possible nesting habitat
	Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat
Probable Breeding	Pairs observed in suitable nesting habitat in breeding season
	Permanent territory presumed through registration of territorial behaviour (song etc) on at least two different days, a week apart, at the same place, or many individuals on one day.
	Display and courtship (judged to be near potential breeding habitat).
	Visiting probable nest site
	Agitated behaviour or anxiety calls from adults, suggesting probably presence of nest or young nearby
	Brood patch on adult examined in the hand, suggesting incubation
	Building nest or excavating nest-hole
Confirmed Breeding	Distraction display or injury feigning
	Used nest or egg shells found (occupied or laid within the survey period)
	Recently fledged young (nidicolous species) or downy young (nififugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significent geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful.
	Adults entering or leaving nest site in circumstances indicating occupied nest or adult sitting on nest
	Adults carrying food for young or faecal sacs
	Nests containing eggs
	Nest with young seen or heard

EOAC and BTO Guidelines (combined)

Appendix E - GMEU Black Redstart Records

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site	startDate	endDate	abundance	sex	stage	status
Albert Square Manchester	09/06/2015	09/06/2015	1			Probable Breeder T - permanent Territory
Albert Square Manchester	08/06/2015	08/06/2015	1		Adult	
Canal St/Minshull St Courts (Manchester City Centre)	17/06/2009	17/06/2009	1	male	Adult	Possible Breeder H - in suitable nesting Habitat
Canal St/Minshull St Courts (Manchester City Centre)	04/06/2009	04/06/2009	1		Adult	Possible Breeder H - in suitable nesting Habitat
Central Retail Park Ancoats	02/06/2008	02/06/2008	1		Adult	
Central Retail Park Ancoats	11/04/2008	11/04/2008	1		Adult	
China Lane Manchester city centre	19/07/2009	19/07/2009	2		Adult	Probable Breeder P - Pair in suitable nesting habitat
China Lane Manchester city centre	14/07/2009	14/07/2009	2		Adult	Probable Breeder P - Pair in suitable nesting habitat
China Lane Manchester city centre	13/07/2009	13/07/2009	1	male	Adult	Probable Breeder T - permanent Territory
China Lane Manchester city centre	12/07/2009	12/07/2009	1		Adult	
China Lane Manchester city centre	05/07/2009	05/07/2009	1		Adult	Confirmed Breeder ON - Occupied Nest
China Lane Manchester city centre	16/06/2009	16/06/2009	3		Adult	Probable Breeder D - courtship and Display
China Lane Manchester city centre	16/06/2009	16/06/2009	2		Adult	
Chinatown, Manchester city centre	25/06/2010	25/06/2010	1	male	Adult	Possible Breeder S - Singing male
Manchester Town Hall	08/10/2015	08/10/2015	1			Probable Breeder T - permanent Territory
Manchester Town Hall	12/06/2015	12/06/2015	1		Adult	Probable Breeder T - permanent Territory
Manchester Town Hall	08/04/2015	08/04/2015	1			Possible Breeder S - Singing male
Manchester Town Hall	26/09/2013	26/09/2013	1			Probable Breeder T - permanent Territory
Manchester Town Hall	01/08/2013	01/08/2013	1			Probable Breeder T - permanent Territory
Manchester Town Hall	25/07/2013	25/07/2013	1			Probable Breeder T - permanent Territory
Manchester Town Hall	03/07/2013	03/07/2013	1			Probable Breeder T - permanent Territory
Manchester Town Hall	03/06/2011	03/06/2011	1	male		
Manchester Town Hall	07/06/2010	07/06/2010	1	male	Adult	Possible Breeder S - Singing male
Oxford Rd Manchester	18/05/2012	18/05/2012	1			Possible Breeder S - Singing male
Piccadilly Station Manchester	01/08/2009	01/08/2009	1	female	Adult	
Port St Manchester city centre	03/08/2009	03/08/2009	1	male		Possible Breeder H - in suitable nesting Habitat
Port St Manchester city centre	15/07/2009	15/07/2009	1	male	Adult	Possible Breeder S - Singing male
Port St Manchester city centre	28/06/2009	28/06/2009	2			Possible Breeder H - in suitable nesting Habitat
Port St Manchester city centre	21/06/2009	21/06/2009	1	female	Adult	Possible Breeder H - in suitable nesting Habitat
Shudehill Manchester City Centre	29/06/2009	29/06/2009	1		Adult	Possible Breeder S - Singing male
Shudehill Manchester City Centre	27/05/2008	27/05/2008	1		Adult	
Shudehill Manchester City Centre	09/06/2010	09/06/2010	1	male	Adult	Possible Breeder S - Singing male
St. Ann's Square Manchester city centre	11/06/2015	11/06/2015	1		Adult	Probable Breeder T - permanent Territory
St. Ann's Square Manchester city centre	14/06/2010	14/06/2010	1	male	Adult	Possible Breeder S - Singing male
St. Peter's Square Manchester City Centre	14/05/2008	14/05/2008	1		Adult	

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Appendix 9.5 River Survey Report, November 2017

BUROHAPPOLD ENGINEERING

Mayfield Regeneration Development

River Survey

035548

29 November 2017

Revision 00

MRP-BHE-XX-XX-RP-YM-0004

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Revision	Description	Issued by	Date	Checked
00	River Survey	GH	29/11/2017	PO

O:\035548 Mayfield Regeneration Development\F32 Environmental\03 Reports\Ecology Survey Reports WIP\River Habitat Survey WIP\MRP-BHE-XX-XX-RP-YM-0004.docx

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date	**29/11/2017**

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1 Introduction

BuroHappold Engineering was instructed to carry out a river and river corridor survey of the River Medlock as it passes through the site of the former Mayfield Railway Station complex in central Manchester.

The current Masterplan proposes the removal of culverted sections and the provision of open spaces along the river corridor and aims to realise the opportunities the new development brings to create an ecological valuable area and increase ecological connectivity within the site and its surroundings. The final design should not exacerbate, but reduce overall flood risk, and provide an aesthetically improved, more biodiverse river and riparian habitat with safe public access.

Early engineering works to the River Medlock have denaturalised the system. Like many other rivers within the Irwell catchment, which include the Rivers Croal, Roch and Irk, the Medlock has been heavily modified, largely due to urbanisation, flood alleviation measures and to allow development over the watercourse. Significant sections of the river have been culverted and canalised in Manchester and this includes sections of the Medlock within the Mayfield site. A pristine river system will adjust in response to fluvial processes of erosion and deposition resulting in morphological changes e.g. lateral migration and channel dimension modifications. These processes do operate in a channelised river but the scale is more limited and the channel is constrained within artificial banks.



Figure 1—1 Historic brick channelled section of River Medlock upstream from Mayfield

Upstream from Mayfield the Medlock was confined to a brick channel. This was done following a major flood in the 1860s. However, the effect was to increase flood risk by accelerating water flow. The section illustrated has subsequently been restored and the bricks removed.

The Water Framework Directive (WFD) designates the River Medlock as 'heavily modified'. The objectives of the WFD are to prevent deterioration of aquatic ecosystems and to restore polluted surface waters and groundwater to 'good' ecological and chemical status. However, although much improved since 1990, the River Medlock is failing to meet targets for both chemical water quality and ecology (Environment Agency 2017a).

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This report presents the results of a baseline survey that aims to characterise the current physical and ecological conditions. It does not provide details of the final design but aims to inform the design and can be read in conjunction with the flood risk assessment. Furthermore, it provides details of the channel and bankside morphology and presents a broader picture of the flow behaviour within the catchment and, by implication, at the Mayfield site.

1.1 The River Medlock Catchment

The River Medlock rises in the hills east of Oldham and flows though Clayton Vale before entering the built-up area of Greater Manchester. The upper section of the catchment consists of woodland, grassland and arable land. The lower section, before joining the River Irwell, is urbanised and makes up approximately 53% (CEH 2011) of the catchment land cover. The average catchment rainfall measured between 1961 and 1990 was 1025mm (National River Flow Archive 2017a).

Table 1—1 River Medlock Catchment Land Use (Land Cover Map 2000 and 2007)

Woodland	19%
Arable/horticultural	24%
grassland	23.8%
Mountain/heath/bog	0.4%
Urban	53.1%

Factors that affect runoff include (National River Flow Archive 2017a):

- reservoirs in the catchment;
- reduced runoff by water abstraction;
- ground water abstraction;
- increased by effluent returns; and
- reduced by industrial and agricultural abstraction.

Changing the physical characteristics, e.g. width and depth, by channelization alters velocity and flow patterns. The latter can also be altered by land use changes, which may also influence the catchment water balance.

The land use affects the hydrological regime of a river. Commonly, consequences of urbanization are a decrease of dry period flows and increase of flood flows. The impervious cover of buildings, hardstanding and tarmac and introduction of urban drainage, speeds up surface runoff so that water arrives at the channel more rapidly and storm conveyance systems increase the 'flashiness' of the system. The lagtime[1] is shorter and peak flow higher (Braud et al. 2013; Miller et al. 2014). It is clear that flow behaviour of the River Medlock is influenced by land use but there are also implications for water quality as urban stormwater runoff can be contaminated with heavy metals and other toxic compounds and represents a significant non-point source of pollution to the river.

1 Time between rainfall and peak flow

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The five main sources of water pollution from within Manchester are:

- urban diffuse pollution (run-off from roads, buildings and the built environment);
- storm outflows and other water industry emissions (e.g. where combined sewers release to watercourses during intense rainfall);
- debris (both from littering/fly tipping and vegetation); and
- contaminated land, (where groundwater water leaches through contaminated land into watercourses, particularly culverted ones).

The main impact on the Medlock comes from Failsworth Sewage Works and the Environment Agency (EA) has set tighter ammonia standards to meet the requirements of the European Union (EU) Freshwater Fisheries Directive (FFD)[2]. Water quality is also threatened by combined sewer storm overflows (Manchester City Council 2007).

The geological characteristics of a catchment, the permeability especially, has a major influence on river flow patterns. The underlying geology of the Medlock catchment consists of coal measures overlain with a covering of superficial deposits over 80.9% of its area (British Geological Survey 2017) and is described as having 'mixed permeability' associated with glacial till deposits.

Table 1—2 Summary of River Medlock Catchment Hydrogeology (BSG 1:625,000UK Hydrogeology Map Version 5)

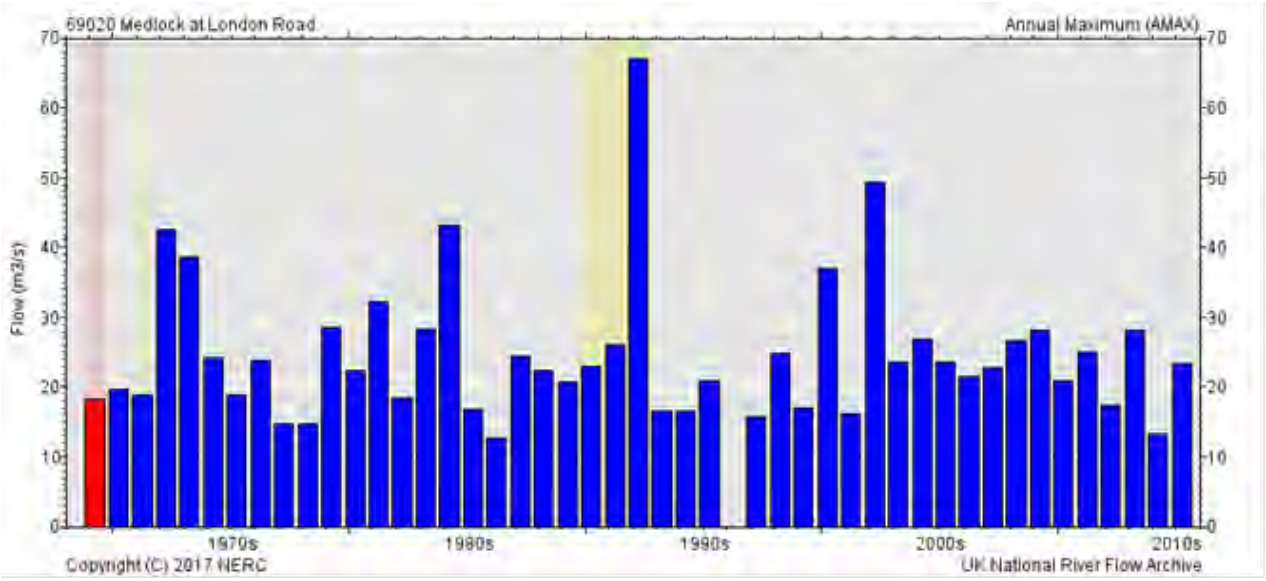
High permeability bedrock	16.2%
Moderately permeability bedrock	13.0%
Mixed permeability superficial deposits	80.9%

There is an EA river gauging station (Station 690202 – Medlock at London Road) approximately 200m downstream from the Mayfield site, which provides records of flow behaviour that reflect the flow conditions at Mayfield. The catchment area above the gauging station is 57.5km^2 with the maximum altitude of 376mAOD[3] and minimum of 33.8mAOD. The mean flow is 0.819m^3/sec, baseflow index 0.52[4] and QMED 22.9m^3/sec[5] (record 1974-2016) (National River Flow Archive 2017b).

The graph below represents the series of maximum peak flows within a water year (October to September). The highest flow (Rank 1) was recorded 12/08/1992 with a discharge of 66.93m^3/sec.

2 FFD was introduced in 1978 to improve the quality of rivers, and to set water quality standards to ensure rivers are capable of supporting fish.
3 mAOD = metres Above Ordnance Datum i.e. above mean sea level.
4 Measure of the ratio of long-term baseflow to total streamflow and represents the slow continuous groundwater contribution to river flow.
5 This represents a flood with a return period of two years. As a general rule of thumb it is the approximate equivalent to bankfull flow.

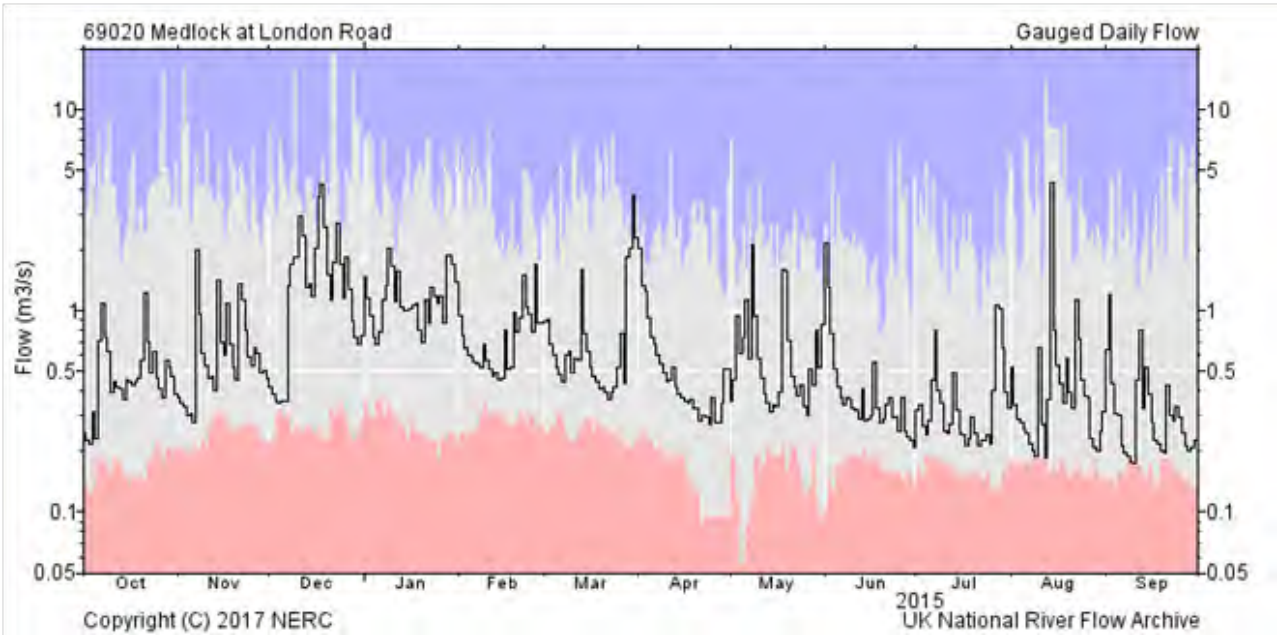
Copyright © Buro Happold Limited



Yellow shading indicates missing data, pink unrepresentative data and red rejected annual maximum values

Figure 1—2 River Medlock series of maximum peak flows, October to September

The hydrograph below shows the daily flow from October 2014 to September 2015. Note the relatively rapid rise in flow following a rainfall event, which is a reflection of the urbanised setting.



Red and blue envelopes represent lowest and highest flows on each day over the period of record

Figure 1—3 Daily flow from October 2014 to September 2015

2 Methodology

2.1 Scope of Survey

A number of river habitat and geomorphological surveys have been devised for different purposes but there is no 'industry-wide' common approach. The four more commonly used are River Habitat Survey, River Corridor Survey, Fluvial Audit and Phase 1 Habitat Survey, and these are explained below.

- The River Habitat Survey (RHS) is designed to characterise in broad terms the physical structure of a river system. It is based on survey lengths of 500m and is more often used for catchment overview and strategic-scale studies (Raven *et al.* 1998; Clews *et al.* 2010). It aims to determine the 'naturalness' by comparing the results of the survey with 'benchmark' sites in the RHS database. The refined 'GeoRHS' captures more river and floodplain geomorphology data than the standard RHS.
- The River Corridor Survey (RCS) is an ecological survey of river corridors using standard survey techniques dividing the river in to 500m sections (NRA 1992). It was designed to provide a consistent method to collecting and recording information. It records the characteristic in four zones: aquatic, marginal, bank and adjacent land zone and extends 50m each side of the river channel.
- The Fluvial Audit approach is a detailed mapping exercise that records in-channel, bank features and biotopes. There is no standardised methodology but the method focuses on the physical character of the river including flow types, bank and boundary materials, bed substrate and locations of erosion and deposition (Geodata Institute 2000; Geodata Institute 2005; Moir 2013).
- The Phase 1 Habitat Survey is designed to record vegetation and wildlife habitats (JNCC 2010). It can be used to cover large areas relatively rapidly, identifying the habitats using a brief description of its defining features and allocating a specific name, mapping the habitats using standard colours and allocating an alpha-numeric code.

The survey of the River Medlock through the Mayfield site was informed by all the above survey methods, although particularly the Fluvial Audit and Phase 1 Habitat Survey approaches. The aim was to describe the physical nature (or geomorphology) of the channel, banks and riparian corridor and the nature of the flow patterns. In addition, in-channel and bankside habitat has been mapped and described. Together, these approaches aim to provide a characterisation of the river and riparian corridor.

2.2 Site Survey

The surveys were carried out on 13th July 2017 by Principal Scientist Gerard Hawley, whose primary role was to complete the fluvial audit, and Senior Ecologist Hazel Robson who recorded and mapped the vegetation.

Sections of the channel are culverted and the river is consequently divided into a number of closed and exposed reaches. The culverts were not included in the survey, with the exception of the entrances and exits where access was available.

The exposed sections are in total 309m in length. The river has not been straightened and the sinuous course can still be seen in planform. However, the river is quite incised and lower than the surface of the surrounding site. At least one of the banks consists of a high stone or brick revetment or side of a building and the width of the opposite bank is generally restricted to a few metres.

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The surveys started upstream at the mouth of the culvert and continued downstream until the river left the site. The river was divided into eight sections (see Appendix A Figure 1 for location of sections). The surveyors took notes and kept a photographic log and features were located using a hand-held GPS. At representative intervals cross-sections of the channel and the river corridor were measured.

The vegetation survey was informed by the methods as set out in the *Handbook for Phase 1 Habitat Survey* (JNCC 2010) for classifying and mapping British habitats. This entailed mapping, describing and collating plant species lists for habitats along the river corridor. Each plant species was assigned abundance codes within each habitat using the 'DAFOR' scale (where: D = dominant; A = abundant; F = frequent; O = occasional; R = rare), which provides an indication of the relative abundance of each plant species present within a particular habitat. The names follow the nomenclature of Stace (2010) and common names only are referred to in the text. A full list of plant species is presented in Appendix B.

2.3 Limitations

At the time of the survey weather conditions were suitable, being dry and warm. The River Medlock was at baseflow and sufficiently shallow to allow access to most sections. However, there were only two points where safe access could be gained to the channel and one reach (Sections 7 and 8) could only be examined from bankside vantage points.

It was not considered safe to survey inside the culverted sections due to the reduced light levels, variable depth and rate of flow and presence of submerged debris that presented a significant trip hazard.

2.4 Results

2.4.1 Hydromorphology and Habitat Summary

The results are presented on a standardised template, each covering one of the eight sections. They include a description of hydromorphological characteristics as well as riparian corridor vegetation. These are presented in Appendix C. Please note:

- Cross-sections are drawn viewing the river downstream; and
- The location ordnance survey reference is for the centre of each of the sections.

The section of the River Medlock that flows through the Mayfield site has been heavily engineered although it remains sinuous in planform. At least one of the banks consists of a vertical stone or brick revetment. The riparian corridor is generally very narrow, rarely extending more than a few metres from the river banks. The boundary conditions (bed and bank material) consist of variable combinations of sand and urban debris with brick, concrete, metal and plastic apparent in the channel as well as more 'natural' sub-angular and tabular sandstone stones and cobbles often with an interstitial filling of sand.

The channel width varies from 3.5m and 8m and the maximum depth is 1.3m. The gradient is relatively low and the flow patterns at baseflow are predominantly ripple and smooth flow, the former associated with shallow sections and the latter with deeper water. The discharge at baseflow is estimated to be approximately 0.6m^3/sec. Trashlines indicate that discharge has been up to 1.5m above baseflow and above banktop.

At the time of survey water clarity was generally good although some sections (3, 4 and 6) where flow was deeper and sluggish were slightly turbid with fine sediment in suspension.

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2.4.2 Flora

The vegetation within the river corridor comprised mainly tall herb species with occasional semi-mature broadleaved trees and was associated with two main types of feature:

- Silt banks within the river channel; and
- Cracks and crevices within the retaining walls.

All of the plants recorded were common and widespread species typical of urban brownfield habitats. A species list is provided in Appendix B.

Vegetation growing within the retaining walls varied depending on the structure of the walls (typically either brick or stone) and the state of dilapidation, with sections in poor condition supporting greater cover of vegetation.

The silt banks were almost entirely covered with vegetation, although areas with shading by trees typically had reduced ground cover and there was no obvious vegetation cover within the culverted sections. In addition to native species, the majority of the silt banks also supported extensive, mature stands of Japanese knotweed and scattered patches of Himalayan balsam, both of which are invasive non-native species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

The River Medlock upstream of the Mayfield site passes through a number of culverts and beneath the railway lines of Piccadilly Station but there are open sections. Direct access to the river upstream was not possible but it could be viewed from roads and bridges and, although the exact extent of colonisation could not be determined, it was clear that all open sections of the river had stands of Japanese knotweed and Himalayan balsam.

The vegetation would all be classified as 'Tall Herb' on a Phase 1 map. The river corridor is dominated by Japanese knotweed and Himalayan balsam, which is highlighted on Appendix A Figure 2.

2.4.3 Fauna

The river corridor did not provide suitable habitat for water voles (*Arvicola amphibius*) due to the heavily engineered nature of the banks with no opportunity for burrowing.

There was no suitable habitat for otter (*Lutra lutra*) holts and the stretch within the site did not appear to support the larger fish that would form the bulk of an otter's diet. Otter can have large territories spanning several kilometre stretches of a watercourse and, therefore, it is feasible that the river could be used occasionally by commuting otters. No evidence of otter presence (such as spraints) was found during the survey of the river channel and neither of these two riparian mammal species were recorded within the data provided by Greater Manchester Ecology Unit as part of the desk study carried out for the preliminary ecological appraisal of the site (BuroHappold Engineering 2017).

Occasional shoals of very small fish were noted within the river channel, although the species was not known.

Grey wagtails (*Motacilla cinerea*) were seen during the survey and the dilapidated retaining walls provided nesting opportunities for this species, as noted in the breeding bird survey carried out earlier in 2017 and reported separately (BuroHappold Engineering 2017).

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3 Evaluation and Recommendations

3.1 Hydromorphology

The River Medlock at Mayfield is a degraded system, compromised by past engineering works. However, although water quality was not assessed through chemical analysis, there were no strong odours and the water clarity was, by and large, good.

A modified river has reduced morphological diversity, which in turn has implications in terms of the habitats it can support. There are established principles related to the physical character of a river and ecological quality, which can be summarised as:

- Diverse morphology in terms of features and fluvial processes support greater biodiversity;
- Unrestrained fluvial processes create dynamic and diverse habitats; and
- High quality habitats are often associated with unmodified channels and the greater the degree of modification, the greater likelihood of environmental degradation (e.g. RSPB *et al.* 1994; Hey 1995; Richards *et al.* 2002).

The River Medlock is a main river and the EA requires a *standoff* zone to carry out improvement and maintenance works and as a main river there may be a requirement for works to be regulated under environmental permits if within 8m of the river. It is planned to deculvert the river and reform the banks and create wider easements to both banks and access to the channel will be made available.

The new design would be informed by the bulleted principles above. Wherever possible, without compromising the structural integrity of buildings and increasing flood risk, soft bankside options will be considered. Opportunities will be sought to 'free' the river from artificial constraints and restore a more natural regime that allows for channel adjustment.

3.1.1 Flora

The plant species recorded during the survey were all common and widespread and the habitats were considered to be of relatively limited ecological value, although still providing some contribution to urban biodiversity.

The river corridor is presently generally of low ecological value. However, new developments can present opportunities to increase biodiversity and add ecological value. It is recommended that native species are selected in landscaping designs to increase biodiversity. Planting schemes prescribed in urban environments often include non-native species. These may be selected for their pollution tolerance, evergreen foliage and low maintenance. Although there may be a predilection for native species it is recognised that in urban settings, non-native species can be more practical in establishing long-term aesthetically pleasing landscaping and provide nectar-bearing species that attract insects that support wildlife such as foraging bats and birds.

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3.2 Invasive Plant Species

It is apparent that the river corridor has been extensively colonised by Japanese knotweed and Himalayan balsam (see Appendix A for a plan showing locations on site). Japanese knotweed was originally brought from the Far East as an ornamental plant by the Victorians but it has now widely naturalized and occurs across the UK. It is a highly invasive exotic species that forms monocultures in riparian areas. Himalayan balsam was introduced in the early 19th Century and is also wide spread, especially along river corridors

Because of their regenerative properties and invasive habits, both species are listed under the Wildlife and Countryside Act 1981 (as amended) (Schedule 9, Section 14), so that it is an offence to plant or otherwise cause the species to spread in the wild. Both out-compete native plant species and although they do provide a source of nectar for common pollinators such as butterflies and moths, they are not a suitable host plant for their caterpillars.

Japanese knotweed spreads via underground rhizomes and, therefore, typically covers a much wider extent than is apparent from above-ground vegetation. All soils and materials within 7m of visible surface growth must be considered potentially contaminated. Himalayan balsam spreads via seeds which are dispersed within a radius of several metres by exploding pods and then readily carried downstream.

Soils and materials contaminated with Japanese knotweed and Himalayan balsam are categorised as controlled waste and can only be transported and received by licensed handling agents and sites. At the Mayfield site this should be interpreted as including all material excavated from silt banks within the river channel.

A management plan will need to be implemented to deal with containment and removal of invasive plants and potentially contaminated materials prior to any site clearance activities taking place. Eradication will be a significant undertaking and the site will remain prone to re-colonisation as long as there remains a source of knotweed rhizomes, stems and crowns, and balsam seeds upstream. Further colonisation from upstream will remain a possibility if not eradicated. An on-going monitoring programme would be needed to identify and treat newly established patches.

3.2.1 Fauna

All nesting birds, their nests, eggs and dependent young are protected under the Wildlife and Countryside Act 1981 (as amended), therefore, the presence of nesting grey wagtail may have implications for the scheduling of works to the retaining walls.

Works to the river corridor are not anticipated to have any direct impact on riparian mammals.

Where practical, bird boxes should be installed, targeted towards species currently known to utilise the site and its surrounds, to potentially accommodate a range of small birds. Traditional nest boxes should be attached in various locations along the river corridor on the south-west or south-eastern side of trees and any built structures.

There may be opportunities to install bat boxes facing south-west, south-east and north to provide additional roosting opportunities for common pipistrelle (*Pipistrellus pipistrellus*) bats, known to be present. Lighting along the river corridor can also attract invertebrates and be beneficial by increasing foraging opportunities for common pipistrelle. However, other species such as birds can be deterred from nesting with bright and permanent lighting and directional lighting should be carefully designed to limit unnecessary excess illumination.

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Appendix A - Plans

Figure 1: River Medlock Survey Sections

Figure 2: River Medlock Non-Native Species

385000 385100 385200

397600

397500

Section 8

Section 5

Section 4

Section 3

Section 1

Section 6

Section 2

Section 7

Baring St

Bond St

Manor St

A57(M)

Mancunian Way

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Legend

- Site boundary
- Survey section division
- River Medlock channel
- In-channel sediment

N

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

Metres

0 5 10 20 30 40

BUROHAPPOLD ENGINEERING

Project Name: Mayfield, Machester

Discipline: Ecology

Title:

RIVER MEDLOCK SURVEY SECTIONS

Scale	1:1,000			Drawing No.	Figure 1
Drawn By	CC	Originator	GJH	Date	13/10/2017
PAA Ref.				Revision	1.0

Figure 1 - River Survey Sections - BUHA01 CC 131017.mxd

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385000 385100 385200

397700 397600 397500

Section 8
Section 5
Section 4
Section 3
Section 1
Section 6
Section 2
Section 7

A57(M)

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Legend

- Site boundary
- Survey section division
- River Medlock channel

In-channel vegetation

- Himalayan balsam (invasive non-native)
- Japanese knotweed (invasive non-native)
- Native tall herb vegetation

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

N

0 5 10 20 30 40 Metres

BUROHAPPOLD ENGINEERING

Project Name: Mayfield, Machester

Discipline: Ecology

Title:

RIVER MEDLOCK INVASIVE NON-NATIVE SPECIES

Scale 1:945			Drawing No.	Figure 2
Drawn By CC	Originator GJH		Date	16/10/2017
PAA Ref.			Revision	1.0

Figure 2 - Invasive Species - BUHA01 CC 161017.mxd

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Appendix B – Plant Species

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Appendix B Plant Species List

Common Name	Scientific Name	DAFOR	
		Silt Banks	Retaining Walls
Woody Species			
Alder	*Alnus glutinosa*		R
Ash	*Fraxinus excelsior*	R	
Bramble	*Rubus fruticosus agg.*	F	F
Butterfly-bush	*Buddleja davidii*		F/LA
Dog rose	*Rosa canina*	R	
Elder	*Sambucus nigra*	O	R
Holly	*Ilex aquifolium*	R	
Sycamore	*Acer pseudoplatanus*	O	
Willow sp.	*Salix sp.*	O/LA	
Grasses, Sedges and Rushes			
Cock's-foot	*Dactylis glomerata*	O	R
Yorkshire fog	*Holcus lanatus*		R
Herbaceous Species			
Broad-leaved dock	*Rumex obtusifolius*	O	
Broad-leaved willowherb	*Epilobium montanum*	O	O
Butterbur	*Petasites hybridus*	O/LD	
Cleavers	*Galium aparine*		O
Common nettle	*Urtica dioica*	O	O
Common ragwort	*Senecio jacobaea*		O
Cow parsley	*Anthriscus sylvestris*	O	
Dandelion	*Taraxacum officinale agg.*		R
Feverfew	*Tanacetum parthenium (Chrysanthemum parthenium)*		R
Garlic mustard	*Alliaria petiolata*	R	R
Geranium species	*Geranium sp.*		R
Himalayan balsam	*Impatiens glandulifera*	A	O
Horsetail species	*Equisetum sp.*	R/LF	
Ivy-leaved toadflax	*Cymbalaria muralis*		LA
Japanese knotweed	*Fallopia japonica*	A/LD	
Knotgrass	*Polygonum aviculare*		R
Michaelmas-daisy	*Aster schreberi*		R
Ribwort plantain	*Plantago lanceolata*		R
Rosebay willowherb	*Chamerion angustifolium*		R
Russian-vine	*Fallopia baldschuanica*	R	
Wall cotoneaster	*Cotoneaster horizontalis*	R	
Wood avens	*Geum urbanum*	O	R
Ferns and Liverworts			
Hart's-tongue	*Asplenium scholopendrium*	O	F
Liverwort species	*Marchantia sp.*		F
Male-fern	*Dryopteris filix-mas*	O	F

DAFOR Key:
D = Dominant
A = Abundant
F = Frequent
O = Occasional
R = Rare
L = Locally

Appendix C - Results

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RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85260 97563		
DATE	13/07/2017	**SECTION**	Section 1

BED AND BOUNDARY MATERIAL	Urban debris of brick, breeze block, concrete, plastic sheeting on banks and bed. Bed fabric sub-angular and tabular sandstone cobble and gravel with coarse sand infilling.		
LEFT BANK	Vertical revetment. Dressed gritstone blocks up to 4m and brick above. Number of unvegetated bars of debris and sand.	**RIGHT BANK**	Bankside of debris material and sand.
AVG DEPTH	0.15m	**MAX DEPTH**	0.25m
FLOW PATTERN	Average velocity ~0.8m/sec. Unbroken standing waves and ripple patterns.		
STRUCTURES	None		
VEGETATION	Japanese knotweed dominant on right bank side bar, with some small stands of Himalayan balsam. Little aquatic vegetation with some filamentous algae.		
COMMENTS	Water clarity good. Shaded section.		

PHOTOS



Looking downstream from culvert



Looking upstream from boundary of S1 and S2

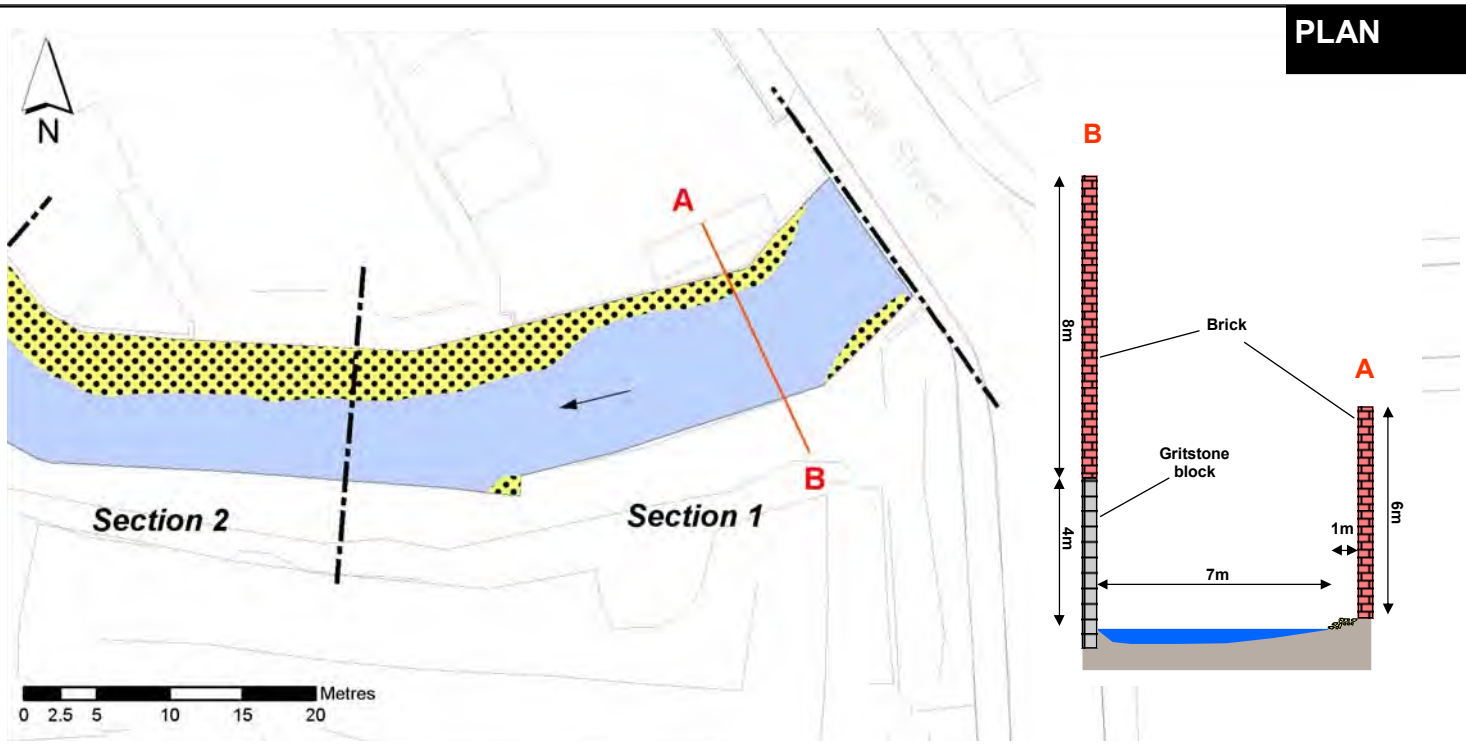
Example of boundary and bed material



Upstream arched culvert



PLAN



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RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85237 97558		
DATE	13/07/2017	**SECTION**	Section 2

BED AND BOUNDARY MATERIAL	In-channel brick, number of large curb stones. Sub-angular and tabular stone, cobble and gravel. Patches of sandy interstitial filling.		
LEFT BANK	Vertical brick revetment with dressed gritstone block base. Bricks and mortar missing.	**RIGHT BANK**	Sandy bank ~4m wide with brick revetment behind.
AVG DEPTH	0.35m	**MAX DEPTH**	0.8m
FLOW PATTERN	Turbulent over debris dam, with unbroken waves above. Smooth flow below where deeper and close to base of left bank revetment. ~0.3m/sec.		
STRUCTURES	None		
VEGETATION	Japanese knotweed dominant on right bank side bar, with some small stands of Himalayan balsam.		
COMMENTS	Some woody debris in dam that drops ~ 0.1m. Shaded section.		

PHOTOS



Left bank brick revetment showing debris dam.

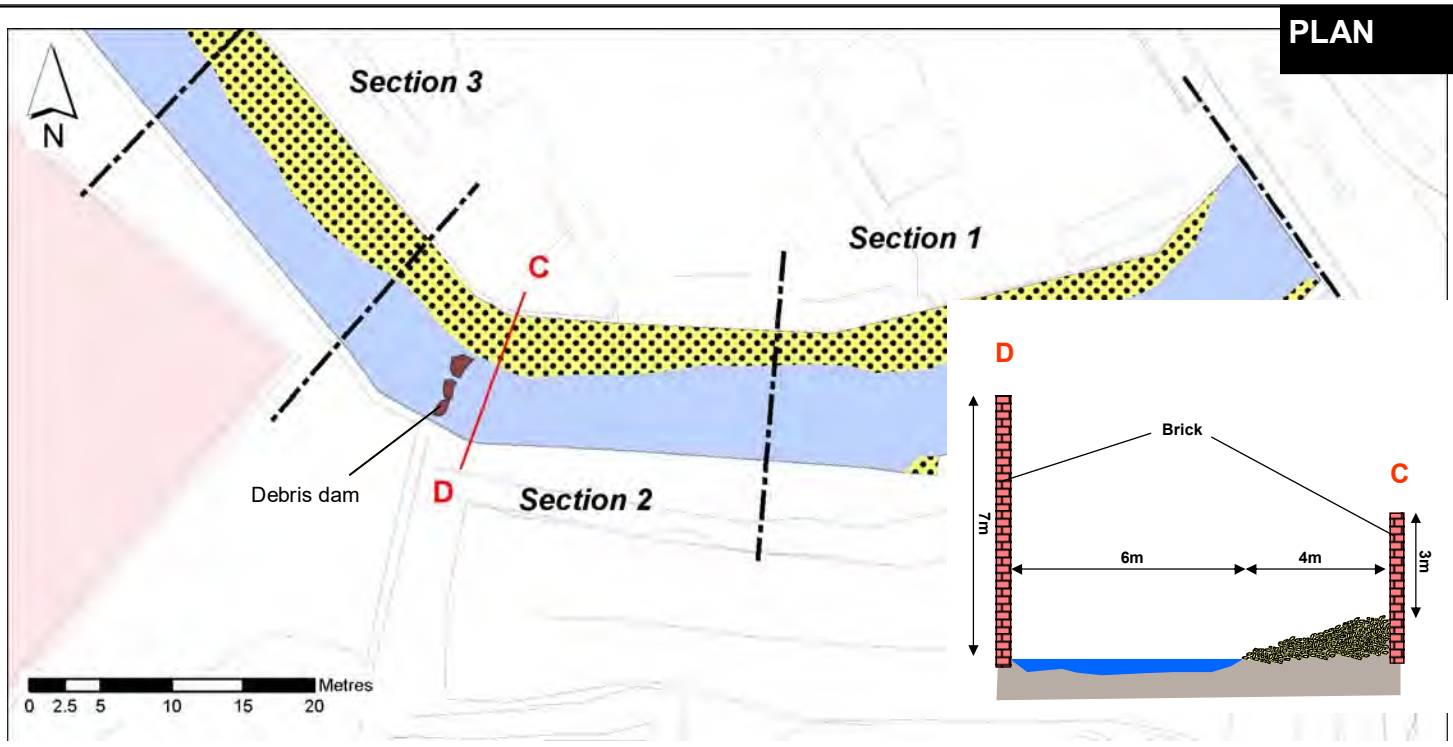


Right bank and point of access to the channel



Left bank brick revetment and Japanese knotweed on right bank

PLAN



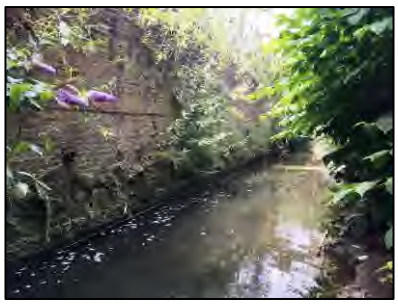
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RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85203 97571		
DATE	13/07/2017	**SECTION**	Section 3

BED AND BOUNDARY MATERIAL	Brick, concrete (particularly in shallower areas). Sub-angular and tabular sandstone stones and cobbles and coating of fine silt.		
LEFT BANK	Vertical brick revetment with dressed gritstone block base.	**RIGHT BANK**	Wide sandy bank grading up to engineering brick back wall.
AVG DEPTH	0.4m	**MAX DEPTH**	1.0m
FLOW PATTERN	Smooth flow ~ 0.3m/sec		
STRUCTURES	None		
VEGETATION	Japanese knotweed dominant on right bank side bar, with some small stands of Himalayan balsam. No aquatic vegetation.		
COMMENTS	Less urban debris apparent than in sections 1 and 2. Partial shading.		

PHOTOS

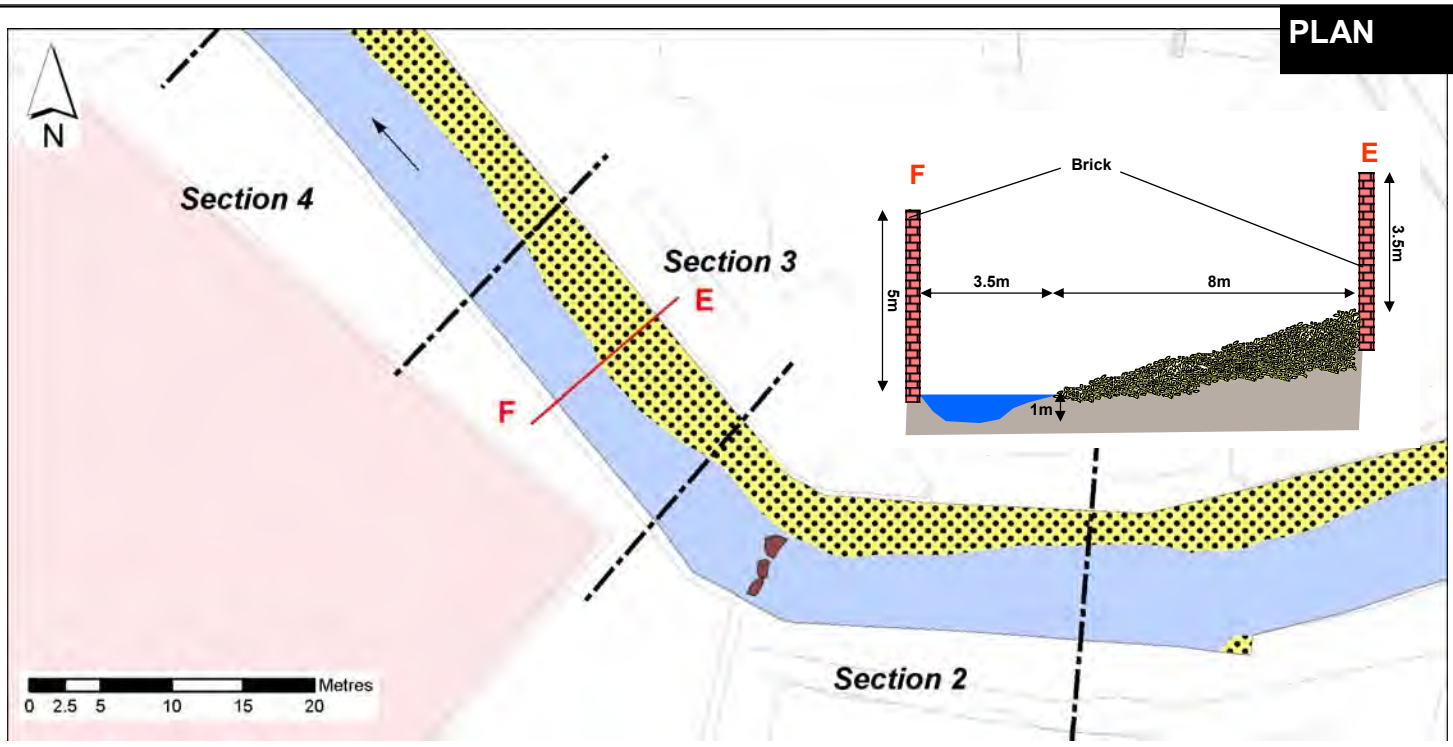


Left bank brick revetment looking downstream with deeper section at base



Looking upstream

PLAN



RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85156 97608		
DATE	13/07/2017	**SECTION**	Section 4

BED AND BOUNDARY MATERIAL	Brick and sub-angular sandstone stones and cobbles. Sandy matrix.		
LEFT BANK	Brick vertical revetment on a base of dressed gritstone blocks.	**RIGHT BANK**	Steep, sandy bank that grades up to engineering brick back wall.
AVG DEPTH	0.4m	**MAX DEPTH**	0.5m
FLOW PATTERN	Smooth flow in upper section, with ripple flow in lower where the stretch broadens to 6m and is shallower. ~0.4m/sec		
STRUCTURES	Right bank: corrugated building supported by universal beams extends ~1.5m from the bank, ~4.5m above channel. Cast iron pipe (~25cm diameter) protrudes from left bank brick revetment, running vertically into channel bed.		
VEGETATION	Japanese knotweed dominant on right bank side bar, with some small stands of Himalayan balsam.		
COMMENTS	Straight section. Trash line visible on both banks, noticeably on willow where material caught at ~1.4m above baseflow. Partial shading.		

PHOTOS



Looking upstream. Note trashline approximately 1.4m above baseflow

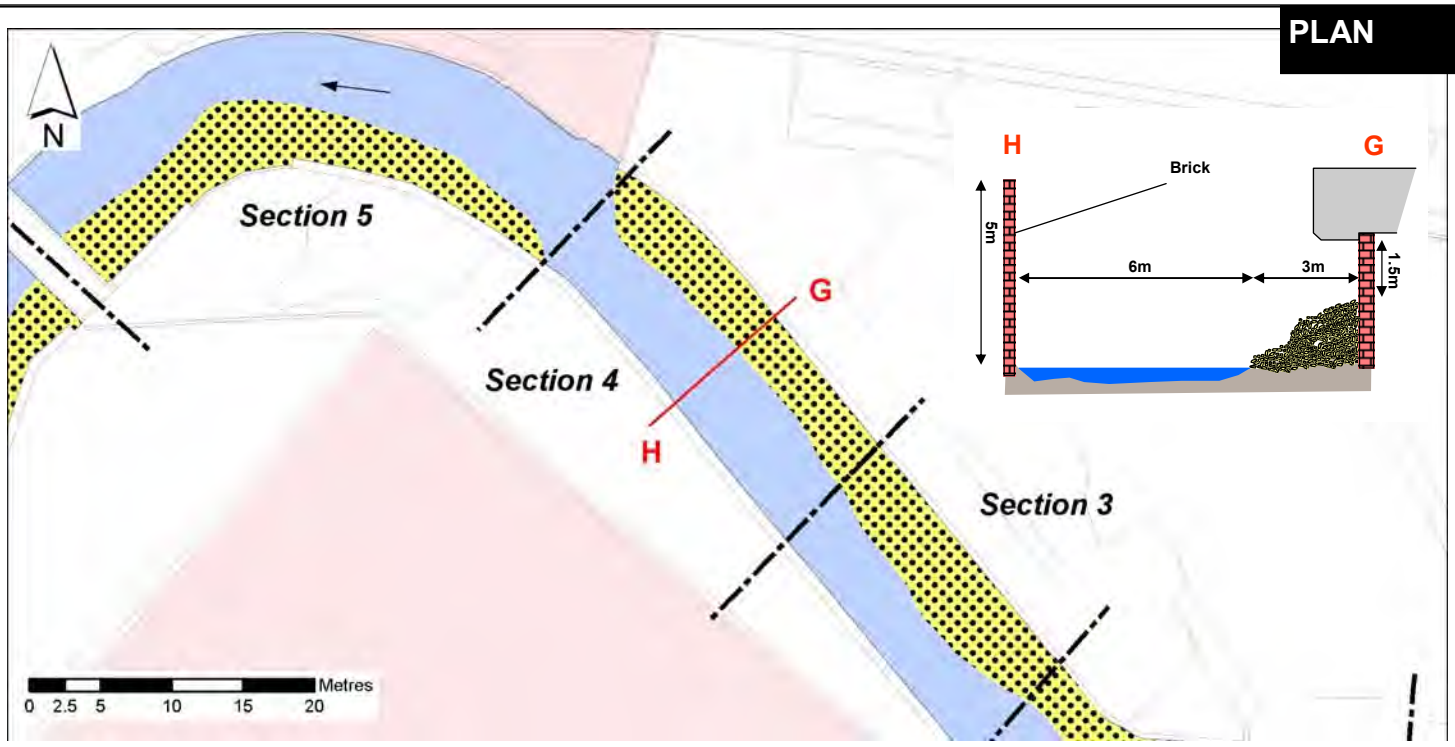


Looking downstream



Looking upstream showing overhanging structure on right bank

PLAN



BUROHAPPOLD ENGINEERING

RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85156 97608		
DATE	13/07/2017	**SECTION**	Section 5

BED AND BOUNDARY MATERIAL	Coarse tabular stones with limited sandy matrix. Coating of fine silt		
LEFT BANK	Relatively broad sandy side berm and bank. ~1m steep slope from channel to vegetated plateau.	**RIGHT BANK**	Base of brick building. No banks.
AVG DEPTH	0.4m	**MAX DEPTH**	1.1m
FLOW PATTERN	Upper section where shallow has ripple flow. Central and lower section where deeper has smooth flow ~0.3m/sec.		
STRUCTURES	Bridge support on left bank.		
VEGETATION	Japanese knotweed dominant on left bank side bar, with some small stands of Himalayan balsam.		
COMMENTS	Upper section 8m wide, narrowing to 4m. Deeper channel up to 1m deep on the outside of the meander at base of right bank building with sluggish flow. Partially shaded.		

PHOTOS



View downstream

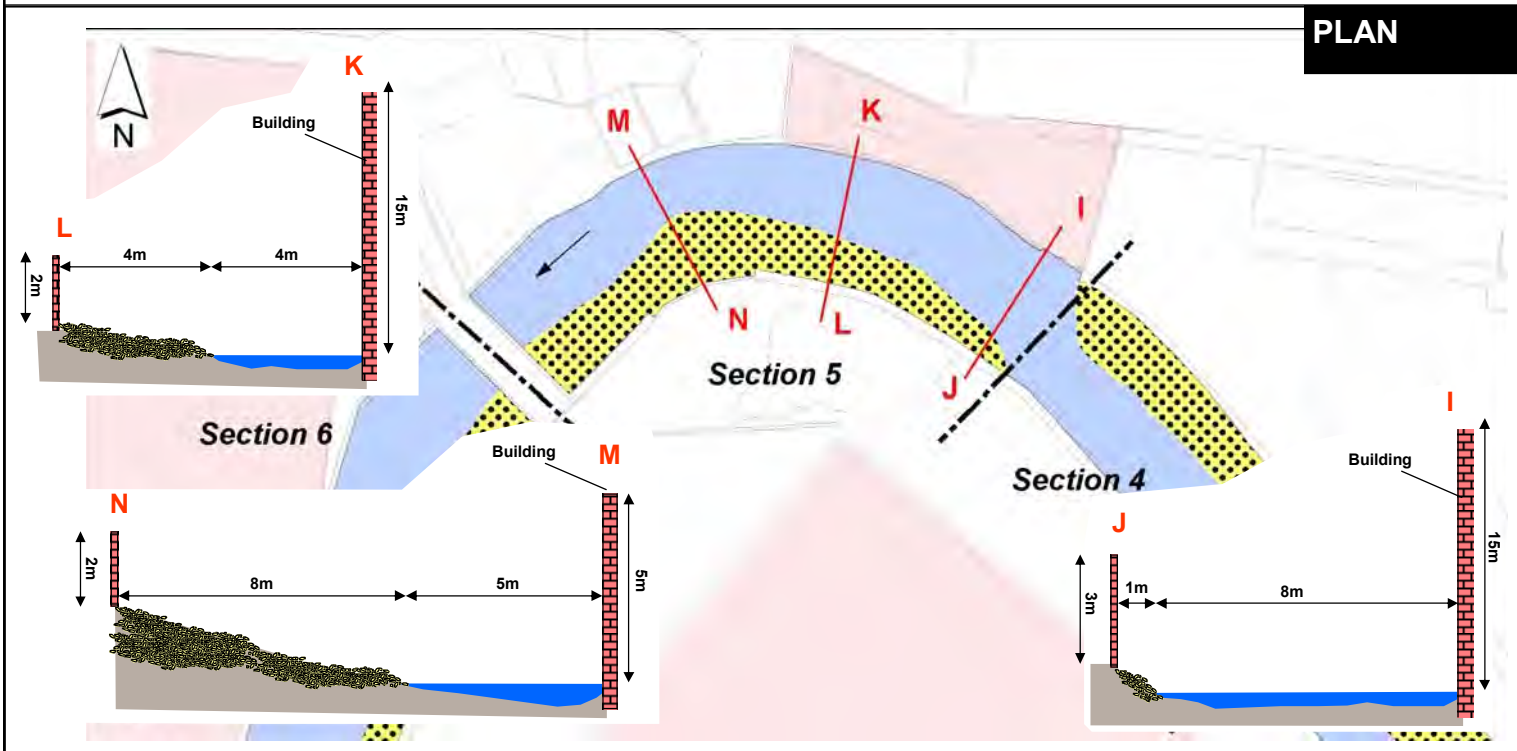


Outer meander showing right bank base of building



Left bank sandy bank showing base of bridge

PLAN



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RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85131 97579		
DATE	13/07/2017	**SECTION**	Section 6

BED AND BOUNDARY MATERIAL	Sub-angular and tabular stones with a sandy matrix.		
LEFT BANK	Steep 1m bank rising to a sand-covered plateau extending ~2m to brick wall.	**RIGHT BANK**	Brick, largely rendered base of building.
AVG DEPTH	0.4m	**MAX DEPTH**	1.2m
FLOW PATTERN	Smooth flow ~0.3m/sec		
STRUCTURES	None		
VEGETATION	Left bank side bar mostly dominated by Japanese knotweed with some small stands of Himalayan balsam, but also a 20m stretch of native tall herbs.		
COMMENTS	Clear evidence of overbank flooding indicated by trash lines and rippled sandy surface on left bank. Partially shaded.		

PHOTOS



View downstream. Base of building forming right bank



View upstream with right bank in foreground

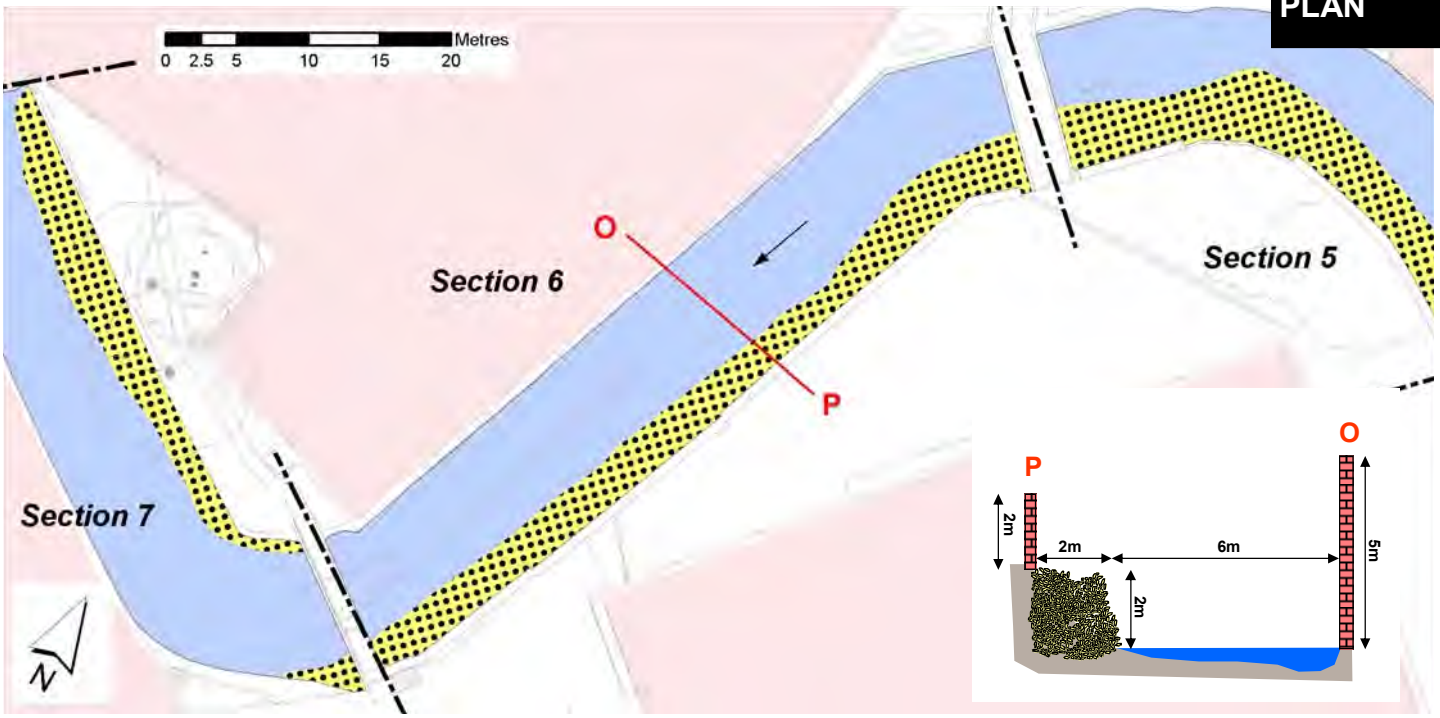


Ripples in sandy left bank approximately 1m above baseflow indicating overbank flooding



Trashline on the left bank approximately 1.5m above baseflow

PLAN



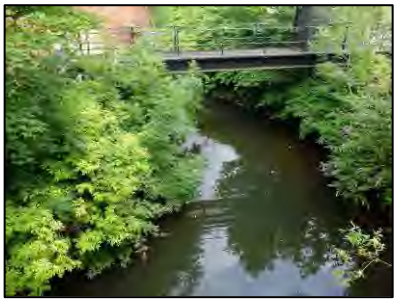
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RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85093 97550		
DATE	13/07/2017	**SECTION**	Section 7

BED AND BOUNDARY MATERIAL	Sub-angular and tabular stones and cobbles with patches of sandy infilling.		
LEFT BANK	Brick base of building.	**RIGHT BANK**	Steep, vegetated channel margin grading up to a brick retaining wall. Scattered trees.
AVG DEPTH	~0.9m	**MAX DEPTH**	1.3m
FLOW PATTERN	Smooth flow ~0.1m/sec. Velocity increases ~0.2m/sec when approaching and entering culvert.		
STRUCTURES	Footbridge support.		
VEGETATION	Right bank side bar vegetation comprised of stands of Japanese knotweed and Himalayan balsam, with some native tall herb species also present.		
COMMENTS	Flow sluggish immediately downstream of footbridge where water depth increases.		

PHOTOS



View upstream

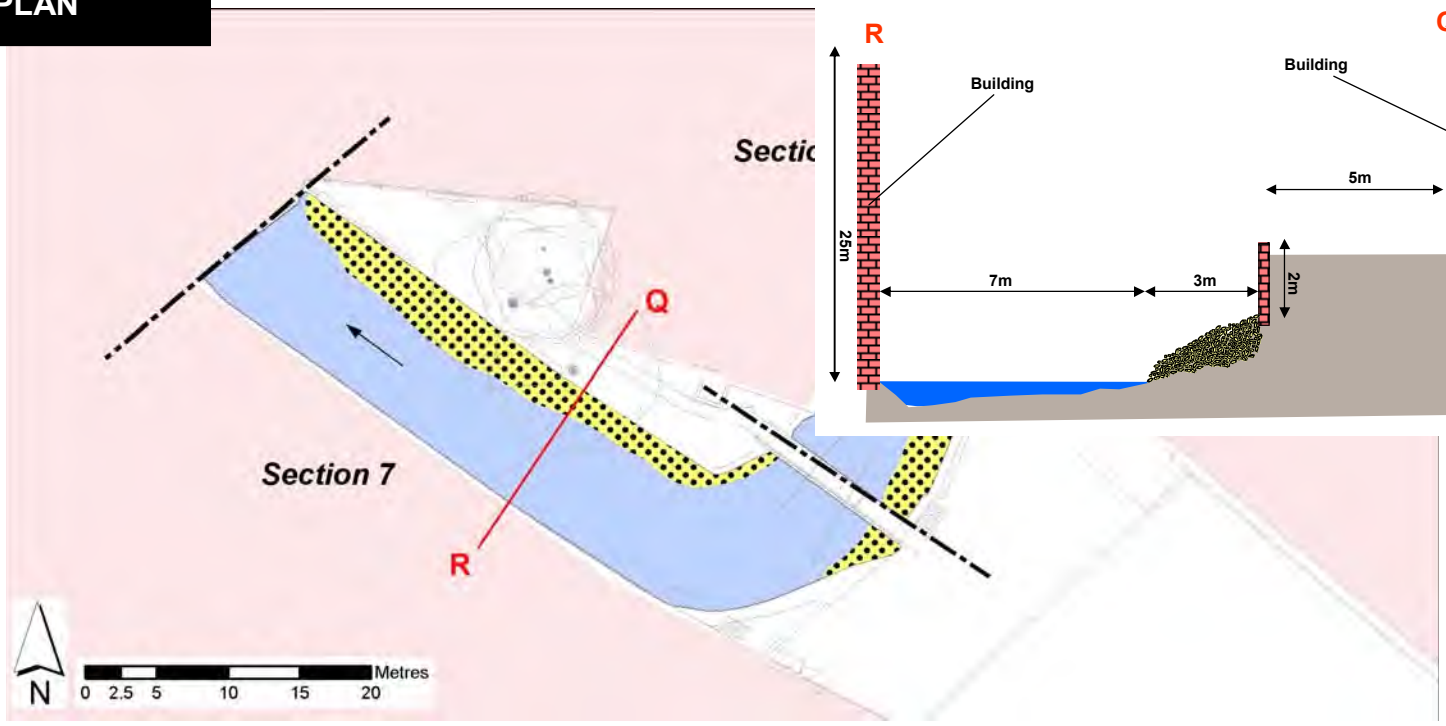


View downstream



Entrance to culvert

PLAN



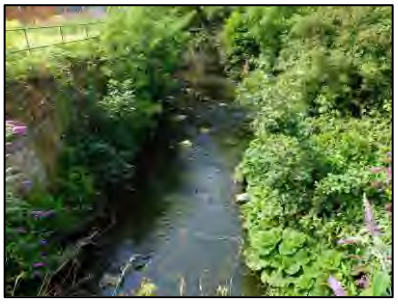
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RIVER MEDLOCK FLUVIAL SURVEY
MAYFIELD, MANCHESTER

LOCATION	SJ 85005 97606		
DATE	13/07/2017	**SECTION**	Section 8

BED AND BOUNDARY MATERIAL	Sub-angular and tabular sandstone rocks and cobbles with patches of coarse sandstone and gravel infill. Some bricks and urban debris.		
LEFT BANK	Brick revetment with rocky side berm at base, increasing in width towards road bridge	**RIGHT BANK**	Steeply sloping vegetated bank that rises ~30m to a fence line.
AVG DEPTH	0.3m	**MAX DEPTH**	0.8m (right bank approaching road bridge)
FLOW PATTERN	Ripple flow ~0.4m/sec, smooth flow on right bank bend ~0.2m/sec where deepest water.		
STRUCTURES	Brick culvert and road bridge supports.		
VEGETATION	Only section with minor emergent vegetation on right bank. Filamentous algae apparent. Japanese knotweed and Himalayan balsam dominant on side bars/banks, with some native tall herb species.		
COMMENTS	Partially shaded.		

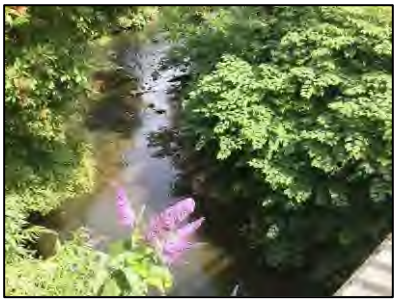
PHOTOS



View downstream from top of the culvert

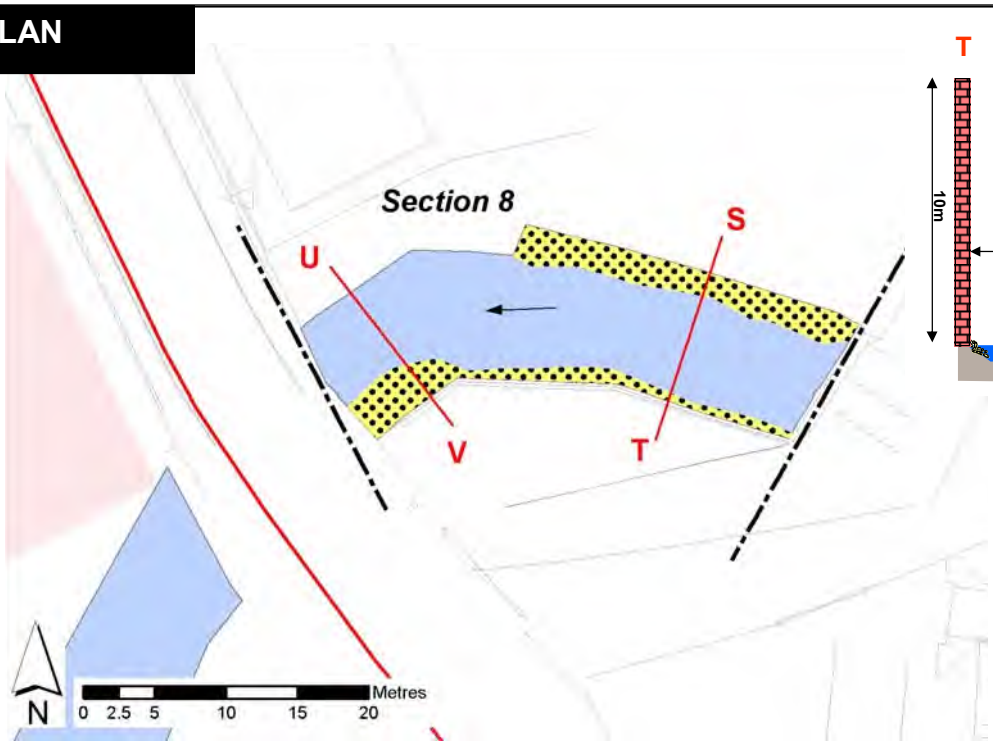


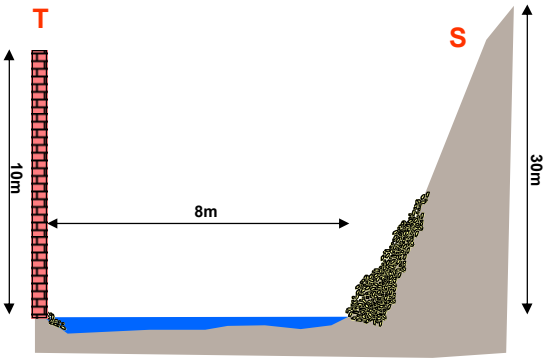
View upstream of culvert exit

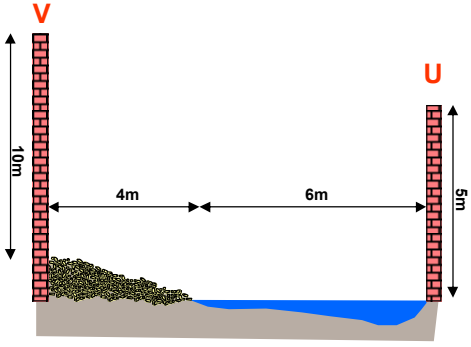


View upstream from road bridge

PLAN







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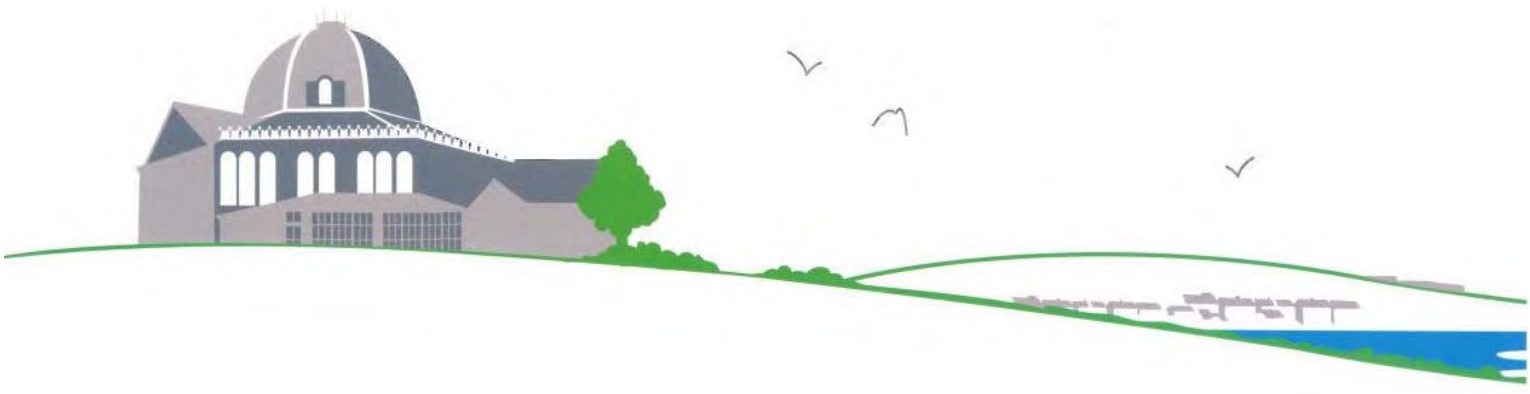
Appendix 9.6 Ecology Strategy with Biodiversity Net Gain Calculations

Penny Anderson Associates Ltd
CONSULTANT ECOLOGISTS

BUROHAPPOLD ENGINEERING

MAYFIELD, MANCHESTER

ECOLOGICAL ASSESSMENT



BUROHAPPOLD ENGINEERING

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March 2019

This project has been undertaken in accordance with PAA policies and procedures on quality assurance.

Signed:_____

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1 Phase 1 Habitat Map 2019

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1 Relevant Protected Species Summary Legislation

2 Species List

3 Desk Study Data

4 Site Photographs

1. INTRODUCTION

Background

1.1 Penny Anderson Associates Ltd (PAA) was commissioned by BuroHappold Engineering to carry out an ecological assessment of a site in central Manchester at and immediately around the former Mayfield Station complex (hereafter referred to as the 'site').

1.2 The site is proposed for re-development, including demolition of the majority of existing structures on the site, refurbishment of some of the older remedial works, and modification of the retaining walls along the River Medlock.

1.3 This report details the results of a desk study and site survey in February 2019. This was carried out to update an earlier survey in November 2016 (results reported in PAA 2017a) and determine if any significant habitat changes have occurred that would change the assessment of the ecological value of habitats.

Site Description

1.4 The site boundary includes an area approximately 9.1ha, comprising a series of buildings that are predominantly commercial or light industrial units and associated areas of hard and soft landscaping.

1.5 The site is surrounded on all sides by dense urban development, with tall buildings and busy roads. Manchester Piccadilly rail station is immediately to the north, and the River Medlock flows east to west through the centre of the site.

Legislative Context

1.6 The text below provides a brief summary of the legislation in relation to the species or species group in England and Wales. The original Acts, Regulations and any amendments should be referred to for the precise wording.

1.7 A range of international and national legislation has been established in the UK to protect important nature conservation sites and priority species. At the international level, European Union (EU) Directives require individual member states to implement their conservation provisions nationally for the benefit of Europe as a whole. These Directives have been transposed into UK law by the Conservation of Habitats and Species Regulations 2017; further details can be obtained from the Joint Nature Conservation Committee (JNCC) web site at www.jncc.defra.gov.uk.

1.8 Other international conventions include: the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979), which requires the maintenance of populations of wild flora and fauna, giving particular protection to endangered and vulnerable species; and the Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979), which requires the protection of migratory species throughout their entire range. The above conventions are implemented in England and Wales via the Wildlife and Countryside Act (WCA) (1981) (as amended) and Countryside and Rights of Way (CRoW) Act 2000. This legislation also protects important habitats and sites such as Sites of Special Scientific Interest (SSSI).

1.9 At the national level, the UK Post-2010 Biodiversity Framework published in 2012 is the Government's response to the Convention on Biological Diversity (2010). It describes the UK's biological resources, commits a detailed plan for the protection of these resources within the UK's devolved framework across England, Wales, Scotland and Northern Ireland. The document identifies future priorities for nature conservation and adopts a more strategic approach, including ecosystem services and sustainability alongside biodiversity. Despite

administrative changes following devolution, there is still an underlying objective of protecting and enhancing a range of priority species and habitats, often still based on the objectives and classifications of the original UK Biodiversity Action Plan. Biodiversity 2020 is England's national biodiversity strategy. Building on the Natural Environment White Paper published in 2011, this provides a means of delivering the international and EU commitments to biodiversity. Under Biodiversity 2020, Priority Species and Habitats referred to are those of 'Principal Importance' for the conservation of biodiversity in England listed on Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006.

1.10 Finally, the National Planning Policy Framework (NPPF), updated 2019, provides guidance for local authorities on the content of the Local Plans and is a material consideration in determining planning applications. Briefly, with an overall focus on sustainable development, the NPPF states that developments should aim to engender positive outcomes for habitats and biodiversity, with a particular focus on the maintenance and creation of ecological networks. Furthermore, the NPPF also states that any planning proposals for which significant negative impacts on biodiversity cannot be avoided, mitigated or compensated for should be refused. The NPPF states that the planning system should contribute to and enhance the natural environment through a range of actions, including:

- protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils;
- recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services; and
- minimising impacts on biodiversity and providing net gains for biodiversity including establishing coherent ecological networks that are more resilient to current and future pressures.

1.11 To protect and enhance biodiversity and geodiversity, plans should:

- Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and
- promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

Invasive Species

1.12 Certain non-native species that have been introduced into the UK are regarded as being a threat to native biodiversity. Legislative measures have, therefore, been put in place to prevent the spread of these invasive species in the wild.

1.13 Under section 14 of the WCA 1981 (as amended), it is illegal to introduce plants listed under Part II of Schedule 9 of the WCA into the wild or sell these species. Offences include causing the spread of viable plant material or neglecting to contain or appropriately manage non-native species.

1.14 Commonly introduced Schedule 9 species include non-native cotoneaster species, specifically, small-leaved cotoneaster (*Cotoneaster microphylla*) and wall cotoneaster (*C. horizontalis*), Himalayan balsam (*Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*).

Protected Species

1.15 Details of the protected species legislation relevant to this report can be found in Appendix 1.

2. METHODS

Desk Study

2.1 The desk study consisted of a consultation exercise to gather local and site-specific ecological information, the data from which, along with survey results, was used to assess the potential likely effect of the proposed development on habitats and protected species at the site and the surrounding areas.

2.2 A request for records of protected and notable species and wildlife sites within 2km of the centre of the site was made to Greater Manchester Ecology Unit (GMEU) in February 2019.

2.3 It is important to note that the desk study results provide an indication of the species present in and around the site, but do not confirm current presence or absence of any particular species. Protected species are often under-recorded in county wildlife databases.

Phase 1 Habitat Survey

2.4 The update habitat survey was undertaken by Principal Ecologist Helen Hamilton (MCIEEM)[1] and Principal Scientist Gerard Hawley (MCIEEM) on 14th February 2019.

2.5 This survey reviewed the findings of the earlier Phase 1 habitat survey completed in 2016, which followed standard methods as set out in the *Handbook for Phase 1 Habitat Survey* (JNCC 2010) for classifying and mapping British habitats based on the identification of individual plant species. The plant species recorded in 2016 within the site and their relative abundances at that time are listed in Appendix 2, which shows both common and scientific names according to Stace (2010); common names only are referred to in the text.

Protected Species Assessment

2.6 The survey included an update assessment for the presence or potential presence of protected species, noting any areas of suitable habitat, along with the location and type of any incidental field signs of protected species.

Limitations

2.7 The habitat survey was undertaken in February, which is outside of the recommended Phase 1 habitat survey period of March to October. Some plant species and habitats are less readily identifiable in the winter period. Furthermore, as stated earlier, some areas had been cleared and less vegetation remained to be identified. However, the nature of the habitats was such that sufficient data were collected and the results of this update survey are considered tenable.

[1] *Full member of the Chartered Institute of Ecology and Environmental Management*.

3. RESULTS

Desk Study

3.1 Desk study data for designated sites, habitats and species are described in further detail under the sub-headings below, with maps to illustrate locations of various features provided in Appendix 3.

Statutory Protected Sites

Special Area of Conservation

3.2 Special Areas of Conservation (SACs) are protected sites with strict conservation protection, designated under Article 3 of the European Commission Habitats Directive.

3.3 There are no SACs in the 2km search area for the site. However, certain stretches of the Rochdale Canal, which is approximately 500m to the north of the site, have been designated a SAC and Site of Special Scientific Interest (SSSI) because they support the European Protected Species floating water plantain (*Luronium natans*)[2]. The canal also has a population of white-clawed crayfish (*Austropotamobius pallipes*), which has some legal protection and American pondweed (*Potamogeton epihydrus*), which is a red data book species[3]. Furthermore, sections of the Ashton Canal to the north of the site have floating water plantain and the nationally scarce grasswrack pondweed (*Potamogeton compressus*), both of which are UK Biodiversity Priority Species (detailed in Map 2 of the desk study data, but not attached in Appendix 3 as it is not for release into the public domain).

Sites of Special Scientific Interest

3.4 Sites of Special Scientific Interest are statutory sites designated to support species of plants and animals that find it more difficult to survive in the wider environment. They represent a selection of this country's best wildlife and geological sites, and cover approximately 7% of the terrestrial area of the country (with over 4,000 separate sites in England).

3.5 There are no SSSI in the search zone for the site, although please note paragraph 3.3 above.

Non-Statutory Protected Sites

Site of Biological Interest

3.6 A Site of Biological Interest (SBI) has no legal protection, but does receive some protection through different policies and must be taken into consideration by the planning authority when planning applications affect the site. SBIs are assigned one of three grades:

- Grade A SBIs are of county or regional importance (assumes a presumption against development);

---

[2] *Floating water-plantain is protected under Schedule 8 of the WCA 1981. It is also protected under the European Communities Directive 92/43/EEC, on the Conservation of Natural Habitats and of Wild Fauna and Flora - the Habitats Directive and is a S41 priority species..*

[3] *The IUCN Red List of Threatened Species (also known as the IUCN Red List or Red Data List) is an inventory of the global conservation status of biological species.*

- Grade B SBIs are those of district importance; and
- Grade C SBIs are those of local importance.

3.7 Rochdale Canal, Stott's Lane - Ducie Street Basin and Ashton Canal approximately 500m to the north are both Grade A SBIs. As stated earlier, the Rochdale Canal supports regionally important aquatic habitat and species, including internationally important populations of floating water plantain, and the Ashton Canal is recognised as important for its submerged aquatic flora including glass-wrack pondweed (refer to Appendix 3, Map 1).

Regionally Important Geological and Geomorphological Sites (RIGS)

3.8 Regionally Important Geological and Geomorphological Sites (RIGS) are locally designated sites of local, regional and national importance for geodiversity and protect important Earth Science and landscape features. They are conserved and protected from development as a material consideration through the planning system.

3.9 There are no RIGS within the search zone for the site.

Protected and Notable Species

Badgers (*Meles meles*)

3.10 There are records of unspecified badger signs within the 2km search area and a sett. The closest records were approximately 850m from the perimeter of the site. Please note that information relating to badgers and their setts is confidential and the map provided by GMEU showing the location of the signs and sett is not included in Appendix 3 for this reason.

Bats

3.11 Table 1 shows the number of each species of bat recorded in the search zone and the proximity to the site of the closest roost for each. The most recorded species in the area are common pipistrelle (*Pipistrellus pipistrellus*) and unspecified pipistrelle species (*Pipistrellus* sp.), and a pipistrelle roost is the closest roost to the site (refer to Appendix 3, Maps 4a and 4b).

Table 1 Bat Records Provided by GMEU

Species		No. Roosts	Closest Record of Roost (m)	No. other Signs	Closest Record of Sign (m)
Common Name	**Latin Name**				
Common pipistrelle	*Pipistrellus pipistrellus*	20	650	28	290
Daubenton's bat	*Myotis daubentonii*	1	1950	1	1500
Soprano pipistrelle	*Pipistrellus pygmaeus*	2	370	2	1100
Pipistrelle species	*Pipistrellus* sp.	20	On site	79	10
Bat species	*Chiroptera* sp.	0	n/a	6	80

3.12 The majority of the records returned are for pipistrelle species. There are two native species - common pipistrelle and soprano pipistrelle (*Pipistrellus pygmaeus*). The common pipistrelle is one of the UK's most common bat species, found in a wide range of habitats including suburban and urban habitats. Soprano pipistrelle is also widely distributed across the UK. One of the soprano pipistrelle records is close to the Rochdale Canal and one is close to the River Irwell, which is consistent with its preferred feeding habitat by water and on the invertebrates it attracts. Where the distinction between the two species has not been made, they are recorded as pipistrelle species. Daubenton's bat (*Myotis daubentonii*) characteristically flies and

forages over water, and the record for a roost and a sign are close to the River Irwell to the north of the site.

3.13 There are records for pipistrelle roosts within the site, in the old station (grid reference SJ 8503 9768) and immediately to the west and north-west of the site.

Section 41 Species

3.14 Some of the rarest and most threatened species are listed under Section 41 (S41) of the 2006 Natural Environment and Rural Communities (NERC) Act as Species of Principal Importance. The Government's Biodiversity 2020 strategy has an ambition to ensure that by 2020 there will be an overall improvement in the status of wildlife and no further extinctions of known threatened species. To achieve this, a range of actions have been identified to help in the recovery of S41 species.

West European Hedgehog (*Erinaceus europaeus*)

3.15 West European hedgehog is classed as a Species of Principal Importance under Section 41 of the NERC Act 2006. Surveys in urban and rural areas indicate falling numbers of hedgehog.

3.16 There are five records for hedgehog in the search area, the closest being approximately 550m to the south-west of the site, close to the Mancunian Way (refer to Appendix 3 Map 5).

Birds

3.17 The majority of S41 species returned are for birds. These are listed in Table 2, along with their conservation status, and the distribution is illustrated on Map 5 in Appendix 3.

Table 2 Bird Species of Principal Importance Records from GMEU

Common Name	Scientific Name	Number Recorded	Amber	Red	Sch 1
Black redstart	*Phoenicurus ochruros*	24		x	x
Bullfinch	*Pyrrhula pyrrhula*	6	x		
Common starling	*Sturnus vulgaris*	11		x	
Dunnock	*Prunella modularis*	29	x		
Herring gull	*Larus canus*	1		x	
House sparrow	*Passer domesticus*	15		x	
Kingfisher	*Alcedo atthis*	14	x		x
Lapwing	*Vanellus vanellus*	6		x	
Lesser redpoll	*Carduelis cabaret*	2		x	
Linnet	*Carduelis cannabina*	2		x	
Little ringed plover	*Charadrius dubius*	6			x
Peregrine falcon	*Falco peregrinus*	12			x
Song thrush	*Turdus philomelos*	12		x	
Spotted flycatcher	*Muscicapa striata*	1		x	
Twite	*Carduelis flavirostris*	1		x	
Yellow wagtail	*Motacilla flava*	1		x	

3.18 Please note that the number of records does not necessarily indicate the population size. Rarer species tend to attract the attention of recorders and some of the more common species may not be included in counts.

3.19 The Red and Amber conservation status assessment (Eaton *et al*. 2015) is based on a number of criteria: historical decline, trends in population and range, rarity, localised distribution and international importance. Nevertheless, some species remain relatively common, such as the common starling[4], dunnock and house sparrow. Species are Red listed because of a 50% decline in their population.

3.20 Schedule 1 species are protected under the WCA 1981 as amended by the Environmental Protection Act 1990. It is an offence to intentionally disturb any of these species during the breeding season without a valid licence. The Schedule 1 species recorded include black redstart, kingfisher, little ringed plover and peregrine falcon. Please note the location of records for these species is provided, but records are not to be placed within the public domain.

3.21 A section of the site falls within the Black Redstart Priority Area. This identifies an area in central Manchester where the black redstart has been recorded. This species is a rare breeder, passage migrant and winter visitor with a small population concentrated in London and the West Midlands. There are also records of black redstarts attempting to breed in the Piccadilly Basin area of Greater Manchester. A Species Action Plan (Greater Manchester Biodiversity Project 2009) aims to maintain a breeding population in Greater Manchester.

3.22 There are 14 records of kingfisher in the search area. Kingfisher is found by still and slow-flowing water, such as canals and rivers, and they nest in holes tunnelled into earth banks.

3.23 The peregrine falcon faced extinction in the UK in the 1960s largely as a result of pesticides. However, they have made a rapid comeback and many now nest on high buildings in city centres. There are 12 records for peregrine falcon within the search area.

3.24 There are six records for little ringed plover. Little ringed plover first bred in the UK in 1938. They are summer visitors and breed in un-vegetated man-made habitats such as industrial and post-industrial land, gravel pits and shingle river banks.

Invertebrates

3.25 Eight unspecified moth species are recorded.

Other Protected Species

3.26 No records were returned for other protected species e.g. otter (*Lutra lutra*), reptiles or amphibians.

Phase 1 Habitat Update Survey

Main Habitat Types Present

3.27 The site chiefly comprises the following habitats, as shown on the Extended Phase 1 habitat map 2019 (Figure 1). There have been no significant changes in habitat, which can be categorised as the following:

- built structures and hardstanding;

[4] *Please see Appendix 3 and Table 2 for scientific names of species – common names are used in the text.*

- spoil;
- ephemeral short perennial vegetation;
- scattered broadleaved trees;
- tall ruderal
- scattered scrub;
- semi-improved neutral grassland;
- introduced shrub;
- amenity grassland;
- broadleaved semi-natural woodland; and
- running water (River Medlock).

3.28 A selection of illustrative photographs of the site is presented in Appendix 4.

3.29 The site is broadly separated into three main areas. The northern boundary is occupied by a former railway station building, platform and associated track bed. This area is at a raised level compared to the rest of the site. Immediately to the south of the former railway station complex is an area known as Colourgates Yard, which is at street level. The remainder of the site is a complex of buildings, mainly warehouses.

Built Structures and Hardstanding

3.30 A large proportion of the site is flat hardstanding. In the northern section, this reflects the site's former use as a railway station. Throughout the remainder of the site there are roads, pavements and car parks (Plate 1).

3.31 The site has a number of built structures of varying ages and styles. For ease of reference, these have been numbered B1, B2, B3 etc. as illustrated on Figure 1: Phase 1 Habitat Plan 2019. At the time of the update survey 2019 buildings B7a and B7b were being demolished. A new building B27 now stands in an area of what was semi-improved neutral grassland at the east of the site. This is now surrounded by hardstanding with small areas partially covered in wood chippings (Plates 2 and 3).

Spoil

3.32 Towards the south-eastern corner of the site is an aggregate recycling yard, which is in constant use, and consequently no vegetation is present on the spoil mounds.

Ephemeral Short Perennial Vegetation

3.33 Throughout the site, small patches of ephemeral short perennial vegetation have developed within gaps and crevices in the hardstanding. The vegetation is most extensive where surfaces have fallen into disrepair.

3.34 The vegetation is not dominated by any particular species, instead comprising a mixture of mostly low-growing species such as willowherb, mugwort and Michaelmas-daisy. The vegetation consists entirely of widespread and common species that are typically found in urban and wasteland habitats (Plate 4).

Scattered Broadleaved Trees

3.35 A number of scattered broadleaved trees were present in 2016, ranging from immature to mature and comprising a variety of species including ash, sycamore and willow. These are mostly self-seeded. Mature trees also occur along the south-eastern boundary with the Mancunian Way, where they remain today as a row of planted poplars. They are approximately 15m in height and appear to be in good condition. Another area of planted trees occurs at the far western end of the site, associated with a small amenity area.

3.36 The River Medlock runs through the centre of the site and the edges of the river corridor were lined with a range of tree species, including ash, sycamore and elder. However, at the time of the 2019 survey these trees had been felled (Plate 5).

Tall Ruderal Vegetation

3.37 In 2016, scattered mainly throughout the southern section of the site, were areas of tall ruderal vegetation that had developed in areas not in use or not managed for some time. In 2019, some of these areas were found to have been cleared recently (Plate 6).

3.38 Tall ruderal vegetation remains within Colourgates Yard, immediately south of the former railway station complex (Plates 7a and 7b). The vegetation is not dominated by any particular species and includes common nettle, creeping thistle and rosebay willowherb. The vegetation composition is not species-rich and consists of common and widespread species.

3.39 Some areas of tall ruderal vegetation, especially along the River Medlock corridor, were found to have been cleared in winter 2019, in preparation for the forthcoming site clearance and building demolition.

Scattered Scrub

3.40 There are small patches of scattered scrub throughout the site, associated with areas of tall ruderal vegetation. Bramble is a common ground flora component of these patches.

Semi-improved Neutral Grassland

3.41 Within the northern section of the site small patches of semi-improved neutral grassland are present, mainly located on the ballast between the old station platforms where the railway lines ran. The most dominant grass is creeping bent, with Yorkshire fog locally abundant and cock's-foot locally occasional. There were a variety of forbs present, including dandelion, creeping buttercup, colt's-foot and evening primrose, some of which suggest that the grassland was a succession habitat from ephemeral short perennial vegetation. The grassland is not species-rich. More recently there has been an increase in scrub with colonisation by butterfly bush and birch (Plate 8). In 2016, southern marsh orchids were recorded in this habitat on the former Mayfield station.

Introduced Shrub

3.42 Throughout the site butterfly-bush occurs frequently. It has established within gaps in the hardstanding surface, resulting in a scattered occurrence across the entire site, including the former railway platform. It is also present within gaps in the mortar of walls and buildings. It frequently occurs within other semi-natural habitat types, including the edges of the river corridor.

3.43 There are a small number of amenity planting areas, associated with the buildings in the southern section of the site, dominated by non-native shrubs comprising cherry laurel and Oregon-grape.

Amenity Grassland

3.44 There are a small number of blocks of amenity grassland within the southern and north-western parts of the site. These formal landscaping areas are associated with roadside areas, and are generally managed by mowing. The species composition is poor and typical of sown grasslands, with perennial rye-grass abundant and few forbs present.

Semi-Natural Broadleaved Woodland

3.45 Within the former railway station complex, the southern edge of the platform supports self-colonised young birch woodland. The trees are of a similar age and height. There is very little understorey, with some bramble present (Plate 9).

3.46 Areas of habitat containing trees along the River Medlock were found to have been cleared in winter 2019, in preparation for the forthcoming site clearance and building demolition.

Running Water

3.47 The River Medlock runs through the centre of the site. A detailed fluvial audit and Phase 1 habitat survey was carried out in 2017 (PAA 2017b) and the 2019 survey found little had changed. It is incised, heavily engineered and contained by high vertical brick and stone sides. The riparian corridor vegetation is dominated by the invasive non-native species Japanese knotweed and Himalayan balsam. There is no in-channel aquatic vegetation (Plate 10).

Invasive Non-native Species

3.48 Four species listed on Schedule 9 are present within the site: Japanese knotweed, Himalayan balsam, wall cotoneaster and Himalayan cotoneaster.

3.49 Japanese knotweed is present on the silt banks of the River Medlock in a number of locations. The extent has been mapped as part of the river corridor survey (PAA 2017) (Plate 11). Japanese knotweed was not found to be present in any area of the site outside of the river channel.

3.50 Himalayan balsam was observed in a variety of locations within Colourgates Yard, including the top of the river corridor. There was also an individual plant growing within a gap in the hardstanding at the north-western corner of B3. Himalayan balsam has colonised bank sections along the river channel.

3.51 Three individual plants of wall cotoneaster are located towards the southern edge of the former railway platform. Two further cotoneaster plants are located in two separate locations within the southern section of the site. The exact species could not be confirmed as there are many similar species of cotoneaster, and both flowers and fruits are required for positive identification. However, the species within the hedgerow is likely to be Himalayan cotoneaster, which is a Schedule 9 species.

Protected Species Assessment

3.52 The potential of habitats on site to support protected or notable species are set out below.

Birds

3.53 The site visit was carried out at a time of year when bird activity is generally low and summer visitors are absent. A small number of birds were recorded including feral pigeon (*Columba livia*), blue tit (*Cyanistes caeruleus*), common starling (Greater Manchester Biodiversity Project, 2008), European robin (*Erithacus rubecula*) and carrion crow (*Corvus corone*)

3.54 A black redstart and breeding bird survey was carried out in 2017 (PAA 2017c) and a total of 11 bird species were confirmed as breeding across the site. This did not include black redstart. The species recorded are listed in Table 3.

Table 3 Birds Confirmed as Breeding 2017

Common Name	Scientific Name
Blackcap	*Sylvia atricapilla*
Chaffinch	*Fringilla coelebs*
Common blackbird	*Turdus merula*
Common bullfinch	*Pyrrhula pyrrhula*
Dunnock	*Prunella modularis*
European robin	*Erithacus rubecula*
Feral pigeon	*Columba livia domestica*
Great tit	*Parus major*
White wagtail	*Motacilla alba*
Willow warbler	*Phylloscopus trochilus*
Winter wren	*Troglodytes troglodytes*

3.55 Since 2017 the site has been cleared of mature trees, areas of scrub and tall ruderal vegetation. This will likely have the effect of significantly reducing foraging habitat and the number of potential breeding sites and there is an expectation that fewer species will breed this year.

3.56 The site partially falls within the Black Redstart Priority Area (Greater Manchester Biodiversity Project, 2008) where this species has been recorded and is known to breed. No evidence of presence and breeding was recorded in 2017.

3.57 Manchester Birding Forum (2019) has recorded black redstart singing, feeding and showing in other areas of the city centre indicating breeding. However, sightings have been concentrated around the Town Hall and Deansgate that lie to the west of the site.

Bats

3.58 A comprehensive range of bat surveys has been completed at the site, and non-breeding summer common pipistrelle roosts have been confirmed in B1, B2, and culvert B24. The details of survey methods and results are presented in a number of reports, including PAA 2017 and PAA 2019.

Other Protected Species

3.59 No signs of badger were observed during the survey, and habitats were poor for this species.

3.60 No signs of water vole (*Arvicola amphibius*) or otter were found using the River Medlock. This is consistent with the findings of earlier surveys. The water quality and known incidents of very high flow conditions make the habitat unsuitable for water vole.

3.61 The water quality and known incidents of very high flow conditions also make the habitat unsuitable for white-clawed crayfish and there are no records of its presence.

3.62 Brownfield sites in urban areas can sometimes provide suitable habitat for reptiles. The semi-natural habitats surrounding the former railway station complex, including Colourgates Yard immediately to the south, ostensibly provide some habitats suitable for reptiles for foraging and also potential refuge and hibernacula features. However, given the isolation by urban development, it is considered highly unlikely that reptiles are present within the site.

3.63 There are no records of great crested newt (GCN) within 2km of the site. There are no suitable breeding ponds within or near to the site, which is isolated by urban development and the river that present a significant barrier to GCN dispersal. It is therefore considered highly unlikely that the site supports GCN.

4. EVALUATION

4.1 A primary aim of the survey was to determine if there had been significant changes in habitats and their biodiversity value. The general conclusion is that the habitats are fundamentally the same, but with the start of enabling works there has been a moderate decrease in value. However, this situation is common to re-development and with good landscaping design there is a potential for overall longer-term biodiversity gain.

Designated Sites

4.2 The desk study identified a number of protected sites within the search area, which had not changed from 2016. These are considered to be sufficiently distant and isolated from the site not to be impacted by the development proposals.

Habitats and Botanical Interest

4.3 The original Phase 1 habitat survey highlighted no areas of habitat of nature conservation interest on site and this remains the case. The site does not support species-rich habitats.

4.4 Earlier surveys of the site in 2009 (BuroHappold 2009), 2010 (BuroHappold 2010) and recorded in 2016 (PAA 2017a) identified a colony of southern marsh orchid (*Dactylorhiza praetermissa*) growing on ballast substrate between the old platforms. It is likely that they are still present but would not be identifiable in the winter months. The birch and scrub encroachment may reduce the habitat suitability and although orchids are prized for their appearance they are not afforded special protection.

Protected Species

Birds

4.5 The semi-natural habitats and some of the buildings provide suitable foraging and nesting habitat for a range of bird species. However, with the start of enabling works and vegetation clearance the habitat value has decreased and is less likely to support the number and range of bird species as before.

Otter and Water Vole

4.6 Although there is some (albeit limited) shelter for otter, the poor water quality, lack of fish and noisy urban context means the river and riparian corridor provide very poor habitat for otter to become resident. Similarly, pollution, water flow ranges and unsuitable boundary materials for burrowing make the habitat for water vole extremely poor.

Bats

4.7 Summer non-breeding roosts have been identified and building demolition or refurbishment could result in disturbance or loss of the roost(s), as well as presenting a risk of causing harm to individual bats, all of which would be an offence under current wildlife legislation. Works that have the potential to impact on bats is being licensed and mitigation to provide alternative roosts provided. Day-lighting of culverts is proposed as part of the re-development and careful landscaping design, the appropriate selection of native plant species and naturalisation of the river corridor have the potential to improve the overall habitat quality for bats and other wildlife. Sensitive lighting design to avoid over-illumination of the site and particularly the river corridor should create in the longer-term an improved environment for bats.

Other Protected/Notable Species

4.8 Due to a lack of suitable habitat and/or isolation from other potential habitats, no other protected species are anticipated to be affected by the proposals.

5. RECOMMENDATIONS

Birds

5.1 Where possible, site clearance should continue to be undertaken during the period October to February inclusive to avoid the bird nesting season. Prior to any clearance of potential nesting habitat at other times of the year, a check for nests should be made by a suitably experienced ecologist no more than 48hrs in advance of clearance. Any active nests will need to be left *in situ* and undisturbed until the young have fledged, which may be a period of several weeks.

Protected Species and Habitats

5.2 Additional surveys or special measures for protected species are not considered necessary.

Invasive Non-native Species

5.3 It is recommended that a programme is introduced for the safe removal and disposal of Japanese knotweed, Himalayan balsam and cotoneaster as they are invasive Schedule 9 species. Similarly, if any other invasive, non-native species colonise the site, appropriate control and eradication measures to prevent spread of the species would need to be implemented.

6. REFERENCES AND ABBREVIATIONS

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7. ABBREVIATIONS

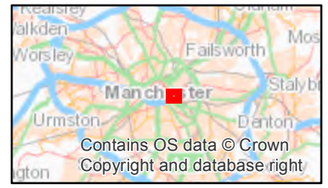
BAP	Biodiversity Action Plan
CRoW	Countryside and Rights of Way
GMEU	Greater Manchester Ecology Unit
EU	European Union
JNCC	Joint Nature Conservation Committee
NERC	Natural Environment and Rural Communities
NPPF	National Planning Policy Framework
PAA	Penny Anderson Associates Ltd
RIGS	Regionally Important Geological and Geographical Sites
SAC	Special Area of Conservation
SBI	Site of Biological Importance
SSSI	Site of Special Scientific Interest
WCA	Wildlife and Countryside Act

FIGURE

384800 385000 385200 385400

397800 397600 397400

A B22 A A A B1 B2 SI B23 B21 B27 B25 B20 B3 B4 B24 SI B5 B6 B19 B26 S B12 B18 B9 B7b B7c B8 B7a B10a B10b S B15 B16 B17 A B13 B14 A



Legend

- Site boundary

Habitat

- Broadleaved woodland - semi-natural
- Broadleaved woodland - recently cleared
- Scattered scrub
- SI Neutral grassland - semi-improved
- Tall ruderal
- Tall ruderal - recently cleared
- Running water
- S Spoil
- A Amenity grassland
- Ephemeral/short perennial
- Introduced shrub
- Building
- Hardstanding
- Culvert
- Building below other features
- Fenceline
- Wall
- Broadleaved scattered trees
- Ephemeral/short perennial - scattered
- Introduced shrub - scattered

N

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

0 10 20 40 60 80 Metres

Buro Happold

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Title:

PHASE 1 HABITAT MAP 2019

Project Name	Mayfield Station, Manchester		
Discipline	Ecology		
Scale	1:2,250	Drawing No.	Figure 1
Drawn By	MDM	Originator GJH	Date March 2019
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps		Revision A

APPENDICES

APPENDIX 1

Relevant Protected Species Summary Legislation

SUMMARY OF THE LEGISLATION RELATING TO BATS

All wild species of bat are protected under the Wildlife and Countryside Act (WCA) 1981, which has also been amended by later legislation, including the Countryside and Rights of Way (CRoW) Act 2000 and the Conservation of Habitats and Species Regulations 2017, and this legislation is applicable to England and Wales. Bats are listed on Schedule 5 of the WCA and are therefore subject to some the provisions of Section 9 which, with the amendments, make it an offence to:

- Intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for shelter or protection (S9:4b).
- Intentionally or recklessly obstruct access to any structure or place used for shelter or protection by a bat (S9:4c).

There are additional offences in relation to buying and selling (S9:5) any live or dead animal of this species or anything derived from them.

Bat species are also listed under Annexes IIa and IVa of the EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2017.

The Conservation of Habitats and Species Regulations 2017 state that a person commits an offence if they:

(a) deliberately capture, injure or kill any wild animal of a European protected species,

(b) deliberately disturb wild animals of any such species, in such a way as –

  (i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong;

(c) deliberately take or destroy the eggs of such an animal, or

(d) damage or destroy a breeding site or resting place of such an animal.

Under these Regulations it is an offence to damage or destroy a breeding site or resting place whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead bat or part of such an animal.

In addition, seven native British bat species, including the soprano pipistrelle (*Pipistrellus pygmaeus*) and the brown long-eared bat (*Plecotus auritus*), that are frequently found in buildings, are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006.

Section 15 of the National Planning Policy Framework (NPPF 2018) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005 *Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System* in respect of statutory obligations for biodiversity and geodiversity conservation.

Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts),

adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Please note: the above text provides a brief summary of the legislation in relation to bats in England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

Penny Anderson Associates Ltd
CONSULTANT ECOLOGISTS

SUMMARY OF THE LEGISLATION RELATING TO BREEDING BIRDS

All wild species of breeding birds and their nests are protected under Part 1 of the Wildlife and Countryside Act (WCA) 1981, as amended by later legislation including the Countryside and Rights of Way (CRoW) Act 2000. This legislation applies in England and Wales.

Part 1 (Section 1:1) of the WCA states that:

> 'If any person intentionally,
>
> (a) kills, injures or takes any wild bird;
>
> (b) takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or
>
> (c) takes or destroys an egg of any wild bird,
>
> he shall be guilty of an offence.'

Part 1 (Section 1:5) of the WCA (amended by the CRoW Act 2000) refers to specific birds listed on Schedule 1 of the WCA, and states that:

> 'If any person intentionally or recklessly,
>
> (a) disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or
>
> (b) disturbs dependent young of such a bird,
>
> he shall be guilty of an offence and liable to a special penalty.'

Schedule 1 includes birds such as barn owl (*Tyto alba*), black redstart (*Phoenicurus ochruros*), wood lark (*Lullula arborea*) and Cetti's warbler (*Cettia cetti*). Please refer to the WCA for a complete list of Schedule 1 species.

Some provisions are made to allow the killing and taking of certain species under certain circumstances, as follows:

- Birds listed on Schedule 2 (Part 1) of the Act may be taken or killed outside of the 'close season' for each individual species (the 'close season' is defined by the Act). This includes various wild duck and geese species.
- Birds listed on Schedule 2 (Part 2) of the Act may be killed or taken by authorised persons at all times. This includes species such as carrion crow (*Corvus corone*), black-billed magpie (*Pica pica*), feral pigeon (*Columba livia*) and greater Canada goose (*Branta canadensis*). An 'authorised person' is defined as a person who has written authorisation to undertake the act from the relevant statutory authority. The written authority is in the form of a licence, either a general licence which covers a number of the more typical 'pest' species, or an individual licence for other individual species. In England these licences are issued by Natural England and in Wales by the Welsh Assembly Government.

Please note: the above text provides a brief summary of the legislation in relation to breeding birds in England and Wales and the original Act and any amendments should be referred to for the precise wording.

APPENDIX 2

Species List

Appendix 2 Plant Species Recorded on the Application Site

Common Name	Latin Name	Habitat Type with Phase 1 Codes								
		Ephemeral/Short Perennial (J1.3)	Broadleaved Scattered Trees (A3.1)	Tall Ruderal (C3.1)	Scattered Scrub (A2.2)	Semi-improved Neutral Grassland (B2.2)	Introduced Shrub - Scattered/ Amenity planting (J1.4)	Amenity Grassland (J1.2)	Broadleaved Semi-natural Woodland (A1.1.1)	Hedgerow (J2.1.2)
Trees and Shrubs										
Alder	*Alnus glutinosa*		R							
An apple	*Malus* sp.		R							
Ash	*Fraxinus excelsior*		F						O - F	
Birch species	*Betula* sp.								LF	
Broom	*Cytisus scoparius*			R						
Butterfly bush	*Buddleja davidii*						D		R - LO	
Cherry laurel	*Prunus laurocerasus*						LO			D
Cherry species	*Prunus* sp.		R						R	
Dogwood	*Cornus sanguinea*								LO	
Elder	*Sambucus nigra*		O - LD							
Holly	*Ilex aquifolium*								R	
Poplar species	*Populus* sp.		LO - LF							
Silver birch	*Betula pendula*								A - LD	
Swedish whitebeam	*Sorbus intermedia* agg.		R							
Sycamore	*Acer pseudoplatanus*		O - F						O - F	
Willow sp.	*Salix* sp.		R - O						R	
Herbs, Grasses and Ferns										
Annual meadow-grass	*Poa annua*					R				
Black medick	*Medicago lupulina*							LF		
Bracken	*Pteridium aquilinum*			LR						
Bramble	*Rubus fruticosus* agg.	O		O - LF	D	LO	LF		LD	
Canadian fleabane	*Conyza canadensis*	O - F								
Cleavers	*Galium aparine*			LO						
Cock's-foot	*Dactylis glomerata*					R - LO				
Colt's-foot	*Tussilago farfara*					R				
Common bent	*Agrostis capillaris*	F						O		
Common cat's-ear	*Hypochaeris radicata*					O-F				
Common centaury	*Centaurium erythraea*					O-F				
Common figwort	*Scrophularia nodosa*	R								
Common mouse-ear	*Cerastium fontanum*	R						R - O		
Common nettle	*Urtica dioica*	F		O - LD						
Common ragwort	*Senecio jacobaea*	O - F				O		R - O		
Cotoneaster species	*Cotoneaster sp. cf Cotoneaster simonsii*			R			R			
Cow parsley	*Anthriscus sylvestris*			R						
Crane's-bill species	*Geranium* sp.							R		
Creeping bent	*Agrostis stolonifera*					F - LD				
Creeping buttercup	*Ranunculus repens*	R				O		O		
Creeping cinquefoil	*Potentilla reptans*	O-F								
Creeping thistle	*Cirsium arvense*	R		O - F						
Dandelion	*Taraxacum officinale agg.*	O - F				O		O - F		
Dock species	*Rumex* sp.	O		R		R		R		
Evening primrose species	*Oenothera* sp.					R				
Eyebright	*Euphrasia nemorosa*					O-F				
Fern species	*Dryopteris* sp.			O - LF						
Field horsetail	*Equisetum arvense*					O				
Garden lady's-mantle	*Alchemilla mollis*					LR				
Garlic mustard	*Alliaria petiolata*	R		R						
Goat's-beard	*Tragopogon pratensis*	O-F				O-F				
Goldenrod	*Solidago virgaurea*			O - F		R				
Greater plantain	*Plantago major*	O								
Groundsel	*Senecio vulgaris*	R - O								
Hart's-tongue	*Asplenium scholopendrium*	R								
Hawkweed species	*Hieracium* sp.					O-F				
Hedge bindweed	*Calystegia sepium*			LR						

Appendix 2 Plant Species Recorded on the Application Site

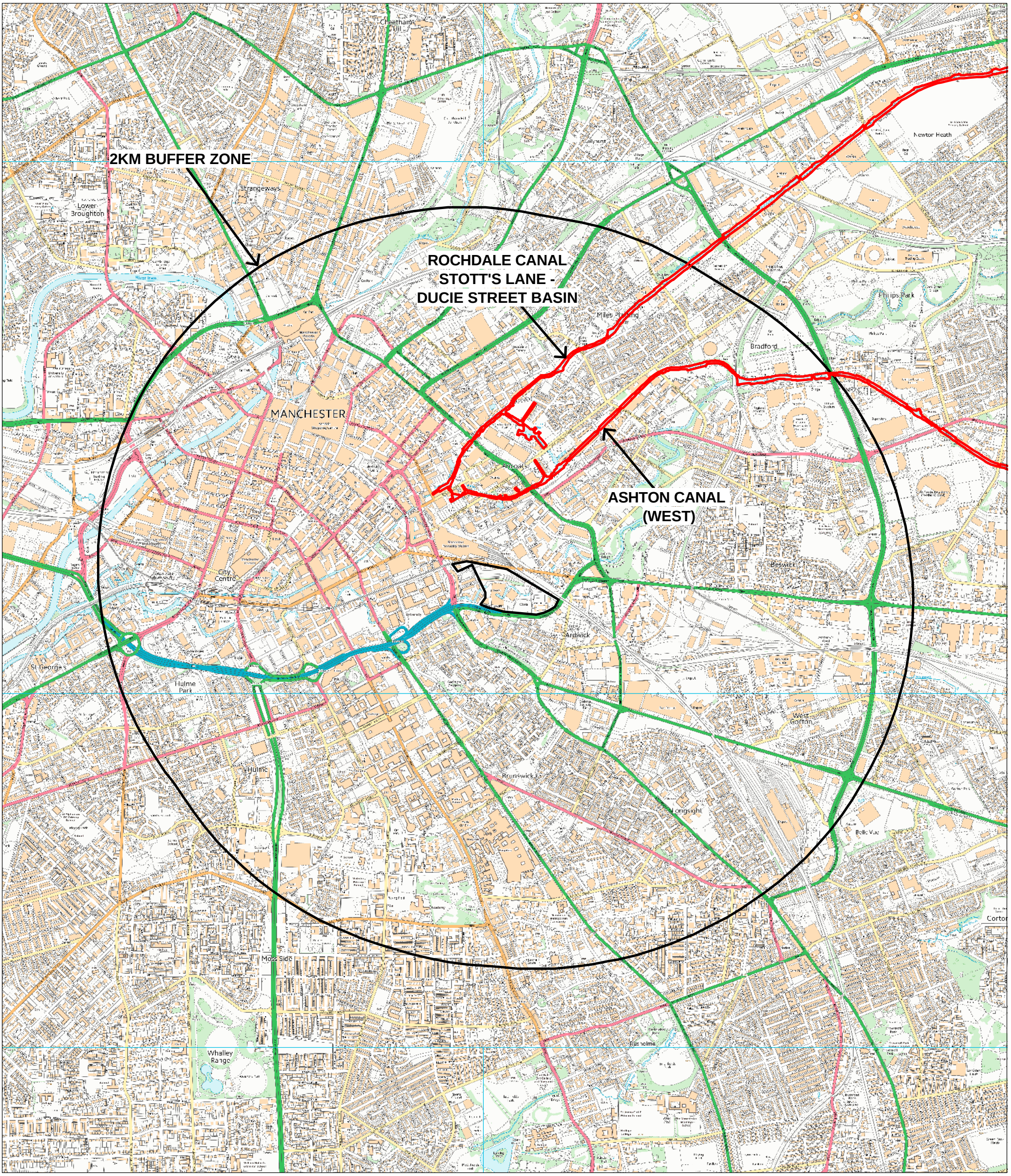
Common Name	Latin Name	Habitat Type with Phase 1 Codes								
		Ephemeral/Short Perennial (J1.3)	Broadleaved Scattered Trees (A3.1)	Tall Ruderal (C3.1)	Scattered Scrub (A2.2)	Semi-improved Neutral Grassland (B2.2)	Introduced Shrub - Scattered/ Amenity planting (J1.4)	Amenity Grassland (J1.2)	Broadleaved Semi-natural Woodland (A1.1.1)	Hedgerow (J2.1.2)
Hedge mustard	*Sisymbrium officinale*	R								
Hemp agrimony	*Eupatorium cannabinum*			O-F	O-F					
Herb-Robert	*Geranium robertianum*	R								
Himalayan balsam	*Impatiens glandulifera*					LO				
Hogweed	*Heracleum sphondylium*			LO						
Ivy	*Hedera helix*	LO								
Knotgrass	*Polygonum aviculare*	R								
Maidenhair spleenwort	*Asplenium trichomanes*	R								
Michaelmas-daisy species	*Aster novi-belgii* agg.	O - F								
Mugwort	*Artemisia vulgaris*	F - LA		O		O				
Nipplewort	*Lapsana communis*	R - O								
Oregon-grape	*Mahonia aquifolium*						LA			
Oxford ragwort	*Senecio squalidus*					R				
Pendulous sedge	*Carex pendula*	R								
Perennial rye-grass	*Lolium perenne*							A		
Perennial sow-thistle	*Sonchus arvensis*	O-F								
Perforate St. John's wort	*Hypericum perforatum*					R				
Polypody species	*Polypodium* sp.	R								
Red clover	*Trifolium pratense*	R				R		R		
Red fescue	*Festuca rubra*	O						O		
Redshank	*Persicaria maculosa*	R								
Ribwort plantain	*Plantago lanceolata*					O		R		
Rosebay willowherb	*Chamerion angustifolium*			O - F						
Scentless mayweed	*Tripleurospermum inodorum*	R								
Shepherd's-purse	*Capsella bursa-pastoris*	R								
Smooth sow-thistle	*Sonchus oleraceus*	O								
Soft-rush	*Juncus effusus*					LR				
Southern marsh-orchid	*Dactylorhiza praetermissa*	LF								
Spear thistle	*Cirsium vulgare*	LR		LO						
Tufted hair-grass	*Deschampsia caespitosa*					LR				
Vetch species	*Vicia* sp.					R		LR		
Wall cotoneaster	*Cotoneaster horizontalis*								LR	
Wavy bitter-cress	*Cardamine flexuosa*	R - O				LF				
White clover	*Trifolium repens*					O		LF		
Willowherb species	*Epilobium* sp.(annual)	F		O - F		R		R		
Yorkshire fog	*Holcus lanatus*					O - LA		R		

Key

D = dominant
A = abundant
F = frequent
O = occasional
R = rare
L = locally

APPENDIX 3

Desk Study Data



KEY

SITE OF BIOLOGICAL IMPORTANCE

SBI BOUNDARY

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 851 975
MAYFIELD - MAP 1

SCALE 1:20,000

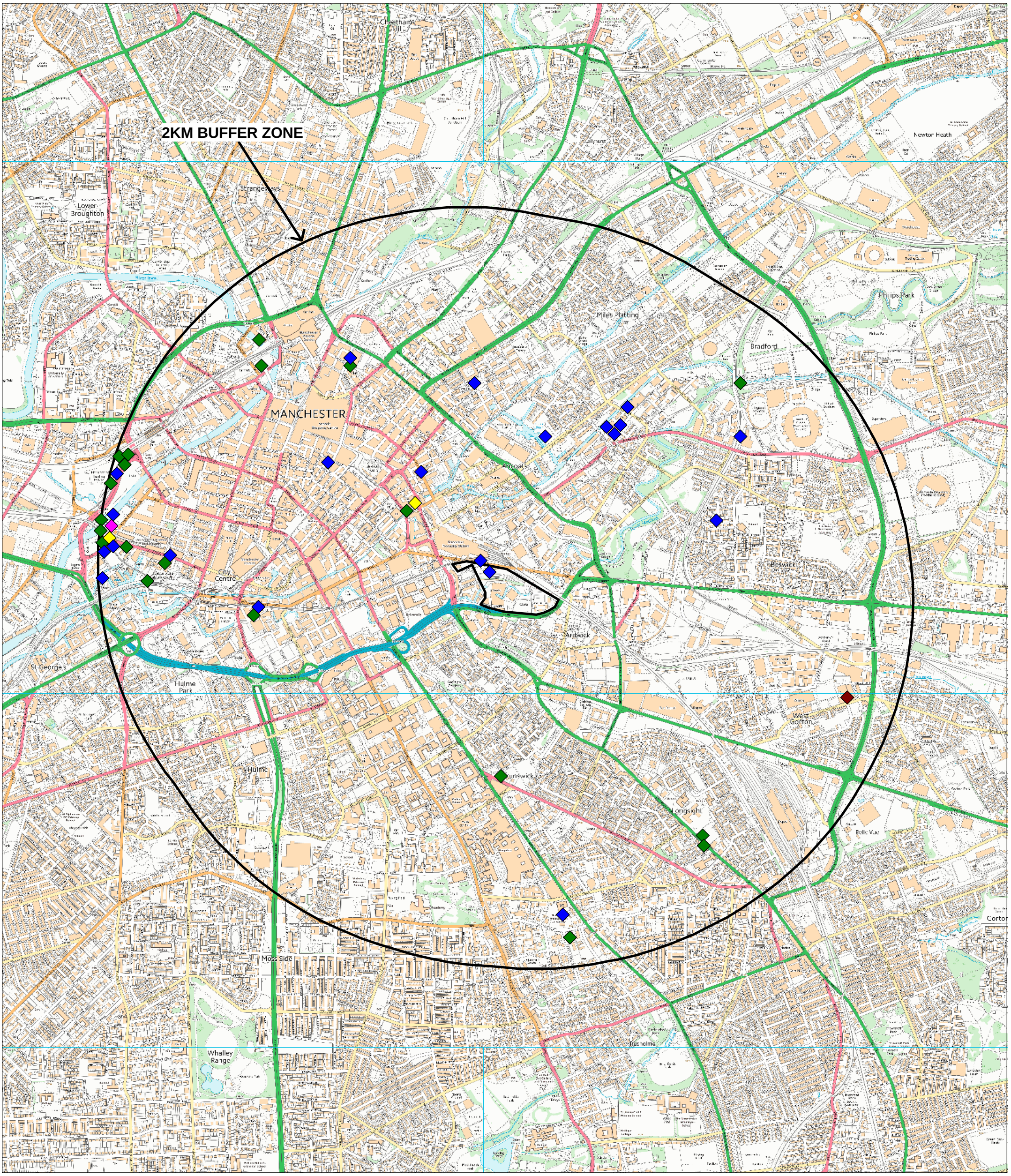
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TAMESIDE MBC LICENCE NO LA100022697, 2019

Greater Manchester Ecology Unit

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Date Produced: 19/02/2019



KEY

BAT ROOSTS

- BROWN LONG-EARED BAT
- COMMON PIPISTRELLE
- DAUBENTON'S BAT
- PIPISTRELLE SP
- SOPRANO PIPISTRELLE

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 851 975
MAYFIELD - MAP 4A

SCALE 1:20,000

BAT DATA COURTESY OF SOUTH LANCS BAT GROUP

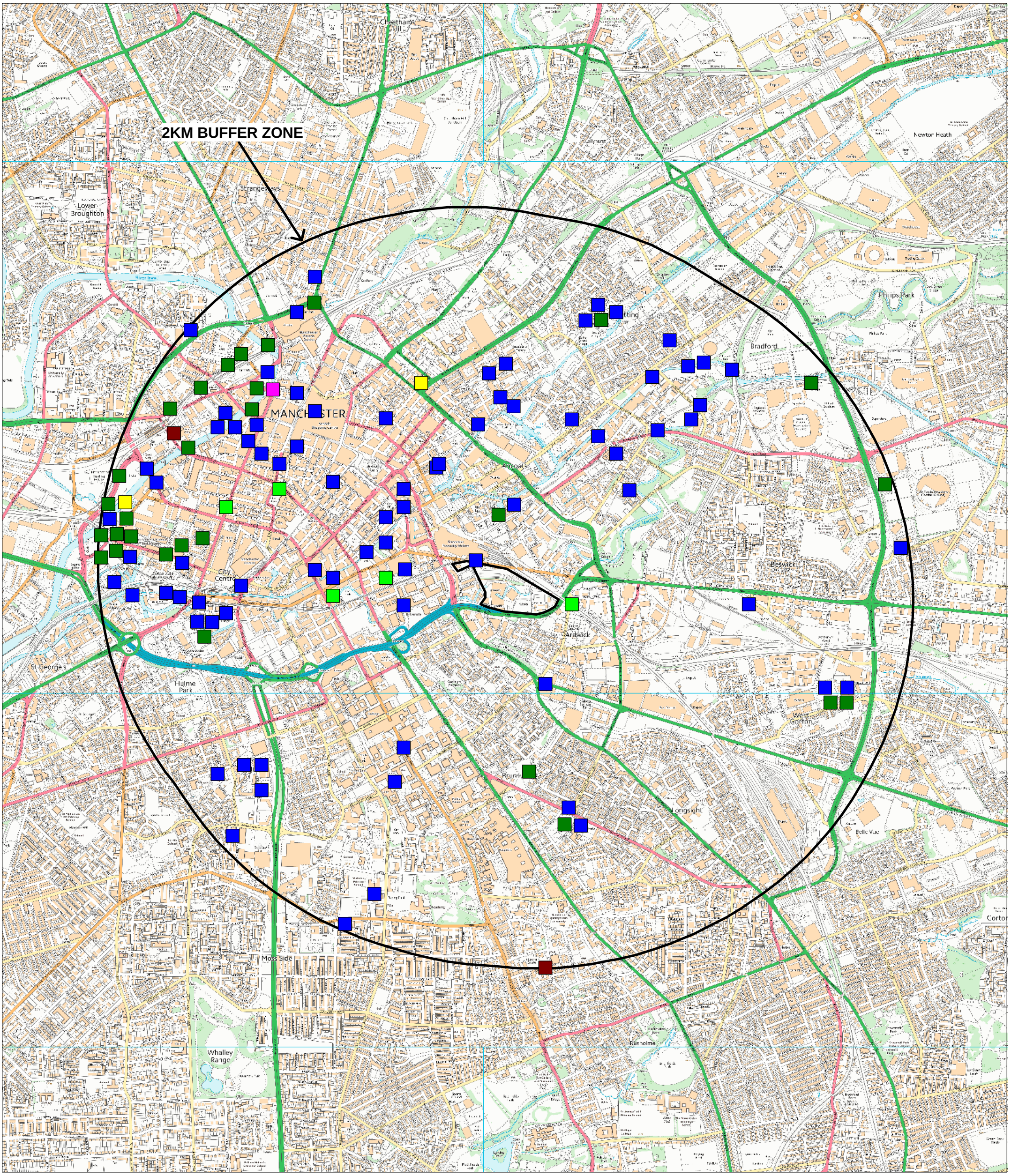
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Date Produced: 20/02/2019



KEY

BAT SIGNS

- BAT SP
- BROWN LONG-EARED BAT
- COMMON PIPISTRELLE
- DAUBENTON'S BAT
- PIPISTRELLE SP
- SOPRANO PIPISTRELLE

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 851 975
MAYFIELD - MAP 4B

SCALE 1:20,000

BAT DATA COURTESY OF SOUTH LANCS BAT GROUP

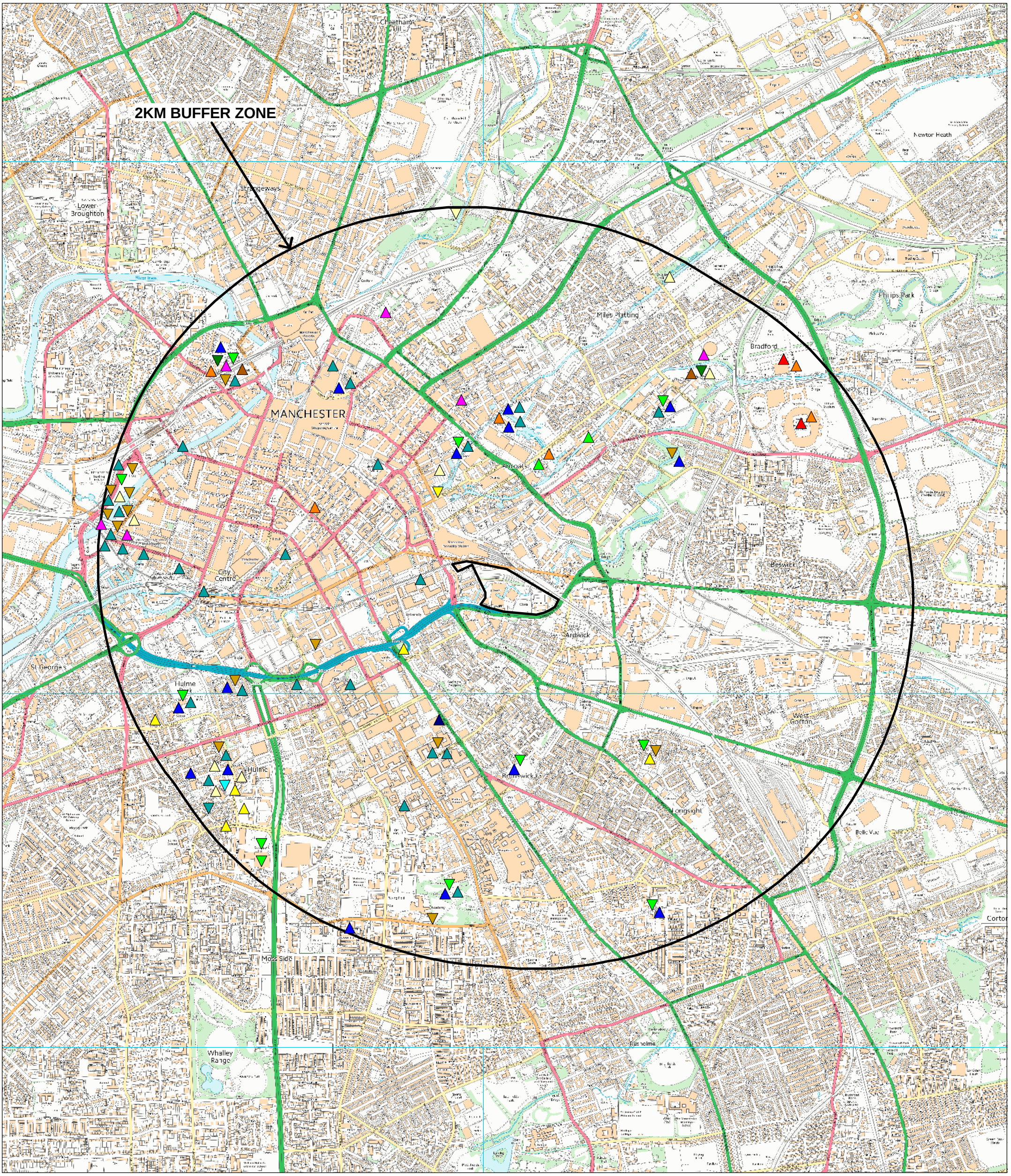
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Date Produced: 20/02/2019



KEY

SECTION 41 SPECIES

- BULLFINCH
- DUNNOCK
- GRS-WRK PONDWEED
- HEDGEHOG
- HERRING GULL
- HOUSE SPARROW
- LAPWING
- LESSER REDPOLL
- LINNET
- S41 MOTH
- SONG THRUSH
- SPOTTED FLYCATCHER
- STARLING
- TREE SPARROW
- TWITE
- YELLOW BIRD'S-NEST
- YELLOW WAGTAIL

GREATER MANCHESTER ECOLOGY UNIT
ECOLOGICAL SEARCH - SJ 851 975
MAYFIELD - MAP 5

SCALE 1:20,000

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Date Produced: 20/02/2019

APPENDIX 4

Site Photographs



Plate 1

Typical area of hardstanding, eastern area of site



Plate 2

Building B27 recently constructed with cobbled area



Plate 3

B27 showing woodchip ground covering



Plate 4

Ephemeral short perennial vegetation (February 2019)



Plate 5

River Medlock looking downstream. Felled trees on left bank



Plate 6

Recently cleared tall ruderal vegetation



Plate 7a

Tall ruderal vegetation (B27 to the right of picture)



Plate 7b

Tall ruderal to south of old railway station (B3 to the right of picture)



Plate 8

Semi-improved species-poor grassland with scattered butterfly-bush - former railway lines



Plate 9

Self-colonised immature birch woodland, southern edge of former railway station complex



Plate 10

River Medlock looking upstream towards culvert B24



Plate 11

River Medlock showing dense stands of Japanese knotweed (August 2017)

Penny Anderson Associates Ltd

CONSULTANT ECOLOGISTS



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Registered Office as Above | Registered in England & Wales | Company No. 4223109 | Directors: Mrs P Anderson Mr P Worrall Miss S Rogers

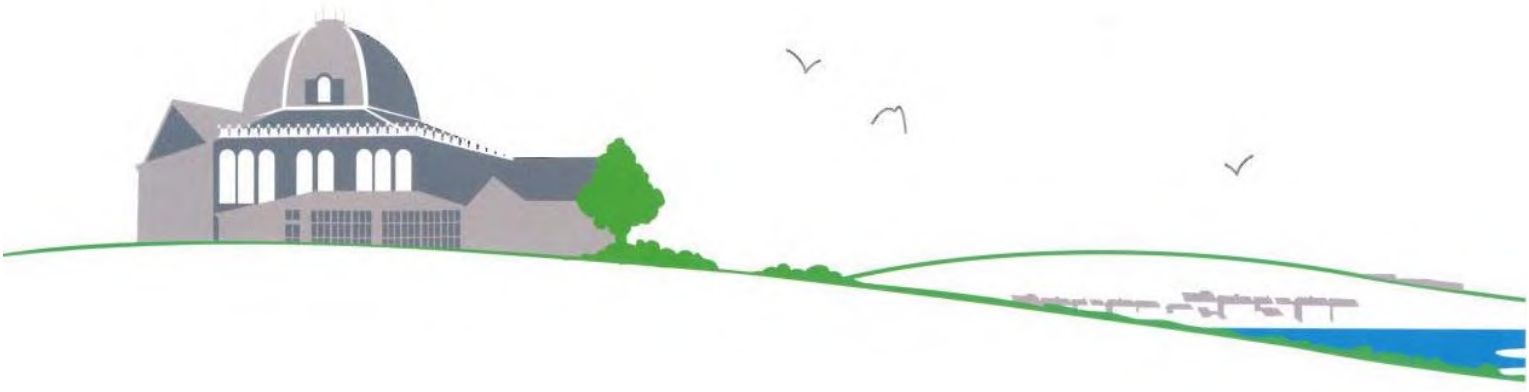
Appendix 9.7 Arboricultural Impact Assessment and Arboricultural Method Statement

Penny Anderson Associates Ltd
CONSULTANT ECOLOGISTS

BUROHAPPOLD ENGINEERING

MAYFIELD, MANCHESTER

BAT INSPECTION AND EMERGENCE SURVEY REPORT – BUILDING B2 AND CULVERTS B24/B26



BUROHAPPOLD ENGINEERING

MAYFIELD, MANCHESTER

BAT INSPECTION AND EMERGENCE SURVEY REPORT – BUILDING B2 AND CULVERTS B24/B26

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Authors
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Helen Hamilton BSc (Hons), MSc, MCIEEM, CEnv

March 2019

This project has been undertaken in accordance with PAA policies and procedures on quality assurance.

Signed: 

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4 Summary of Bat Roost Status 11

FIGURE

1 Bat Roost Summary 2013-2019

PLATES

1 Southern side of B2 – roost entrance identified towards end of ramp identified during earlier survey work undertaken by other consultants during 2014

2 Three to four bats seen close to building at sunset during dusk surveys, considered likely to be roosting but exact roost feature not identified

3 Culvert B24 box section culvert over River Medlock

4 Culvert B24 showing gaps at junction between wall and roof

5 Culvert B24 wall of mixed materials

6 Culvert B24 example crevice at join between wall and roof with bat roost potential but no evidence

7 Culvert B26 looking upstream, showing on-site headwall. Brickwork largely intact with few crevices (February 2019)

8 Culvert B26 looking upstream, showing intact brickwork interior (February 2019)

SUMMARY

Additional bat surveys were undertaken at two locations within the former Mayfield Station. The surveys follow on from studies in 2017 (PAA 2017), and previously, which indicated a day roost of three to four common pipistrelle bats (Pipistrellus pipistrellus) on the southern elevation of B2, and day roosts used by five bats each within culverts B24 and B26. The surveys aimed to inform demolition and development proposals at the site. They entailed emergence surveys of the building referred to as B2 on 23rd July and 17th August 2018, and an internal inspection of culvert B24, conducted on 19th July 2018 and culvert B26 on 14th February 2019.

Surveys followed current good practice guidelines published by The Bat Conservation Trust (Collins 2016). The survey programme was led by licensed bat ecologist Hazel Robson MCIEEM in 2017 and 2018, with three competent surveyors. Culvert B26 was inspected in 2019 by licensed bat ecologist Helen Hamilton and an assistant surveyor. All members of the survey teams were appropriately qualified for their assigned tasks, based on the CIEEM competency framework (CIEEM 2013).

Emergence surveys corroborated evidence for a bat roost on B2 near the ramp, but the exact location could not be determined as the roost site may be hidden by the depot ramp which occupies much of the southern wall. Together with previous data for this part of B2, the survey results confirm the presence of a regularly-used, non-breeding summer day roost of up to four common pipistrelle bats in this area.

Culvert B24 contained many crevices that bats could use singly or in pairs for shelter and several locations where cavities extended further into the structure, but no evidence of bats was found. The evidence from emergence surveys is that bats roost within the culvert, and potential for bats to roost here was certainly evident. Thus, the culvert contains a summer day roost for approximately five common pipistrelle bats.

The 2017 activity surveys (PAA 2017) reported evidence for a day roost of five common pipistrelles within culvert B26, which needed to be investigated. A full internal inspection was carried out in February 2019 and no internal features were found that would be suitable for bat roosting. Furthermore, the on-site headwall was also inspected and no potential roost sites found. Therefore, in conclusion, it is considered more likely that bats observed in the past had arrived from off-site. At present, no works are proposed inside B26.

In total, six bat roosts have been identified in buildings B1, B2 (x2), B6, B23 and B24 at Mayfield. All roosts identified would be classed as ‘low status’ following the guidance in Mitchell-Jones (2004) because they are of individual to low numbers of bats of common species used in summer and not maternity sites.

A European Protected Species mitigation licence (EPSL) has been obtained for the following activities:

- removal of the ramp structure on the south wall of B2, as this may destroy, damage or disturb the roost;
- removal of buildings above B24, as the works have the potential to disturb the roost; and
- removal of B6 as a roost will be destroyed.

For these roosts, there is flexibility over timing of works and the provision of replacements. Other buildings containing roosts are not affected at this stage.

1. INTRODUCTION

Background

1.1 Penny Anderson Associates Ltd (PAA) was commissioned by BuroHappold Engineering to carry out additional bat surveys at two locations within the former Mayfield Station complex (hereafter referred to as the 'site'). The surveys detailed in this report follow on from studies undertaken in 2017 (PAA 2017), and previously, which indicated a day roost of 3-4 common pipistrelle bats (*Pipistrellus pipistrellus*) on the southern elevation of B2, and day roosts used by five bats each within culverts B24 and B26.

1.2 The site is proposed for re-development, including demolition of the majority of existing structures on the site, refurbishment of some of the older remedial works, and refurbishment and modification of the retaining walls along the River Medlock.

1.3 The follow-on surveys aimed to gain more information about both roosting areas to inform demolition and development proposals at the site. They entailed:

- Emergence surveys of the building referred to as B2; and
- Internal inspection of culverts B24 and B26.

1.4 This report should be read in conjunction with the bat survey report (PAA 2017a). In that study, B2 was subject to two dusk and one dawn emergence survey, but the roost entrance location was not confirmed and further investigation was recommended. The 2017 report also recommended an internal visual inspection of the culverts to identify the roost locations, if possible.

1.5 This report presents the methods and results of two additional dusk surveys carried out on 23rd July and 17th August 2018, and of the visual inspection of culvert B24 carried out on 19th July 2018 and culvert B26 on 14th February 2019. The suite of bat surveys carried out in 2017, 2018 and 2019 is intended to provide sufficient information on bat roosts within the whole Mayfield complex to allow impacts of the demolition proposals upon bats to be fully considered.

Building Descriptions

1.6 B2, known as 'the Depot', is the most extensive building within the Mayfield site complex. It is 20m tall and consists of former station platforms and warehouses. It has a brick façade and there are two large internal warehouses with concrete floors and flat roof supported by concrete pillars.

1.7 There is a narrow enclosed ramp from ground level to the former platforms on the southern elevation, supported by metal stanchions and framework, and covered with corrugated sheets. There is an open ramp on the northern elevation and a series of large brick arches beneath the platforms at the eastern end, each enclosed with wooden boarding previously used for warehousing and industrial units.

1.8 The locations of culverts B24 and B26 are shown on Figure 1. Both are situated on the River Medlock within the site boundary.

Legislative Context

1.9 All wild species of bat are protected under the Wildlife and Countryside Act (WCA) 1981, which has also been amended by later legislation, including the Countryside and Rights of Way (CRoW) Act 2000 and the Conservation of Habitats and Species Regulations 2017, and this legislation is applicable to England and Wales. Bats are listed on Schedule 5 of the WCA and

are, therefore, subject to some of the provisions of Section 9 which, with the amendments, make it an offence to:

- Intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for shelter or protection (S9:4b); or
- Intentionally or recklessly obstruct access to any structure or place used for shelter or protection by a bat (S9:4c).

1.10 There are additional offences in relation to buying and selling (S9:5) any live or dead bat or anything derived from them.

1.11 Bat species are also listed under Annexes IIa and IVa of the EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, also known as the 'Habitats Directive'. Inclusion on Annex IVa means they are consequently identified as European Protected Species (EPS) and protected under the Conservation of Habitats and Species Regulations 2017.

1.12 The Conservation of Habitats and Species Regulations 2017 state that a person commits an offence if they:

a) deliberately capture, injure or kill any wild animal of a European protected species,

b) deliberately disturb wild animals of any such species, in such a way as –

i) to impair their ability to survive, to breed or reproduce, or to rear their young, or

ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate, or

iii) to affect significantly the local distribution or abundance of the species to which they belong;

c) deliberately take or destroy the eggs of such an animal, or

d) damage or destroy a breeding site or resting place of such an animal.

1.13 Under these Regulations it is an offence to damage or destroy a breeding site or resting place whether the animal is in occupation or not, and protection extends to all life stages of the animal in question. There are additional offences relating to possession, control and sale of a live or dead bat or part of such an animal.

1.14 In addition, seven native British bat species, including the soprano pipistrelle (*Pipistrellus pygmaeus*) and the brown long-eared bat (*Plecotus auritus*), that are frequently found in buildings, are listed as a 'Priority Species' under the under the 2011 biodiversity strategy for England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services,* under the 2012 UK Post-2010 UK Biodiversity Framework. These Priority Species are also referred to as 'species of principal importance' for the conservation of biodiversity in England and Wales within Section 74 of the CRoW Act 2000, and Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006.

1.15 Section 15 of the National Planning Policy Framework (NPPF), revised in 2019, states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. The NPPF also includes the requirement to contribute to the Government's commitment to halt the overall decline in biodiversity and to promote the reservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets. Reference is made to Circular 06/2005

Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System in respect of statutory obligations for biodiversity and geodiversity conservation.

1.16 Local authorities in England are required to ensure that where significant harm resulting from development cannot be avoided (through locating on alternative sites with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, planning permission is refused. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

1.17 Please note: the above text provides a brief summary of the legislation in relation to bats in England and Wales and the original Acts, Regulations and any amendments should be referred to for the precise wording.

2. METHODS

2.1 The surveys followed current good practice guidelines published by The Bat Conservation Trust (Collins 2016). The surveys in 2017 and 2018 were led by licensed bat ecologist Hazel Robson[1] MCIEEM[2], with three competent surveyors. The inspection of culvert B26 was led by licensed bat ecologist Helen Hamilton and a competent surveyor. All members of the survey teams were appropriately qualified for their assigned tasks, based on the CIEEM competency framework (CIEEM 2013).

Emergence Surveys

2.2 For the emergence surveys, the weather conditions were recorded at the start and end of each survey. Temperature and humidity were measured using a hygro-thermometer (810-190 www.etiltd.com). Wind was estimated using the Beaufort Wind Force Scale, ranging from 0 calm to 5 moderate breeze (NB. while the scale extends to force 12 hurricane, 6 or higher would represent unsuitable conditions for survey). Cloud cover was estimated using percentage cover where 0% is a completely clear sky and 100% is completely overcast. Surveys were undertaken within the recommended survey season and on days with weather conditions forecast to be suitable. Three surveyors were situated outside the southern elevation of B2 and one surveyor within the building. Their locations are illustrated in Figure 1.

2.3 Each survey lasted for at least 1.5 hours, with emergence surveys commencing at least 15 minutes prior to sunset in the most likely period bats would be observed emerging from a roost site. Surveyors were positioned at vantage points close to the target feature to observe any bats exiting potential roost features. Each was equipped with a Batbox Duet bat detector to aid detection in the field and an Anabat SD1 to record all calls and enable sonogram analysis for confirmation of species identification.

2.4 Echolocation bat calls from each of the surveys were analysed using specialist sound analysis software AnalookW published by Titley Scientific. Based on parameters such as peak frequency and call duration, each call could be assigned to a particular bat species. Sonogram analysis can also be used to investigate the type of bat calls, including echolocation, social calls and feeding buzzes as well as providing an indicating of whether more than one individual is present at a time.

2.5 The dates and weather conditions of each survey visit are provided in Table 1.

Culvert Inspections

2.6 Culvert inspections were undertaken from within the river, where it was safely accessible. The surveyors used Clu-lite torches and endoscopes to inspect cracks and crevices that could potentially provide roost sites for bats. Bats and evidence of bats, such as droppings were also sought.

2.7 The survey of culvert B24 was carried out on 19th July 2018. The survey of culvert B26 was conducted on 14th February 2019. Both surveys were carried out during daylight hours in fine dry weather conditions, when water levels in the River Medlock were low enough for access.

[1] *Natural England class licence registration number 2015-10504-CLS-CLS, survey level 2 (WML-CL18)*

[2] *Full Member of Chartered Institute of Ecology and Environmental Management (CIEEM)*

Table 1 Dates and Weather Conditions for Emergence Surveys

Date	Sunset	Start	End Time	Weather Conditions
23/07/18	21:20	21:00	22:30	Dry and calm, Temperature 24.8ºC, decreasing to 19.9ºC. Relative humidity 54%, increasing to 75% by end. Cloud cover 100% throughout.
17/08/17	20:53	20:30	22:00	Dry and calm. Temperature 19.4ºC decreasing to 19.2ºC. Relative humidity remained at 62% throughout survey. Cloud cover 20% throughout.

Limitations

Emergence Surveys

2.8 The visits were undertaken during the main period of the bat active season (May to August inclusive) and weather conditions were favourable and unlikely to restrict bat activity levels. However, the effectiveness of the surveys was compromised by a number of factors.

2.9 At B2, there was a narrow corridor of accessible land between the base of the building and a wire fence. Beyond the fence the area was well-vegetated and fell sharply towards the River Medlock. It was not possible, therefore, to step away and view the building more fully and surveyors were confined to making observations from close to the building walls. Visibility was further inhibited by the former pedestrian ramp walkway, which partially blocks the view of the building (see Plates 1 and 2).

2.10 Also at B2, security lighting *c*.3m from the ground was turned on at sunset. This would not necessarily discourage bat activity, which was largely observed above the ramp but the glare of the lamps affected surveyors' visibility.

2.11 Despite the constraints outlined above, the survey techniques and equipment used were consistent with the currently accepted standards for bat survey (Collins 2016) and the results are considered to provide a reasonable characterisation of bat activity during the survey period.

Culvert Inspections

2.12 Both culverts B24 and B26 were accessed internally from the River Medlock and were surveyed in full. It should be noted that evidence of bat roosts, such as droppings, would not accumulate in a culvert as it might in a normal structure.

3. RESULTS AND EVALUATION

Emergence Surveys

3.1 In keeping with all bat surveys completed at the site, common pipistrelle was the only species detected during the emergence surveys.

3.2 During the first survey (23rd July 2018) sunset was at 21:20 and the first record was at 21:39, which is 19 minutes after sunset. The first bat recorded during the second survey (8th August 2018) was 18 minutes after sunset inside the depot. Peak emergence time for common pipistrelle is generally around 20 - 25 minutes after sunset (Andrews and Pearson 2017; Bat Conservation Trust 2018).

3.3 On the second emergence survey date, two surveyors positioned to the south of B2 (Figure 1) independently reported the sudden appearance of a bat at the same time. However, neither surveyor directly witnessed emergence from a particular feature, suggesting that the roost site may be hidden by the depot ramp which occupies much of the southern wall of B2. Figure 1 indicates a broad 'roost entrance area', and the roost is assumed to be at ramp level. Together with previous data for this part of B2, the survey results confirm the presence of a regularly-used, non-breeding summer day roost of up to four common pipistrelle bats in this area.

3.4 Around B2, general activity levels were similar during both surveys with discontinuous activity by a small number of bats. Activity was largely recorded just below the platform level and above the former pedestrian ramp. Most records are of bats feeding with a smaller number commuting. A maximum of two bats were recorded at any given time.

3.5 The surveys corresponded with the results of earlier surveys that encompassed the wider site (PAA 2017), which indicated that activity levels varied across the site, with surveyors consistently detecting frequent activity along the river corridor and on the south side and upper level of the depot buildings (B2) but very little activity elsewhere.

Culvert Inspections

3.6 Culvert B24 was surveyed from the upstream end, entering the river via the B4 warehouse off Baring Street and walking downstream through the tunnel. The stream channel was accessible throughout but a lot of debris, including tyres, fabric and construction materials, was present within the channel. The culvert itself was box-section (Plate 3), with metal girders supporting brick arches perpendicular to the stream (Plate 4). The culvert walls were mainly brick with sections of stone and concrete (Plate 5). The walls appeared to have been modified considerably since construction. No maintenance has been undertaken recently and there were many cracks and crevices that bats could access, particularly in the junction between the walls and the roof (Plate 6), although relatively few were more than superficial. Occasional resting moths were noted and spiders (including old cobwebs) were abundant in more sheltered cavities in the roof, indicating that waters rarely reach these levels.

3.7 Culvert B24 contained many crevices that bats could use singly or in pairs for shelter and several locations where cavities extended further into the structure. All larger cavities were searched using a torch and endoscope and no evidence of bats was found. It has to be noted that roosts over a river will not be marked by droppings, a feature which often provides a clue to bats' whereabouts. The presence of moths and spiders (including old cobwebs) indicate that the culvert rarely fills, making it more suited to bat roosting. The evidence from emergence surveys is that bats roost within the culvert, and potential for bats to roost here was certainly evident. Thus, the culvert contains a confirmed summer day roost for approximately five common pipistrelle bats.

3.8 Culvert B26 is an arched structure with dressed stone lintel and brick interior and headwall. Sidewalls are also of brick. Some opportunities for bat roosts were apparent in gaps in the headwall at the downstream end (Plate 7). Further in, the culvert is a vaulted brick structure, which extends to a longer section under the railway lines into Piccadilly Station, north of Temperance Street. On internal inspection the brickwork was intact throughout and in good condition. Mortar was intact and the roof and walls heavily cobwebbed and conditions indicated that the interior of culvert B26 would not be very suitable for bat roosts, as the condition of the brick is good and crevices were few. Inspections of the headwall and the junction with the culvert revealed no evidence of bats and low suitability for roosting. This is because cracks were either damp, shallow or filled with soil, making them less attractive to bats for roosting (Plate 8).

3.9 These findings for B26 contradict the conclusions from the 2017 activity surveys (PAA 2017) in which a day roost of five common pipistrelles was identified within the culvert. Internal inspection shows that the internal structure of the culvert or its headwalls on site would not be suitable for a bat roost of this type. It is considered most probable that the bats seen were flying through the culvert rather than roosting within it. At present, no works are proposed inside B26.

Roost Summary

3.10 Table 2 summarises roosting activity at Mayfield across survey dates from 2013 (Wardell Armstrong 2013, 2014), 2017 (PAA 2017) and the 2018 and 2019 results reported here. Table 3 presents a description of the roost locations within each structure. Figure 1 shows the locations and classifications of all roosts identified since 2013.

Table 2 Summary of Bat Roosting Activity from Surveys Dating from 2013 to 2019

Structure	Results	Roost classification	Results	Roost Classification	Results	Roost Classification	Results	Roost Classification
Source and Date (survey type):	*Wardell Armstrong 2013 (building inspection)*		*Wardell Armstrong 2014 (emergence/ re-entry surveys)*		*PAA 2017 (emergence/re-entry surveys)*		*2018 (emergence/re-entry and inspection surveys)*	
B1					Activity survey reported single common pipistrelle emerging from gap in stonework on 1st of 3 surveys.	Summer day roost used by 1 common pipistrelle, non-breeding, occasional use.		
B2	Building inspection found scattered droppings and separate 5 bat droppings found under potential roost area.	Internal day roost used by low numbers of non-breeding females or males intermittently throughout the summer. Hibernation potential considered present.	Activity survey recorded 3-4 common pipistrelles emerging on 2nd survey and 2 on 3rd survey.	(Internal) non-breeding summer roost for up to 4 common pipistrelles. Hibernation potential for common pipistrelles.	3-4 common pipistrelles likely to have emerged on 1 of 3 activity surveys.	Summer day roost used by 3-4 common pipistrelles, non-breeding.	Emergence survey - likely emergence by 1 common pispitrelle on 2nd of 3 surveys.	(External) non-breeding summer day roost for up to 4 common pipistrelles, regular use. (Internal) non-breeding summer roost for up to 4 common pipistrelles. Hibernation potential for common pipistrelles.
B6					Single bat seen to emerge near fire escape over river on 1 of 3 surveys.	Summer day roost used by 1 common pipistrelle, non-breeding, occasional use.		
B23					2 bats seen to enter building on 1 of 3 activity surveys, 2 bat droppings below roost.	Summer day roost for 2 common pipistrelles, non-breeding, occasional use.		
B24					3 bats entered culvert on 2nd of 3 surveys, and 3 emerged on 3rd survey.	Summer day roost used by up to 5 common pipistrelles, non-breeding, regular use.	Inspection revealed potential roost features but no direct evidence for specific locations.	Summer day roost used by up to 5 common pipistrelles, non-breeding, regular use.
B26					4 bats emerged from culvert on 3rd activity survey but considered to be flying in from off-site	No roost.		

Table 3 Description of Bat Roost Location

Structure	Roost Classification	Bat Roost Location
B1	Day roost used by 1 common pipistrelle, non-breeding, occasional use.	Crevice in brickwork on NE facing external wall.
B2	Internal non-breeding summer day roost for up to 4 common pipistrelles.	At locations where droppings recorded in 2013.
	External non-breeding summer day roost for up to 4 common pipistrelles.	S side of building, precise roost entrance not confirmed.
	Hibernation roost potential for common pipistrelles.	Suitable crevices within building fabric.
B6	Summer day roost used by 1 common pipistrelle, non-breeding, occasional use.	Crevice in brickwork on external wall below metal fire escape on NE side above river.
B23	Day roost for 2 common pipistrelles, non-breeding, occasional use.	Gap between brick wall and wooden soffit on S side.
B24	Day roost used by up to 5 common pipistrelle bats, non-breeding, regular use.	Inside culvert, precise roost entrance not confirmed.

3.11 All the roosts were assessed as being non-breeding, due to the small numbers of bats and the occasional patterns of usage. More details of roost locations are illustrated in Figure 1.

3.12 In addition, some potential for common pipistrelle to hibernate within B2 was identified (Wardell Armstrong 2013). In keeping with the survey results across all studies, common pipistrelle is the only bat species likely to use the site and numbers are likely to be limited to up to five individual bats.

Evaluation

3.13 Table 4 summarises the evaluation of bat roost status at Mayfield site.

3.14 Common pipistrelle was the only bat species recorded throughout all surveys completed at Mayfield. The common pipistrelle is common across the UK (Battersby 2005).

3.15 All summer roosts identified at the Mayfield site would be classed as ‘low status’ following the guidance in Mitchell-Jones (2004) because they are of individual to low numbers of bats of common species and not maternity sites.

3.16 Hibernation sites for small numbers of common to rarer species have higher conservation significance, but this activity can be hard to confirm by survey in large structures of the type covered in this report. Hibernation evidence was not found during inspections and dedicated hibernation surveys were not carried out at Mayfield B2. This is because the approach from the outset has been to address impacts through timing of works and provision of compensation roost features (Wardell Armstrong 2013, 2014).

Table 4 Summary of Bat Roost Status

Structure	Roost Classification	Roost Status
B1	Day roost used by 1 common pipistrelle, non-breeding, occasional use.	Low
B2	Internal non-breeding summer day roost for up to 4 common pipistrelles.	Low
	External non-breeding summer day roost for up to 4 common pipistrelles.	Low
	Hibernation roost potential for common pipistrelles.	Moderate
B6	Summer day roost used by 1 common pipistrelle, non-breeding, occasional use.	Low
B23	Day roost for 2 common pipistrelles, non-breeding, occasional use	Low
B24	Day roost used by up to 5 common pipistrelles, non-breeding, regular use.	Low

4. IMPACTS

4.1 Roosts in Buildings B2 (external), B6 and culvert B24 will be directly impacted by demolition proposals and will require an EPS mitigation licence and accompanying mitigation and compensation strategy.

4.2 Later phases of the project may impact upon roosts in B1, B2 (internal and hibernation) and B23.

4.3 The location of all roosts is shown on Figure 1.

Confirmed Roosts Affected by Demolition Proposals

4.4 The three confirmed roosts in B2 (external), B6 and B24, which are affected by current demolition proposals, have been evaluated (after Mitchell-Jones 2004) as roosts of 'low status', for which there is flexibility over the provision of bat boxes and no conditions about timing or monitoring.

4.5 Impacts have been identified as follows, based upon the following factors:

- B2 – removal of the depot ramp is likely to result in temporary disturbance of the external roost located upon the south face of the building, and may result in permanent destruction of the roost itself;
- B6 – removal of B6 will result in permanent destruction of the roost; and
- B24 – removal of the buildings over the culvert may result in temporary disturbance of the roost within the culvert.

Confirmed Roosts with Potential Impacts from Future Proposals

4.6 The following buildings are potentially affected by future proposals for the Mayfield site:

- B1;
- B2 (interior and hibernation);
- B23; and
- B24 (removal of culvert).

5. RECOMMENDATIONS

5.1 For culverts and buildings with confirmed bat roosts, demolition, refurbishment or structural works could result in the modification or destruction of a bat roost, an offence under current wildlife legislation. All British bats hibernate during the winter and, therefore, have very different habitat requirements depending on the season. This means that although bats do typically use the same roost sites annually, the majority of roosts are used for only part of each year. For this reason it should be noted that a bat roost remains fully protected by law regardless of whether or not bats are present at that time.

5.2 In line with current good practice, if development has not begun within two years of this report then the bat surveys should be repeated to re-assess how bats are using B2 and the culvert B24. These would update (and hopefully confirm) the location and nature of any roosting activity at that time.

Licence Application

5.3 An EPSL bat mitigation licence has been obtained for the current works affecting B2, B6 and B24.

5.4 For other roosts within the site, it is likely that they will be affected by future phases of the works, and would therefore require mitigation licensing at that time. At present the roosts on site are all 'low status' (Mitchell-Jones 2004) and based upon current guidance (e.g. Mitchell-Jones 2004, Collins 2016) the application should include an outline mitigation strategy broadly as follows:

- A toolbox talk for contractors to brief them on the presence of bats and provisions of the mitigation strategy;
- Scheduling works for periods of least potential for disturbance of bats, e.g. autumn/winter/spring (for demolition);
- Survey for bat presence (by inspection or emergence/re-entry) prior to works, including up-close inspection by licensed bat ecologist of individual potential roost features (PRF) where possible;
- Plan and agree approach to PRF and roost removal, possibly involving destructive hand-search. A licensed bat ecologist may be required to oversee works;
- Temporary roost feature for re-homing bats discovered during works;
- Agree approach to handling bats injured during works;
- Agree approach to dealing with bats uncovered when bat ecologist not present;
- The compensation strategy to include replacement roost features (e.g. bat boxes) – types and potential locations to be agreed in advance of works.

5.5 It should be noted that all bat boxes erected under the terms of an EPSL licence are expected to be maintained *in situ* for five years. If boxes become occupied by bats they may need inclusion within an EPSL to be moved or disturbed.

Ecological Enhancements

5.6 Alternative roost habitat and features provided for common pipistrelle bats, e.g. bat boxes, should be planned and designed with the habitat needs of nocturnal animals in mind. In addition to bat boxes attached to building exteriors, there is potential for incorporating suitable roost features into new or existing structures.

5.7 Culvert B24 is to be removed. The process of 'day-lighting' and uncovering buried urban rivers, restoring them to more natural conditions, creates new habitat for plants and animals and extends green corridors. The ecological benefits are significant and of overall benefit to bats, but the designs should consider the specific requirements of nocturnal animals as outlined above.

5.8 In any bat roost provision including enhancement, the lighting design should completely avoid all illumination along the river corridor and roost locations to minimise light spill into this important habitat. The strategy should be informed by published guidance on how artificial lighting can effect bat (and other animal) behaviour, e.g. guidelines for mitigation (Institution of Lighting Professionals and Bat Conservation Trust 2018, Bat Conservation Trust 2014, RPEP 2009).

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7. ABBREVIATIONS

CIEEM	Chartered Institute of Ecology and Environmental Management
CRoW	Countryside and Rights of Way
EPS	European Protected Species
EPSL	European Protected Species Licence
NERC	Natural Environment and Rural Communities
NPPF	National Planning Policy Framework
PAA	Penny Anderson Associates Ltd
PRF	Potential Roost Feature(s)
RPEP	Royal Commission of Environmental Pollution
WCA	Wildlife and Countryside Act

FIGURE

384800 384900 385000 385100 385200 385300 385400 385500

397800 397700 397600 397500 397400

B1
Summer day roost for
1 common pipistrelle bat

B2
External day roost for up to 4
non-breeding common pipistrelle bats

Summer day roost for 1
non-breeding common pipistrelle bat

B2
Internal non-breeding summer
roost, up to 4 common pipistrelle.
Hibernation potential

B24 (culvert)
Summer day roost for approx. 5
non-breeding common pipistrelle bats

Summer day roost for 1
non-breeding common pipistrelle bat

B22 B1 B2 B21 B23 B25 B20 B3 B4 B24 B5 B6 B9 B7a B7b B7c B8 B10a B10b B12 B19 B26 B11 B15 B16 B17 B18 B13 B14

Temperance St
Crane St
Baring St
Bond St
Hoyle St



BUROHAPPOLD ENGINEERING

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Buxton, Derbyshire, SK17 6SN.
Telephone 01298 27086

Penny Anderson Associates Ltd
Consultant Ecologists

N

British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

0 10 20 40 60 80 Metres

Legend

- Site boundary
- Confirmed roost
- No evidence of roosting
- Building no longer present
- Roost entrance
- Roost entrance area
- Surveyor

Title:

Bat Roost Summary 2013 to 2019

Project Name	Mayfield, Manchester		
Discipline	Ecology		
Scale	1:2,000	Drawing No.	Figure 1
Drawn By	CC	Originator GJH	Date 06/03/2019
PAA Ref.	G:\BUHA01_1_Mayfield_Picadilly\Maps\Figures	Revision	A

Ordnance Survey © Crown copyright and database right 2018

PLATES



Plate 1 Southern side of B2 – roost entrance identified towards end of ramp during earlier survey work undertaken by other consultants during 2014



Plate 2 Three to four bats seen close to building at sunset during dusk surveys, considered likely to be roosting but exact roost feature not identified



Plate 3 Culvert B24 box section culvert over River Medlock



Plate 4 Culvert B24 showing gaps at junction between wall and roof



Plate 5 Culvert B24 wall of mixed materials



Plate 6 Culvert B24 example crevice at join between wall and roof with bat roost potential but no evidence



Plate 7 Culvert B26 looking upstream, showing on-site headwall. Brickwork largely intact with few crevices (February 2019)



Plate 8 Culvert B26 looking upstream, showing intact brickwork interior (February 2019)

Penny Anderson Associates Ltd

CONSULTANT ECOLOGISTS



Park Lea, 60 Park Road, Buxton, Derbyshire SK17 6SN

Registered Office as Above | Registered in England & Wales | Company No. 4223109 | Directors: Mrs P Anderson Mr P Worrall Miss S Rogers

Appendix 10.1 Ground Engineering Desk Study Report- Mayfield Regeneration

FACTUAL GROUND INVESTIGATION AND TEST REPORT FOR REDEVELOPMENT OF LAND TO THE SOUTH OF MANCHESTER PICCADILLY RAILYWAY STATION, MANCHESTER.

Date: 8th October 2009
Our Ref: DPS/17855

Client: British Railway Board (Residuary) Ltd
Whittles House
14 Pentonville Road
London
N1 9HF

Engineer: Buro Happold Ltd
2 Brewery Place
Brewery Wharf
Leeds
LS10 1NE

Report Status: Final

CONTENTS

SECTION		PAGE No.
1	Introduction	1
2	The Site	1
3	Fieldwork	2
4	Contamination Testing	3
5	Ground Conditions	3
	References	4

APPENDICES

A	Window Sample Borehole Logs
B	Gas and Groundwater Monitoring Results
C	Contamination Test Results (SAL)
D	Exploratory Hole Location Plan - Drawing No.1
E	Notes on Site Investigation Reports

1 Introduction

1.1 It is proposed to redevelop an area of land located to the south of Piccadilly Railway Station in Manchester City Centre.

1.2 Upon the instruction of the client, British Railway Board (Residuary) Ltd and supervised by the Engineer, Buro Happold Ltd, a ground investigation was undertaken consisting of seven window sample boreholes. The purpose of the investigation was to determine the nature of the prevailing ground conditions. The form and extent of the investigation was specified and supervised by the Engineer in conjunction with the client.

1.3 This report contains a factual record of the fieldwork, laboratory test results, anticipated geology and strata encountered by this investigation.

2 The Site

2.1 The site itself is bounded to the north / east by Fairfield Street and Temperance Street, to the west by Baring Street and to the south by the River Medlock. The area of BH1/1a/1b comprised a triangular island of grass. BH2 was situated on a gravel covered car park to the rear of the Star and Garter public house and could be accessed via Nield Street. BH3 and BH4 were accessed via a padlocked gate at the junction of Travis Street and Fairfield Street. A cobbled ramp around 150m in length rises approximately 10m in elevation opening out onto a cobble and hardcore covered area where BH3 was located. To the south and east of this, separated by a steel fence, is what is believed to be former railway platforms with a corrugated steel roof. A narrow track leads south east from BH3 to BH4 beyond which the land opens out onto active railway lines. BH5 is accessed by another padlocked gate off Baring Street opposite Buxton Street. The gate opens out onto a rough concrete and cobbled yard upon which there are numerous rusted steel containers, broken wheelie bins, piles of rubble, used tyres and at least one storage tank. The land to the east and south of BH5 is inaccessible due to overgrown vegetation.

2.2 The location of the site and position of the exploratory holes, as determined initially by Buro Happold, are indicated upon the appended site plan (Drawing No.1).

3 Fieldwork

3.1 General Comments

3.1.1 The prevailing ground conditions were determined by the use of window sample boreholes (7 no). All exploratory works were carried out, where appropriate, in accordance with BS 5930 (Ref. 1).

3.2 Window Sample Boreholes

3.2.1 Seven window sample boreholes were sunk to depths of between 0.35m (BH 1A) and 3.80m (BH 2) below ground level.

3.2.2 At the request of Buro Happold environmental samples comprising a 1kg plastic tub, 250ml amber glass jar and 60ml glass amber vial (McCartney Vial) were taken for use in contamination testing and as an aid for the production of the appended engineer verified borehole logs.

3.3 Instrumentation and Monitoring

3.3.1 50mm internal diameter HDPE monitoring standpipes were installed within BH 2 & 5, monitoring of which has been carried out three times over a four week period. The results of this monitoring are included within the appendices.

4 Contamination Testing

4.1 A schedule of contamination testing was prepared by Buro Happold and carried out by SAL according to the specifications prepared by Buro Happold. The results of this testing are included within the appendices.

5 Ground Conditions

5.1 Anticipated Geology

5.1.1 The available geological information (Ref 2) shows the site to be underlain by superficial deposits in the form of Late Glacial Flood Gravels. This masks the solid geology beneath the site which comprises the Bunter Sandstone strata of the Triassic Period.

5.2 Strata Encountered

5.2.1 Reference should be made to the appended exploratory hole records for full details of the strata encountered by this investigation.

FOR AND ON BEHALF OF:
GIP LTD

D.P. Shuker HNC (Civils), F.G.S.
ENGINEERING GEOLOGIST

J.P.Hughes B.Sc., M.Sc., C.Geol., F.G.S., C.Sci. Eur.Geol
TECHNICAL DIRECTOR

References

1. British Standards Institution 5930 (1999); Code of Practice for Site Investigation.

2. British Geological Survey Sheet 85 ‘Manchester’ Solid & Drift Editions 1:50,000 Series.

APPENDIX A



GROUND INVESTIGATION & PILING LTD
Competitor 130 Borehole Log

Borehole No. BH1
Page No. Sheet 1 of 1

Level (mAOD): 40.39
Date: 04/09/2009 to 04/09/2009
Coordinates E: 384933.75 N397725.59
Location: Manchester City Centre
Cased (m):
Client: British Railway Board (Residuary) Ltd
Diameter (mm):
Engineer: Buro Happold

DESCRIPTION OF STRATA	Legend	Depth (m bgl)	Level (m AOD)	Water Level (m bgl)	Samples/Tests Type	Samples/Tests Depth (m bgl)	SPT 'N' Value	Hand Vane (kPa)	Piezo /Gas Pipe
MADE GROUND:- Turf onto grey silty gravelly SAND with some cobbles of brick, concrete and hardcore. Gravel is angular to subangular brick, concrete, hardcore and ash					ES	0.30			
					ES	0.60			
- pockets of white ash from 0.60m to 0.70m		0.80	39.59						
MADE GROUND:- CONCRETE									
Borehole Complete									

SAMPLES / TESTS

U	Undisturbed Sample
D	Disturbed
B	Bulk
W	Water
S/C	SPT/CPT
▽	Water strike
▼	Water level

OTHER INFORMATION

1. Hand excavated service avoidance pit to 0.80m. Concrete obstruction in ground, moved to BH1A at engineers request.
2. No groundwater encountered.
3. ES = 1 tub, 250ml amber jar, 60ml McCartney Vial

Logged by	TPH
Checked by	DPS

Project No. 17855

Ground Investigation & Piling Limited,Devonshire House, Ettingshall Road, Wolverhampton,WV2 2JT. Tel. 01902 459558 Fax 01902 459085

GROUND INVESTIGATION & PILING LTD
Competitor 130 Borehole Log

Borehole No. BH1A
Page No. Sheet 1 of 1

Level (mAOD): 40.50
Date: 04/09/2009 to 04/09/2009
Coordinates E: 384937.48 N397725.16
Location: Manchester City Centre
Cased (m):
Client: British Railway Board (Residuary) Ltd
Diameter (mm):
Engineer: Buro Happold

DESCRIPTION OF STRATA	Legend	Depth (m bgl)	Level (m AOD)	Water Level (m bgl)	Samples/Tests Type	Samples/Tests Depth (m bgl)	SPT 'N' Value	Hand Vane (kPa)	Piezo /Gas Pipe
MADE GROUND:- Turf onto dark grey gravelly SAND. Gravel is angular ash		0.15	40.35		ES	0.25			
MADE GROUND:- TARMAC (in situ)		0.20	40.30						
MADE GROUND:- Brown and dark grey very gravelly SAND. Gravel is angular to subangular hardcore and tarmac		0.35	40.15						
MADE GROUND:- CONCRETE									
Borehole Complete									

SAMPLES / TESTS

U	Undisturbed Sample
D	Disturbed
B	Bulk
W	Water
S/C	SPT/CPT
▽	Water strike
▼	Water level

OTHER INFORMATION

1. Hand excavated service avoidance pit to 0.35m. Concrete obstruction in ground, moved to BH1B at engineers request.
2. No groundwater encountered.
3. ES = 1 tub, 250ml amber jar, 60ml McCartney Vial

Logged by	TPH
Checked by	DPS

Project No. 17855

Ground Investigation & Piling Limited,Devonshire House, Ettingshall Road, Wolverhampton,WV2 2JT. Tel. 01902 459558 Fax 01902 459085

GROUND INVESTIGATION & PILING LTD
Competitor 130 Borehole Log

Borehole No. BH1B
Page No. Sheet 1 of 1

Level (mAOD): 40.48
Date: 04/09/2009 to 04/09/2009
Coordinates E: 384943.49 N397725.76
Location: Manchester City Centre
Cased (m):
Client: British Railway Board (Residuary) Ltd
Diameter (mm):
Engineer: Buro Happold

DESCRIPTION OF STRATA	Legend	Depth (m bgl)	Level (m AOD)	Water Level (m bgl)	Samples/Tests Type	Samples/Tests Depth (m bgl)	SPT 'N' Value	Hand Vane (kPa)	Piezo /Gas Pipe
MADE GROUND:- Turf onto grey brown silty gravelly SAND. Gravel is angular to subangular brick, ash, hardcore and concrete		0.40	40.08		ES	0.30			
MADE GROUND:- CONCRETE									
Borehole Complete									

SAMPLES / TESTS

U	Undisturbed Sample
D	Disturbed
B	Bulk
W	Water
S/C	SPT/CPT
▽	Water strike
▼	Water level

OTHER INFORMATION

1. Hand excavated service avoidance pit to 0.40m. Concrete obstruction in ground. Borehole abandoned at engineers instruction.
2. No groundwater encountered.
3. ES = 1 tub, 250ml amber jar, 60ml McCartney Vial.

Logged by	TPH
Checked by	DPS

Project No. 17855

Ground Investigation & Piling Limited,Devonshire House, Ettingshall Road, Wolverhampton,WV2 2JT. Tel. 01902 459558 Fax 01902 459085

GROUND INVESTIGATION & PILING LTD
Competitor 130 Borehole Log

Borehole No. BH2
Page No. Sheet 1 of 1

Level (mAOD): 39.77
Date: 04/09/2009 to 04/09/2009
Coordinates E: 385028.89 N397710.75
Location: Manchester City Centre
Cased (m):
Client: British Railway Board (Residuary) Ltd
Diameter (mm): 100
Engineer: Buro Happold

DESCRIPTION OF STRATA	Legend	Depth (m bgl)	Level (m AOD)	Water Level (m bgl)	Samples/Tests Type	Samples/Tests Depth (m bgl)	SPT 'N' Value	Hand Vane (kPa)	Piezo /Gas Pipe
MADE GROUND:- Dark grey sandy GRAVEL. Gravel is angular hardcore and brick		0.05	39.72		ES	0.30			
MADE GROUND:- Grey brown silty gravelly SAND with some cobbles of brick, quartz, cloth and timber. Gravel is angular to subrounded brick, rubber, quartz, hardcore, slate, timber and ash					ES	0.70			
					ES	1.00			
- becoming clayey and ash rich below 1.50m					ES	1.70			
POSSIBLE MADE GROUND:- Soft to firm brown very sandy gravelly friable CLAY occasionally tending to very clayey sand. Gravel is subangular to subrounded sandstone and quartz		1.90	37.87		ES	2.50			
Orange brown silty fine to medium SAND		3.20	36.57		ES	3.60			
Borehole Complete		3.80	35.97						

SAMPLES / TESTS

U	Undisturbed Sample
D	Disturbed
B	Bulk
W	Water
S/C	SPT/CPT
▽	Water strike
▼	Water level

OTHER INFORMATION

1. Hand excavated service avoidance pit to 1.20m.
2. No groundwater encountered.
3. 50mm ID HDPE standpipe installed to 3.0m (slotted from 1.0m to 3.0m) with gravel filter, bentonite seals from 3.80m to 3.0m and 1.0m to 0.30m and concrete to ground level. Lockable security cover fitted flush at surface.
4. ES = 1 tub, 250ml amber jar, 60ml McCartney Vial

Logged by	TPH
Checked by	DPS

Project No. 17855

Ground Investigation & Piling Limited,Devonshire House, Ettingshall Road, Wolverhampton,WV2 2JT. Tel. 01902 459558 Fax 01902 459085

GROUND INVESTIGATION & PILING LTD
Competitor 130 Borehole Log

Borehole No. BH3
Page No. Sheet 1 of 1

Level (mAOD): 49.87
Date: 04/09/2009 to 04/09/2009
Coordinates E: 385184.48 N397662.57
Cased (m):
Diameter (mm):

Location: Manchester City Centre
Client: British Railway Board (Residuary) Ltd
Engineer: Buro Happold

DESCRIPTION OF STRATA	Legend	Depth (m bgl)	Level (m AOD)	Water Level (m bgl)	Samples/Tests Type	Samples/Tests Depth (m bgl)	SPT 'N' Value	Hand Vane (kPa)	Piezo /Gas Pipe
MADE GROUND:- Rough grass onto dark grey silty gravelly SAND with occasional cobbles of brick and timber. Gravel is angular to subangular brick, concrete, roadstone, ash and tarmac		0.40	49.47		ES	0.20			
					ES	0.50			
MADE GROUND:- Grey GRAVEL. Gravel is subangular medium roadstone		0.70	49.17						
Borehole Complete									

SAMPLES / TESTS

U	Undisturbed Sample
D	Disturbed
B	Bulk
W	Water
S/C	SPT/CPT
▽	Water strike
▼	Water level

OTHER INFORMATION

1. Hand excavated service avoidance pit to 0.70m. Pit abandoned at 0.7m at engineers request, due to continuous side collapse.
2. No groundwater encountered.
3. ES = 1 tub, 250ml amber jar, 60ml McCartney Vial.

Logged by	TPH
Checked by	DPS

Project No. 17855

Ground Investigation & Piling Limited,Devonshire House, Ettingshall Road, Wolverhampton,WV2 2JT. Tel. 01902 459558 Fax 01902 459085

GROUND INVESTIGATION & PILING LTD
Competitor 130 Borehole Log

Borehole No. BH4
Page No. Sheet 1 of 1

Level (mAOD): 49.44
Date: 04/09/2009 to 04/09/2009
Coordinates E: 385246.41 N397616.43
Location: Manchester City Centre
Cased (m):
Client: British Railway Board (Residuary) Ltd
Diameter (mm):
Engineer: Buro Happold

DESCRIPTION OF STRATA	Legend	Depth (m bgl)	Level (m AOD)	Water Level (m bgl)	Samples/Tests Type	Samples/Tests Depth (m bgl)	SPT 'N' Value	Hand Vane (kPa)	Piezo /Gas Pipe
MADE GROUND:- Grey sandy GRAVEL with some cobbles. Gravel and cobbles are angular roadstone and occasional timber		0.40	49.04		ES	0.40			
Borehole Complete									

SAMPLES / TESTS

U	Undisturbed Sample
D	Disturbed
B	Bulk
W	Water
S/C	SPT/CPT
▽	Water strike
▼	Water level

OTHER INFORMATION

1. Hand excavated service avoidance pit to 0.40m. Concrete obstruction in ground. Borehole abandoned at engineers request.
2. No groundwater encountered.
3. ES = 1 tub, 250ml amber jar, 60ml McCartney Vial.

Logged by	TPH
Checked by	DPS

Project No. 17855

Ground Investigation & Piling Limited,Devonshire House, Ettingshall Road, Wolverhampton,WV2 2JT. Tel. 01902 459558 Fax 01902 459085

GROUND INVESTIGATION & PILING LTD
Competitor 130 Borehole Log

Borehole No. BH5
Page No. Sheet 1 of 1

Level (mAOD): 37.70
Date: 04/09/2009 to 04/09/2009
Coordinates E: 384996.22 N397634.52
Location: Manchester City Centre
Cased (m):
Client: British Railway Board (Residuary) Ltd
Diameter (mm): 100
Engineer: Buro Happold

DESCRIPTION OF STRATA	Legend	Depth (m bgl)	Level (m AOD)	Water Level (m bgl)	Samples/Tests Type	Samples/Tests Depth (m bgl)	SPT 'N' Value	Hand Vane (kPa)	Piezo /Gas Pipe
MADE GROUND Concrete									
		0.30	37.40						
MADE GROUND:- CONCRETE (to 0.30m) onto light grey sitly SAND and GRAVEL with some cobbles of brick hardcore and concrete. Gravel is angular ash, brick and concrete					ES	0.50			
					ES	1.00			
		1.10	36.60		ES	1.10			
MADE GROUND:- Soft to firm grey and dark grey very sandy gravelly CLAY. Gravel is angular to subangular ash, brick and quartz		1.50	36.20		ES	1.50			
MADE GROUND:- Light grey gravelly SAND. Gravel is angular ash and crushed brick									
		2.10	35.60						
Light brown clayey SAND with clay laminae and occasional quartz gravels		2.30	35.40		ES	2.20			
		2.40	35.30						
Light orange brown silty fine to coarse SAND									
Borehole Complete									

SAMPLES / TESTS

U	Undisturbed Sample
D	Disturbed
B	Bulk
W	Water
S/C	SPT/CPT
▽	Water strike
▼	Water level

OTHER INFORMATION

1. Hand excavated service avoidance pit to 1.10m.
2. No groundwater encountered.
3. 50mm ID HDPE standpipe installed to 2.30m (slotted from 2.30m to 1.0m) with gravel filter, bentonite seals from 2.40m to 2.30m and 1.0m to 0.3m with concrete to ground level. Lockable security cover fitted ats surface.
4. ES = 1 tub, 250ml amber jar, 60ml McCartney Vial.

Logged by	TPH
Checked by	DPS

Project No. 17855

Ground Investigation & Piling Limited,Devonshire House, Ettingshall Road, Wolverhampton,WV2 2JT. Tel. 01902 459558 Fax 01902 459085

APPENDIX B



GIP Ltd. Ground Investigation & Piling Limited

Devonshire House, Ettingshall Road,
Wolverhampton. WV2 2JT.
Tel. 01902 459558 Fax. 01902 459085

STANDPIPE GAS & GROUNDWATER MONITORING RESULTS

CONTRACT No. 17855 **SITE** Manchester City Centre **CLIENT / ENGINEER** British Railway Board (Residuary) Ltd / Buro Happold

REPORT DATE 16/11/2009

CHECKED **NOTES**

Borehole. ID No	Date/Time	CH_4 (%) (by Volume)	CO_2 (%) (by Volume)	O_2 (%) (by Volume)	Peak CH_4 (%) (by Volume)	Atmospheric Pressure (mbar)	Relative Pressure (mbar)	Gas Flow Rate (l/hr)	Air Temperature (^oC)	Operator Initials	CO (ppm)	H_2S (ppm)	N_2 & Inert Gases (%) (by Volume) (by difference)	Borehole Temperature (^oC)	Groundwater (mbgl)
MANCHBH2	16/09/2009 09:18	0.0	4.9	15.6	0.0	1021	0.27	0.3	14	AG	0	0	79.5	14	Dry
MANCHBH5	16/09/2009 09:46	0.0	7.3	11.8	0.0	1021	0.33	0.2	14	AG	0	0	80.9	14	Dry
MANCHBH2	23/09/2009 13:02	0.0	5.2	14.5	0.0	1004	-0.2	0.1	17	AG	0	0	80.3	17	Dry
MANCHBH5	23/09/2009 13:23	0.0	5.6	10.5	0.0	1004	-0.15	0	17	AG	0	0	83.9	17	Dry
MANCHBH2	07/10/2009 14:37	0.0	4.2	15.9	0.0	1000	0.09	-0.4	17	AG	0	0	79.9	17	Dry
MANCHBH5	07/10/2009 14:49	0.0	6.1	13.4	0.0	1000	0.14	-0.4	17	AG	0	0	80.5	17	Dry

APPENDIX C



Scientific Analysis Laboratories is a limited company registered in England and Wales (No 2514788) whose address is at Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 176378-4

Date of Report: 05-Oct-2009

Customer: Ground Investigation & Piling Ltd
Devonshire House
Ettingshall Road
Wolverhampton
WV2 2JT

Customer Contact: Mr Andy McHugh

Customer Job Reference: 17855
Customer Purchase Order: 29685
Customer Site Reference: Manchester City Centre
Date Job Received at SAL: 08-Sep-2009
Date Analysis Started: 10-Sep-2009
Date Analysis Completed: 05-Oct-2009

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs

UKAS TESTING
1549

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Mr Ross Walker
Customer Services Manager

Issued by :

Index to symbols used in 176378-4

Value	Description
AR	As Received
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
2:1	Leachate to BS EN 12457-3 (2:1)
8:1	Leachate to BS EN 12457-3 (8:1)
N.D.	Not Detected
2	LOD Raised Due to Matrix Interference
9	LOD raised due to dilution of sample
W	Analysis was performed at another SAL laboratory
S	Analysis was subcontracted
U	Analysis is UKAS accredited
M	Analysis is MCERTS accredited
N	Analysis is not accredited

Notes

"Fill" samples are outside the scope of our MCERTS accreditation. Results are UKAS only

Waste Acceptance Criteria

Customer Sample Reference : BH1
SAL Sample Reference : 176378 001
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Test Portion Mass (g) : 175
Depth : 0.30
Type : Topsoil

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.017	ug/l		2
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.12	ug/l		12
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.22	ug/l		22
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00021	ug/l		0.02
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.034	ug/l		3
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.026	ug/l		2.6
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.0048	ug/l		0.5
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l		<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.047	ug/l		5
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l		<1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.0083	ug/l		0.8
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.024	ug/l		2
Chloride	Calc / IC	0.50	mg/kg	N	3.5	mg/l		0.35
Fluoride	Calc / IC	0.50	mg/kg	N	4.4	mg/l		0.44
Sulphate ion	Calc / IC	0.50	mg/kg	N	50	mg/l		5.0
Total Dissolved Solids	Calc	100	mg/kg	N	590	mg/l		<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l		<.1
pH	Calc / Probe			N		pH		9.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	51	mg/l		5
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Note:- Sample failed to produce sufficient eluate within the specified time after vacuum filtration for 1 hour and centrifugation for 30 minutes. Therefore, the exact application of the two-step leaching test is precluded on technical grounds. (ref: Section 5.2.4 BS EN 12457-3:2002) Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH1
SAL Sample Reference : 176378 002
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Test Portion Mass (g) : 175
Depth : 0.60
Type : Topsoil

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.018	ug/l	3	2
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.16	ug/l	5.5	17
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.21	ug/l	41	18
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00031	ug/l	0.07	0.03
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.032	ug/l	5	3
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.042	ug/l	5.8	4.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	<0.0030	ug/l	3.9	<.3
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l	<.05	<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.080	ug/l	18	7
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l	2	<1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.012	ug/l	1.0	1.2
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.026	ug/l	4	2
Chloride	Calc / IC	0.50	mg/kg	N	5.6	mg/l	1.9	0.41
Fluoride	Calc / IC	0.50	mg/kg	N	3.8	mg/l	0.77	0.33
Sulphate ion	Calc / IC	0.50	mg/kg	N	63	mg/l	17	5.0
Total Dissolved Solids	Calc	100	mg/kg	N	630	mg/l	120	<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l	<.1	<.1
pH	Calc / Probe			N		pH	7.8	8.4
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	28	mg/l	4	3
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH1B
SAL Sample Reference : 176378 003
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Depth : 0.30
Test Portion Mass (g) : 175
Type : Topsoil

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.033	ug/l	6	3
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.12	ug/l	7.3	12
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.38	ug/l	33	38
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00064	ug/l	0.04	0.07
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.088	ug/l	9	9
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.097	ug/l	8.3	9.9
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.21	ug/l	4.6	23
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	0.0070	ug/l	0.20	0.76
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.042	ug/l	7	4
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.024	ug/l	2	3
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.0080	ug/l	0.8	0.8
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.17	ug/l	4	18
Chloride	Calc / IC	0.50	mg/kg	N	3.8	mg/l	1.1	0.29
Fluoride	Calc / IC	0.50	mg/kg	N	4.8	mg/l	0.95	0.42
Sulphate ion	Calc / IC	0.50	mg/kg	N	47	mg/l	13	3.8
Total Dissolved Solids	Calc	100	mg/kg	N	690	mg/l	110	<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l	<.1	<.1
pH	Calc / Probe			N		pH	7.6	8.1
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	81	mg/l	21	6
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH2
SAL Sample Reference : 176378 005
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Depth : 1.70
Test Portion Mass (g) : 175
Type : Topsoil

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.045	ug/l	8	4
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.070	ug/l	7.0	7.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.083	ug/l	15	8
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00063	ug/l	0.14	0.05
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.050	ug/l	9	5
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.065	ug/l	9.4	6.2
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.019	ug/l	12	0.7
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l	<.05	<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.17	ug/l	35	15
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.026	ug/l	4	2
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.013	ug/l	2.2	1.2
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.051	ug/l	19	3
Chloride	Calc / IC	0.50	mg/kg	N	5.1	mg/l	1.9	0.35
Fluoride	Calc / IC	0.50	mg/kg	N	3.3	mg/l	0.34	0.33
Sulphate ion	Calc / IC	0.50	mg/kg	N	97	mg/l	30	7.4
Total Dissolved Solids	Calc	100	mg/kg	N	1100	mg/l	190	<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l	<.1	<.1
pH	Calc / Probe			N		pH	7.9	7.9
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	30	mg/l	6	3
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH2
SAL Sample Reference : 176378 006
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Test Portion Mass (g) : 175
Depth : 2.50
Type : Sand

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l	<1	<1
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.0058	ug/l	1.0	0.5
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.043	ug/l	12	3
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	<0.00020	ug/l	0.05	<.02
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.020	ug/l	5	2
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l	1.2	<.5
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	<0.0030	ug/l	2.9	<.3
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l	<.05	<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.055	ug/l	8	5
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l	2	<1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l	2.4	<.5
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.033	ug/l	6	3
Chloride	Calc / IC	0.50	mg/kg	N	3.0	mg/l	1.2	0.20
Fluoride	Calc / IC	0.50	mg/kg	N	1.5	mg/l	0.15	0.15
Sulphate ion	Calc / IC	0.50	mg/kg	N	82	mg/l	26	6.0
Total Dissolved Solids	Calc	100	mg/kg	N	490	mg/l	<100	<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l	<.1	<.1
pH	Calc / Probe			N		pH	7.8	7.9
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	27	mg/l	3	3
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH2
SAL Sample Reference : 176378 007
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Test Portion Mass (g) : 175
Depth : 3.60
Type : Clay

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l		<1
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.0060	ug/l		0.6
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.017	ug/l		2
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	<0.00020	ug/l		<.02
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.011	ug/l		1
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l		<.5
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	<0.0030	ug/l		<.3
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l		<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l		<1
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l		<1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l		<.5
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.054	ug/l		5
Chloride	Calc / IC	0.50	mg/kg	N	1.9	mg/l		0.19
Fluoride	Calc / IC	0.50	mg/kg	N	0.63	mg/l		0.06
Sulphate ion	Calc / IC	0.50	mg/kg	N	12	mg/l		1.2
Total Dissolved Solids	Calc	100	mg/kg	N	140	mg/l		<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l		<.1
pH	Calc / Probe			N		pH		7.9
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	75	mg/l		8
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Note:- Sample failed to produce sufficient eluate within the specified time after vacuum filtration for 1 hour and centrifugation for 30 minutes. Therefore, the exact application of the two-step leaching test is precluded on technical grounds. (ref: Section 5.2.4 BS EN 12457-3:2002) Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH3
SAL Sample Reference : 176378 008
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Depth : 0.20
Test Portion Mass (g) : 175
Type : Topsoil

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.011	ug/l	2	1
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.088	ug/l	5.1	9.3
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.31	ug/l	40	30
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00021	ug/l	0.02	0.02
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.029	ug/l	4	3
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.045	ug/l	6.6	4.2
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.019	ug/l	2.8	1.8
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l	<.05	<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.027	ug/l	4	3
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.011	ug/l	2	1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l	<.5	<.5
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.080	ug/l	20	7
Chloride	Calc / IC	0.50	mg/kg	N	5.3	mg/l	1.8	0.38
Fluoride	Calc / IC	0.50	mg/kg	N	1.7	mg/l	0.29	0.15
Sulphate ion	Calc / IC	0.50	mg/kg	N	52	mg/l	13	4.3
Total Dissolved Solids	Calc	100	mg/kg	N	670	mg/l	120	<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l	<.1	<.1
pH	Calc / Probe			N		pH	8.0	7.8
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	75	mg/l	13	7
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.0019	ug/l		0.21
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.00045	ug/l		0.05
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.0037	ug/l		0.41
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.0017	ug/l		0.19
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.00018	ug/l		0.02
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.0021	ug/l		0.24
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.00036	ug/l		0.04
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.00009	ug/l		0.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.00009	ug/l		0.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.00018	ug/l		0.02
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	0.011	ug/l		1.2
Diesel Range Organics	Calc / GC/FID (LV)	0.90	mg/kg	N	<0.90	mg/l		(2) <.1
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.90	mg/kg	N	<0.90	mg/l		(2) <.1
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH4
SAL Sample Reference : 176378 010
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Test Portion Mass (g) : 175
Depth : 0.30
Type : Fill

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.016	ug/l	2	1
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.076	ug/l	6.8	7.7
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.34	ug/l	42	33
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00058	ug/l	0.11	0.05
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.018	ug/l	3	2
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.017	ug/l	2.5	1.6
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.0058	ug/l	1.5	0.5
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l	<.05	<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.14	ug/l	29	12
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l	1	<1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l	<.5	<.5
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.038	ug/l	2	4
Chloride	Calc / IC	0.50	mg/kg	N	2.4	mg/l	0.55	0.20
Fluoride	Calc / IC	0.50	mg/kg	N	0.89	mg/l	0.19	0.08
Sulphate ion	Calc / IC	0.50	mg/kg	N	62	mg/l	13	5.3
Total Dissolved Solids	Calc	100	mg/kg	N	520	mg/l	<100	<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l	<.1	<.1
pH	Calc / Probe			N		pH	8.1	7.9
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	59	mg/l	10	5
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH5
SAL Sample Reference : 176378 012
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Depth : 1.10
Test Portion Mass (g) : 175
Type : Clay

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.019	ug/l		2
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	2.0	ug/l		200
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.11	ug/l		11
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00027	ug/l		0.03
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.028	ug/l		3
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.033	ug/l		3.3
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.0072	ug/l		0.7
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l		<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.069	ug/l		7
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l		<1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l		<.5
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.031	ug/l		3
Chloride	Calc / IC	0.50	mg/kg	N	6.8	mg/l		0.68
Fluoride	Calc / IC	0.50	mg/kg	N	3.5	mg/l		0.35
Sulphate ion	Calc / IC	0.50	mg/kg	N	85	mg/l		8.5
Total Dissolved Solids	Calc	100	mg/kg	N	740	mg/l		<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l		<.1
pH	Calc / Probe			N		pH		7.6
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	13	mg/l		1
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.40	mg/kg	N	<0.40	mg/l		(2) <.04
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	1.0	mg/kg	N	<1.0	mg/l		(2) <.1
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Note:- Sample failed to produce sufficient eluate within the specified time after vacuum filtration for 1 hour and centrifugation for 30 minutes. Therefore, the exact application of the two-step leaching test is precluded on technical grounds. (ref: Section 5.2.4 BS EN 12457-3:2002) Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH5
SAL Sample Reference : 176378 014
SAL Reference : 176378
Project Site : Manchester City Centre
Customer Reference : 17855
Depth : 2.20
Test Portion Mass (g) : 175
Type : Sand

10:1 Leachate					Result	Units	2:1	8:1
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.015	ug/l		1
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.014	ug/l		1.4
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.050	ug/l		5
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00052	ug/l		0.05
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.019	ug/l		2
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l		<.5
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	<0.0030	ug/l		<.3
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	<0.00050	ug/l		<.05
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.16	ug/l		16
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	ug/l		<1
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	<0.0050	ug/l		<.5
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.034	ug/l		3
Chloride	Calc / IC	0.50	mg/kg	N	4.0	mg/l		0.40
Fluoride	Calc / IC	0.50	mg/kg	N	1.5	mg/l		0.15
Sulphate ion	Calc / IC	0.50	mg/kg	N	49	mg/l		4.9
Total Dissolved Solids	Calc	100	mg/kg	N	490	mg/l		<100
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	mg/l		<.1
pH	Calc / Probe			N		pH		8.3
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	WN	30	mg/l		3
Naphthalene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Acenaphthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluorene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Phenanthrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Chrysene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(b/k)Fluoranthene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(a)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Indeno(123-cd)Pyrene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Dibenzo(ah)Anthracene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Benzo(ghi)Perylene	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
PAH(total)	Calc / GC/MS (SIR)	0.00010	mg/kg	N	<0.00010	ug/l		<.01
Diesel Range Organics	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
Total Petroleum Hydrocarbons	Calc / GC/FID (LV)	0.10	mg/kg	N	<0.10	mg/l		<.01
TPH Speciation	Calc / GC/FID	0	mg/kg	N	0			

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Note:- Sample failed to produce sufficient eluate within the specified time after vacuum filtration for 1 hour and centrifugation for 30 minutes. Therefore, the exact application of the two-step leaching test is precluded on technical grounds. (ref: Section 5.2.4 BS EN 12457-3:2002) Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
				Customer Sample Reference	**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
				Depth	**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
				Type	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Moisture	Grav (1 Dec) (40 C)	0.1	%	N	**9.3**	**12**	**10**	**14**	**17**	**9.1**	**9.5**
Moisture @ 105 C	Grav (1 Dec) (105 C)	0.1	%	N	**10**	**12**	**10**	**16**	**17**	**16**	**9.6**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**176378 008**	**176378 009**	**176378 010**	**176378 011**	**176378 012**	**176378 013**	**176378 014**
				Customer Sample Reference	**BH3**	**BH3**	**BH4**	**BH5**	**BH5**	**BH5**	**BH5**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
				Depth	**0.20**	**0.50**	**0.30**	**0.50**	**1.10**	**1.50**	**2.20**
				Type	**Topsoil**	**Fill**	**Fill**	**Sand**	**Clay**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Moisture	Grav (1 Dec) (40 C)	0.1	%	N	**13**	**2.2**	**6.9**	**16**	**17**	**18**	**15**
Moisture @ 105 C	Grav (1 Dec) (105 C)	0.1	%	N	**13**	**2.6**	**15**	**18**	**19**	**16**	**14**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Metals

				SAL Reference	**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
				Customer Sample Reference	**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**	**M40**	**M40**
				Depth	**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
				Type	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Arsenic	ICP/OES	2	mg/kg	M	**21**	**23**	**21**	**21**	**27**	**10**	<2
Cadmium	ICP/OES	1	mg/kg	M	<1	<1	<1	**1**	<1	<1	<1
Chromium	ICP/OES	1	mg/kg	M	**17**	**25**	**32**	**19**	**15**	**31**	**5**
Copper	ICP/OES	1	mg/kg	M	**60**	**65**	**82**	**97**	**210**	**21**	**3**
Lead	ICP/OES	1	mg/kg	M	**140**	**170**	**230**	**940**	**370**	**18**	**3**
Mercury	ICP/OES	1	mg/kg	M	**1**	<1	**6**	**2**	<1	<1	<1
Nickel	ICP/OES	1	mg/kg	M	**19**	**21**	**23**	**24**	**31**	**38**	**4**
Selenium	ICP/OES	3	mg/kg	M	<3	<3	<3	<3	<3	<3	<3
Zinc	ICP/OES	1	mg/kg	M	**210**	**180**	**190**	**340**	**91**	**74**	**9**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Metals

				SAL Reference	**176378 008**	**176378 011**	**176378 012**	**176378 013**	**176378 014**
				Customer Sample Reference	**BH3**	**BH5**	**BH5**	**BH5**	**BH5**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**
				Depth	**0.20**	**0.50**	**1.10**	**1.50**	**2.20**
				Type	**Topsoil**	**Sand**	**Clay**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Arsenic	ICP/OES	2	mg/kg	M	**30**	**16**	**90**	**26**	<2
Cadmium	ICP/OES	1	mg/kg	M	**2**	<1	<1	<1	<1
Chromium	ICP/OES	1	mg/kg	M	**25**	**12**	**19**	**9**	**8**
Copper	ICP/OES	1	mg/kg	M	**110**	**34**	**120**	**32**	**9**
Lead	ICP/OES	1	mg/kg	M	**370**	**480**	**900**	**2800**	**18**
Mercury	ICP/OES	1	mg/kg	M	<1	**1**	**3**	**1**	<1
Nickel	ICP/OES	1	mg/kg	M	**32**	**11**	**24**	**10**	**8**
Selenium	ICP/OES	3	mg/kg	M	<3	<3	<3	<3	<3
Zinc	ICP/OES	1	mg/kg	M	**280**	**93**	**89**	**42**	**20**

SAL Reference: 176378
Project Site: Manchester City Centre
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Soil Analysed as Soil
Metals (Fill)

				SAL Reference	**176378 009**	**176378 010**
				Customer Sample Reference	**BH3**	**BH4**
				Test Sample	**M40**	**M40**
				Depth	**0.50**	**0.30**
				Type	**Fill**	**Fill**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Arsenic	ICP/OES	2.0	mg/kg	U	**3.3**	**12**
Cadmium	ICP/OES	1.0	mg/kg	U	**1.4**	<1.0
Chromium	ICP/OES	1.0	mg/kg	U	**4.7**	**20**
Copper	ICP/OES	1.0	mg/kg	U	**220**	**130**
Lead	ICP/OES	1.0	mg/kg	U	**19**	**59**
Mercury	ICP/OES	1.0	mg/kg	U	<1.0	<1.0
Nickel	ICP/OES	1.0	mg/kg	U	**3.1**	**26**
Selenium	ICP/OES	3.0	mg/kg	U	<3.0	<3.0
Zinc	ICP/OES	1.0	mg/kg	U	**57**	**220**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Boron

				SAL Reference	**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
				Customer Sample Reference	**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
				Depth	**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
				Type	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1	<1	<1

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Soil Analysed as Soil
Boron

				SAL Reference	**176378 008**	**176378 009**	**176378 010**	**176378 011**	**176378 012**	**176378 013**	**176378 014**
				Customer Sample Reference	**BH3**	**BH3**	**BH4**	**BH5**	**BH5**	**BH5**	**BH5**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
				Depth	**0.20**	**0.50**	**0.30**	**0.50**	**1.10**	**1.50**	**2.20**
				Type	**Topsoil**	**Fill**	**Fill**	**Sand**	**Clay**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1	<1	<1

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Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Total and Speciated USEPA16 PAH, Coronene and Phenols

				SAL Reference	**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
				Customer Sample Reference	**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**	**M105**	**M105**
				Depth	**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
				Type	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Naphthalene	GC/MS(MCERTS)	0.1	mg/kg	M	**3.3**	**0.5**	**0.8**	**0.4**	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS(MCERTS)	0.1	mg/kg	U	**2.2**	**0.2**	**0.5**	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS(MCERTS)	0.1	mg/kg	M	**3.1**	**0.5**	**1.2**	**1.7**	<0.1	<0.1	<0.1
Fluorene	GC/MS(MCERTS)	0.1	mg/kg	M	**1.9**	**0.4**	**0.7**	**1.2**	<0.1	<0.1	<0.1
Phenanthrene	GC/MS(MCERTS)	0.1	mg/kg	M	**27**	**5.3**	**10**	**12**	<0.1	<0.1	<0.1
Anthracene	GC/MS(MCERTS)	0.1	mg/kg	U	**6.7**	**1.2**	**2.6**	**2.8**	<0.1	<0.1	<0.1
Fluoranthene	GC/MS(MCERTS)	0.1	mg/kg	M	**34**	**7.6**	**16**	**19**	<0.1	<0.1	<0.1
Pyrene	GC/MS(MCERTS)	0.1	mg/kg	M	**32**	**7.9**	**15**	**17**	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS(MCERTS)	0.1	mg/kg	M	**14**	**3.5**	**7.5**	**8.0**	<0.1	<0.1	<0.1
Chrysene	GC/MS(MCERTS)	0.1	mg/kg	M	**16**	**4.3**	**8.3**	**9.0**	<0.1	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS(MCERTS)	0.1	mg/kg	M	**18**	**4.5**	**12**	**11**	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS(MCERTS)	0.1	mg/kg	M	**13**	**3.2**	**7.1**	**6.8**	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS(MCERTS)	0.1	mg/kg	M	**5.1**	**1.1**	**3.3**	**2.8**	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS(MCERTS)	0.1	mg/kg	M	**2.4**	**0.6**	**1.5**	**0.5**	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS(MCERTS)	0.1	mg/kg	M	**6.1**	**1.5**	**3.9**	**3.4**	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS(MCERTS)	0.1	mg/kg	U	**190**	**43**	**92**	**94**	<0.1	<0.1	<0.1
Coronene	GC/MS(MCERTS)	0.1	mg/kg	N	**2.7**	**0.8**	**1.9**	**1.8**	<0.1	<0.1	<0.1
Total Phenols	GC/MS(MCERTS)	0.1	mg/kg	N	**0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Soil Analysed as Soil

Total and Speciated USEPA16 PAH, Coronene and Phenols

				SAL Reference	176378 008	176378 011	176378 012	176378 013	176378 014
				Customer Sample Reference	BH3	BH5	BH5	BH5	BH5
				Test Sample	M105	M105	M105	M105	M105
				Depth	0.20	0.50	1.10	1.50	2.20
				Type	Topsoil	Sand	Clay	Sand	Sand
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS(MCERTS)	0.1	mg/kg	M	**43**	**3.5**	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS(MCERTS)	0.1	mg/kg	U	<0.1	**1.4**	<0.1	<0.1	<0.1
Acenaphthene	GC/MS(MCERTS)	0.1	mg/kg	M	**100**	**2.7**	<0.1	<0.1	<0.1
Fluorene	GC/MS(MCERTS)	0.1	mg/kg	M	**48**	**2.3**	<0.1	<0.1	<0.1
Phenanthrene	GC/MS(MCERTS)	0.1	mg/kg	M	**570**	**27**	**0.5**	<0.1	<0.1
Anthracene	GC/MS(MCERTS)	0.1	mg/kg	U	**180**	**6.4**	**0.1**	<0.1	<0.1
Fluoranthene	GC/MS(MCERTS)	0.1	mg/kg	M	**710**	**27**	**0.9**	<0.1	<0.1
Pyrene	GC/MS(MCERTS)	0.1	mg/kg	M	**610**	**25**	**1.0**	<0.1	<0.1
Benzo(a)Anthracene	GC/MS(MCERTS)	0.1	mg/kg	M	**310**	**11**	**0.6**	<0.1	<0.1
Chrysene	GC/MS(MCERTS)	0.1	mg/kg	M	**300**	**13**	**0.8**	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS(MCERTS)	0.1	mg/kg	M	**420**	**11**	**1.3**	<0.1	<0.1
Benzo(a)Pyrene	GC/MS(MCERTS)	0.1	mg/kg	M	**240**	**9.1**	**1.2**	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS(MCERTS)	0.1	mg/kg	M	**110**	**3.2**	**0.6**	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS(MCERTS)	0.1	mg/kg	M	**21**	**1.5**	**0.3**	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS(MCERTS)	0.1	mg/kg	M	**130**	**3.9**	**0.8**	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS(MCERTS)	0.1	mg/kg	U	**3800**	**150**	**8.8**	<0.1	<0.1
Coronene	GC/MS(MCERTS)	0.1	mg/kg	N	**30**	**2.8**	**0.7**	<0.1	<0.1
Total Phenols	GC/MS(MCERTS)	0.1	mg/kg	N	**2.3**	**0.6**	<0.1	<0.1	<0.1

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Soil Analysed as Soil

Total and Speciated USEPA16 PAH, Coronene and Phenols (Fill)

				SAL Reference	176378 009	176378 010
				Customer Sample Reference	BH3	BH4
				Test Sample	M105	M105
				Depth	0.50	0.30
				Type	Fill	Fill
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Naphthalene	GC/MS(MCERTS)	0.1	mg/kg	U	**0.3**	**0.1**
Acenaphthylene	GC/MS(MCERTS)	0.1	mg/kg	U	<0.1	<0.1
Acenaphthene	GC/MS(MCERTS)	0.1	mg/kg	U	**2.4**	<0.1
Fluorene	GC/MS(MCERTS)	0.1	mg/kg	U	**1.5**	**0.1**
Phenanthrene	GC/MS(MCERTS)	0.1	mg/kg	U	**17**	**0.3**
Anthracene	GC/MS(MCERTS)	0.1	mg/kg	U	**4.7**	**0.1**
Fluoranthene	GC/MS(MCERTS)	0.1	mg/kg	U	**29**	**1.6**
Pyrene	GC/MS(MCERTS)	0.1	mg/kg	U	**25**	**1.6**
Benzo(a)Anthracene	GC/MS(MCERTS)	0.1	mg/kg	U	**12**	**0.4**
Chrysene	GC/MS(MCERTS)	0.1	mg/kg	U	**14**	**0.6**
Benzo(b/k)Fluoranthene	GC/MS(MCERTS)	0.1	mg/kg	U	**13**	**0.5**
Benzo(a)Pyrene	GC/MS(MCERTS)	0.1	mg/kg	U	**12**	**0.3**
Indeno(123-cd)Pyrene	GC/MS(MCERTS)	0.1	mg/kg	U	**4.0**	**0.2**
Dibenzo(ah)Anthracene	GC/MS(MCERTS)	0.1	mg/kg	U	**0.7**	**0.1**
Benzo(ghi)Perylene	GC/MS(MCERTS)	0.1	mg/kg	U	**4.4**	**0.2**
Polyaromatic Hydrocarbons (Total)	GC/MS(MCERTS)	0.1	mg/kg	U	**140**	**6.1**
Coronene	GC/MS(MCERTS)	0.1	mg/kg	N	**2.8**	<0.1
Total Phenols	GC/MS(MCERTS)	0.1	mg/kg	N	<0.1	<0.1

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Customer Reference: 17855

Soil Analysed as Soil
BTEX GRO MTBE

				SAL Reference	176378 001	176378 002	176378 003	176378 004	176378 005	176378 006	176378 007
				Customer Sample Reference	BH1	BH1	BH1B	BH2	BH2	BH2	BH2
				Test Sample	M105	M105	M105	M105	M105	M105	M105
				Depth	0.30	0.60	0.30	0.70	1.70	2.50	3.60
				Type	Topsoil	Topsoil	Topsoil	Topsoil	Topsoil	Sand	Clay
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Benzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10	<10	<10
EthylBenzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10	<10	<10
Meta/Para-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10	<10	<10
Ortho-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10	<10	<10
Toluene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10	<10	<10
Gasoline Range Organics	GC/MS (Headspace)	100	µg/kg	N	<100	<100	<100	<100	<100	<100	<100

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Soil Analysed as Soil
BTEX GRO MTBE

				SAL Reference	176378 008	176378 011	176378 012	176378 013	176378 014
				Customer Sample Reference	BH3	BH5	BH5	BH5	BH5
				Test Sample	M105	M105	M105	M105	M105
				Depth	0.20	0.50	1.10	1.50	2.20
				Type	Topsoil	Sand	Clay	Sand	Sand
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Benzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10
EthylBenzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10
Meta/Para-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10
Ortho-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10
Toluene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<10
Gasoline Range Organics	GC/MS (Headspace)	100	µg/kg	N	<100	<100	<100	<100	<100

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Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
BTEX GRO MTBE (Fill)

				SAL Reference	176378 009	176378 010
				Customer Sample Reference	BH3	BH4
				Test Sample	M105	M105
				Depth	0.50	0.30
				Type	Fill	Fill
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Benzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	U	<10	<10
EthylBenzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	U	<10	<10
Meta/Para-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	U	<10	<10
Methyl tert-Butyl Ether	GC/MS(Head Space)(MCERTS)	10	µg/kg	U	<10	<10
Ortho-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	U	<10	<10
Toluene	GC/MS(Head Space)(MCERTS)	10	µg/kg	U	<10	<10
Gasoline Range Organics	GC/MS (Headspace)	100	µg/kg	N	<100	<100

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
TPH Ali/Aro

				SAL Reference	**176378 001**	**176378 003**	**176378 005**	**176378 006**
				Customer Sample Reference	**BH1**	**BH1B**	**BH2**	**BH2**
				Test Sample	**M105**	**M105**	**M105**	**M105**
				Depth	**0.30**	**0.30**	**1.70**	**2.50**
				Type	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**				
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GC/FID	1	mg/kg	N	(9) <10	(9) <10	<1	<1
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GC/FID (MCERTS)	2	mg/kg	M	**35**	**32**	<2	<2
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GC/FID (MCERTS)	1	mg/kg	M	**110**	**99**	**2**	<1
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GC/FID (MCERTS)	4	mg/kg	M	**92**	**230**	**31**	<4
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GC/FID	1	mg/kg	N	(9) <10	(9) <10	<1	<1
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GC/FID (MCERTS)	1	mg/kg	M	**11**	**19**	<1	<1
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GC/FID (MCERTS)	1	mg/kg	M	**140**	**230**	<1	<1
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GC/FID (MCERTS)	1	mg/kg	M	**360**	**670**	**3**	<1

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Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
TPH Ali/Aro

				SAL Reference	**176378 007**	**176378 008**	**176378 013**	**176378 014**
				Customer Sample Reference	**BH2**	**BH3**	**BH5**	**BH5**
				Test Sample	**M105**	**M105**	**M105**	**M105**
				Depth	**3.60**	**0.20**	**1.50**	**2.20**
				Type	**Clay**	**Topsoil**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**				
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GC/FID	1	mg/kg	N	<1	**31**	<1	<1
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GC/FID (MCERTS)	2	mg/kg	M	<2	**430**	<2	<2
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GC/FID (MCERTS)	1	mg/kg	M	<1	**1100**	<1	<1
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GC/FID (MCERTS)	4	mg/kg	M	<4	**660**	<4	<4
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GC/FID	1	mg/kg	N	<1	(9) <10	<1	<1
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GC/FID (MCERTS)	1	mg/kg	M	<1	**180**	<1	<1
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GC/FID (MCERTS)	1	mg/kg	M	<1	**3200**	<1	<1
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GC/FID (MCERTS)	1	mg/kg	M	<1	**5000**	**6**	<1

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
TPH Ali/Aro (Fill)

	SAL Reference	176378 010
	Customer Sample Reference	BH4
	Test Sample	M105
	Depth	0.30
	Type	Fill

Determinand	Method	LOD	Units	Symbol	
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GC/FID	1	mg/kg	N	(9) <10
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GC/FID (MCERTS)	2	mg/kg	U	(9) <20
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GC/FID (MCERTS)	1	mg/kg	U	**31**
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GC/FID (MCERTS)	4	mg/kg	U	**400**
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS(Head Space)(MCERTS)	0.100	mg/kg	N	<0.100
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GC/FID	1	mg/kg	N	(9) <10
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GC/FID (MCERTS)	1	mg/kg	U	(9) <10
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GC/FID (MCERTS)	1	mg/kg	U	(9) <10
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GC/FID (MCERTS)	1	mg/kg	U	**200**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
TPH

	SAL Reference	176378 001	176378 002	176378 003	176378 004	176378 005	176378 006	176378 007
	Customer Sample Reference	BH1	BH1	BH1B	BH2	BH2	BH2	BH2
	Test Sample	M105	M105	M105	M105	M105	M105	M105
	Depth	0.30	0.60	0.30	0.70	1.70	2.50	3.60
	Type	Topsoil	Topsoil	Topsoil	Topsoil	Topsoil	Sand	Clay

Determinand	Method	LOD	Units	Symbol						
Total Petroleum Hydrocarbons (C10-C35)	GC/FID	1	mg/kg	M	**660**	**630**	**1800**	**1000**	**12**	**3**	**1**
Total Petroleum Hydrocarbons (C10 - C40 Mineral Oil:WAC)	GC/FID	1	mg/kg	N	**770**	**780**	**2000**	**1200**	**12**	**3**	**1**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
TPH

	SAL Reference	176378 008	176378 011	176378 012	176378 013	176378 014
	Customer Sample Reference	BH3	BH5	BH5	BH5	BH5
	Test Sample	M105	M105	M105	M105	M105
	Depth	0.20	0.50	1.10	1.50	2.20
	Type	Topsoil	Sand	Clay	Sand	Sand

Determinand	Method	LOD	Units	Symbol					
Total Petroleum Hydrocarbons (C10-C35)	GC/FID	1	mg/kg	M	**14000**	**490**	**31**	**21**	**11**
Total Petroleum Hydrocarbons (C10 - C40 Mineral Oil:WAC)	GC/FID	1	mg/kg	N	**15000**	**580**	**38**	**26**	**15**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
TPH (Fill)

					SAL Reference	**176378 009**	**176378 010**
					Customer Sample Reference	**BH3**	**BH4**
					Test Sample	**M105**	**M105**
					Depth	**0.50**	**0.30**
					Type	**Fill**	**Fill**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Total Petroleum Hydrocarbons (C10-C35)	GC/FID	1	mg/kg	U	**1600**	**760**
Total Petroleum Hydrocarbons (C10 - C40 Mineral Oil:WAC)	GC/FID	1	mg/kg	N	**1800**	**900**

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
PCB EC7 (Fill)

					SAL Reference	**176378 009**	**176378 010**
					Customer Sample Reference	**BH3**	**BH4**
					Test Sample	**M105**	**M105**
					Depth	**0.50**	**0.30**
					Type	**Fill**	**Fill**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	**1.8**
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	**1.9**
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	**6.4**
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
PCB EC7

					SAL Reference	**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
					Customer Sample Reference	**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
					Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**	**M105**	**M105**
					Depth	**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
					Type	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**								
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.05	µg/kg	M	**2.1**	**4.2**	**2.4**	(9) <0.50	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	M	**1.6**	**2.8**	**1.6**	(9) <0.50	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.05	µg/kg	M	**2.3**	**4.4**	**3.6**	**0.80**	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.05	µg/kg	M	**1.1**	**2.2**	**2.2**	(9) <0.50	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.05	µg/kg	M	(9) <0.50	**0.80**	**2.1**	**0.90**	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.05	µg/kg	M	(9) <0.50	(9) <0.50	(9) <0.50	(9) <0.50	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.05	µg/kg	M	**0.80**	**1.4**	**0.90**	(9) <0.50	<0.05	<0.05	<0.05

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
PCB EC7

				SAL Reference	**176378 008**	**176378 011**	**176378 012**	**176378 013**	**176378 014**
				Customer Sample Reference	**BH3**	**BH5**	**BH5**	**BH5**	**BH5**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Depth	**0.20**	**0.50**	**1.10**	**1.50**	**2.20**
				Type	**Topsoil**	**Sand**	**Clay**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.05	µg/kg	M	**1.5**	**0.22**	**0.08**	<0.05	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	M	**0.90**	**0.10**	**0.05**	<0.05	<0.05
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.05	µg/kg	M	**4.7**	**0.42**	**0.11**	<0.05	<0.05
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.05	µg/kg	M	**2.0**	**0.23**	**0.08**	<0.05	<0.05
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.05	µg/kg	M	**1.3**	**0.23**	**0.08**	<0.05	<0.05
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.05	µg/kg	M	(9) <0.50	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.05	µg/kg	M	(9) <0.50	<0.05	<0.05	<0.05	<0.05

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
% Stones

				SAL Reference	**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
				Customer Sample Reference	**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
				Depth	**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
				Type	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Retained on 2mm Sieve	Grav	0.1	%	N	**8.7**	**5.4**	**5.2**	**4.5**	**5.5**	**8.0**	<0.1
Retained on 20mm Sieve	Grav	0.1	%	N	<0.1	<0.1	**26.9**	<0.1	<0.1	<0.1	<0.1
Retained on 50mm Sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
% Stones

				SAL Reference	**176378 008**	**176378 009**	**176378 010**	**176378 011**	**176378 012**	**176378 013**	**176378 014**
				Customer Sample Reference	**BH3**	**BH3**	**BH4**	**BH5**	**BH5**	**BH5**	**BH5**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
				Depth	**0.20**	**0.50**	**0.30**	**0.50**	**1.10**	**1.50**	**2.20**
				Type	**Topsoil**	**Fill**	**Fill**	**Sand**	**Clay**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Retained on 2mm Sieve	Grav	0.1	%	N	**6.9**	**23.9**	**51.9**	**6.2**	<0.1	<0.1	<0.1
Retained on 20mm Sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Retained on 50mm Sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Miscellaneous

SAL Reference					**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
Customer Sample Reference					**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
Depth					**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
Type					**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Asbestos ID	PLM			SU	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cyanide (Total)	Colorimetry	1	mg/kg	U	<1	**1**	<1	<1	<1	<1	<1
pH	Probe			M	**8.3**	**8.0**	**8.2**	**8.3**	**8.0**	**7.7**	**7.9**
pH	Probe			U	-	-	-	-	-	-	-
(Water Soluble) Sulphate ion expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	N	**0.02**	**0.02**	**0.01**	**0.02**	**0.03**	**0.03**	<0.01
Sulphide	Colorimetry	10	mg/kg	N	<10	<10	<10	<10	<10	<10	<10

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Miscellaneous

SAL Reference					**176378 008**	**176378 009**	**176378 010**	**176378 011**	**176378 012**	**176378 013**	**176378 014**
Customer Sample Reference					**BH3**	**BH3**	**BH4**	**BH5**	**BH5**	**BH5**	**BH5**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**	**AR**	**AR**
Depth					**0.20**	**0.50**	**0.30**	**0.50**	**1.10**	**1.50**	**2.20**
Type					**Topsoil**	**Fill**	**Fill**	**Sand**	**Clay**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Asbestos ID	PLM			SU	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cyanide (Total)	Colorimetry	1	mg/kg	U	<1	<1	<1	<1	<1	<1	<1
pH	Probe			M	**8.0**	-	-	**10.0**	**8.0**	**7.9**	**8.4**
pH	Probe			U	-	**8.8**	**8.3**	-	-	-	-
(Water Soluble) Sulphate ion expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	N	**0.03**	<0.01	**0.03**	**0.03**	**0.05**	**0.05**	**0.03**
Sulphide	Colorimetry	10	mg/kg	N	<10	<10	<10	<10	<10	<10	<10

SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Miscellaneous

SAL Reference					**176378 001**	**176378 002**	**176378 003**	**176378 004**	**176378 005**	**176378 006**	**176378 007**
Customer Sample Reference					**BH1**	**BH1**	**BH1B**	**BH2**	**BH2**	**BH2**	**BH2**
Test Sample					**M40**	**M40**	**M40**	**M40**	**M40**	**M40**	**M40**
Depth					**0.30**	**0.60**	**0.30**	**0.70**	**1.70**	**2.50**	**3.60**
Type					**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Topsoil**	**Sand**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Loss on Ignition	Grav	0.1	%	N	**5.3**	**5.7**	**6.3**	**7.1**	**9.0**	**3.4**	**0.7**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**5.5**	**6.4**	**7.2**	**10**	**12**	**1.1**	<0.1
Total Organic Carbon	OX/IR	0.1	%	N	**3.2**	**3.7**	**4.1**	**6.0**	**6.9**	**0.6**	<0.1

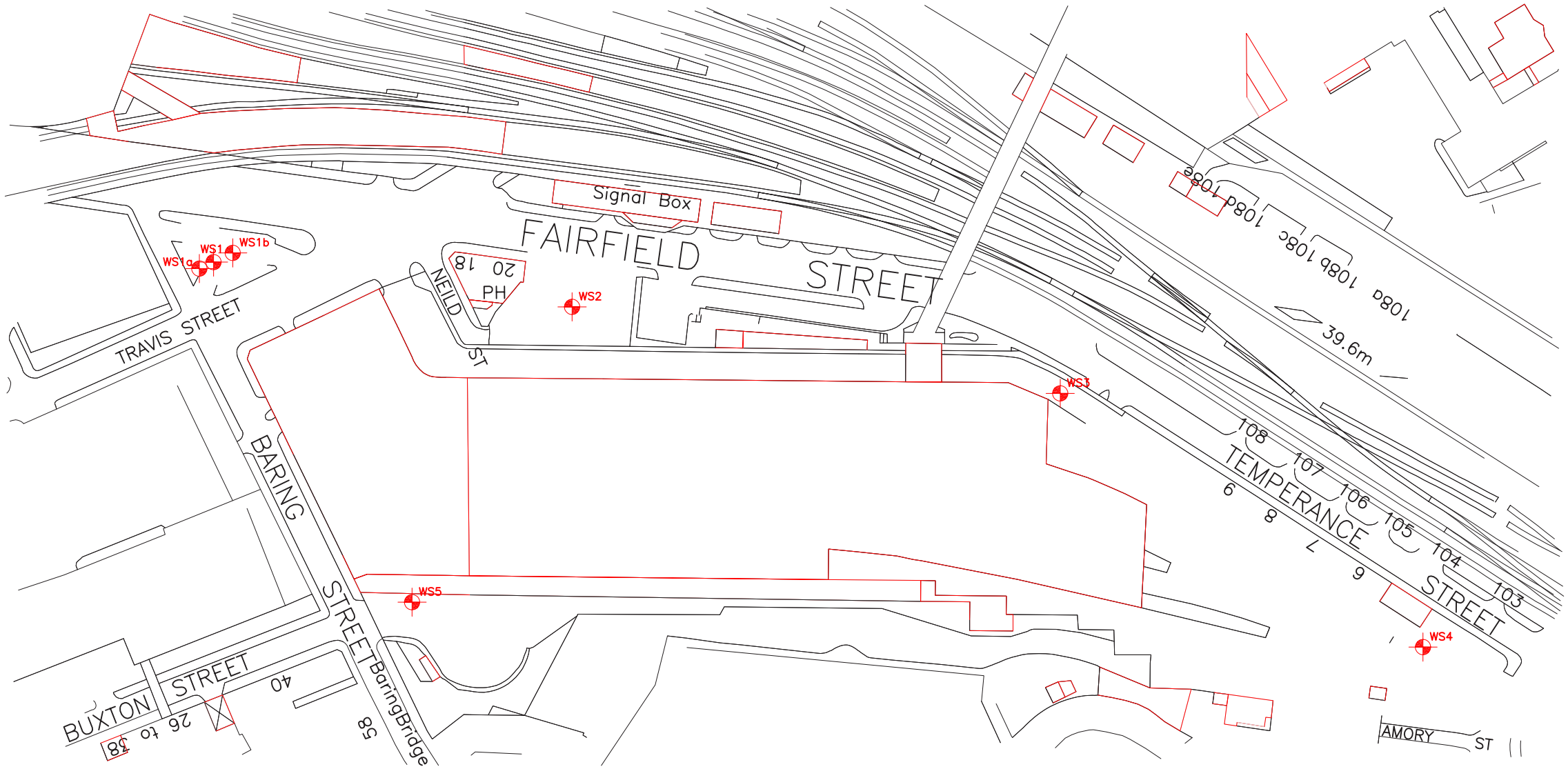
SAL Reference: 176378
Project Site: Manchester City Centre
Customer Reference: 17855

Soil Analysed as Soil
Miscellaneous

				SAL Reference	**176378 008**	**176378 009**	**176378 010**	**176378 011**	**176378 012**	**176378 013**	**176378 014**
				Customer Sample Reference	**BH3**	**BH3**	**BH4**	**BH5**	**BH5**	**BH5**	**BH5**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**	**M40**	**M40**
				Depth	**0.20**	**0.50**	**0.30**	**0.50**	**1.10**	**1.50**	**2.20**
				Type	**Topsoil**	**Fill**	**Fill**	**Sand**	**Clay**	**Sand**	**Sand**
Determinand	**Method**	**LOD**	**Units**	**Symbol**							
Loss on Ignition	Grav	0.1	%	N	**16**	**1.4**	**4.7**	**3.9**	**9.5**	**3.5**	**1.5**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**32**	**8.0**	**20**	**4.9**	**12**	**3.2**	**0.3**
Total Organic Carbon	OX/IR	0.1	%	N	**18**	**4.6**	**12**	**2.8**	**6.7**	**1.9**	**0.2**

APPENDIX D





NOTES

KEY

Window Sample Location

Rev	Date	Detail	Made	Chk'd	App'd
A	7/10/09	EXPLORATORY HOLES ADDED BY GIP	AG	AG	

Client / Eng:

Buro Happold Ltd

Project:

Manchester City Centre

Title:

Approximate Exploratory Hole Locations

Co-ord check:	CAD: AG
Chk'd: AG	App'd: AG
Date: 7/10/09	Scale: DO NOT SCALE

GIP
DEVONSHIRE HOUSE
ETTINGSHALL ROAD
WOLVERHAMPTON
WV2 2UT.
TEL:01902 459558
FAX:01902 459085
E-MAIL: info@gipuk.com

No. GIP 17855

Rev: A

cm A3

APPENDIX E



General Notes

1. The copyright of this report and other plans and documents prepared by Ground Investigation and Piling Limited are owned by them. No such report plan or document may be produced, published or adapted without the written consent of Ground Investigation and Piling Limited. Copies of this report may however, be made and distributed by the Client as an expedient in dealing with matters related to its commission.

2. This report is provided for sole use by the client and is confidential to the Client and the Clients professional advisors. No responsibility whatsoever for the contents of the report will be accepted to any other person other than the client.

3. The report and/or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Ground Investigation and Piling Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.

4. The report will be based on the ground conditions encountered in the exploratory holes together with results of field and laboratory testing in the context of the proposed development. Conditions between exploratory holes have been interpolated, however soils and rock conditions are highly variable and may differ from our interpolation There may be conditions, appertaining to the site, which may not be revealed by the investigation, and which may not be taken into account in the report.

5. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.

6. The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.

7. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

8. Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated on the light of these data by the supervising geotechnical engineers.

9. Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

10. Unless specifically stated, the investigation will not take into account possible effects of mineral extraction.

11. The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.

Appendix 10.2 Phase II Geo-Environmental and Geotechnical Assessment, Plots N+O Mayfield, Baring Street, Manchester

BUROHAPPOLD ENGINEERING

Mayfield Regeneration

Geoenvironmental and Geotechnical Desk Study Report

035548

10 August 2017

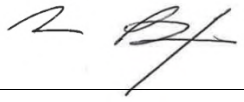
Revision 00

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Revision	Description	Issued by	Date	Checked
00	Issue	GM	10.8.17	RF

\\SRV-bath03\project filing\035548 Mayfield Regeneration Development\F9 Ground Engineering - Site Investigation\03 Reports\Desk Study\Appendix\170713 RF 035548 Geoenvironmental and Geotechnical Desk Study Report 00.docx

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Author	George Mitchell
Date	10.8.17
Approved	Rob Frost
Signature	
Date	10.8.17



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Appendix C BuroHappold Design Note

Appendix D BGS Historic Borehole Logs

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Executive Summary

Background	BuroHappold Engineering was commissioned to carry out a geoenvironmental and geotechnical desk study of a Site known as Mayfield Regeneration (the Site). This desk based study provides information on potential ground related risks associated with redevelopment the extent of which is yet to be determined. A previous ground investigation was undertaken in 2009, which included the Mayfield Regeneration area.
Site Setting	The Site is located in Manchester City Centre to the immediate south/southeast of Piccadilly Railway Station. The River Medlock meanders through the central area of the Site (flowing towards the west) and is culverted beneath Hoyle Street. The Site is currently occupied by existing and historical urban development comprising the former Mayfield Railway Station, numerous works / factories, a scrap yard, a depot, Hoyle Street Industrial Estate, derelict land and car parking. The immediate surrounding area comprises urban development including residential (student accommodation/private rental), offices, commercial and industrial facilities. The Site currently has as a range of industrial uses including network rail access, depots, scrap yards, tanks, vehicle repair and waste sites. The proposed future development is likely to include areas of park land and open space in addition to commercial development use.
History	The Site has a long predominantly industrial history with a range of potentially contaminative uses. This includes Mayfield Works, Chapelfield Works, Mayfield Station & associated infrastructure, Printing Works, Ice Works, Baths, Cotton Mills, Hanover Mills, Fairfield Street Garage, Ardwick Tannery, Scrap Yard, Timber Yards, Britannia Brewery, Iron Works, Tanks, a Mortuary, various depots and smaller commercial/industrial facilities.
Geological Setting	The Site is underlain by Made Ground, Quaternary Glacial Till (likely absent in some locations and in the western portion were no boulder clay is recorded) and Sherwood Sandstone. Recent Alluvial deposits are recorded adjacent to the River Medlock. The solid geology is Sherwood Sandstone underlain by Manchester Marls. The Sherwood Sandstone is a Principal Aquifer, capable of supporting water supply and/ or river base flow on a strategic scale. There is one groundwater abstraction over 700m distant from the Site and the Site is not within a groundwater source protection zone. Groundwater underlying the Site is considered likely to be in hydraulic continuity with the River Medlock. Localised groundwater may be encountered in the Made Ground deposits perched on underlying low permeability Glacial Till.
UXO	An Explosive Ordnance Threat Assessment has been undertaken by PLANIT UXB Limited which states that a "Medium" Ordnance Threat Level applies across the Site, and that "a UXO threat management strategy is required to be in place prior to intrusive engineering works".
Geoenvironmental Considerations	Identified potential risks above Low are summarised below: There is a Moderate risk to future Site users and future buildings due to release of ground gases from Made Ground underlying the Site; There is a Moderate/Low risk to Site workers due to the potential for inhalation of ground gas. This risk is likely to be mitigated by standard working practice assuming that no deep poorly ventilated excavations are required. There is a Moderate / Low risk to construction workers, future site users and controlled waters from historic and current site uses which are likely to have contaminated Site Made Ground. This site has a long industrial history which has continued until present day. It appears likely that significant thicknesses of Made Ground are present on site as some areas appears to have been filled and there has been significant redevelopment over the years. This industrial legacy is likely to have contaminated shallow soils to some extent and a ground investigation is required to define the extent of contamination and determine the need for remedial measures as part of development work.
Geotechnical Considerations	The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock. A range of foundation options are possible for the development based on a desk based study of available information, however there is currently insufficient information to create a detailed ground model. A ground investigation will be required to produce a detailed ground model to allow geotechnical design.

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Recommendations	A combined geotechnical and geoenvironmental ground investigation is required to better understand the potential contamination risks identified and to produce a detailed ground model to allow geotechnical design. Sharps and Needles were identified on Site during the Site walkover. It is recommended that a sharps and needle disposal specialist is consulted with regards to identifying the extent of and appropriate measures for Site management and/or removal of these items prior to the start of any construction works. It is also recommended that the site is secured prior to any such removal to prevent further sharps beings dumped on site. Large quantities of Japanese Knotweed were identified on the banks of the River Medlock within the channel during the Site walkover. There was no visual evidence that knotweed had migrated out of the channel onto surrounding areas of the Site, however it is quite possible this has occurred. It is understood that a full survey of the river will be undertaken in the near future, which will fully characterise the extent of knotweed present. It is recommended that a Japanese Knotweed specialist is consulted with regards to identifying the extent of the infestation and recommending appropriate measures for Site management and/or removal of Japanese Knotweed impacted material.

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1 Introduction

1.1 General

This report is the Desktop Geoenvironmental and Geotechnical Study for the Mayfield Regeneration Site (the Site) and was prepared by BuroHappold following instruction from U+I. The purpose of this study is to establish the environmental, geological, hydrological and hydrogeological conditions present at the Mayfield Site that may result in potential contamination or geotechnical risks for development and future Site users.

The Site occupies some 10.25 hectares and lies in Manchester City Centre to the immediate south/southeast of Piccadilly Railway Station. The River Medlock meanders through the central area of the Site (flowing towards the west) and is culverted beneath Hoyle Street. The Site is currently occupied by existing and historical urban development comprising the former Mayfield Railway Station and associated railway lines, numerous works/ factories, derelict land and car parking.

1.2 Study Aims and Objectives

The overall aim of this study was to carry out a geoenvironmental and geotechnical assessment of the Site in order to inform the Client's understanding of potential ground-related risks associated with the proposed redevelopment and regeneration. This study will also form the basis for planning and targeting further ground investigations.

This report will also provide information relevant to restoration/ redevelopment in accordance with the requirements of the National Planning Policy Framework (NPPF 2012). The work was carried out in general accordance with Model Procedures (Environment Agency, 2004), the relevant British Standard (British Standards Institute, 2011), the Environment Agency Guiding Principles (Environment Agency, 2010), Groundwater Protection Policy (Environment Agency, 2013) and other current good practice guidance. The particular objectives were:

- To determine the historical and current use of the Site and its surroundings;
- To determine the nature of the ground conditions and the environmental sensitivity of the Site;
- To assess the potential location, nature and extent of any ground and groundwater contamination;
- To assess the potential risks to people and the environment (natural and built) associated with ground contamination (solid, liquid or gas) for the Site future use;
- To prepare a report based upon all of the above to support a possible future planning application in accordance with NPPF (Department for Communities and Local Goverment, 2012); and
- To evaluate the potential need for and scope of any subsequent Site investigations and/or remedial action or design.

1.3 Information Sources

The principal sources of information for this desk study report include: historical and current topographic maps and public register information from the Groundsure report (Appendix B) previous Site investigation reports (discussed in Section 5); a Site walkover survey; information provided by the local authority, available from the Environment Agency website and other online sources.

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This report is based upon information obtained from third party sources, together with observations from the Site walkover survey. The third party data has been accepted as face value and has not been independently verified. BuroHappold can therefore give no warranty, representation or assurance as to the accuracy or completeness of such information.

1.4 Competence

The work reported here was carried out by a qualified geoenvironmental scientists and geotechnical engineers with relevant degree qualifications, training and experience. The work has been overseen by an Associate Director with experience in the assessment of land affected by contamination who is a Chartered Geologist and a registered SiLC (Specialist in Land Contamination).

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2 Current land use and proposed development

2.1 Site Location, Topography and Current Use

The Site is located in Manchester City Centre to the immediate south/southeast of Piccadilly Railway Station, centred at NGR 385006 397717. The River Medlock meanders through the central area of the Site (flowing towards the west) and is culverted beneath Hoyle Street. The Site is currently occupied by existing and historical urban development comprising the former Mayfield Railway Station and associated railway lines, numerous works / factories, a scrap yard, a depot, Hoyle Street Industrial Estate, derelict land and car parking. The immediate surrounding area comprises urban development including residential (student accommodation/private rental), offices, commercial and industrial facilities.

Overall, the northern half of the Site generally slopes from a maximum spot height of 40.80 m AOD on Fairfield Street towards the River Medlock in the central area of the Site (below 37.80 m AOD recorded at WS5 GIP GI), with the exception of the former Mayfield Station which is recorded at approximately 49.00 m AOD (WS3/WS4 GIP GI). There are no recorded spot heights in the southern half of the Site, however it generally slopes northwards to the River Medlock. There is thus currently a ~12 m difference in height across the Site (Mayfield Station to the River Medlock) separated by slopes with localised or potentially buried retaining structures. A topographical survey is required to fully confirm all Site levels.

2.2 Site Walkover Survey

2.2.1 General

The Site walkover survey was carried out on 4th July 2017, in mild and overcast weather conditions and was generally limited to external areas, though all external areas were accessible. Philippa Hunsworth and George Mitchell from Buro Happold attended, and were escorted around Site by Jonathan Such (JS) of U+I. An annotated plan showing points of interest identified during the survey is included as Appendix E. To describe its variable nature, the Site has been divided into three zones: northern, southern, and the river zone, for ease of reference (Figure 2-1 refers).

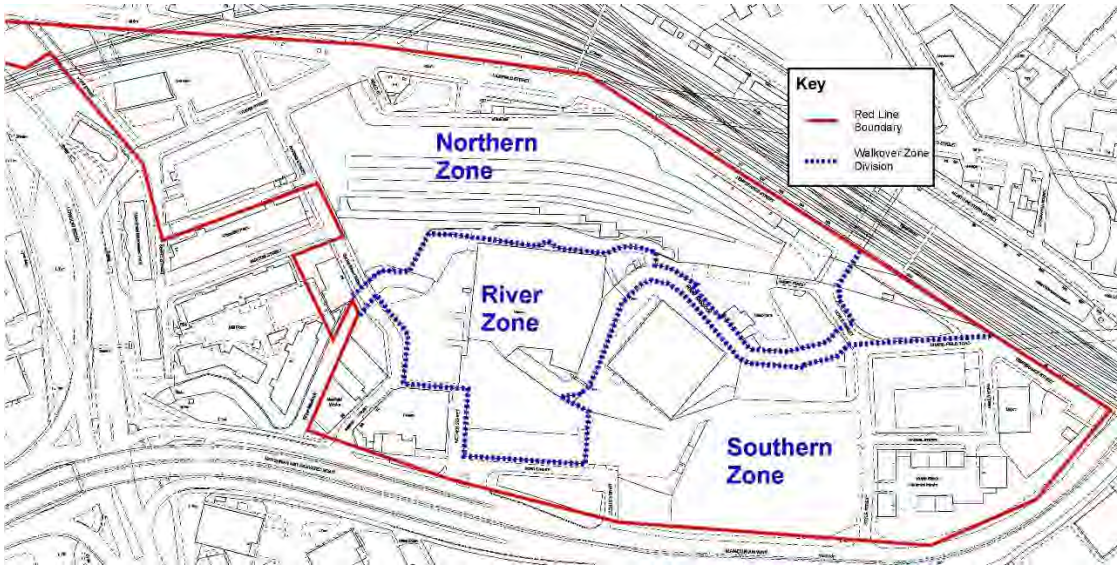


Figure 2-1 Division of the Site into zones.

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2.2.2 Northern Zone

- Area west of Wyre Street / north of arches: Overgrown with long grass and birch trees, Heras fenced off
- Under arches: Full of rubble / overgrown (Photograph 1)
- Between Wyre Street, Travis Street and Baring Street: Car park with tarmac surface. Brown metal building in western area – substation. A GIP 2009 borehole was undertaken in this car park, but unable to locate well cover. (Photograph 2)
- South of Travis Street, west of Baring Street: Tarmac car park for adjacent Macdonald Manchester Hotel. Surrounded by a planter with numerous mature trees. 2 No. substations present in SE corner. ~1 m drop down to Baring Street (east) and ~1.50 m drop down to access road to the south, separated by a chain link fence.
- Triangular parcel of land to north of Travis Street and east of Baring Street. Grassed area. Historical maps indicate that a garage was historically present, and obstructions (thought to be the garage slab) were encountered during the GIP 2009 GI. Well cover present from GIP 2009 GI. (Photograph 3)
- Area to the north of former Mayfield Station building:
    - Western side: Star and Garter pub, still in use – listed building. Tarmac car park to the east (access via Neild Street). GIP 2009 borehole cover present in car park. (Photograph 4)
    - Row of 1 storey units present against the Mayfield Station building. Uses include a garage, storage, substation. (Photograph 5)
- Temperance Street: Series of arches on both sides of the road, however only the southern set are onSite.
    - Arch 6: U+I security offices
    - Arch 7: Art exhibition company
    - Arch 8: Theatre set manufacturer
- Upper level of old Mayfield Station building (Photograph 6):
    - Cobbled ramp up to the upper station platform level behind Star and Garter pub.
    - Platform is open air with majority of steel roof removed (some sections remaining in the northern area of the platform).
    - Dilapidated old station buildings in western corner of platform. Heras fenced off. (Photograph 7)
    - 2 No. tracks with stoppers at western end. Overgrown.
    - Track leading eastwards on upper level, eventually joining onto live railway to the east of the Site. Brick building present at eastern end, apparently disused. Railway sleepers and sections of rail/track stored in the area.
- Area immediately south of Mayfield Station:
    - Adjacent to Baring Street:

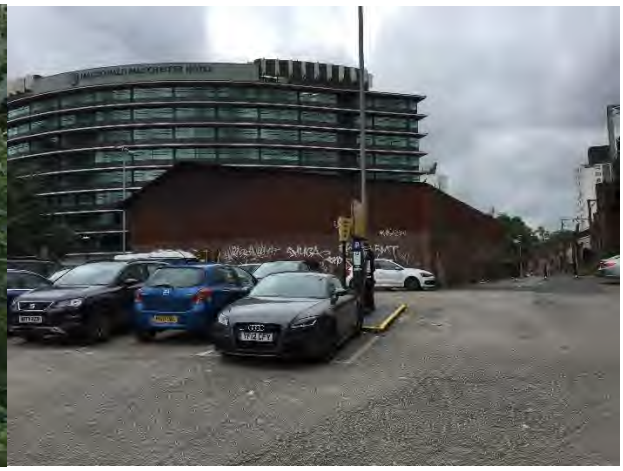
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        - Compound where U+I temporary offices are currently under construction (wooden frame up at time of walkover). (Photograph 8)
        - Temporary landscaped area in southern portion of compound, surfaced with wood chips directly on top of Made Ground. 2 No. trees in poor health (brown leaves). (Photograph 9)
        - Made Ground material has been stripped and piled up along the northern edge of the compound against the Mayfield Station building.
        - Suspended metal/wooden walkway at the upper station level is joined onto the station building.
        - Compound is surrounded by wooden hoarding.
        - Portaloos, food cabins and outdoor seating area present in north of compound.
    - Through gate in wooden hoarding to the east: Narrow overgrown walkway between the station building and a brick retaining wall to the lower level where the TFGM building is situated. Metal disused building at the eastern end.
    - Through a gate to the south of the compound: Heavily overgrown area adjacent to the River Medlock, which is at a lower level. Fly tipping (old tyres, brick and concrete rubble) present. River wall in poor state of disrepair. Knotweed present on riverbank but not noted on upper level. (Photograph 10)
- Building adjacent to Baring Street Bridge (#58), historic clothing factory. Disused. Car park/yard area to the side and rear of the building.
- Area between Hoyle Street, the River Medlock and Mayfield Station:
    - Western area: Former scrapyard, now vacated. Metal structures, ~2 m high, present around the edge of the Site, filled with Made Ground/fly tipping. (Photograph 11) Vacant industrial building in west of yard, joined onto Mayfield Station.
    - Eastern area: Yard with small 2 storey brick structure, metal containers, and numerous car parts/engines on the ground. Large metal weighbridge present (Photograph 12), Large quantities of knotweed in river channel, but appears not to have encroached into the yard.

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Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6

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Photograph 7



Photograph 8



Photograph 9



Photograph 10



Photograph 11



Photograph 12

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2.2.3 River Zone

- Transport for Greater Manchester (TFGM) building area
    - River Medlock is culverted under the car park area.
    - 1 storey brick/steel industrial building (Photograph 13). River Medlock is culverted under the building (Photograph 14). Multiple units:
        - Northernmost unit = TFGM.
        - Middle unit = formerly FedEx, now vacant.
    - Southern unit = Hilclare (electronic component manufacturer); JS advised that they are vacating on 28th September 2017.
    - External exit from former FedEx unit: External area bordering the river to the north. Overgrown grassed area with mature trees. Knotweed in river channel; river wall in poor state of disrepair. Metal footbridge present leading to yard/warehouse south of the river.
- TFGM car park (east of Baring Street)
    - Very overgrown in northern portion of car park adjacent to River Medlock. (Photograph 15)
    - Car park surfaced with tarmac.
    - Void recently opened up in car park outside Unit 4 (Section 3.5 refers). Cordoned off by barriers at time of walkover. (Photograph 16)
- Area north of Chapelfield Road and east/south of Hoyle Street: Yard with vehicles parked (including tracked excavators). Sign outside advertising 'Free tipping of clean hardcore'. River culverted under this yard. (Photograph 17)



Photograph 13



Photograph 14

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Photograph 15



Photograph 16



Photograph 17

2.2.4 Southern Zone

- West of Baring Street: Row of buildings and concrete yards (not currently owned by U+I) (Photograph 18)
    - Southernmost building = Mayfield Works (disused); formerly clothing works. Yard/car park area to north of building.
    - Northernmost building = disused, former use unknown. Another yard/car park area to the north.
    - Both yards have borehole well covers in them, this ground investigation is not known to BuroHappold and has not been reviewed as part of this report.
- Area between Baring Street and Nether Street:
    - 3 No. conjoined buildings (west to east): Tow bar and trailer shop; Historic church (with basement – advised by JS); sock factory (still in use; JS advised that it has been there for >20 years). Concrete yard present to south of buildings. (Photograph 19)
- East of Nether Street: Hilclare building and car park beyond to the east/south.
- South of Bond Street, adjacent to Mancunian Way: Grass verge with advertising boards.

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- Square warehouse building, north of Hilclare car park and surrounded by meandering River Medlock: (Photograph 20)
    - JS advised that the building is to be vacated in mid-July 2017. Mixed boxes stored. Current tenant has occupied the building for ~1 year.
    - Around edges of building: Concrete yard. Pallets of food produce (coconut milk, ketchup, tinned tomatoes etc).
    - Disused footbridge across River Medlock to NW of building
    - N and E of building: Overgrown. Fly tipping and evidence of burning (ashes, charred material). Brick/concrete walls border the plot in the eastern area; poor state of disrepair. (Photographs 21 and 22)
- East of square warehouse: Unoccupied yard with piles of demolition rubble and brick walls of historic buildings. (Photograph 23)
- South of square warehouse: Concrete retaining wall with Hilclare car park and skips beyond.
- East of Manor Street: Wooded area with large amount of fly tipping (Photograph 24)
- East of Hilclare car park and west of Hoyle Street: 'Delaney' Site. Yard area, hoarded off. Material stockpiles ~3 to 5 m high comprising both apparently screened and unscreened material, demolition rubble, piles of whole bricks (Photograph 25)
- Between Hoyle Street, Chapelfield Road, River Street and Rachel Street
    - Former morgue. Extremely overgrown; no access. Fenced off. (Photograph 26)
    - Brick walls of derelict building visible
    - JS advised high risk of sharps, needles etc. in the area, and presence of drug users and prostitutes
- Hoyle Street Industrial Estate (Photograph 27)
    - Unit 1: Florist
    - Unit 2: Security systems
    - Unit 3: Vacant
    - Unit 4: Unknown
    - Unit 5: Asian wedding company
    - Unit 6 and 7: MOT centre
    - Unit 8: Photographer
    - South of industrial estate adjacent to Mancunian Way: Grassed area with mature trees
- East of River Street and southwest of Temperance Street:

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- Timber yard and car depot
- Western portion of yard full with timber, old vehicles (Photograph 28)
- Eastern portion of yard piled up with doors, oil drums, fridges, rubble, insulation etc. (Photograph 29)



Photograph 18



Photograph 19



Photograph 20



Photograph 21

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Photograph 22



Photograph 23



Photograph 24



Photograph 25



Photograph 26



Photograph 27

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Photograph 28



Photograph 29

2.3 Current Activities in the Surrounding Area

The area is situated in Manchester City Centre with a mixture of residential, commercial and industrial land uses in the surrounding area. Neighbouring the Site is Manchester Piccadilly station to the northwest, a railway viaduct to the north, the Mancunian Way (A57M/A635) to the south and high rise residential buildings including student accommodation to the west. To the south beyond Mancunian Way, there is an industrial estate and terraced housing. To the north, west and east, typical city centre land uses including shops, restaurants, offices, bars and flats are present.

2.4 Proposed Development

The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock.

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3 Environmental Setting

3.1 Geology

The Site geology is described below and summarised in Table 3-1. This has been determined with reference to the relevant 1:50,000 scale BGS Geological Maps, (British Geological Survey, 2006); the Groundsure report Appendix B) and available historic Site investigation data (GIP 2009 GI – see Section 5).

Given the urban setting and development history of the Site, including numerous buildings of different ages and reprofiling of the Site to create terraced levels for car parking, a reasonable thickness of Made Ground is anticipated, and thicknesses of up to 3.20 m were recorded in historic boreholes. Made Ground material due to its nature is likely to be very variable in both composition and characteristics.

The underlying natural geology comprises superficial Glacial Till (absent beneath much of the Site) underlain by the Chester Pebble Beds Formation (Sherwood Sandstone Group), except the western portion where no Glacial Till is recorded on the maps. The geology maps record Alluvial Deposits adjacent to the River Medlock which meanders east to west across the Site.

Table 3-1 - Summary of Anticipated Geology

Strata	Description	Depth to top [Thickness] (m)	Aquifer status
Made Ground	Heterogeneous material consisting of sand / gravel / clay with ash, brick, concrete, timber, slate. Likely to be some reworked natural material.	GL [3.20 m max. recorded]	N/A
Glacial Till	Gravelly clay / stiff clay / sand and clay. Present sporadically.	0.60 m [<1.80 m]	Secondary Aquifer (Undifferentiated)
Chester Pebble Beds Formation	Orange / brown / red brown sand.	2.30 to 3.20 m [0.10 - >3.00 m]	Principal Aquifer
	Red sandstone.	1.52 to 3.40 m [>8.54 m, thickness unproven]	

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3.2 Hydrogeology and Hydrology

The nearest surface water feature to the Site is the River Medlock, which flows east to west across the Site to its confluence with the River Irwell on the south side of Manchester Victoria Railway Station. The River Medlock is culverted beneath the railway line and the transport for Greater Manchester building in the centre of the Site.

The southwest corner of the Site, adjacent to the River Medlock, is indicated to be within a 'Zone 2 Floodplain' as presented in the Groundsure Report, based on the relevant Environment Agency information and reproduced in Appendix B. The centre of the Site, adjacent to the River Medlock, is indicated to be within either a 'Zone 2' or 'Zone 3' Floodplain.

The Environment Agency Groundwater Vulnerability Map Sheet 17 (Derbyshire and North Staffordshire) indicates that the Site is underlain by a '*Major Aquifer*' with '*Soils of High Leaching Potential (U)*' (Appendix B). It should be noted that the Site is labelled 'U' for urban and a note is normally included on the maps explaining that such a classification means that '*Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) is assumed until proved otherwise*'.

The Chester Pebble Beds Formation is a Principal Aquifer, defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability capable of supporting water supply and/or river base flow on a strategic scale. The Site is not recorded to be within a Source Protection Zone (SPZ).

The Groundsure Report records one historic groundwater abstraction from within the Site boundary licenced to Moseley Rubber Co Ltd (eastern part of the Site, adjacent to the River Medlock) this has now lapsed. No active water abstractions are recorded within 500m of the Site. There are two No. abstractions locations within 1 km of the Site including: G T Energy UK Limited (778m SE) and Manchester Metropolitan University (870m SW). The Site is not within a groundwater source protection zone.

3.2.1 Groundwater

Examination of the general topography and hydrology of the Site, based on the current and historic OS maps indicates that the prevailing direction of groundwater flow is likely to be to the southwest, towards and in the direction of flow of the River Medlock.

It is considered likely that groundwater underlying the Site will be in hydraulic continuity with the River Medlock due to the presence of this watercourse on the Site and poor condition of the channel walls. Localized groundwater may be encountered in the Made Ground deposits perched on underlying low permeability Glacial Till, if present. Deeper groundwater conditions within the weathered and intact sandstone bedrock are likely to be controlled by the hydraulic conductivity of the sandstone (degree of cementation, degree of fissuring, faults etc.).

Groundwater was not recorded / encountered within any of the historic BGS boreholes, or in any exploratory hole from the GIP 2009 GI.

3.3 Ecology

The Groundsure Report records no SSSIs, nature reserves or environmentally sensitive areas within 2 km of the Site. The Site is not within a Nitrate Vulnerable Zone.

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3.4 Japanese Knotweed

An initial ecological assessment on site was carried out during 2009 by BuroHappold which details the following:

'Japanese knotweed was recorded along the River Medlock on the silt banks where river flow is low. No Japanese knotweed was recorded within the Colourgates Yard section; however it was not possible to carry out a full walkover survey of this area due to the density of the vegetation, so the presence of this species within this small area cannot be completely discounted at this stage'.

Large quantities of Japanese Knotweed were identified on the banks of the River Medlock within the river channel during the Site walkover (Section 2.2 refers). There was no visual evidence that knotweed had migrated onto adjacent areas of the Site, however. It is understood that a full survey of the river will be undertaken in the near future, which will fully characterise the extent of knotweed present.

3.5 Geological and Geotechnical hazards

According to the information presented in the Groundsure report, the following ground hazard ratings are applicable:

- Very Low hazard rating for shrinking or swelling clay;
- Very Low hazard rating for Landslides;
- Negligible hazard rating for Soluble Rocks;
- Moderate hazard rating for Compressible Ground;
- Very Low hazard rating for Collapsible Rocks;
- Low hazard rating for Running Sand.

The maximum potential for ground instability due to compressibility is stated as 'Moderate' within the Groundsure report. However, the 'Compressible Deposits Legend' within the report (Appendix B refers) indicates the majority of the Site to be situated within a 'Negligible' hazard rating zone, with a band of 'Moderate' hazard bordering the Site to the south, underlying an area of Mancunian Way to the south of Bond Street. As such the potential for encountering compressible ground within the Site is considered low.

It is worthy of note that during August 2015 a large hole appeared in the Mancunian Way after a period of heavy rain. A leaking water pipe is reported to have been the cause of the incident. The road has since been repaired and fully reopened.

In June 2017, a void (~1.50 m diameter x ~5.00 m deep) appeared in the car park of the Transport for Greater Manchester (TFGM) building (Unit 4), close to the culverted River Medlock. The cause is currently unknown and is under investigation. The void appears to be connected to existing drainage, and there may have historically been a chamber in the locality. Further assessment, including a CCTV survey, is currently being undertaken, and appropriate repair/remediation measures will be undertaken once better understood. Bulging and cracking to the nearby car park retaining wall was also noted, with a depression to the tarmac adjacent to the wall. A Design Note has been prepared by BuroHappold and is included as Appendix C.

3.6 Radon

Less than 1% of homes are affected by radon, therefore, radon protection measures are not considered necessary in the design of new dwellings or extensions on this Site.

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3.7 Mining Activity

The Groundsure Report states that the Site is *'located within the specified search distance of an identified mining area'*. A Coal Authority (CA) Report (Coal Authority , September 2015)has been obtained for the proposed development as the Site overlies coal bearing strata and, as such, further assessment in respect of previous coal mining activity was considered necessary.

The CA Report states that:

- The Site is within the likely zone of influence from workings in 2 No. seams of coal at 1050 m to 1100 m depth which were last worked in 1958. Furthermore, reserves of coal do exist in the locality which could be worked in the future subject to feasibility, licences and planning consents.
- There are no recorded mine entries on Site or within 20 m of the Site boundary.
- In respect of opencast mining, the Site is not within the boundary of any past or present workings. In addition, there is no licence to extract or proposed licence to extract coal by opencast methods within the immediate vicinity of the Site.
- No subsidence, in respect of the Coal Mining Subsidence Act 1991, has been recorded in respect of the immediate Site area.

Given the published and unpublished geology of the Site, the Site history and the CA Report information it is considered that the risk arising from former coal mining operations can be considered to be low.

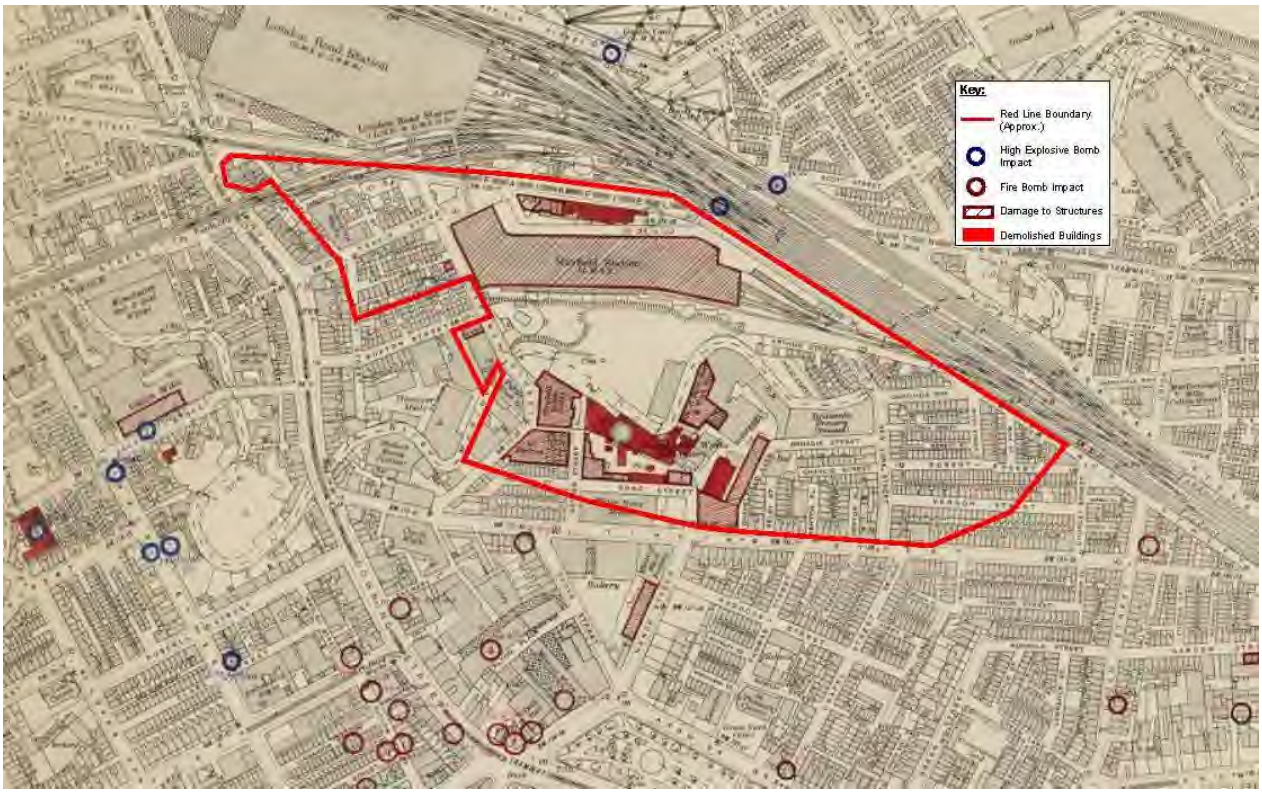
3.8 Unexploded Ordnance

The Manchester bomb map records a number of high explosive and fire bomb impacts in close proximity to the Site, as well as damage to several buildings within the Site (**Error! Reference source not found.** refers). Some buildings, i ncluding the Mayfield station building itself, have not been developed since the war and remain on Site.

A Preliminary UXO Risk Assessment has been carried out by Planit in accordance with CIRIA C681 (CIRIA, 2009) and is included in Appendix A. In addition to the consideration of the potential for aerial delivered UXO, consideration has also been given to mitigation factors, namely: (i) the extent of post-war development); (ii) the extent of proposed intrusive works. The assessment concluded on the basis of Site setting, historical land usage, record of bombing, post war development and proposed intrusive work that the risks associated with UXO on site are Medium. Considering the findings of this assessment, a UXO Threat Mitigation Strategy is required to be in place prior to intrusive works at the Site. A review of these recommendations must be undertaken considering any additional, relevant information being provided (i.e. significant changes to the masterplan that require significant ground excavations).

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Figure 3-1 Manchester bomb map



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4 Site Setting

4.1 Site History

The Site history and that for the surrounding area has been completed using historic maps from 1873 to 2015. This history is summarised in Table 4-1 below and a selection of the maps reproduced in full Appendix B Map Record.

Table 4-1 - Summary of Site history and history of the surrounding area

Date	Site History	History of the Surrounding Area
1851	**North-**Mayfield Works (Dye & Print) & associated Reservoirs/Filtering Pools and tanks, Timber Yard, Hotel (later known as the Star & Garter Public House), northeast corner of Hanover Mill (cotton), various roads and residential housing. Public house and residential housing in the north east corner, north of the railway line. **South-** Chapelfield Dye Works, Ardwick Dye Works, Britannia Brewery, Tipping Street Chapel, a Tannery and various roads and residential housing. **East-**A Timber Yard is recorded to the north of Chapelfield Road. Residential housing, open land and various roads are recorded across the rest of the Site. **West-**Railway lines, residential housing, Timber Yard, Public House and various roads.	*London Road Station*, associated railway lines and *Goods Yard* to the immediate north of the Site, *Hanover Mill* & ancillary buildings to the immediate west of the Site, *Ardwick Saw Mill & Timber Yard* approximately 20 m to the northeast, *Maskrey Mill (Cotton)* approximately 70 m to the northeast and *Ardwick Bridge Chemical Works* approximately 45 m to the southwest. Residential housing dominates the surrounding area along with various smaller commercial/industrial facilities.
1893	**North-** Hotel & Police Station recorded to the north of Station Street. The Timber Yard is no longer recorded. **South-**Chapelfield Dye Works has expanded to the south and west, Ardwick Dye Works is no longer recorded, the Tannery is now recorded as Ardwick Tannery. Mayfield Baths and Water Meter Works are now recorded to the west and south of Ardwick Tannery respectively. An Ice Works is recorded to the south of Mayfield Baths. **East-** Timber Yard is no longer recorded and the rest of the land on Site is now covered in residential housing. **West-** A Timber Yard is recorded south of the railway lines at the end of Cross Street.	*Hanover Mills* has expanded, *Ardwick Saw Mill & Mill Yard* is no longer recorded and *Ardwick Bridge Chemical Works* is now recorded as 'Disused'. Tramlines are recorded along *Fairfield Street* and *London Road* and *Maskrey Mill (Cotton)* is now recorded as *Marlborough Mills (Cotton Waste)* (later recorded as a *Mill*).
1908	**North-** Mayfield Works (Dye & Print) & associated reservoirs no longer recorded but buildings/reservoir outlines remain. Police Station in the northwest area and residential housing to the north of Arthur Street are no longer recorded. The Hotel is now recorded as a Public House. **South-**Chapelfield Works (Indian Rubber) has expanded to the west and Ardwick Tannery is no longer recorded. **East-**Half the residential housing to the north of Chapelfield Road is no longer recorded. **West-** The Timber Yard is no longer recorded.	Chief Fire Engine Station (& ancillary buildings) approximately 50 m to the northwest of the Site (currently disused). The residential housing to the north is no longer recorded and a Police Station and Public House are recorded approximately 50 m and 60 m to the northeast of the Site.

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Date	Site History	History of the Surrounding Area
1922	**North-** Residential housing in the northwest is no longer recorded and Mayfield Station (L.M.S.B) and associated railway lines are recorded covering the majority of the north. **South-** Mayfield Baths is now recorded as Mayfield Public Baths and Public Wash House, Tipping Street Chapel is no longer recorded and Britannia Brewery is now recorded as 'Disused'. The Ice Works is now recorded as Ice Factory. **East-** No significant change **West-** A number of residential buildings are no longer recorded and an Engineering Works is recorded to the south of Carston Street.	*London Road Station* has expanded and the number of railway lines to the north has increased. The *Police Station* is no longer recorded and the land to the south/southwest of the Site now comprises predominantly commercial/industrial facilities (*Coachworks, Bakery, Dairy, various Mills/Warehouses*).
1948	**North-**Chapelfield Works (Indian Rubber) has expanded and is now recorded in between Mayfield Station and the River Medlock (culverted in part). Fairfield Street Garage is recorded on a small plot of land to the northwest of Mayfield Station. The northeast corner of Hanover Mill (cotton)is now recorded as a Printing Works. **South-** Mayfield Public Baths and Britannia Brewery (disused) are no longer recorded and the Public Wash House is now recorded as a Dairy. A Leather & Cloth Factory is recorded to the south of the dairy and the Ice Factory is now recorded as Mayfield Ice Factory. **East-** The majority of the residential properties are no longer recorded. **West-** A number of residential properties are no longer recorded in the north, central and southern areas.	A number of Works/Factory at Hanover Mills (Printing Machinery, Stationary, Motor Repair).
1950	**North-** Fairfield Street garage is no longer recorded. Ruins are recorded in between Mayfield Station and Temperance Street. **South-** Ruins are recorded at the former Mayfield Public Baths and the former Britannia Brewery. **East-** No significant change **West-** No significant change	Ruins approximately 100 m northeast of the Site, no other significant change.
1954-1936/64	**North-** The Ruins are no longer recorded. **South-** The Dairy is now recorded as Dairy (Disused), Mayfield Ice Factory is now recorded as Factory, Chapelfield Works (Indian Rubber) is now recorded as Works. The Ruins are no longer recorded. **East-** A Mortuary and a Depot are recorded in the central area. **West-** No significant change	By the mid-late 1950's, two *Garages* are recorded approximately 70 m and 75 m to the northeast respectively. The 1964 map records *London Road Station* as *Piccadilly Station,* two *Depots* are recorded approximately 50 m and 85 m to the west respectively, *Hanover Mills* is no longer recorded and the industry around the former *Hanover Mills* are all recorded as *Works/Factory*.

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Date	Site History	History of the Surrounding Area
1960-1977	**North-** Mayfield Station is now recorded as Mayfield Station (Goods) and the Printing Works is now recorded as Works. **South-** The Dairy (Disused) is now recorded as Works, the Leather & Cloth Factory is now recorded as Factory. **East-** No significant change **West-** Engineering Works is no longer recorded.	The 1970/71 map (1:2,500 scale) no longer records the Mill to the northeast, the larger Depot is now recorded as Estates & Engineering Depot, the Works/Factory are now recorded as Hanover Mills again, a Garage is recorded approximately 50 m to the south of the southwestern corner of the Site and Mancunian Way is now recorded to the immediate south of the Site.
1978-1986	**North-** The Works to the west of Baring Street is no longer recorded. **South-** The Works to the west of Baring Street is no longer recorded and the Factory to the south of the former Works is recorded as Mayfield Works. The Rubber & Plastic Works is now recorded as Works. **East-** Hoyle Street Industrial Estate is now recorded to the south of Rachel Street. **West-** The Car Park to the south of Travis Street is no longer recorded and the area of the land to the north of Travis Street is now recorded as a Car park.	The *Garage* to the southwest is no longer recorded by 1984 and the area around the former *Garage* is now recorded as *Downing Street Industrial Estate*.
1987-1991	**North-** A Scrap Yard is recorded to the south of Mayfield Station in the far east of the Plot. **South-** A tank is recorded to the west of the Works in the east of the Plot and another tank is recorded approximately 100 m to the northwest. **East-** No significant change **West-** No significant change	No significant change
1992 - 1994	**North-** No significant change **South-** No significant change **East-**No significant change **West-** No significant change	The *Garage* to the north of *Fairfield Street* as a *Depot*. There are no further major changes to the surrounding area.

4.2 Regulatory Data

Regulatory data relating to potentially contaminative uses is summarised in Table 4-2 below. This information was obtained from the Groundsure report, presented in full in Appendix B.

Table 4-2 Summary of Regulatory Data

Item	Location [on/off Site]	Information	Potential to Impact
Environmental Permits, Incidents and Registers			
Part A (2) and Part B Activities and Enforcements	2 [on Site]	2 x Part B Historical Permits, metal and other mineral processes	Yes
Licensed Discharge Consents	1 [~50m]	Effective 1995. Sewage discharge effluent, revoked from being received into the River Medlock.	No
National Incidents Recording System, List 2	2 [on Site] 3 [~50m]	Both unidentified pollutant sources occurred in 2001. 2001-2003, contaminated water from urban runoff, and diesel from oils and fuel.	Yes Yes

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Item	Location [on/off Site]	Information	Potential to Impact
No records within 550m of: Historic IPC Authorisations, Part A (1) and IPPC Authorised Activities, Red List Discharge Consents, List 1 and 2 Dangerous Substances Inventory Sites or Water Industry Referrals, Planning Hazardous Substance Consents and Enforcements, COMAH and NIHHS Sites, National Incidents Recording System, List 1, Sites Determined as Contaminated Land under Part 2A EPA 1990, Category 3 or 4 Radioactive Substances Authorisations.			
Landfill and Other Waste Sites			
Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	2 [on Site] 2 [51-250m]	2 x Scrap yards, 1991, 1994 Metal works, 1948	Yes No
EA Licensed Waste Sites	4 [on Site]	Waste treatment to product oil (issued 2015) Metal recycling Site (issued 1996) Inert and excavated waste treatment (issued 2015) Metal recycling Site (issued 1996)	Yes Yes Yes Yes
One historic landfill identified located 341m NE of the Site. Licenced to receive inert and industrial wastes, licence surrender July 1988.			No
Current Land Use			
Current Industrial Sites Data	14 [on Site] 3 [~50m]	Range of industrial works including vehicle repair and servicing, electricity sub stations and tanks. Range of industrial and repair and vehicle works.	Yes No
Records of Petrol and Fuel Sites	1 [51-250m]	85m NE, unbranded	No
No records within 250m of National Grid Underground Electricity Cables.			
Historical Industrial Sites			
Railway Building, including a goods station and Siding Features	On Site	1890 – present	Yes
Tanks	9 [on Site]	Unspecified Tanks present at various times between 1889-1994.	Yes
Other Industrial Buildings e.g. Police Station, Fire Station, Unspecified Mills, Cotton Mills, Iron Works	On Site	1890-1990's	Yes
Historical Garage and Motor Vehicle Repair Database	1 [on Site]	Garage on Site from 1948	Yes
No historical petrol and fuel Sites were recorded within 500m of the Site.			

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5 Previous Site Investigations

Exploratory hole logs from the Ground Investigation & Piling Ltd. (GIP) ground investigation (GI) for the Site have been reviewed. The GI works were undertaken during April 2009 and comprised 7 No. window sample boreholes with associated monitoring and testing. Historic borehole logs from the BGS Geoscience Database have also been reviewed. The data from the ground investigation and the BGS boreholes is summarised in Section 3.1 and logs are included within Appendix D.

It is understood that further ground investigation works have been undertaken on Site, however no information has been made available to BuroHappold at time of writing.

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6 Preliminary Geoenvironmental Risk Assessment

6.1 General Approach

In the UK, the assessment of risk from contamination follows the source-pathway-receptor approach. If one of these three elements is absent, it is considered that there is no risk of harm. If, however, there is considered to be a linkage between any given source and any given receptor, then a risk-based approach is used to assess the significance or impact of any such linkage.

Risks are defined as the probability of an event occurring combined with the severity of the consequence of that event. Particularly, to assess the risks to Site end users posed by any given source, the sensitivity of each receptor is considered. For example, the concentration of contamination acceptable at a Site to be developed as a residential property with a garden used to grow vegetables and accessible to young children is set lower than that for a commercial Site where soil is exposed only in minor areas of landscaping and the only long-term users of the Site are adults. Similarly, a Site overlying a Principal Aquifer supplying potable water to a large population will be considered more stringently than a Site overlying an impermeable geology with only minor seepages of groundwater.

6.2 Sources, Receptors and Pathways

Potential contamination sources have been identified and are summarised in Table 6-1 below. The 'Contaminants of Concern' in this risk assessment are based primarily on information from the review of historical information, reference to DEFRA R&D Publication CLR 8 'Priority Contaminants for the Assessment of Land' and relevant Industry Profile reports published by the Department of Environment. Site specific pathway-receptor linkages have been identified in Table 6.2 with respect to the sources outlined in Table 6-1.

Table 6-1 - Summary of Potential Contamination Sources

Location	Potential Source	Likely Age	Potential Contaminants of Concern
On Site	Infilled land / Made Ground	>100 years	Ground gases / vapours
	Historical Site uses: *Works, printing works, mills, garage, tannery, scrap yard, brewery, iron works, waste tank / reservoirs, mortuary, various depots, smaller commercial/industrial facilities* **Current Site Uses:** *Works / factories, a scrap yard, a depot, Industrial Estate, derelict land and car parking. Garages, tanks, scrap yards, fly tipped material, sub station*	>100 years - current	Heavy metals, organic and inorganic compounds, acids, asbestos, fuel oils, lubricating oils, PAHs, effluent treatment chemicals Heavy metals, organic and inorganic compounds, acids, asbestos, fuel oils, PAHs, solvents.

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Location	Potential Source	Likely Age	Potential Contaminants of Concern
Off Site	**Historical Industrial Uses:** *Saw Mill, Timber Yard, Railway Lines, Cotton Mill, Chemical Works, Dairy, Printing Works.*	>200 years - current	Fuel oils, lubricating oils, PAHs, ethylene glycol, creosote, herbicides, ash, sulphates, heavy metals, organic and inorganic compounds, acids, asbestos, dyes

Table 6-2 - Summary of Receptors and Pathways

Receptor		**Pathway**
Human Health	Construction / Maintenance Workers	Direct contact, ingestion, inhalation
	Future Site Occupants	Direct contact, ingestion, inhalation
	Site Neighbours	Inhalation
Controlled Waters	Principal Aquifer (Sherwood Sandstone	Migration through granular strata
	River Medlock	Leaching and migration via permeable strata. Surface water runoff. Potential could be realised during current use and during restoration earthworks.
Ecology	On Site flora and fauna	Root uptake
Built Environment	On-Site buildings, structures and services	Gas migration via permeable strata with potential for accumulation to hazardous concentrations. Direct contact with contaminated material / aggressive attack.

6.3 Physical Hazards

The Site walkover identified a significant number of needles and other sharps lying on the surface of the Site, this was noted as a particular problem in the area of the former Mortuary. These sharps and the illegal activities that are associated with them will pose a risk to future construction workers that will require mitigation. This risk is not set out in the below table but is taken forwards to the conclusion.

6.4 Results of Risk Assessment

The details of the Preliminary Risk Assessment are presented in Table 6-3 overleaf and the results discussed in Section 8.1.

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Table 6-3 Preliminary Risk Assessment

		Pollutant Linkage	Risk Assessment (following CIRIA C552)			Comment on hazard realisation
Source	**Contaminants of Concern**	**Receptor / Pathway**	**Consequence**	**Probability**	**Risk**	
On site Made Ground	Ground Gas/vapour	**Description of source: Historical maps and data show a number of areas of infilling on Site. Potential for hazardous ground gas and vapours resulting from infilling with putrescible materials and significant depths of Made Ground. Nature of ground gas regime not proven. The relatively permeable Made Ground and limited glacial till are unlikely to limit the vertical and horizontal migration of gas and vapours.**				
		Construction/ Maintenance Workers Gas and vapour migration via permeable strata with potential for accumulation in hazardous concentrations potentially leading to explosion, fire and/or asphyxiation	Severe	Unlikely	**Moderate/ Low**	Limited potential for hazardous gases to impact construction and maintenance workers, possible for gases to build up in enclosed below ground excavations, good ventilation and health and safety practices can mitigate this risk.
		Future site users Gas and vapour migration via permeable strata with potential for accumulation in hazardous concentrations potentially leading to explosion, fire and/or asphyxiation	Severe	Low	**Moderate**	Potential for build-up of hazardous gases in buildings. Capable of mitigation by Site investigation to classify the ground gas regime followed by installation of appropriate gas protection measures.
		On- Site buildings and structures Gas and vapour migration via permeable strata with potential for accumulation in hazardous concentrations potentially leading to explosion and fire	Severe	Low	**Moderate**	Potential for build-up of hazardous gases in buildings. Capable of mitigation by Site investigation to classify the ground gas regime followed by installation of appropriate gas protection measures.
On site historic and current site Uses.	Heavy metals, organic and inorganic compounds, acids, asbestos, fuel oils, lubricating oils, PAHs, effluent treatment chemicals, solvents.	**Description of Source: Historic construction and demolition activities over the years will likely have resulted in the presence of infilled / Made Ground. A timber yard was recorded on Site from 1851 to 1893. A tannery, brewery, and print works were present from 1851 until 1922. A cotton mill was recorded on Site from 1851 – 1948. Ice works and Baths have been recorded on Site from 1893 – 1850. The Mortuary and Depot were present from 1954-1963. Tanks were recorded between 1987-1991.** **Mayfield Station has been recorded in mapping since 1922. Hoyle Street Industrial Estate has been recorded since 1978 and various works and factories have been recorded since 1960 – 1977. Two scrap yards have been recorded; one since 1991, and the other since 1994. There are also two four licensed waste Sites (for metal recycling and waste treatment).** **Historical and recent Sites uses make it likely that contamination is present within site soils. The relatively permeable Made Ground and limited glacial till are unlikely to limit the vertical and horizontal migration of contamination.**				
		Construction and maintenance workers Dermal contact, soil and dust ingestion/ inhalation	Medium	Low	**Moderate / Low**	Potential for exposure during investigations/ earthworks. Period of exposure dependent on construction timescales. Standard Health and Safety precautions likely to be used by workers. Mitigation of potential risks can be achieved by appropriate investigation and adoption of standard good construction practice.
		Future site users Dermal contact, soil and dust ingestion/ inhalation	Medium	Low	**Moderate / Low**	Potential for dust generation, direct contact and ingestion. Exposure time is relatively limited. Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation / mitigation measures including encapsulation.
		Off Site occupiers / visitors of neighbouring land Soil and dust ingestion/ inhalation	Medium	Unlikely	**Low**	Large scale development, potential to impact surrounding visitors by dust generation. Increased potential during any earthworks. Mitigation of potential risks can be achieved by appropriate investigation and adoption of standard good construction practice.

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Source	Contaminants of Concern	Pollutant Linkage Receptor / Pathway	Risk Assessment (following CIRIA C552) Consequence	Probability	Risk	Comment on hazard realisation
		Degradation of water quality [Principle Aquifer] Migration via permeable strata, contaminated run off/ near surface soils	Medium	Low	**Moderate / Low**	Potential for increased infiltration and promotion of leaching during development works. Nearest active local abstraction over 700m from the Site. Site not within a groundwater protection zone. Quality of groundwater not known. Mitigation of potential risks can be achieved by appropriate investigation and remedial design. Good construction practice likely.
		River Medlock Migration via permeable strata, drainage pipes and surface run-off.	Medium	Low	**Moderate/ Low**	Potential for contaminated groundwater to migrate via drainage, permeable strata and surface run-off., River Medlock runs through the Site. River Medlock present on site. Mitigation of potential risks can be achieved by appropriate investigation and remedial design. Good construction practice likely.
		Flora Root uptake and contact with soil by invertebrates/fauna	Mild	Low	**Low**	Limited vegetation on Site, future vegetation likely to be within specific landscaped areas utilising imported soils. Mitigation of potential risks can be achieved by appropriate investigation and remedial design.
		Buildings structures and services Direct contact, permeation of water supply pipework. Direct contact/, aggressive attack	Medium	Unlikely	**Low**	Potential for direct contact on redeveloped Site. No record of degradation to water supply or evidence of structures damaged by contaminated soils currently. Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation.
Off site historical industrial uses	Fuel oils, lubricating oils, PAHs, ethylene glycol, creosote, herbicides, ash, sulphates, heavy metals, organic and inorganic compounds, acids, asbestos, dyes	**Description of source: Numerous potentially contaminating activities present on the site boundaries since development of the area. Nature and extent of any contamination that has migrated onto site not proven and unlikely to be gross.**				
		Construction and maintenance workers Dermal contact, soil and dust ingestion/ inhalation	Medium	Very Low	**Low**	Potential for exposure during investigations/ earthworks in site areas adjacent to the site boundary, source likely to be limited. Period of exposure dependent on construction timescales. Standard Health and Safety precautions likely to be used by workers. Mitigation of potential risks can be achieved by appropriate investigation and adoption of standard good construction practice.
		Future site users Dermal contact, soil and dust ingestion/ inhalation	Medium	Very Low	**Low**	Potential for dust generation, direct contact and ingestion in site areas adjacent to the site boundary, source likely to be limited. Exposure time is relatively limited. Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation / mitigation measures including encapsulation.

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7 Preliminary Geotechnical Assessment

7.1 General

On the basis of the desk study data, an outline of geotechnical recommendations for foundation, earthworks and associated risks are set out in the following section. The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock.

In due course, this section would need to be reviewed in the context of additional ground investigation and masterplan development, as there is currently limited data available for the geotechnical/geological characteristics of soil/rock present on Site.

7.2 Geological profile and geotechnical parameters

The geological succession is outlined in Section 3.1 and is thought to comprise a thickness of Made Ground overlying Glacial Till (sporadically present) overlying the Chester Pebble Beds Formation, increasing in competence with depth. Further Site investigation and laboratory testing is necessary for further soil/rock characterization and geotechnical design parameter derivation.

7.3 Excavation, Earthworks and Groundwater Control

Given the development history of the Site, significant thicknesses of Made Ground are anticipated in some areas. If this material is not self-supporting, temporary retaining works would be required for shallow footing and/or any excavations needed (to be established during Site specific ground investigation).

Re-profiling works may be required as part of the development works. It may be possible to re-use suitable material elsewhere on Site, however it is possible that some of the excavated material will be unsuitable for engineering purposes and will require disposal off Site. Material considered unsuitable for engineered fill may be used in non-engineered landscaped areas provided its engineering properties are suitable, and the material is tested for contamination in keeping with the end use of the development. A detailed cut/fill exercise will be required in order to ascertain the amount of surplus arisings that will need to be handled/placed/removed from Site as part of masterplan development.

Materials arising from the removal of any foundations/obstructions and any appropriate Made Ground could, if cost effective, be considered for re-use as hardcore/reprocessed stone if appropriately sorted, processed and treated. This process, if cost effective, has the advantage of minimising waste disposal requirements and reduction of import and use of raw materials in accordance with environmental guidelines and best practice.

The Chester Pebble Beds Formation is a Principal Aquifer, however there is currently no groundwater data available for the Site. Ground investigation is needed to establish the groundwater regime and characteristic soil permeability. From there, the requirement for any groundwater control measures for shallow excavations, and in the permanent case, can be established.

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7.4 Engineering Assessment and Foundation Methods

The foundation options that may be feasible for the proposed development comprise pad or strip footings, raft foundations or piled foundations. The selection of these options is influenced by a number of factors relating to the ground conditions and proposed development. These are generally associated with the ability of the ground to support the loads applied by the structure above and to the sensitivity of the structure to ground movement.

7.4.1 Shallow Foundations

Depending on the structural loads, shallow foundations may be feasible. The Glacial Till or Chester Pebble Beds are envisaged to provide a suitable founding strata for a shallow foundation option (pads/strip/raft) subject to detailed characterisation, although it should be noted that due to the Site history, significant thicknesses of Made Ground are likely to be present in localised areas which could make shallow foundations uneconomic due to required excavation depths.

7.4.2 Piled Foundations

Where shallow foundations are found to be impractical or uneconomical, then consideration will need to be given to piled foundations, particularly for any heavily loaded high rise structures. Rotary bored or continuous flight auger (CFA) are suitable from a technical perspective, with CFA piles socketed into the Chester Pebble Beds likely to be most feasible.

7.5 Buried Structures and Obstructions

Due to the rich development history of the Site, it is considered likely that localised obstructions, such as historic floor slabs, foundations or infilled basements, are present which are not recorded or have not been identified. Any such structures/obstructions/services encountered may require removal as part of any construction works and any excavations should be infilled with suitable structural fill where appropriate.

7.6 Void

A void (~1.50 m diameter x ~5.00 m deep) appeared in the car park of the Transport for Greater Manchester (TFGM) building (Unit 4), directly above the culverted River Medlock during the recent Site walkover. The cause is currently unknown. Further assessment, including a CCTV survey, is currently being undertaken, and appropriate repair/remediation measures will be undertaken once better understood. Bulging and cracking to the nearby car park retaining wall was also noted, with a depression to the tarmac adjacent to the wall. A Design Note has been prepared by Buro Happold and is included as Appendix C.

7.7 Preliminary Geotechnical Risk Register

The Geotechnical Risk Register developed below shows the degree of risk attached to various ground related aspects of the proposed development. The aim of this section is to provide an assessment of the risk to the project that rise from ground related problems (in relation to geotechnical issues and obstructions) and propose possible mitigation measures. The register risk is only an initial assessment and should be revised in the detailed design.

It has been developed in general accordance with the guidance presented in ICE/DETR Document 'Managing Geotechnical Risk' (2001). The degree of risk is determined by combining the assessment of probability of the hazard occurring with an assessment of the impact. The scale against which the probability and impact are measured and the resulting degree of risk determined are shown below.

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Table 7-1 – Risk scoring matrix

Probability	(P)		Impact	(I)		Risk	(R)
Very Likely	5		Very High	5		Severe	20 – 25
Likely	4		High	4		Substantial	15 – 19
Plausible	3	X	Medium	3	=	Moderate	10 – 14
Unlikely	2		Low	2		Minor	5 – 9
Very Unlikely	1		Very Low	1		Negligible	1 – 4

Table 7-2 - Risk Register

Site/Ground Conditions	Hazard	Potential Impact	P	I	R	Mitigation
Previous Site use	Contaminated Ground	Health and safety of ground workers, environmental damage	4	4	16	Ground Investigation to be undertaken. Vigilance throughout works. Seek advice of Environmental Engineer if any identified unusual odorous or visually contaminated materials encountered.
Historic buildings on Site	Obstructions / infilled basements	Obstructions to piling. Potential presence of poorly compacted backfill.	5	3	15	Enabling works may be required – to be established following ground investigation and when proposed development is at a more advance stage.
Gradient on Site	Earthworks or retaining walls required to accommodate layout	Increased cost of development	3	4	12	Cut and fill earthworks will be required to the Site to form suitable founding ground. Ground Investigation to confirm the ground model and quality of materials. Ground modelling and slope stability design assessments will be required to confirm designs at detailed design stages
Japanese Knotweed in River Medlock	Spread of invasive species	Damage to structures, illegal spreading of knotweed	4	4	16	Full survey to be undertaken. Appropriate treatment to be undertaken by a suitably qualified professional before construction commences.
Loose or soft, compressible soils at shallow depth	Ground unsuitable for conventional shallow footings	Excess settlement or alternative foundations	3	4	12	Ground investigation needed to confirm soil compressibility. Consolidation and compressibility parameters to be taken into account and allow for settlements.
Soft and compressible near surface soil	Ground unsuitable for conventional ground bearing slab	Alternative floor design	2	3	6	Ground investigation needed to confirm suitability of ground bearing slab.
Loose or unstable strata at shallow depth	Excavation Instability	Potential collapse – Health and safety	3	4	12	Support of excavations to be considered for temporary construction works if required.

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Shallow groundwater	Excavation Instability / Water ingress into excavations / Slab Uplift	Collapse of excavations. Difficulties in casting concrete e.g. for foundations. Damage to structure from slab uplift.	3	4	12	Groundwater monitoring to be undertaken as part of ground investigation. Groundwater control measures, e.g. sump pumping, may be required for shallow excavations. More substantial control measures (e.g. secant piled walls) may be required if permanent groundwater level is shallow, or for deep excavations / reductions in level below groundwater table.
Unexploded Ordnance	Encountering unexploded WWII bombs	Risk to human life, damage to structures	3	5	15	Detailed UXO risk assessment was undertaken by Planit UXB Ltd. UXO management is required during the GI / construction based on the findings.
Coal mining	Unstable ground	Voids in historic mine workings causing collapse; potential for soft ground / voids within historic mine shafts	1	5	5	Coal Authority report / records and geological maps indicate that the risk from historic coal mining is low.
Voids	Unstable ground	Potential harm to structures and human life. Cost of repairs.	4	4	16	Voids have opened up on / near Site (Section 3.5 refers). Investigation required to establish extent, cause and mitigation.
Live services	Diversions required, explosion, flooding, damage to utilities	Diversions may be required, increasing cost. Risk of injury if excavated through during GI / construction	5	3	15	GPR utilities survey to be undertaken before ground investigation. To be incorporated into design to minimise clashes / diversions.
River Medlock	Working near water	Construction or GI workers falling in, causing injury / death	3	4	12	Appropriate measures required for working in close proximity to River Medlock.
Needles and sharps	Needles and sharps	Harm to workers – diseases, cuts	4	4	16	Vigilance and appropriate PPE. Site to be cleared of sharps and other potentially harmful materials before construction starts.

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8 Conclusions and Recommendations

8.1 Summary of Contamination Risks

The identified potential risks above Low are summarised below:

- There is a Moderate risk to future Site users and future buildings due to release of ground gases from Made Ground underlying the Site;
- There is a Moderate/Low risk to Site workers due to the potential for inhalation of ground gas. This risk is likely to be mitigated by standard working practice assuming that no deep poorly ventilated excavations are required.
- There is a Moderate / Low risk to construction workers, future site users and controlled waters from historic and current site uses which are likely to have contaminated Site Made Ground.

A ground investigation over the whole Site area will be required to better understand the risks identified and allow the adoption of suitable remedial measures if required.

8.2 Geoenvironmental Conclusions

This site has a long industrial history which has continued until present day. It appears likely that significant thicknesses of Made Ground are present on site as some areas appears to have been filled and there has been significant redevelopment over the years. This industrial legacy is likely to have contaminated shallow soils to some extent and a ground investigation is required to define the extent of contamination and determine the need for remedial measures as part of development work.

8.3 Geotechnical Conclusions

The development proposals are currently not finalised but are expected to comprise mixed use development with high rise buildings, associated hard and soft landscaping, car parking, and landscaping/management of the River Medlock. A range of foundation options are possible for the development based on a desk based study of available information, however there is currently insufficient information to create a detailed ground model. A ground investigation will be required to produce a detailed ground model to allow geotechnical design.

8.4 UXO Conclusions

An Explosive Ordnance Threat Assessment (EOTA) has been undertaken by PLANIT UXB Limited (Appendix A). The EOTA states that a "Medium" Ordnance Threat Level applies across the Site, and that "a UXO threat management strategy is required to be in place prior to intrusive engineering works". Further liaison with PLANIT is ongoing to establish the extent of the mitigation measures required, and whether the Site can be 'zoned' in terms of risk level.

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8.5 Recommendations

8.5.1 Ground Investigation

A combined geotechnical and geoenvironmental ground investigation is required to better understand the potential contamination risks identified and to produce a detailed ground model to allow geotechnical design.

8.5.2 Physical Hazards

Sharps and Needles were identified on Site during the Site walkover. It is recommended that a sharps and needle disposal specialist is consulted with regards to identifying the extent of and appropriate measures for Site management and/or removal of these items prior to the start of any construction works. It is also recommended that the site is secured prior to any such removal to prevent further sharps beings dumped on site.

8.5.3 Japanese Knotweed

Large quantities of Japanese Knotweed were identified on the banks of the River Medlock within the channel during the Site walkover. There was no visual evidence that knotweed had migrated out of the channel onto surrounding areas of the Site, however it is quite possible this has occurred. It is understood that a full survey of the river will be undertaken in the near future, which will fully characterise the extent of knotweed present. It is recommended that a Japanese Knotweed specialist is consulted with regards to identifying the extent of the infestation and recommending appropriate measures for Site management and/or removal of Japanese Knotweed impacted material.

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Appendix A UXO Assessment

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EXPLOSIVE ORDNANCE (EO) THREAT ASSESSMENT (EOTA)

MAYFIELD DEPOT, FAIRFIELD STREET, MANCHESTER, M1 2QF

This assessment draws together all the available information with regards to the site of concern regarding potential Explosive Ordnance (EO) Contamination. It assigns an Explosive Ordnance Threat Level and proposes an appropriate Risk Management Strategy to reduce any associated risks.

This assessment has been produced in compliance with the Construction Industry Research and Information Association guidelines (Report CIRIA 681, dated Dec 08) for the preparation of detailed Risk Assessments in the management of UXO risks in the construction industry, for which PLANIT was an instrumental driver for improved UXO risk management and transparency.

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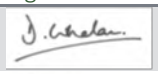
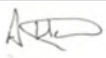
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EXECUTIVE SUMMARY

SITE DESCRIPTION

The site is located approximately 1.5km east of Manchester city centre and the Exhibition Centre, immediately south of Piccadilly Station. The site is loosely bounded by the main line railway running east to west forming the northern boundary of the site, to the west London Road runs north to south and the site's southern boundary is formed by the A635 (M) leading into Mancunian Way.

National Grid Reference for the approximate centre of the site is **SJ 851 976** and the nearest postcode is **M1 2QF**.

POTENTIAL THREAT SOURCE

The following items of explosive ordnance are thought to remain as potential threat sources to ongoing engineering operations at the site of concern:

- WW2 German air-dropped bombs – High Explosive (HE).
- British Anti-Aircraft Artillery (AAA) projectiles.

THREAT PATHWAY

For the purposes of this assessment, it has been assumed that development works would include piled foundations and excavations beyond WW2 ground levels. It is anticipated that personnel or key equipment may complete the risk pathway during excavation and/or piling operations that may bring them into physical contact with potential threat items.

KEY FINDINGS

There is incontrovertible evidence that the site of concern was directly affected by aerial bombing during WW2. The possibility that the site was affected by Anti-Aircraft Artillery projectiles returning to earth unexploded cannot be reasonably ignored.

- There is no evidence to suggest that other ordnance contamination events occurred at the site of concern.
- There are no Abandoned Bombs or UXBs recorded that would affect the site of concern directly.
- The EO Threat varies across the site of concern.

THREAT LEVEL

The following Ordnance Threat Levels apply:

Ordnance Type	Threat Level
50, 250, 500 and 1,000kg bombs, British AAA projectiles	MEDIUM

THREAT MITIGATION

Considering the findings of this assessment, a **UXO THREAT MITIGATION STRATEGY IS REQUIRED** to be in place prior to intrusive engineering works at this site of concern.

THREAT REVIEW

A review of these recommendations must be undertaken considering any additional, relevant information being provided. Such a review may, if the EO Threat Level is deemed to have altered, make alternative recommendations from those made above to implement work safely.

AIM & METHODOLOGY	The aim of this assessment is to identify any threats that may be posed by EO during the proposed engineering works at the site of concern and, where a threat is identified, to recommend a risk mitigation strategy that will reduce this threat to acceptable levels. This assessment follows the CIRIA 681 Guidelines, which were compiled using, as a main driver of change, PLANIT's innovative approach to EO risk assessment. The following key considerations are addressed in this assessment: • The risk that the site of concern was contaminated by EO. • The risk that EO remains on site. • The risk that EO may be encountered during the proposed engineering works. • The risk that EO may be initiated by proposed engineering works. • The consequences of encountering or initiating EO. If the likelihood of encountering EO is significant, information about the types and natures of that EO and the expected levels of contamination is considered within the source-pathway-receptor context of contamination. Should a confirmed pathway exist, the information enters our proprietary Threat Assessment Matrices in order to arrive at a valid and transparent Threat Level. The Threat Level allows relevant conclusions to be made about the EO Risk at the site of concern, which in turn allows an appropriate Risk Mitigation Strategy to be developed. The Threat Mitigation Strategy is intended to give the Client a best-fit, safe solution that will allow the level of risk from EO to be reduced to an acceptable level; providing maximum project planning flexibility. PLANITs approach to EO threat assessment has been fundamental in driving change throughout the UK Commercial EOD Industry and was instrumental in the drafting of CIRIA 681. PLANITs approach provides transparency to our EO risk assessment process allowing the Client to make valid decisions on what is a specialist activity; empowering them to maintain control over this vital aspect of their project - Where necessary, appropriate EO risk mitigation measures will be recommended. This assessment considers general and site-specific factors, including: • Historical use of the site in relation to ordnance manufacturing, storage and disposal. • Historical use of the site in relation to Military training and related facilities. • Evidence of offensive aerial and naval bombardment during WW1 and WW2. • Evidence of Unexploded Bombs (UXBs). • Previous EO incidents and/or EO survey/clearance activities. • Extent of post-war redevelopment. • Proposed engineering works.
RELIABILITY OF HISTORICAL RECORDS	This assessment is drawn from detailed research into the available historical evidence. Every effort is made to gather all the relevant material; however, PLANIT cannot be held responsible for any changes to the assessed level of risk or proposed risk mitigation strategies due to subsequent information that may come to light at a later date. The accuracy and detail of wartime historical records is difficult to verify, not least of which is due to the conditions under which much of this information was gathered and recorded. Additionally, recording of information was less formalised in the early days of the German air campaign against the UK mainland (Pre-Bomb Census Record) and much information recorded early on was lost during subsequent air raids. Records for rural, sparsely populated areas are not always reliable, being based on second-hand information in many cases; records of attacks on military installations was often recorded independently from general records and many such archives have been lost or remain undisclosed to the public. Consequently, the exact location, quantity and nature of the EO threat cannot be definitive but rather remains subjective and is based on the careful analysis by experts of the available information. PLANIT cannot accept liability for any gaps in the historical record.

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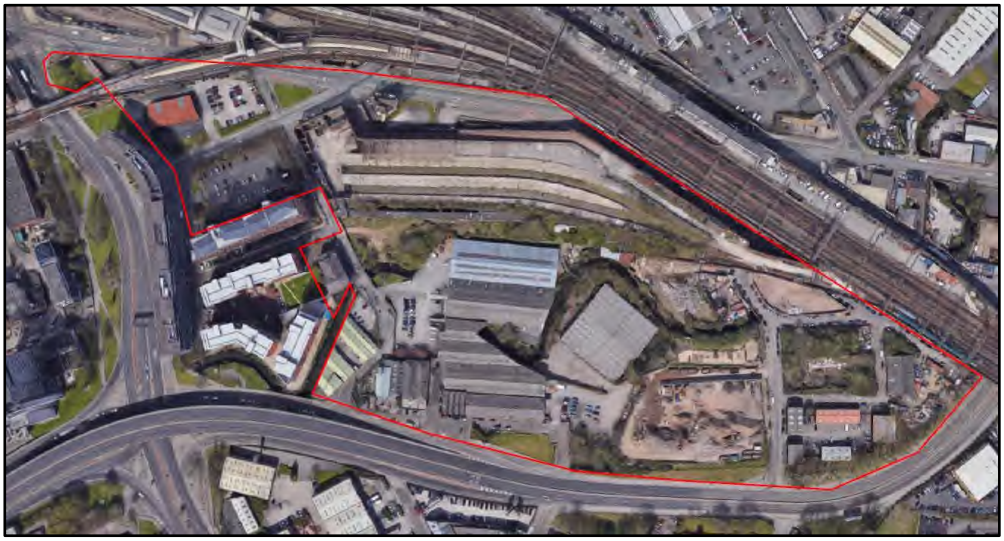
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SITE LOCATION & DESCRIPTION

SITE OF CONCERN

The site is located approximately 1.5km east of Manchester city centre and the Exhibition Centre, immediately south of Piccadilly Station. The site is loosely bounded by the main line railway running east to west forming the northern boundary of the site, to the west London Road runs north to south and the site's southern boundary is formed by the A635 (M) leading into Mancunian Way.

National Grid Reference for the approximate centre of the site is SJ 851 976 and the nearest postcode is M1 2QF.



The site is dominated by a multitude of large, multi-storey industrial buildings with large areas of hard standing for vehicle manoeuvre, parking and material storage associated with the Goods Yard supporting Piccadilly Station. Small, isolated areas of scrub/ grass with shrubs and small trees are dotted across the site area.

Maps showing the site location and layout are at Annex A.

SCOPE OF PROPOSED WORKS

The details of the proposed development are unknown at the time of writing this assessment.

For the purposes of this assessment, it has been assumed that development works could include intrusive engineering beyond WW2 ground levels. It is anticipated that personnel or key equipment may complete the risk pathway during excavation and/or piling operations that may bring them into physical contact with potential threat items.

GEOLOGICAL ENVIRONMENT

The available geological information (Ref 2) shows the site to be underlain by superficial deposits in the form of Late Glacial Flood Gravels. This masks the solid geology beneath the site which comprises the Bunter Sandstone strata of the Triassic Period.

According to the, "Factual Ground Investigation and test report for redevelopment of land to the south of Manchester Piccadilly Railway Station, Manchester", by Buro Happold, dated 8 Oct 09, the specific ground conditions are:

Strata	Depth (m)	Thickness (m)
Made Ground: Turf on gravelly sand with cobbles, brick and concrete. Tarmac in places over concerete.	0.80	0.80
Soft to firm very sandy gravelly friable clay.	1.90	1.30
Orange brown silty fine to medium sand.	3.20	Not proven

REVIEW OF RELEVANT DATASETS

SOURCES OF INFORMATION

PLANIT ensures that Explosive Ordnance Risk Assessments (EORAs) are as comprehensive as possible and detailed research is undertaken to collate all the available EO-related information that relates to the site of concern. Information sources may include, but are not restricted to:

- National Historic Archives.
- Local Authority & Council Archives.
- English Heritage National Monuments Record.
- Ministry of Defence Archives.
- PLANITs extensive archives drawn from many years of detailed research and operational experience of UXO Risk Management activities in the UK and abroad.
- Joint Service EOD Centre (JSEOD).
- Historic Mapping and Aerial Photography.
- Specific UXO-related documents such as military bombing and casualty records.
- Local libraries and history groups.
- Open sources such as published books and internet searches.
- Anecdotal evidence from eye witnesses.

NB: The MoD information office that deals with requests for information relevant to EO clearance operations completed by the MoD is currently facing significant delays. Although a request has been submitted, any information that may be relevant has not yet been forwarded for timely inclusion in this assessment. However, if any relevant information comes to light from this source that affects the threat assessment, this will be notified to the client as a matter of urgency.

SITE HISTORY

Up to **1905**, the site was occupied by what appear to be residential houses but by **1923** they have been cleared to make way for Mayfield Station which is now dominating the northern part of the site. The site layout is constant until the map record of **1956,** which shows cleared areas more than likely because of bomb damage during WW2. Mayfield Station itself has been reduced by half and there are other clear areas of bob damage across large areas of the site. There is also a notable addition to the site area in this map sheet which is the addition of a large structure, built immediately post-War, in the centre of the site.

By **1968**, Mayfield Goods Station has been fully restored and other previously cleared areas of the site have been redeveloped. This work appears to be complete with the addition of some small buildings to the western edge of the site area by **1985**. This site layout remains constant until at least **2010** but by **2013**, the Goods Station roof has been removed.

ORDNANCE MANUFACTURE & STORAGE

During WW1 and WW2, Lincolnshire housed many facilities involved in the manufacture, storage, filling and testing ordnance. The nearest explosive manufacturing sites (known as His Majesty's Explosive Filling Factories (HMEFs)) were:

	• Trafford Park (HMEF). • Hyde Road, Gorton, Manchester (National Shell Factory – manufacturing 4.5" shell (projectile) casings). The nearest Royal Ordnance Facilities (ROFs) established in the run up to WW2 were: • ROF Chorley. • ROF Radway Green. None of these sites would have posed a potential threat to the site of concern.
MILITARY HISTORY	There is no evidence to indicate that the site was ever used for military purposes.
CIVIL DEFENCE	Manchester possessed a peak of 56 Heavy Anti-Aircraft Batteries during WW2, including 4.5, 3.7 and 3-inch Anti-Aircraft (AA) guns, sited in some 70 separate locations. None of these were sited on or near to the site of concern to have created a direct source of potential ordnance contamination. Due to the relatively high failure rate of Anti-Aircraft Ammunition (AAA) during this time, there remains the possibility that such ordnance fell back to earth creating additional UXO hazards. This type of ordnance had the potential to penetrate the ground to significant depths and cannot be entirely discounted as a potential threat source although its potential presence is impossible to determine with any quantifiable degree of certainty. As would be expected, Manchester had several Civil Defence ('Starfish') sites designed to protect London from aerial attack. Manchester's Starfish Sites were located at: • Chat Moss. • Tatton Park. • Park Moor (now in Lyme Park Country Park). • Churnal Moor. • Mossley. • Carrington Moss. • Ludworth Moor. • Reddish. • Elkstone (north Staffordshire). None of these sites would indicate the possibility that erroneous Luftwaffe bombing would have produced a consequent UXO risk on the site of concern.
WW1	Greater Manchester suffered two aerial bombardments during WW1; on 26 Sep 1916 Zeppelin L21 dropped 20 HE bombs on Bolton, mistaking the town for Derby. Significant damage was caused and 13 people were killed. On 12 Apr 1918 Zeppelin L61 bombed Wigan at 2300hrs in a raid that lasted some 12 minutes. Three people were killed and a further nine were injured during the raid. Neither of these raids would have affected the Site of concern and therefore the risk from WW1 unexploded ordnance is negligible.
WW2	During WWII, the site sat close to several industrial and strategic installations key to the war effort that were located in the area – including Mills, Quarries and Railway infrastructure. Luftwaffe target maps do not list specific locations on or close to the site although the concept of specific targets, when bombing in and around Manchester, was only relevant prior to the accidental Luftwaffe raid on London on 24th Aug 1940. This attack broke the unofficial agreement not to bomb opposing capitals and led to the gradual breakdown of the Amsterdam draft international rules prohibiting the attacking of civilian infrastructure outside of combat zones

(purely industrial areas); Great Britain, including Manchester, was now opened to air attacks. As well as the air raids targeting Manchester itself, unused bombs were routinely jettisoned whilst returning to base following an unsuccessful raid. In addition, the high-altitude area bombing during this period was notoriously inaccurate with areas surrounding specific targets suffering during attacks on the targets themselves.

The site in question sits in the middle of the main areas within Manchester that were targeted, mostly during the 'Manchester Blitz' of Dec 22-24 1940 - Salford Docks, Manchester's industrial centre and Trafford Park (with the areas surrounding them also being affected by the same air raids). Many Manchester companies were involved in war production work including the Fairey Aviation plant at Ringway, the Ferranti factory at Hollingwood, Metropolitan Vickers works at Trafford Park and the A.V. Roe (Avro) plant at Chadderton. In addition, Ford operated a factory in Eccles building Rolls Royce Merlin engines for the Lancaster bomber and the Mosquito fighter bomber.

The Luftwaffe mounted consecutive heavy attacks on the Manchester area on the nights of 22/23rd and 23/24th Dec 1940. Large areas of Manchester, Salford and Stretford were devastated, killing some 684 people and injuring a further 2,364. The first raid of this 'Manchester Blitz' saw 272 tons of HE bombs and 1, 023 canisters of Incendiary Bombs (IBs) dropped. During the second raid, 171 aircraft dropped a further 195 tons of HE bombs and 893 canisters of IBs.

The site is in Region 10 (Manchester) for Civil Defence purposes. Manchester received some 3, 465 Tonnes of HE bombs throughout the war although Cheshire and Chester were much less affected:

Ordnance Type	Number of Bombs		
	Region 10	Cheshire	Chester Rural District
50Kg HE	1403 (79)* + 576 (1)**	594 (25)	1
250Kg HE	727 (49) + 368	301 (19)	13
500Kg HE	114 (7) + 57 (3)	58 (6)	10 (1)
1000Kg HE	2 (2) + 6	1 (1)	
Parachute Mine	514 (77) + 592	139 (16)	
V1 'Doodlebug'	14	6	1
V2 Long Range Rocket	0		
Small Incendiary Bombs	25 454	3 639	
50Kg Phosphorus Bomb	Unknown		
Fire Pots	Unknown		
Oil Bomb	212 (4) + 202	48 (1)	
Containers	Unknown		
Unclassified Ordnance	8 114 (1 341) + 10 658	2 806 (524)	

The bombs recorded as falling on the County Borough of Manchester are summarised below:

Area Acreage	27, 255
High explosive Bombs (All Types)	712
Parachute Mines	18
Oil Bombs	7
Phosphorus Bombs	-
V1 'Doodlbug'	1
Total	**738**
Items per 1000 acres	**27.1**

UNEXPLODED BOMBS (UXBs)

Between 1940 and 1945, Bomb Disposal (BD) Teams cleared over 50,000 items of German air-dropped ordnance of 50Kg or larger, 7 000 anti-aircraft (AA) projectiles and more than 30 000 beach mines – This work claimed the lives of 394 Officer's and men. The War Office at the time stated that over 200 000 HE bombs exploded in

Britain during WW2 with some 25 195 remaining a threat as UXBs i.e. 11%. Some 93% of all UXBs were 50Kg HE and 250Kg HE aerial bombs.

The types of ordnance discovered as UXBs give an indicator of the type of ordnance that may be encountered on or near the site of concern. In this instance, there are no records of UXBs that may present a threat to the site.

ABANDONED BOMBS

A post-air raid search of damaged buildings and facilities would have included a specific search for bomb entry holes. If such evidence was discovered, then BD Teams would have been tasked (in order of strict priority from Category A, the highest priority, to category D, the lowest) to assess the potential UXB and to recommend a course of action. For UXBs that were deemed to be a high enough priority were tackled by the BD Teams who made strenuous efforts to recover and dispose of these items. However, it was not always possible to recover such bombs either through physical constraints, a lack of resources or a change in priority. Such UXBs were noted as 'Abandoned'.

Due to the low priority of abandoned bombs, records that detail them are sketchy and sometimes contradictory. Others were subsequently recovered after the War when time and resources permitted and others remain 'abandoned'. It is worth remembering that 'abandoned' bombs may also include suspected UXBs that were reported but not confirmed, but simply efforts to locate the 'bomb' were exhausted.

The Abandoned Bombs recorded near the site are:

Reference/ Location	Item
CD 49.3822 – Fields 600yds SE of Grove Farm, Chorlton by Beckford.	1 x AA Shell
CD 53.3825 – Fiels near rear of Gun Site Acres Lane, Upton Heath.	1 x AA Shell
CD 56.3826 – Staok Grange Farm, Little Stanney.	1 x AA Shell
CD 84.3843 – Wood Farm, Grove Road, Mollington, 500yds W of Lee Holme.	1 x AA Shell
CD 82.3842 – 50yds W of Dunkirk Lane, Capenhurst Hall Park Farm, Capenhurst.	1 x AA Shell
CD 81.3841 – 100yds S of Pitts farm, Woodbank, Shotwick.	1 x AA Shell
CD 59.3827 – Shotwick Park, S of No. 9/10 Holding Arterial Road.	1 x AA Shell

None of these are considered to present a potential UXO-related threat.

BOMB CENSUS MAPS

Manchester's Bomb Census Records are comprehensive and indicate that several large, air-dropped bomb fell within the site itself with further bomb being suggested by the large-scale building clearances in the east of the site (See Annex C). Mayfield station directly suffered the effects of bombing during World War II, when it was hit by a parachute mine on 22 December 1940.

The relevant Bomb Census Map extract is at Annex B.

HISTORICAL STREEP MAPS

Historical street plans of the period are a useful indicator of whether an area may have suffered bomb damage. The street layout prior to WW2 is the 'start state' and major changes to street layouts or building boundaries may indicate that the change was due to bomb damage. In this instance, there are some significant changes to the street layout that probably indicate bomb damage within the site boundary and there is clear bomb damage in the wider area surrounding the site. Mayfield Station itself and the building complex immediately to the south have received direct bomb/ parachute mine strikes.

The relevant Historical Street Plans are at Annex C.

HISTORICAL AERIAL PHOTOGRAPHY	The same rational applies with historic aerial photography as it does when examining historical street plans – changes between pre-war and post-war images may indicate the possibility of damage caused by bombs falling on the site. Sometimes, detail is such that it allows bomb damage to be seen directly on sites of concern. In this instance, historical aerial photography from the period is not available and therefore no comparisons can be made.

THREAT ANALYSIS

IS THERE EVIDENCE THAT THE SITE WAS AFFECTED BY ANY EXPLOSIVE ORDNANCE CONTAMINATION EVENTS?	**Yes.** The historical record is acknowledged as being incomplete from a National perspective but there is clear evidence within the relevant extract from the Manchester Bomb Census Maps that the site of concern was directly affected by bombing during WW2; which included large air-dropped bombs and parachute mines and/or British anti-aircraft artillery falling back to earth as UXBs. Not much of the site area escaped unscathed, and there is clear evidence that the site did receive direct bomb strikes as well as widespread bomb blast damage. The bomb damage would have been significant and the possibility that another bomb fell on the same area and remained underground, undiscovered as a UXB must be considered plausible. It was also a common error to mistake the havoc wreaked by a large bomb falling through built structures unexploded, which is considerable, with a smaller bomb detonating as intended.
IF ENCOUNTERED, WHAT ORDNANCE TYPES ARE ANTICIPATED?	There is explicit evidence that the site received a number direct hits from large, air-dropped bombs/ parachute mines during WW2. Parachute mines, due to their nature, would have remained on the surface if unexploded and would have been dealt with at the time and can therefore be discounted as potential threat items today. There is no explicit evidence that the site directly received Anti-Personnel or incendiary bomb strikes. Whether the area received AAA returning to earth unexploded is impossible to answer but it would be prudent to accept the worst-case scenario in this case and accept that they probably did. The site is not known to have been used for ordnance manufacture or storage and neither was it a former Military installation. So, we can discount the possibility that the site was contaminated by ad hoc military activity. The type and degree of post-War redevelopment is significant in that it would reduce the encounter potential for smaller items of ordnance such as anti-personnel bombs or AAA projectiles to such a degree across the site that this potential threat source may effectively be discounted. This would not be the case for areas of the site that have not been significantly redeveloped since the end of the War or within ground volumes that have remained undisturbed by intrusive engineering since this time. The following potential threat items may remain under the site within 'at risk' ground volumes: • Large, air-dropped, German HE Bombs including 50, 250, 500kg bombs (of WW2 vintage). • British AAA projectiles.
WHAT IS THE EXPLOSIVE ORDNANCE / UXB ENCOUNTER DEPTH?	**Ministry of Homeland Defence Security Bomb Penetration Studies**. A major study was completed by the Ministry of Homeland Security during WW2, during which the penetration depths of 1328 air-dropped bombs (as reported by the BD Sections of the day and mostly in the Birmingham area). It was concluded, not surprisingly, that the penetration depths of different sized bombs varied according to the geology into which they fell. The average penetration depth of 430 x 50Kg HE bombs in London Clay was found to be 4.6m and that for a 250Kg bomb 6.1m. Also, they concluded that a 500Kg bomb, the largest common bomb dropped during the War, had a likely penetration depth of 6m in sand and 8.7m in clay – the maximum observed for a 500Kg was

10.2m and for a 1000Kg bomb was 12.7m. It should be remembered that these depths were achieved unencumbered by obstacles to penetration such as buildings, concrete and brickwork.

The 'J' Curve. The 'J-curve' describes the path of a bomb (dropped from a normal altitude of about 5 000m) into homogenous ground will continue its line of flight (unless deflected by a substantial obstacle) but then turn upwards towards the surface before it stops. The horizontal distance (the 'offset') between the point of entry and final resting position was typically 1/3 of the ultimate penetration depth for a bomb. Therefore, if a bomb fell close to the exterior of a building or site and did not explode, the path that the bomb subsequently travelled beneath the ground, the "J-Curve", may have delivered it beneath the building or site footprint. The J-curve is often misunderstood, and used to describe the path taken by a bomb dropped from low flying aircraft to which it should not be applied.

The final penetration depth of an air-dropped depends upon several factors; the velocity of the bomb (as a function of the mass, speed) – PLANIT uses a standard velocity of 267m/s for assessment purposes – the angle of penetration of the bomb and the physical features through which the bomb travelled prior to impact with the ground and the geology of the ground into which it entered - Generally, the softer the ground, the deeper the expected penetration depth of the bomb. Peat, alluvium and soft clays are easier to penetrate than gravels and sand and water content plays a part. In addition, it must be remembered that 'barrier geology' such as very dense gravels or bedrock i.e. geology dense enough to stop the progress of a bomb underground, is an important factor in determining the median bomb penetration depth.

Given the ground cover at the time that the bombs fell, the anticipated geology and accepting the norm for the impact angle and velocity of a large UXB, it is reasonable to assume the norm when considering the potential Bomb Penetration Depth (BDP). Therefore, it is estimated that the average penetration depths of Explosive Ordnance (EO) at this site would be:

- British AAA projectiles – 2m
- 50kg HE – 4m
- 250kg HE – 6m
- 500kg HE – 8m
- 1000kg HE – 10m

HOW COULD AN UNCONTROLLED DETONATION BE BROUGHT ABOUT?

Unexploded Bombs rarely spontaneously explode (although some incidents claim to contradict this statement). High Explosive (HE) requires a great deal of energy to create the necessary conditions for detonation to occur. In the case of WWII German bombs being disturbed during intrusive ground works, there are many scenarios to be considered:

- **Direct impact onto the main body of the bomb**. Although this is a possibility, there is little chance of generating enough energy to detonate the explosive fill unless the fuse itself is directly struck.

- **Re-starting the mechanical clock-timer in a bomb fuse**. This is a possibility. It is probable that environmental conditions have corroded the fuse sufficiently to prevent clockwork mechanisms from functioning. However, under some conditions, fuse elements will be in a good condition and additional movement of a bomb fuse may be sufficient to restart a previously 'jammed' mechanical clockwork mechanism.

- **Induction of a static charge, creating a sufficient current to initiate an electric fuse**. This is an unlikely event. Environmental conditions are likely to have corroded the fuse, degrading its components sufficiently to prevent them from functioning. Any elements of the fuse capable of holding a charge would have dissipated in the time since the bomb failed to function.

- **Friction impact initiating fuse elements causing bombs to detonate**. Although remote, this is the most likely scenario that may result in a bomb detonating. Weathering within the fuse pocket can cause the explosives within the fuse to breakdown, crystallize and exude from the fuse itself. Violent physical disturbance of this exuded material carries the remote possibility of initiating the fuse mechanism which in turn will initiate the bomb.

WHAT WOULD THE EFFECTS OF SUCH A DETONATION BE TO THE SITE?

The effects of WWII German bombs detonating have been the subject of several well recorded studies. The general effect of an explosive detonation will depend upon:

- The size of the bomb and its Net Explosive Quantity (NEQ) (i.e. how much explosive material it contains).
- The type of fill in the bomb (i.e. high explosive, incendiary, photoflash).
- The physical location of the bomb. Whether it is:
    - On the surface.
    - Partially buried.
    - Buried (A bomb is 'buried' when it is more than 2½ times its own length below ground level and covered).
- The locations of the bomb in relation to other structures.
- The strength and design of structures near to the seat of an explosion.
- The nature of the ground (i.e. sand, gravel, clay, marsh etc).
- The location of the bomb in relation to human and animal populations.

There would be the potential for ground shock to damage important underground structures including sewers, communication cables, and foundations.

The potential Damage Radii to various underground structures has been assessed by extrapolating from the Joint Service Publication 364 which is the MOD Manual for assessing bomb damage. Potential damage radii for underground structures are assessed as:

Structure	Dist (m)
Brick Walls	30
Foundations	60
Cast Iron/ Concrete Pipes	15
Earthenware/ brisk Sewers	25
Electric Cables/ Steel Pipes	12

WOULD THE SITE CONDITIONS AFFECT THE BOMB FAILURE RATE?

There is no evidence to suggest that bomb failure rate at the site of concern would have been any different from that routinely experienced, i.e. 10-15% of all bombs dropped.

WOULD UXBs HAVE BEEN DISCOVERED DURING WW2?

Density of Bombing. Manchester received a high density of bombing in WW2, and the site sits within the focus of those attacks. We know that the site itself received direct bomb/ mine strikes which caused significant damage. This factor would have made data gathering at the time more complicated and the likelihood of overlooking UXBs higher.

Frequency of Access. Since the site was occupied and used at the time of the air raids, the site of concern would have been subject to post-air raid survey and clearance. The fact that the site itself was affected by bombing, and given its key industrial role, any post-raid survey activities would have been thorough. This would have made the likelihood of identifying smaller items of EO (such as Incendiaries and AP bomblets) quite high whilst larger UXBs would have been more readily identified. However, entry holes and UXBs could easily have been overlooked due to their diminutive size, or gone unnoticed if they fell into water.

Ground Cover. The site was industrial in nature at the time of the attacks and as such it's physical characteristics would act to retard the progress of UXBs underground by reducing their overall velocity prior to impact. However, bomb penetration statistics were collected at the time in similar conditions and therefore the

	maximum potential bomb penetration depths must be considered as the 'worst case'. This is also true of bombs falling into water. **Peripheral Bomb Damage.** We know that the site of concern was subject to serious bomb damage during the War. This increases the possibility of post-air raid operations failing to identify entry holes of potential UXBs.
DOES THE SITE'S DEVELOPMENT HISTORY AFFECT THE POTENTIAL FOR UXO ENCOUNTER?	**Yes.** The fact that there has been a degree of post-War development at the site is worthy of note in that any potential contamination from shallow EO (i.e. AP bombs and IBs) would likely have been discovered during these works and dealt with at the time. Apart from the renovation of the Station with the notable exception of the new structure which appeared in the centre of the site by 1956 (foundation design unknown), much of the site within which the bombs are recorded as falling have seen little redevelopment ibn terms of large, industrial buildings since the end of the War. In areas where redevelopment has not been significant, the potential for UXO encounter as it did immediately post-War. For other areas, it is worth remembering that development either immediately post-War or in the 1960/ 70/ 80s would not have taken any account of the potential for UXBs at the site of concern nor would any effective technology be available to detect such potential threat items. Modern structures tend to have foundation designs that go deeper than historic buildings and risk encountering UXBs at depths beyond existing historic foundation levels or within historic foundation structures that were not detected by excavation or historical bomb survey. Ground volumes between that which has been redeveloped significantly post-War down the maximum anticipated bomb penetration depth (BPD) must be considered potentially at risk from large, deep buried, air-dropped bombs or large Anti-Aircraft Artillery (AAA) Projectiles. If future engineering is to impact on these ground volumes the potential for UXO encounter in this area remains as it did immediately post-War.
DOES THE UXO THREAT VARY ACROSS THE SITE?	**Yes.** Volumes of ground across the site that have already been subjected to extensive redevelopment involving the displacement of earth, may be considered free from the threat of UXO/EO *within the volumes of ground excavated/disturbed*. The same cannot be said of areas of the site that have not been subjected to the same degree of physical disturbance. Areas of the site that have been subjected to historical piling *cannot be automatically considered to be free from the threat of UXO/ EO within the volumes occupied by the piling layout although the threat is significantly reduced* – there is a possibility that historical piles have either missed UXBs at depth or pushed these items aside without incident when they were emplaced. Further, the volume of ground below such piled areas cannot be considered free from the threat of UXO/ EO down to the maximum BPD. Volumes of post-War made ground may be considered free from the threat of UXO/EO also, unless a cross-contamination event has occurred, which would be almost impossible to ascertain.

THREAT ASSESSMENT

POTENTIAL EXPLOSIVE ORDNANCE THREAT ITEMS

The following items are considered to remain under the site as potential threat items:

- Large, air-dropped, German HE Bombs including 50, 250, 500kg bombs (of WW2 vintage).
- British AAA projectiles.

CURRENT EXPLOSIVE ORDNANCE THREAT LEVELS

The Ordnance Threat Levels for the site of concern from the Threat Assessment Matrices are assessed as:

Ordnance Type	Threat Level
50, 250, 500 and 1,000kg bombs, British AAA projectiles	MEDIUM

ENGINEERING WORKS

Intrusive Site Investigation, piled foundations, bulk excavations etc.

RISK PATHWAY

For the purposes of this assessment, it has been assumed that development works could include excavations and/or intrusive engineering beyond WW2 ground levels. It is anticipated that personnel or key equipment may complete the risk pathway during excavation and/or piling operations that may bring them into physical contact with potential threat items.

WHAT ARE THE CONSEQUENCES OF AN UNCONTROLLED DETONATION?

The consequences of the uncontrolled detonation of any of the items of ordnance listed above are:

Asset	Consequence
People	Lost Time Injury >7 Days
Plant	Unit Level Damage
Property	Major Wider Damage
Environmental	Major Effect

THREAT MATRICES

ORDNANCE CATEGORY

The 'Ordnance Category' is assessed for the different types of ordnance in terms of the 'Damage Radii' that may result were the ordnance subject to an uncontrolled explosion and is a function of the calibre of the ordnance and whether it is encountered on the 'surface' or 'buried'.

Ordnance Category	Ordnance Category Description	Danger Radii (m)	Potential Threat Item
0	No Explosive Ordnance (EO) suspected to be present	NA	NA
1	Landmines, Anti-Personnel, HE; HE in Bulk <5Kg; Pyrotechnics	< 75	NA
2	Projectiles, HE <75mm calibre; Projectiles, Mortar, HE 50mm to < 75mm calibre; Grenades, Hand, HE; Grenades, Rifle, HE.	< 100	NA
3	Projectiles, HE < 125mm calibre; Rockets, HE, Anti-Tank (HEAT); Bombs PIAT, HE; Arial Bombs, HE, 50-250Kg (Surface & Buried); Aerial Bombs, Blast, HE & Sea Mines 20-250Kg; Aerial Bomb, HE, 250-500Kg (Buried)	< 250	**British AAA 50kg HE Bombs**
4	Bombs, Mortar, HE <105mm calibre; Bombs, Mortar, Spigot, HE; Landmines, Anti-Tank, HE; Aerial Bombs, HE, 250-500Kg (Surface)	< 300	**250-500kg HE Bombs**
5	Projectile, HE > 125mm calibre; Aerial Bombs, HE, 1500-2500Kg (Surface); Aerial Bomb, Blast, HE & Sea Mines 500-1500Kg (Surface)	< 500	NA
6	Aerial Bombs, HE, 2000-10000Kg (Buried); Aerial Bombs, Blast, HE & Sea Mines 1500-4000Kg (Surface)	< 800	NA

ORDNANCE THREAT

This table assigns the 'Ordnance Threat', which is a function of the Ordnance Category and the anticipated encounter depth. i.e. the smaller and deeper the ordnance the less threat is present to people and property at the surface.

	ORDNANCE CATEGORY						Depth of Encounter (m)
0	1	2	3	4	5	6	
	ORDNANCE THREAT						
							>10
				250-500kg Bomb			5<10
			50kg Bomb				2.5<5
			British AAA				0.5<2.5
							0<0.5
							Surface

ORDNANCE THREAT LEVEL

The 'Ordnance Threat Level' is arrived at by comparing the 'Ordnance Risk' with the 'Likelihood of Encounter' of a ordnance as a function of the level of expected ordnance contamination of a given type at a site of concern.

Ordnance Threat	ASSETS AFFECTED				LIKELIHOOD OF ENCOUNTER				
	People	Plant	Property	Environment	Very Unlikely	Unlikely	Likely	Very Likely	Extremely Likely
	First aid injury	Slight damage	Slight damage	Slight Effect					
	Medical injury	Item repair	Minor damage	Minor Effect					
	Lost time <7 days	Item write off	Major damage	Local Effect					
British AAA, 50-500kg Bomb	Lost time injury >7 days	Unit level damage	Major wider damage	Major Effect	British AAA, 50-500kg Bomb				
	Fatality	Multiple damage	Catastrophe	Massive Effect					

	ORDNANCE THREAT LEVEL	
No special measures required	NEGLIGIBLE	
Monitor & manage potential risks	LOW	
Review & emplace strict control measures if necessary	MEDIUM	X
Control measures required to mitigate risks to acceptable levels	HIGH	
Intolerable Risk Level. Immediate control measures prior to any further works	EXTREME	

THREAT MITIGATION		
ACTIVITY	THREAT MITIGATION MEASURES	FINAL THREAT LEVEL
All Activities	If planned engineering works are going to enter potentially 'at risk' ground volumes, then a threat management strategy **IS REQUIRED** to be in place prior to intrusive engineering works at the site of concern. **Explosive Ordnance Safety Awareness Briefings.** An explosive ordnance Safety Briefing should be included as part of routine site health and safety training and form a key element of the Site Health & Safety Plan. This should be conducted by a trained specialist and would assist conformance with the CDM Regulations 2007. The briefing will instruct all personnel on the identification of EO hazards, actions to take in the event of an EO incident to protect personnel, key equipment, property and the public. **Explosive Ordnance Site Safety Instructions.** Explosive Ordnance Site Safety Instructions should be drafted for inclusion in the site-specific health and safety manual and would include information on dealing with an EO incident safely and appropriately. These instructions would form part of the permanent site documentation and will be an aide memoire for identifying potential EO hazards, making a preliminary threat assessment as well as specific guidelines on what to do in the event of a confirmed incident.	AS LOW AS REASONABLY PRACTICABLE (ALARP)
SITE INVESTIGATION WORKS	Site investigation works should be supported by UXO survey as appropriate. Consideration should be given to whether the works are shallow or deep from the perspective of UXO Survey. 'Shallow' Survey is survey of the ground from 0.0m bgl to 6.5m bgl and 'Deep' UXO Survey is that beyond 6.5mbgl. • **Boreholes.** PLANIT can conduct a non-intrusive survey of a 5m x 5m box which will accurately allow your borehole to proceed into a volume of ground under which there are no ferrous obstructions. Several locations may be provided within a survey box, allowing maximum flexibility for positioning and preventing any boreholes being terminated because of encountering a potential threat item at depth. • **Trial Pits.** Using shallow non-intrusive survey, the area for your trial pit can quickly be surveyed and confirmed as free from ferrous anomalies/UXO. Data is interpreted on-site and therefore locations can be changed very efficiently in the event of a potential obstacle. • **Window Sampling.** Using shallow non-intrusive survey, the area for your window sample can quickly be surveyed and confirmed as free from ferrous anomalies/UXO. Data is interpreted on-site and therefore locations can be changed very efficiently in the event of a potential obstacle.	AS LOW AS REASONABLY PRACTICABLE (ALARP)

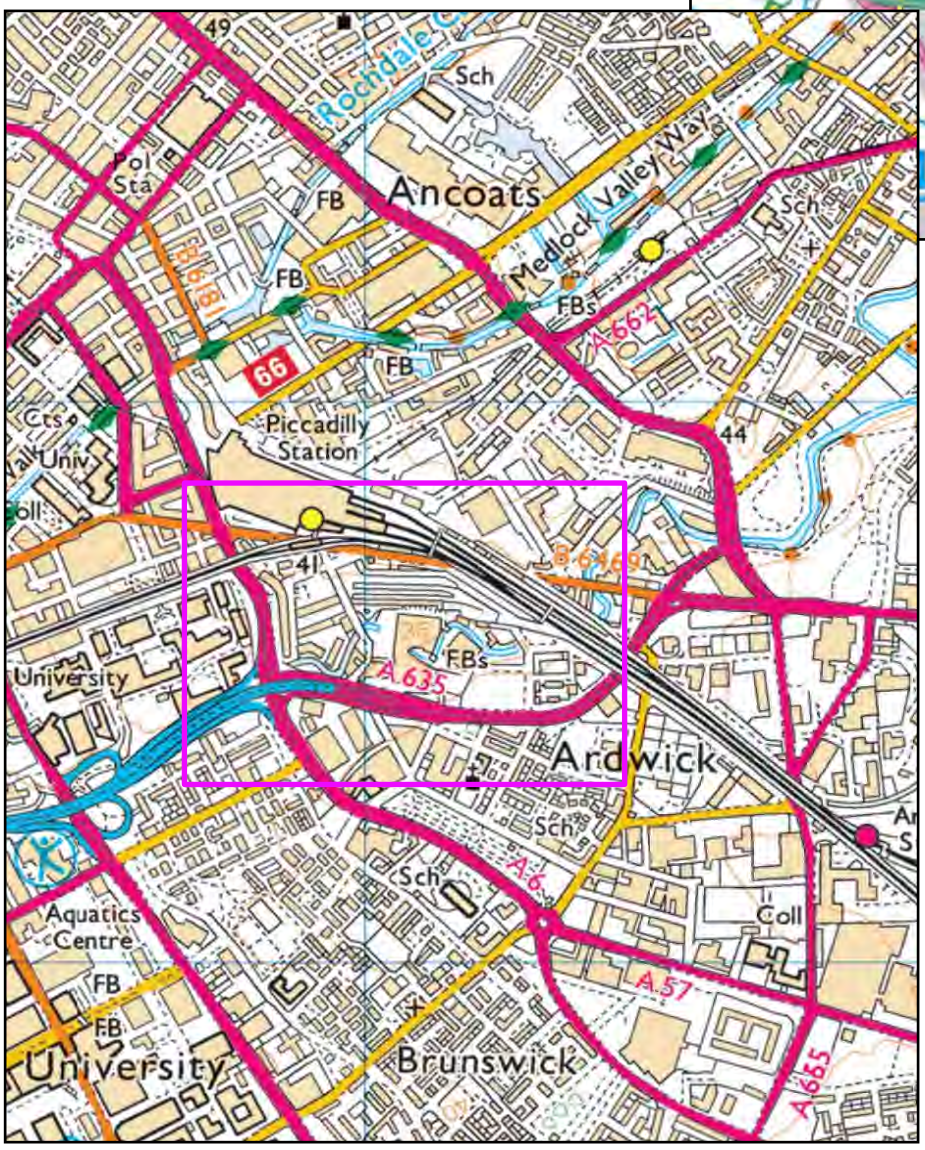
SHALLOW INTRUSIVE ENGINEERING WORKS	Where 'shallow' engineering may complete the risk-receptor pathway, there are two options available to effectively deal with the EO Threat when conducting shallow intrusive ground works. **On-Site UXO Support.** On-site UXO Support for shallow ground works would involve the presence of an appropriately trained and experienced UXO Technician during this phase of construction. The role of the UXO Technician is to: • Conduct EO Safety Awareness Briefings as required. • Monitor all intrusive ground works using visual and instrument aided means to locate any EO that may be uncovered during site works. • Provide an immediate and expert assessment of any EO that may be discovered. • Assist in implementing an appropriate and safe response to an EO incident. • Design and emplace protective works as an immediate response to protect personnel, key equipment, property and the public as may be required. • Advise on best safe working practice considering the perceived EO Threat. • Act as the liaison with the Authorities on behalf of the Client in the event of an EO incident. **Shallow Non-Intrusive UXO Survey**. PLANIT can deploy industry leading technology that will survey your site of concern non-intrusively (if ground conditions permit) to identify potential EO Threat Items. Any anomalies identified following the non-intrusive survey that may be EO should then be subject to Controlled Excavation to confirm them as EO and remove the threat or discount them. Once the non-intrusive survey and controlled excavation are complete, there is no further requirement for UXO Support at the site of concern since all EO Threats would have been identified and dealt with.	AS LOW AS REASONABLY PRACTICABLE (ALARP)
DEEP INTRUSIVE ENGINEERING	There are a few options available to effectively deal with potential EO Threats when conducting deep intrusive ground works. Which approach is applicable will depend upon the ground conditions of the site of concern: **Deep Non-Intrusive UXO Survey.** PLANIT can deploy industry leading technology that will survey your site of concern non-intrusively (if ground conditions permit) in order to identify potential EO Threat Items at depth – UXO Survey should proceed to the expected UXB penetration depth or maximum depth of intrusive ground works, whichever is shallower. As a benchmark, PLANITs Deep Non-Intrusive Survey is capable of identifying a 500Kg HE bomb to some 8.0m bgl in average ground and larger bombs deeper. This approach is ideal for covering large areas quickly and can be employed to survey piling runs and borehole locations. Any anomalies identified following the non-intrusive survey that may be EO should then be subject to Controlled Excavation to confirm them as EO and remove the threat or discount them. Once the non-intrusive survey and controlled excavation are complete, there is no further requirement for UXO Support at the site of concern since all EO Threats would have been identified and dealt with. **Magcone UXB Survey.** PLANIT can deploy world class Magcone Survey Systems to survey either pile locations or small areas ahead of intrusive	AS LOW AS REASONABLY PRACTICABLE (ALARP)

	engineering including piling and drilling. The Magcone system is very versatile and can survey to great depths if required. **Down-Hole Magnetometer UXO Survey**. PLANIT can deploy down-borehole UXO Survey equipment that will clear ahead of a piling or borehole rig as it descends underground. The main drawbacks of this approach are that it is time consuming, 'blind' (insofar as the borehole may proceed for some depth before a potential threat item is identified, at which stage the borehole will have to be terminated and relocated, wasting time and money), equipment heavy and expensive. Any anomalies identified during this survey that may be EO should either be subject to Controlled Excavation to confirm them as EO and remove the threat or discount them or relocate the borehole or adjust the piling plan. UXO Survey should proceed to the expected UXB penetration depth or maximum depth of intrusive ground works, whichever is shallower.	

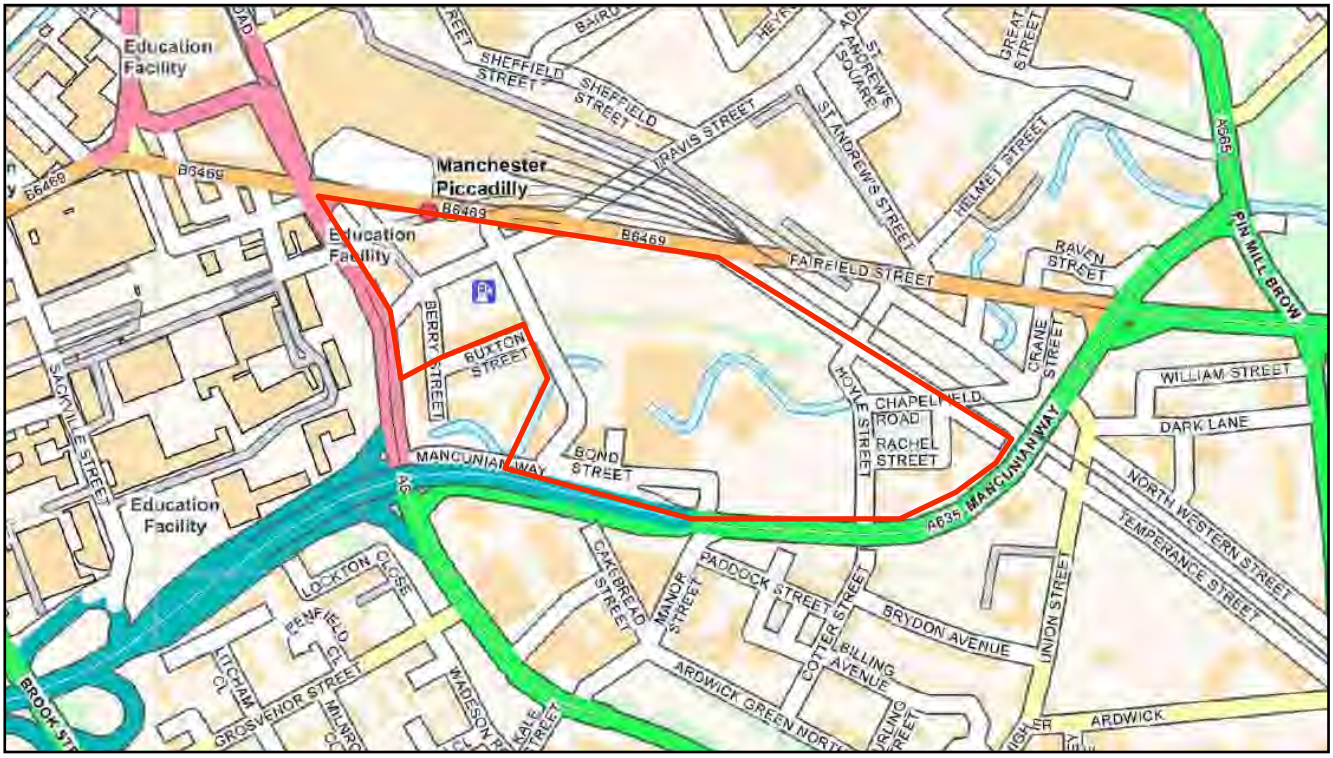
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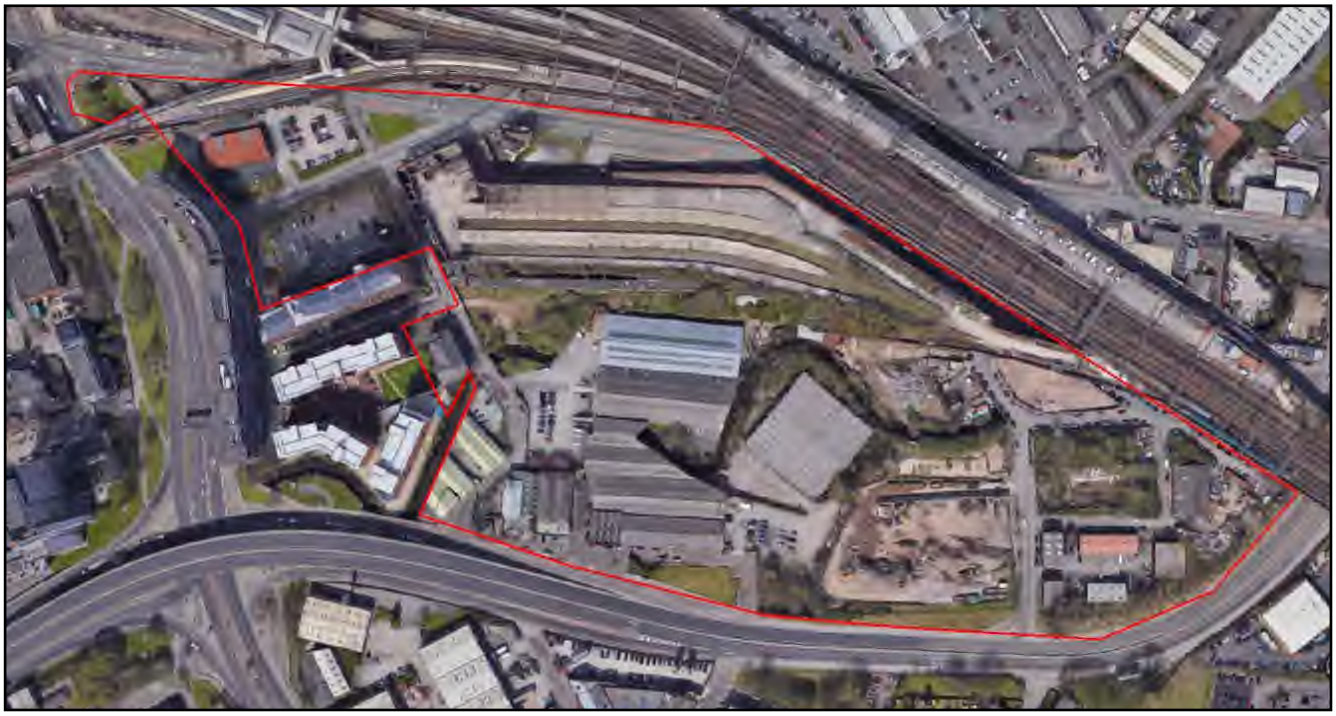
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C. Historical Street Maps.





Doc Ref:	EOTA Mayfield Manchester 14/07/17	Site Location	PLANIT
Project Ref:	Mayfield Manchester		
Client:	Buro Happold		A - 1



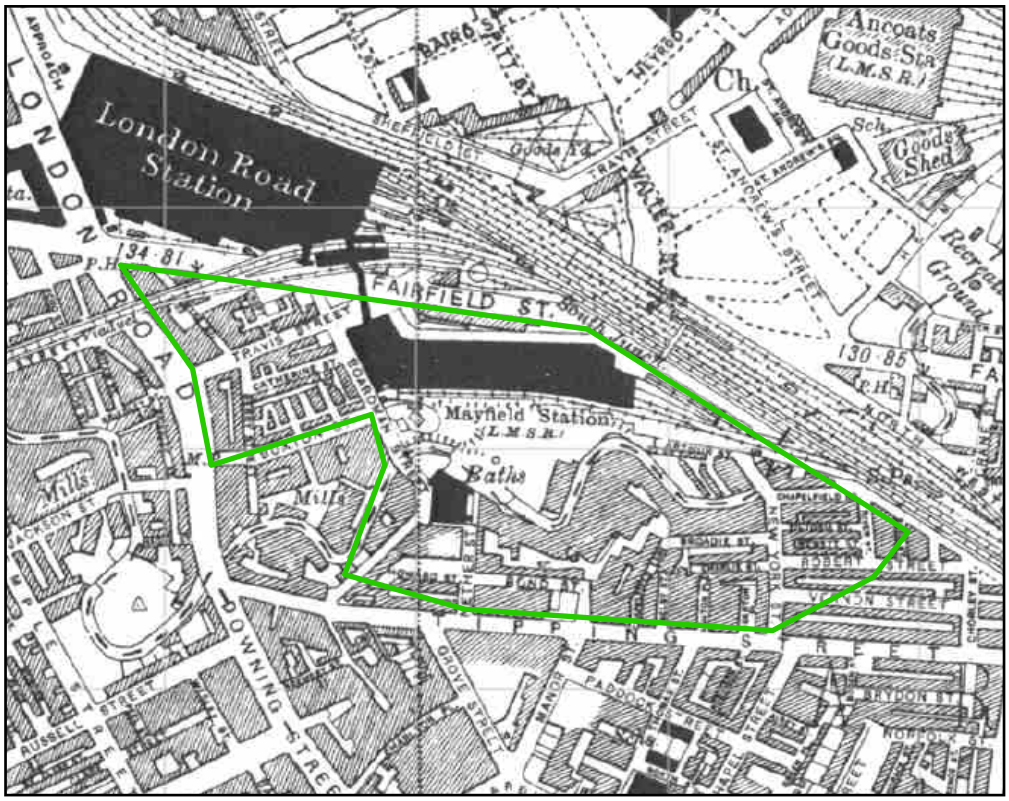


Doc Ref:	EOTA Mayfield Manchester 14/07/17	Site Location	PLANIT
Project Ref:	Mayfield Manchester		
Client:	Buro Happold		A - 2

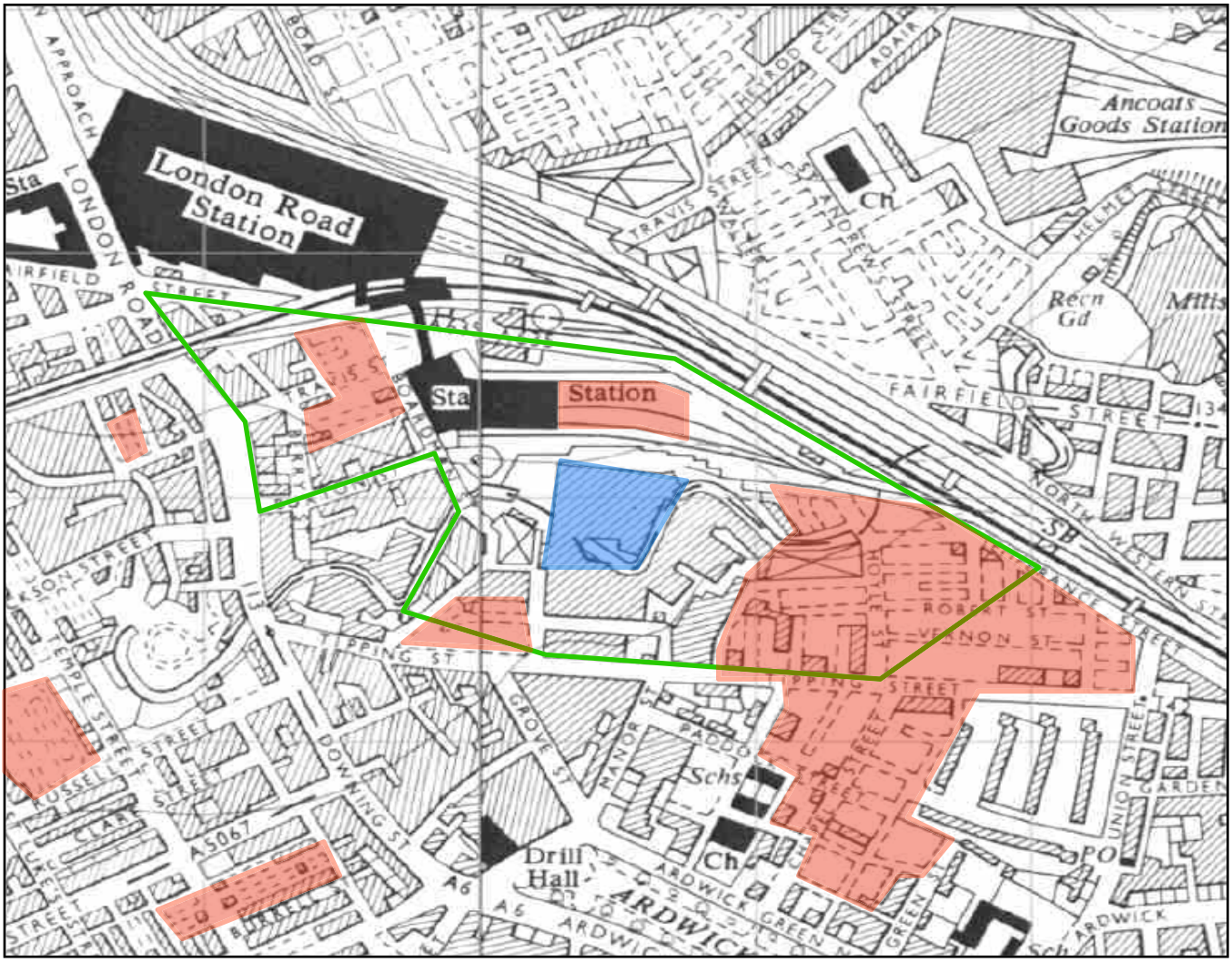


Doc Ref:	EOTA Mayfield Manchester 14/07/17	Site Location	PLANIT
Project Ref:	Mayfield Manchester	Bomb Damage	
Client:	Buro Happold	High Explosive Bombs	B - 1

1938



1956



Doc Ref:	EOTA Mayfield Manchester 14/07/17	Site Location Bomb Damage New Construction	PLANIT C - 1
Project Ref:	Mayfield Manchester		
Client:	Buro Happold		

Appendix B Groundsure

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Buro Happold Engineering

17 BURO HAPPOLD ENGINEERS LTD,
NEWMAN STREET,
LONDON, W1T 1PD

Groundsure Reference:	GS-4028399
Your Reference:	035548
Report Date	28 Jun 2017
Report Delivery Method:	Email - pdf

Enviro Insight

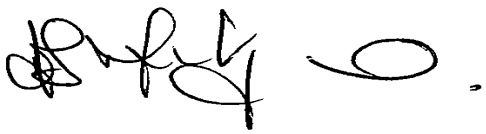
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Date:	**28 Jun 2017**
Reference:	**GS-4028399**
Client:	**Buro Happold Engineering**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	11-Jun-2015
Grid Reference:	385104,397611
Site Size:	10.25ha

Report Reference: GS-4028399
Client Reference: 035548

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	73	25	143	205
1.2 Additional Information – Historical Tank Database	28	11	62	73
1.3 Additional Information – Historical Energy Features Database	9	0	21	60
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	1	1	47	70
1.6 Potentially Infilled Land	3	0	9	92

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	2	0	0	7
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	6
2.1.8 Records of Licensed Discharge Consents	0	1	8	27
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	2	3	1	6
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	1	0	0
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	2	0	2	4	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	4	0	0	0	11	17

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	14	3	63	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	1	2
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	Yes
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	2	0	0	2	5	36
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	11
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	0	0	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	Yes	Yes	Yes
6.10 Detailed River Network entries within 500m of the site	2	0	3	8	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	Yes
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Yes
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	High
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Limited potential
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	1	1
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Moderate
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Very Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Moderate
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	Yes
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	No
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

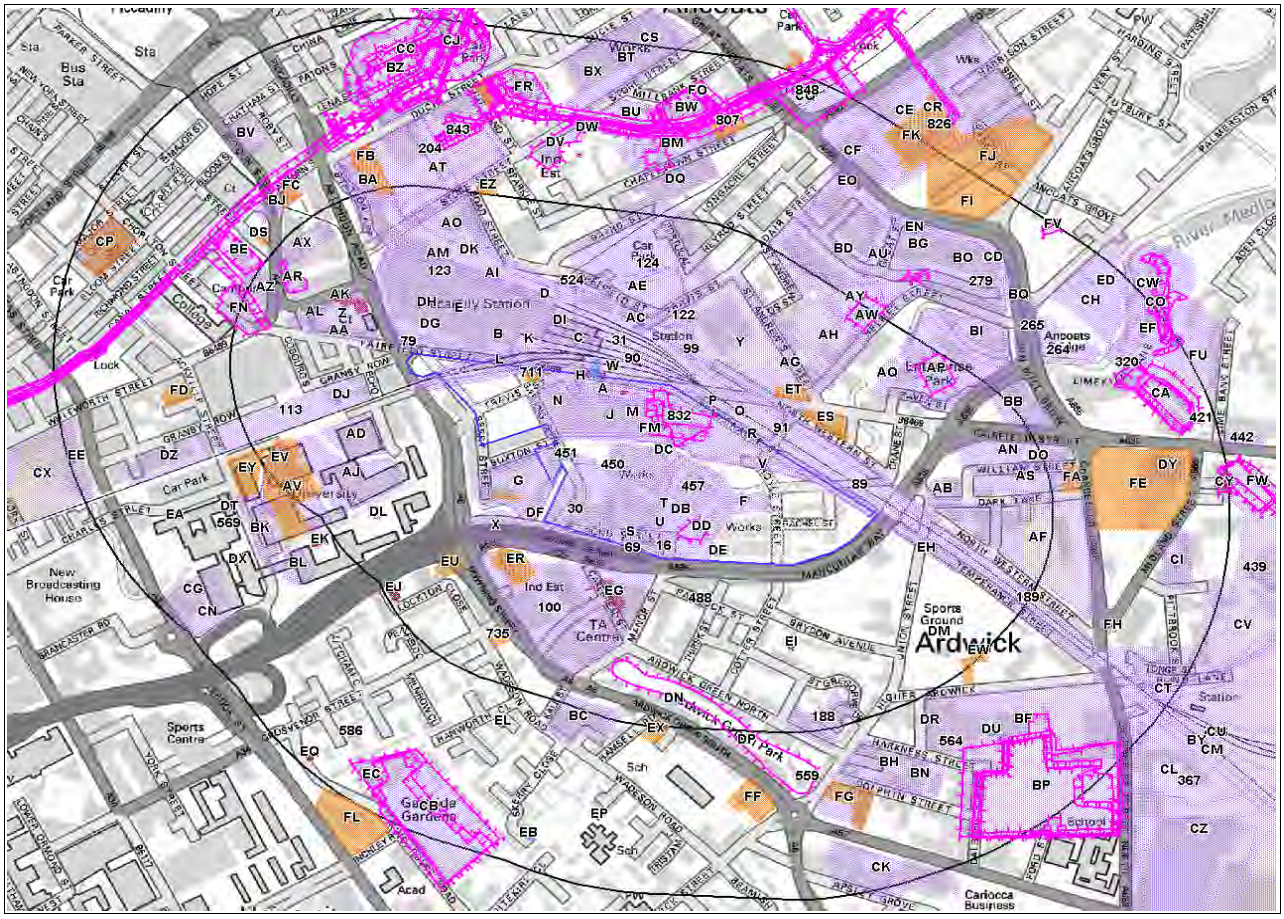
All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use

NW N NE

W E

SW S SE



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Site Outline

250
500
Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 446

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Railway Building	1938
2B	0	On Site	Railway Stations	1938
3C	0	On Site	Railway Sidings	1938
4A	0	On Site	Railway Building	1934
5B	0	On Site	Railway Stations	1934
6B	0	On Site	Railway Stations	1915
7C	0	On Site	Railway Sidings	1915
8C	0	On Site	Railway Sidings	1934
9A	0	On Site	Railway Building	1915
10D	0	On Site	Railway Sidings	1890
11D	0	On Site	Railway Sidings	1905
12E	0	On Site	Railway Station	1890
13E	0	On Site	Railway Station	1905
14F	0	On Site	Brewery	1923
15F	0	On Site	Brewery	1915
16	0	On Site	Unspecified Station	1991
17V	0	On Site	Railway Building	1923
18R	0	On Site	Railway Sidings	1956
19G	0	On Site	Unspecified Mill	1915
20G	0	On Site	Unspecified Mill	1934
21G	0	On Site	Unspecified Mills	1890
22G	0	On Site	Unspecified Mills	1938
23I	0	On Site	Unspecified Works	1915
24S	0	On Site	Unspecified Commercial/Industrial	1956
25H	0	On Site	Railway Building	1978
26N	0	On Site	Railway Station	1956
27H	0	On Site	Railway Building	1968
28I	0	On Site	Unspecified Works	1923
29G	0	On Site	Cotton Mill	1851
30	0	On Site	Dye Works	1851
31	0	On Site	Railway Sidings	1923
32G	0	On Site	Unspecified Mill	1923
33J	0	On Site	Railway Station	1923

34J	0	On Site	Railway Station	1968
35K	0	On Site	Railway Sidings	1988
36K	0	On Site	Railway Sidings	1985
37K	0	On Site	Railway Sidings	1978
38K	0	On Site	Railway Sidings	1994
39K	0	On Site	Railway Sidings	1971
40DK	0	On Site	Railway Sidings	1956
41L	0	On Site	Railway Building	1971
42L	0	On Site	Railway Building	1994
43L	0	On Site	Railway Building	1978
44L	0	On Site	Railway Building	1988
45L	0	On Site	Railway Building	1985
46E	0	On Site	Railway Station	1923
47M	0	On Site	Goods Station	1978
48M	0	On Site	Goods Station	1991
49M	0	On Site	Goods Station	1985
50A	0	On Site	Railway Building	1956
51J	0	On Site	Railway Station	1956
52N	0	On Site	Railway Station	1988
53N	0	On Site	Railway Station	1994
54A	0	On Site	Police Station	1851
55O	0	On Site	Unspecified Works	1978
56P	0	On Site	Railway Sidings	1968
57O	0	On Site	Unspecified Works	1968
58P	0	On Site	Railway Sidings	1978
59Q	0	On Site	Railway Sidings	1991
60Q	0	On Site	Railway Sidings	1985
61T	0	On Site	Unspecified Works	1915
62R	0	On Site	Railway Building	1923
63S	0	On Site	Unspecified Tank	1915
64S	0	On Site	Unspecified Tank	1923
65T	0	On Site	Unspecified Works	1923
66S	0	On Site	Unspecified Works	1915
67U	0	On Site	Unspecified Tank	1915
68U	0	On Site	Unspecified Tank	1923
69	0	On Site	Unspecified Works	1923
70T	0	On Site	Unspecified Works	1991
71T	0	On Site	Unspecified Works	1985
72V	0	On Site	Railway Building	1923
73DB	0	On Site	Dye Works	1851
74H	1	N	Railway Building	1923
75H	2	N	Railway Building	1938
76H	2	N	Railway Building	1915
77H	2	N	Railway Building	1934
78	6	NE	Railway Sidings	1851
79	6	N	Railway Buildings	1923

80E	7	N	Railway Station	1956
81H	7	N	Railway Building	1956
82W	8	N	Railway Building	1968
83W	8	N	Railway Building	1978
84E	14	N	Railway Station	1988
85E	14	N	Railway Station	1985
86E	14	N	Railway Station	1978
87E	14	N	Railway Station	1994
88E	14	N	Railway Station	1971
89	17	NE	Railway Building	1923
90	22	N	Railway Building	1923
91	26	NE	Railway Building	1923
92Q	27	NE	Railway Buildings	1923
93X	32	W	Unspecified Works	1915
94X	32	SW	Unspecified Works	1923
95Y	33	NE	Unspecified Depot	1985
96C	37	N	Railway Station	1978
97C	37	N	Railway Station	1968
98C	48	N	Railway Buildings	1923
99	51	NE	Railway Building	1923
100	52	S	Unspecified Commercial/Industrial	1923
101Y	54	NE	Goods Yard	1968
102Z	56	NW	Fire Station	1971
103Z	56	NW	Fire Station	1988
104Z	56	NW	Fire Station	1978
105Z	56	NW	Fire Station	1985
106Z	56	NW	Fire Station	1994
107Z	56	NW	Fire Station	1956
108AA	57	NW	Fire Engine Station	1923
109AA	57	NW	Fire Station	1938
110AA	57	NW	Fire Station	1934
111C	57	N	Railway Building	1956
112AA	63	NW	Fire Engine Station	1915
113	64	SW	Unspecified Commercial/Industrial	1923
114DI	68	N	Railway Building	1923
115AB	72	E	Unspecified Mills	1934
116AB	72	E	Unspecified Mills	1938
117AB	72	E	Unspecified Mills	1915
118AB	75	E	Unspecified Mills	1923
119AC	78	N	Railway Building	1923
120AC	81	N	Smithy	1915
121AF	81	E	Unspecified Works	1978
122	85	N	Smithy	1923
123	86	N	Railway Station	1851

124	86	N	Unspecified Depot	1991
125AD	86	SW	Unspecified Works	1923
126AD	87	SW	Unspecified Works	1915
127AE	101	N	Goods Yard	1915
128AE	101	N	Goods Yard	1934
129AE	101	N	Goods Yard	1938
130AE	101	N	Goods Yard	1923
131AF	104	E	Unspecified Works	1991
132AF	104	E	Unspecified Works	1985
133AG	113	NE	Chimney	1991
134AG	113	NE	Chimney	1985
135AH	118	NE	Unspecified Depot	1985
136AH	118	NE	Unspecified Depot	1991
137AJ	121	W	Unspecified Mills	1923
138AI	123	N	Railway Building	1934
139AI	123	N	Railway Building	1938
140AJ	124	W	Unspecified Mills	1915
141AJ	124	W	Unspecified Mills	1938
142AJ	124	W	Unspecified Mills	1934
143AI	125	N	Railway Building	1905
144AI	125	N	Railway Building	1915
145AI	125	N	Railway Building	1923
146AK	129	NW	Police Station	1938
147AK	129	NW	Police Station	1934
148AL	133	NW	Police Station	1915
149AL	133	NW	Police Station	1923
150AN	138	NE	Brewery	1915
151AS	141	E	Unspecified Works	1978
152AM	142	N	Railway Building	1938
153AM	142	N	Railway Building	1934
154AP	144	NE	Unspecified Mill	1890
155AM	144	N	Railway Building	1905
156AM	144	N	Railway Building	1915
157AM	144	N	Railway Building	1923
158AH	153	NE	Unspecified Depot	1978
159AH	153	NE	Unspecified Depot	1968
160AN	154	NE	Brewery	1934
161AN	154	NE	Brewery	1938
162AL	158	W	Police Station	1988
163AL	158	W	Police Station	1978
164AL	158	W	Police Station	1985
165AL	158	W	Police Station	1994
166AL	158	W	Police Station	1971
167AO	163	N	Grain Store	1915
168AO	163	N	Railway Building	1938
169AO	164	N	Grain Store	1923

170AP	171	NE	Unspecified Mills	1938
171AP	171	NE	Unspecified Mill	1934
172AP	171	NE	Unspecified Mill	1915
173AP	171	NE	Unspecified Mill	1923
174AQ	175	NE	Unspecified Tank	1923
175AQ	175	NE	Unspecified Tank	1915
176AQ	175	NE	Unspecified Tank	1934
177AQ	175	NE	Unspecified Tank	1938
178AR	178	NW	Unspecified Ground Workings	1934
179AR	178	NW	Unspecified Ground Workings	1938
180AP	181	NE	Unspecified Mills	1956
181AP	183	NE	Unspecified Mill	1968
182AS	189	E	Unspecified Factory	1915
183AS	192	E	Unspecified Factory	1923
184AZ	192	NW	Unspecified Works	1923
185AT	192	N	Goods Station	1905
186AT	192	N	Goods Station	1890
187AT	192	N	Goods Station	1923
188	197	S	Industrial School	1890
189	197	SE	Railway Sidings	1934
190AT	200	N	Goods Station	1938
191AT	200	N	Goods Station	1934
192AT	200	N	Goods Station	1915
193AU	203	NE	Railway Sidings	1938
194AU	203	NE	Railway Sidings	1915
195AU	203	NE	Railway Sidings	1934
196AU	203	NE	Railway Sidings	1905
197AU	203	NE	Railway Sidings	1923
198AV	203	SW	Unspecified Works	1923
199AU	205	NE	Railway Sidings	1890
200AV	206	SW	Iron Works	1890
201BY	207	SE	Railway Sidings	1923
202FN	209	W	Unspecified Wharf	1890
203AX	209	NW	Unspecified Mill	1915
204	210	N	Unspecified Commercial/Industrial	1956
205AW	212	NE	Railway Building	1938
206AW	212	NE	Railway Building	1915
207AW	212	NE	Railway Building	1934
208AW	212	NE	Railway Building	1923
209AX	212	NW	Unspecified Mill	1923
210AY	214	NE	Goods Shed	1915
211AY	214	NE	Goods Shed	1938
212AY	214	NE	Goods Shed	1934
213AU	215	NE	Goods Station	1956

214AZ	215	W	Ice Works	1915
215AY	216	NE	Goods Shed	1905
216AY	216	NE	Goods Shed	1923
217DO	217	E	Brewery	1923
218BA	220	N	Railway Building	1890
219AV	222	SW	Unspecified Works	1915
220BD	224	NE	Goods Station	1968
221BA	227	N	Goods Shed	1934
222BA	227	N	Goods Shed	1915
223BA	227	N	Goods Shed	1938
224BA	229	N	Goods Shed	1905
225BA	229	N	Goods Shed	1923
226BB	229	NE	Pin Mill	1915
227BB	229	NE	Pin Mill	1938
228BB	229	NE	Pin Mill	1934
229BB	232	NE	Pin Mill	1923
230BC	235	S	Tyre Works	1915
231BC	237	S	Tyre Works	1923
232BD	241	NE	Goods Station	1938
233BD	241	NE	Goods Station	1915
234BD	241	NE	Goods Station	1934
235DQ	243	N	Unspecified Works	1968
236BB	243	NE	Unspecified Works	1968
237BD	244	NE	Goods Station	1890
238BD	246	NE	Goods Station	1905
239BD	246	NE	Goods Station	1923
240BE	249	NW	Unspecified Wharf	1915
241BE	250	NW	Unspecified Wharf	1923
242BF	252	SE	Unspecified Works	1978
243BF	252	SE	Unspecified Works	1968
244AV	252	SW	Railway Sidings	1923
245AV	256	SW	Railway Sidings	1915
246BG	272	NE	Railway Sidings	1968
247BG	272	NE	Railway Sidings	1956
248BI	279	NE	Unspecified Works	1923
249BH	279	S	Unspecified Commercial/Industrial	1978
250BH	279	S	Unspecified Works	1968
251BI	280	NE	Unspecified Commercial/Industrial	1934
252BI	280	NE	Unspecified Works	1915
253BI	280	NE	Printing Works	1890
254BJ	282	NW	Unspecified Works	1915
255BJ	283	NW	Unspecified Works	1923
256BH	285	S	Unspecified Works	1915
257BK	290	SW	Unspecified Works	1923

258BK	291	SW	Unspecified Works	1915
259BI	292	NE	Unspecified Works	1968
260DV	297	N	Unspecified Ground Workings	1851
261BL	299	SW	Unspecified Works	1915
262BL	301	SW	Unspecified Works	1923
263BM	302	N	Unspecified Works	1923
264	305	NE	Unspecified Factory	1915
265	306	NE	Unspecified Factory	1923
266DZ	308	SW	Unspecified Commercial/Industrial	1923
267BG	311	NE	Goods Shed	1968
268EM	314	NE	Unspecified Ground Workings	1851
269BM	315	N	Unspecified Works	1968
270BN	319	S	Unspecified Works	1985
271BN	319	S	Unspecified Works	1991
272BO	319	NE	Unspecified Commercial/Industrial	1985
273BO	319	NE	Unspecified Commercial/Industrial	1991
274FG	322	S	Unspecified Works	1978
275BR	338	N	Unspecified Warehouse	1923
276BP	347	SE	Cemetery	1851
277BQ	360	NE	Unspecified Works	1923
278BP	360	SE	Cemetery	1890
279	362	NE	Railway Building	1923
280BQ	363	NE	Unspecified Works	1915
281BR	365	N	Unspecified Warehouses	1934
282BR	365	N	Unspecified Warehouses	1915
283BR	365	N	Unspecified Warehouses	1938
284BS	367	N	Unspecified Wharf	1938
285BS	367	N	Unspecified Wharf	1915
286BS	367	N	Unspecified Wharf	1934
287BP	368	SE	Cemetery	1938
288BP	368	SE	Cemetery	1934
289BP	368	SE	Cemetery	1915
290BP	368	SE	Cemetery	1956
291BP	371	SE	Cemetery	1923
292BP	371	SE	Cemetery	1905
293BU	373	N	Unspecified Workshop	1923
294BV	374	NW	Infirmary	1923
295CC	375	N	Unspecified Wharf	1956
296BT	376	N	Clothing Foundry	1905
297BT	376	N	Unspecified Disused Foundry	1890
298BU	377	N	Unspecified Works	1915
299BV	380	NW	Infirmary	1915

300FR	382	N	Unspecified Wharf	1923
301BW	382	N	Unspecified Wharves	1923
302BW	382	N	Unspecified Wharves	1915
303BW	382	N	Unspecified Wharves	1934
304BW	382	N	Unspecified Wharves	1938
305BX	383	N	Clothing Factory	1915
306BX	383	N	Clothing Factory	1938
307BX	383	N	Clothing Factory	1934
308BY	383	SE	Goods Depot and Mineral Yard	1938
309EO	384	NE	Railway Building	1938
310BZ	387	N	Unspecified Wharf	1890
311BZ	387	N	Unspecified Wharf	1905
312BZ	387	N	Unspecified Wharf	1923
313CB	387	SW	Cemetery	1851
314CA	387	NE	Cuttings	1905
315CA	387	NE	Cuttings	1923
316DY	389	E	Unspecified Works	1923
317CB	392	SW	Cemetery	1956
318CC	394	N	Unspecified Wharf	1915
319BZ	394	N	Unspecified Wharf	1934
320	395	NE	Railway Sidings	1923
321CA	395	NE	Cuttings	1915
322CA	395	NE	Cuttings	1934
323CA	395	NE	Cuttings	1938
324BX	401	N	Clothing Factory	1923
325CD	401	NE	Railway Building	1938
326CD	401	NE	Railway Building	1915
327CD	401	NE	Railway Building	1934
328CD	402	NE	Railway Building	1923
329CB	402	SW	Cemetery	1923
330CB	402	SW	Cemetery	1938
331CB	402	SW	Cemetery	1934
332CB	402	SW	Cemetery	1915
333CB	402	SW	Cemetery	1905
334CB	402	SW	Cemetery	1890
335CE	402	NE	Vulcan Works	1934
336CE	402	NE	Vulcan Works	1938
337CE	402	NE	Vulcan Works	1915
338CF	403	NE	Grain Store	1905
339CF	403	NE	Grain Store	1923
340CG	403	SW	Unspecified Works	1915
341CF	403	NE	Grain Store	1915
342CG	404	SW	Unspecified Works	1923
343CI	405	E	Brewery	1915
344CH	408	NE	Rubber Works	1938

345CH	408	NE	Rubber Works	1915
346CI	409	E	Brewery	1923
347BX	409	N	Unspecified Factory	1968
348CR	410	NE	Unspecified Commercial/Industrial	1956
349CJ	410	N	Unspecified Wharf	1923
350CA	412	NE	Cuttings	1890
351CJ	412	N	Unspecified Mills	1923
352CF	414	NE	Unspecified Warehouse	1968
353ED	415	NE	Rubber Works	1923
354CJ	415	N	Unspecified Mills	1915
355CK	416	S	Drill Shed	1915
356CE	417	NE	Unspecified Warehouse	1985
357CE	417	NE	Unspecified Warehouse	1991
358CN	418	SW	Unspecified Mills	1923
359CK	419	S	Drill Shed	1923
360CA	419	NE	Cuttings	1978
361CL	420	SE	Goods and Mineral Yard	1905
362BY	420	SE	Railway Sidings	1905
363CL	420	SE	Goods and Mineral Yard	1923
364CO	420	NE	Unspecified Works	1938
365CM	421	SE	Railway Sidings	1934
366CM	421	SE	Railway Sidings	1915
367	421	SE	Goods and Mineral Yard	1934
368CL	421	SE	Goods and Mineral Yard	1938
369CM	421	SE	Railway Sidings	1938
370CN	421	SW	Unspecified Mills	1938
371CN	421	SW	Unspecified Mills	1915
372CN	421	SW	Unspecified Mills	1934
373CN	421	SW	Unspecified Mills	1890
374CW	422	NE	Dye Works	1923
375CO	424	NE	Dye Works	1915
376CH	425	NE	Rubber Works	1934
377CM	427	SE	Railway Sidings	1890
378CP	428	NW	Bus Station	1978
379CP	428	NW	Bus Station	1988
380CP	428	NW	Bus Station	1985
381CP	428	NW	Bus Station	1994
382CM	432	SE	Goods Yard	1905
383CM	432	SE	Goods Yard	1923
384CQ	432	NE	Corporation Yard	1938
385CQ	432	NE	Corporation Yard	1915
386CQ	432	NE	Corporation Yard	1934
387CQ	432	NE	Corporation Yard	1923
388CJ	433	N	Unspecified Wharf	1938
389CJ	433	N	Unspecified Wharf	1934

390CO	433	NE	Lime Kiln Works	1934
391BY	433	SE	Goods Yard	1915
392BY	433	SE	Goods Depot and Mineral Yard	1934
393CO	437	NE	Unspecified Works	1968
394CH	439	NE	Unspecified Works	1968
395EF	439	NE	Dye Works	1851
396CR	442	NE	Vulcan Works	1923
397CJ	447	N	Unspecified Wharf	1915
398CR	447	NE	Vulcan Works	1905
399CS	448	N	Unspecified Warehouse	1923
400CS	449	N	Unspecified Warehouse	1934
401CS	449	N	Unspecified Warehouse	1938
402CS	449	N	Unspecified Warehouse	1915
403CR	451	NE	Unspecified Mills	1890
404CT	452	SE	Railway Station	1968
405CR	455	NE	Unspecified Warehouse	1968
406CT	455	SE	Railway Station	1915
407CT	455	SE	Railway Station	1938
408CT	455	SE	Railway Station	1934
409CT	457	SE	Railway Station	1905
410CT	457	SE	Railway Station	1923
411FU	458	NE	Unspecified Works	1968
412CT	462	SE	Railway Station	1956
413CT	464	SE	Railway Station	1890
414CL	466	SE	Goods and Mineral Yard	1956
415CU	466	SE	Railway Sidings	1956
416	466	SE	Railway Sidings	1978
417CU	466	SE	Railway Sidings	1968
418CZ	469	SE	Unspecified Commercial/Industrial	1978
419	473	SE	Railway Station	1851
420BY	473	SE	Goods Depot and Mineral Yard	1956
421	475	E	Railway Building	1923
422CU	476	SE	Railway Sidings	1985
423CK	477	S	Unspecified Depot	1978
424CV	477	E	Unspecified Depot	1991
425CV	477	E	Unspecified Depot	1985
426CW	478	NE	Refuse Heap	1938
427CW	479	NE	Refuse Heap	1934
428CO	479	NE	Refuse Heap	1956
429FV	479	NE	Unspecified Ground Workings	1923
430CX	482	W	Unspecified Mills	1932
431CX	482	W	Unspecified Mills	1938
432CX	482	W	Unspecified Mills	1916

433CX	482	W	Unspecified Commercial/Industrial	1905
434CX	482	W	Unspecified Commercial/Industrial	1923
435CY	485	E	Unspecified Heap	1923
436CY	487	E	Cuttings	1934
437CY	487	E	Cuttings	1915
438CY	487	E	Cuttings	1938
439	489	E	Unspecified Depot	1978
440CY	491	E	Cuttings	1923
441FW	494	E	Cuttings	1956
442	496	E	Unspecified Works	1923
443CZ	498	SE	Unspecified Depot	1985
444DA	499	N	Unspecified Wharf	1938
445DA	499	N	Unspecified Wharf	1934
446DA	499	N	Unspecified Wharf	1915

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 174

ID	Distance (m)	Direction	Use	Date
447DB	0	On Site	Unspecified Tank	1889
448O	0	On Site	Unspecified Tank	1889
449O	0	On Site	Unspecified Tank	1889
450	0	On Site	Unspecified Tank	1889
451	0	On Site	Tanks	1908
452DC	0	On Site	Unspecified Tank	1889
453H	0	On Site	Unspecified Tank	1932
454H	0	On Site	Unspecified Tank	1922
455H	0	On Site	Unspecified Tank	1908
456DC	0	On Site	Unspecified Tank	1889
457	0	On Site	Unspecified Tank	1889
458DB	0	On Site	Unspecified Tank	1889
459S	0	On Site	Unspecified Tank	1932
460S	0	On Site	Unspecified Tank	1922
461S	0	On Site	Unspecified Tank	1908
462DD	0	On Site	Unspecified Tank	1998
463DD	0	On Site	Unspecified Tank	1995
464DE	0	On Site	Unspecified Tank	1995
465DE	0	On Site	Unspecified Tank	1998

466DB	0	On Site	Unspecified Tank	1977
467FM	0	On Site	Tanks	1891
468DB	0	On Site	Unspecified Tank	1994
469DB	0	On Site	Unspecified Tank	1985
470DB	0	On Site	Unspecified Tank	1991
471DE	0	On Site	Unspecified Tank	1986
472DD	0	On Site	Tanks	1986
473H	0	N	Unspecified Tank	1889
474H	0	N	Unspecified Tank	1889
475H	1	N	Unspecified Tank	1891
476H	8	N	Unspecified Tank	1948
477H	9	N	Unspecified Tank	1948
478DF	12	NW	Unspecified Tank	1889
479DF	12	NW	Unspecified Tank	1889
480B	21	N	Unspecified Tank	1891
481B	24	N	Unspecified Tank	1891
482DG	41	N	Unspecified Tank	1891
483B	44	N	Unspecified Tank	1891
484B	47	N	Unspecified Tank	1891
485B	48	N	Unspecified Tank	1891
486B	51	N	Unspecified Tank	1891
487E	52	N	Unspecified Tank	1891
488	53	S	Unspecified Tank	1995
489E	56	N	Unspecified Tank	1891
490DG	57	N	Unspecified Tank	1891
491C	57	N	Unspecified Tank	1950
492C	58	N	Unspecified Tank	1948
493C	58	N	Unspecified Tank	1952
494C	58	N	Unspecified Tank	1955
495E	60	N	Unspecified Tank	1891
496E	61	N	Unspecified Tank	1891
497E	65	N	Unspecified Tank	1891
498E	65	N	Unspecified Tank	1891
499E	69	N	Unspecified Tank	1891
500DH	73	N	Unspecified Tank	1891
501X	75	W	Unspecified Tank	1908
502E	77	N	Unspecified Tank	1891
503AC	79	N	Unspecified Tank	1889
504AC	80	N	Unspecified Tank	1891
505DH	82	N	Unspecified Tank	1891
506DH	82	N	Unspecified Tank	1891
507DI	84	N	Unspecified Tank	1950
508DI	84	N	Unspecified Tank	1948
509DI	84	N	Unspecified Tank	1952
510E	84	N	Unspecified Tank	1891
511DI	85	N	Unspecified Tank	1955

512DI	85	N	Unspecified Tank	1955
513DH	85	N	Unspecified Tank	1891
514AC	88	N	Unspecified Tank	1948
515AC	88	N	Unspecified Tank	1948
516E	89	N	Unspecified Tank	1891
517DH	90	N	Unspecified Tank	1891
518Z	90	NW	Gas Meter Testing Station	1948
519DH	96	N	Unspecified Tank	1891
520DJ	104	SW	Unspecified Tank	1891
521DJ	109	SW	Unspecified Tank	1955
522DJ	109	SW	Unspecified Tank	1955
523DJ	109	SW	Unspecified Tank	1952
524	131	N	Unspecified Tank	1889
525DK	169	N	Unspecified Tank	1950
526DK	169	N	Unspecified Tank	1965
527DK	169	N	Unspecified Tank	1965
528DK	170	N	Unspecified Tank	1948
529DK	170	N	Unspecified Tank	1952
530DK	170	N	Unspecified Tank	1964
531DK	170	N	Unspecified Tank	1955
532DL	176	SW	Unspecified Tank	1955
533DL	176	SW	Unspecified Tank	1952
534DM	186	SE	Unspecified Tank	1954
535DM	187	SE	Unspecified Tank	1965
536DM	187	SE	Unspecified Tank	1965
537DM	187	SE	Unspecified Tank	1968
538DN	210	S	Unspecified Tank	1932
539DN	211	S	Unspecified Tank	1889
540DN	211	S	Unspecified Tank	1889
541DN	211	S	Unspecified Tank	1922
542DN	211	S	Unspecified Tank	1908
543DO	213	NE	Unspecified Tank	1889
544AN	213	NE	Unspecified Tank	1889
545AN	215	NE	Unspecified Tank	1948
546AN	216	NE	Unspecified Tank	1948
547AN	218	NE	Unspecified Tank	1953
548DP	267	S	Unspecified Tank	1889
549DP	267	S	Unspecified Tank	1889
550DS	278	NW	Unspecified Tank	1891
551DQ	281	N	Unspecified Tank	1889
552DQ	282	N	Unspecified Tank	1908
553DR	288	SE	Tanks	1954
554DR	288	SE	Tanks	1948
555DR	289	SE	Tanks	1948
556BI	293	NE	Unspecified Tank	1908
557BI	296	NE	Unspecified Tank	1889

558DS	298	NW	Unspecified Tank	1891
559	319	S	Unspecified Tank	1908
560BL	321	SW	Unspecified Tank	1889
561BL	321	SW	Unspecified Tank	1908
562BL	321	SW	Unspecified Tank	1889
563DT	328	SW	Unspecified Tank	1891
564	333	SE	Unspecified Tank	1977
565DT	338	SW	Unspecified Tank	1891
566DT	338	SW	Unspecified Tank	1891
567DU	344	SE	Unspecified Tank	1989
568DU	344	SE	Unspecified Tank	1991
569	344	SW	Unspecified Tank	1891
570DU	345	SE	Unspecified Tank	1994
571DU	345	SE	Unspecified Tank	1993
572DU	345	SE	Unspecified Tank	1993
573DU	345	SE	Unspecified Tank	1994
574DV	360	N	Unspecified Tank	1889
575DW	360	N	Unspecified Tank	1889
576DW	362	N	Unspecified Tank	1908
577DX	374	SW	Unspecified Tank	1891
578BU	385	N	Unspecified Tank	1891
579DX	392	SW	Tanks	1891
580EA	400	SW	Unspecified Tank	1891
581DY	402	E	Unspecified Tank	1908
582DY	402	E	Unspecified Tank	1922
583DY	402	E	Unspecified Tank	1932
584DZ	408	SW	Unspecified Tank	1891
585EA	410	SW	Unspecified Tank	1891
586	416	SW	Unspecified Tank	1954
587DY	417	E	Unspecified Tank	1908
588CI	428	E	Unspecified Tank	1908
589CG	439	SW	Tanks	1968
590CG	440	SW	Tanks	1969
591CG	440	SW	Tanks	1962
592CG	440	SW	Unspecified Tank	1950
593CG	440	SW	Unspecified Tank	1953
594CG	441	SW	Unspecified Tank	1955
595CG	441	SW	Unspecified Tank	1955
596CG	442	SW	Unspecified Tank	1948
597EB	451	S	Unspecified Tank	1968
598EB	451	S	Tanks	1984
599EB	452	S	Unspecified Tank	1970
600EB	452	S	Unspecified Tank	1970
601EB	452	S	Unspecified Tank	1970
602EC	453	SW	Unspecified Tank	1955
603EC	453	SW	Unspecified Tank	1955

604EC	453	SW	Unspecified Tank	1948
605EC	453	SW	Unspecified Tank	1954
606EC	454	SW	Unspecified Tank	1950
607EB	454	S	Unspecified Tank	1968
608EB	455	S	Unspecified Tank	1970
609EB	455	S	Unspecified Tank	1970
610EB	455	S	Unspecified Tank	1970
611ED	461	NE	Unspecified Tank	1922
612EE	488	W	Unspecified Tank	1891
613EE	489	W	Unspecified Tank	1891
614EE	489	W	Unspecified Tank	1891
615EE	489	W	Unspecified Tank	1893
616EF	490	NE	Tanks	1922
617EE	491	W	Unspecified Tank	1891
618EE	492	W	Unspecified Tank	1891
619EE	493	W	Unspecified Tank	1891
620EE	499	W	Tanks	1891

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 90

ID	Distance (m)	Direction	Use	Date
621A	0	On Site	Electricity Substation	1977
622I	0	On Site	Electricity Substation	1950
623I	0	On Site	Electricity Substation	1948
624I	0	On Site	Electricity Substation	1952
625I	0	On Site	Electricity Substation	1955
626I	0	On Site	Electricity Substation	1955
627A	0	On Site	Electricity Substation	1985
628A	0	On Site	Electricity Substation	1991
629A	0	On Site	Electricity Substation	1994
630EG	56	S	Electricity Substation	1948
631EG	71	S	Electricity Substation	1953
632EG	72	S	Electricity Substation	1948
633EH	86	SE	Electricity Substation	1986
634EH	87	SE	Electricity Substation	1998
635EH	87	SE	Electricity Substation	1995
636EG	88	S	Electricity Substation	1998
637EG	88	S	Electricity Substation	1995
638EG	89	S	Electricity Substation	1986

639Z	90	NW	Gas Meter Testing Station	1948
640EI	115	S	Electricity Substation	1968
641EI	115	S	Electricity Substation	1969
642EI	116	S	Electricity Substation	1986
643EI	116	S	Electricity Substation	1995
644EI	116	S	Electricity Substation	1998
645EJ	232	SW	Electricity Substation	1968
646EJ	232	SW	Electricity Substation	1970
647EJ	232	SW	Electricity Substation	1970
648EJ	232	SW	Electricity Substation	1970
649EJ	233	SW	Electricity Substation	1998
650EJ	233	SW	Electricity Substation	1984
651EK	260	SW	Electricity Substation	1968
652EK	260	SW	Electricity Substation	1970
653EK	260	SW	Electricity Substation	1970
654EK	260	SW	Electricity Substation	1970
655EK	260	SW	Electricity Substation	1998
656EK	261	SW	Electricity Substation	1984
657EL	304	S	Electricity Substation	1968
658EL	304	S	Electricity Substation	1984
659EL	304	S	Electricity Substation	1970
660EL	304	S	Electricity Substation	1970
661EL	304	S	Electricity Substation	1970
662EL	307	S	Electricity Substation	1998
663EM	312	NE	Electricity Substation	1985
664EM	312	NE	Electricity Substation	1991
665EM	313	NE	Electricity Substation	1994
666DV	322	N	Electricity Substation	1992
667DV	322	N	Electricity Substation	1997
668EN	380	NE	Electricity Substation	1994
669EN	380	NE	Electricity Substation	1985
670EN	380	NE	Electricity Substation	1991
671EO	392	NE	Electricity Substation	1981
672EP	394	S	Electricity Transformer	1968
673EP	395	S	Electricity Substation	1986
674EP	395	S	Electricity Transformer	1969
675EP	395	S	Electricity Substation	1995
676EP	395	S	Electricity Substation	1998
677EO	396	NE	Electricity Substation	1978
678EO	396	NE	Electricity Substation	1948
679EO	396	NE	Electricity Substation	1955
680EO	397	NE	Electricity Substation	1967
681EO	397	NE	Electricity Substation	1951
682EO	397	NE	Electricity Substation	1948
683EO	397	NE	Electricity Substation	1967
684BW	417	N	Electricity Substation	1991

685BW	417	N	Electricity Substation	1992
686BW	417	N	Electricity Substation	1997
687EQ	477	SW	Electricity Substation	1968
688EQ	477	SW	Electricity Substation	1950
689EQ	477	SW	Electricity Substation	1955
690EQ	477	SW	Electricity Substation	1955
691EQ	478	SW	Electricity Substation	1970
692EQ	478	SW	Electricity Substation	1970
693EQ	478	SW	Electricity Substation	1948
694EQ	478	SW	Electricity Substation	1970
695EQ	478	SW	Electricity Substation	1954
696EQ	478	SW	Electricity Substation	1984
697EQ	478	SW	Electricity Substation	1998
698CY	489	E	Electricity Substations	1964
699CY	489	E	Electricity Substations	1986
700CY	489	E	Electricity Substations	1987
701CY	490	E	Electricity Substation	1996
702CY	490	E	Electricity Substation	1994
703CY	494	E	Electricity Substations	1953
704CY	494	E	Electricity Substations	1977
705CY	494	E	Electricity Substation	1988
706CY	494	E	Electricity Substations	1948
707CY	494	E	Electricity Substations	1948
708CY	496	E	Electricity Substations	1948
709CY	496	E	Electricity Substations	1977
710CY	496	E	Electricity Substations	1953

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 119

ID	Distance (m)	Direction	Use	Date

711	0	On Site	Garage	1948
712G	48	NW	Motor Repair Works	1948
713ER	56	SW	Garage	1968
714ER	56	SW	Garage	1970
715ER	56	SW	Garage	1970
716ER	56	SW	Garage	1970
717ER	65	SW	Coach Works	1932
718ES	66	NE	Garage	1994
719ES	66	NE	Garage	1963
720ES	67	NE	Garage	1968
721ES	67	NE	Garage	1977
722ES	67	NE	Garage	1965
723ES	67	NE	Garage	1965
724ES	68	NE	Garage	1985
725ES	68	NE	Garage	1991
726ET	69	NE	Garage	1965
727ET	69	NE	Garage	1968
728ET	69	NE	Garage	1965
729ET	69	NE	Garage	1985
730ET	69	NE	Garage	1991
731ET	69	NE	Garage	1977
732ET	69	NE	Garage	1963
733EU	133	SW	Garage	1954
734EU	134	SW	Garage	1954
735	171	S	Garage	1984
736AV	194	SW	Motor Engineering Works	1955
737EV	202	SW	Motor Engineering Works	1950
738EV	207	SW	Motor Engineering Works	1952
739EV	207	SW	Motor Engineering Works	1948
740EW	230	SE	Garages	1954
741EW	230	SE	Garages	1948
742EW	232	SE	Garages	1968
743EW	232	SE	Garages	1965
744EW	232	SE	Garages	1965
745EY	232	SW	Garage	1955
746BA	239	N	Garage	1990
747EX	240	S	Garage	1965
748EX	240	S	Garage	1965
749EX	240	S	Garage	1960
750EX	243	S	Garage	1953
751EY	245	SW	Garage	1952
752EZ	249	N	Garage	1971
753EZ	249	N	Garage	1971
754EZ	249	N	Garage	1960
755EZ	249	N	Garage	1953
756EZ	249	N	Garage	1965

757EZ	249	N	Garage	1967
758EZ	249	N	Garage	1953
759EZ	249	N	Garage	1953
760DS	263	NW	Garage	1968
761DS	263	NW	Garage	1984
762FA	267	E	Garage	1960
763FA	268	E	Garage	1968
764FA	268	E	Garage	1965
765FB	272	N	Garage	1971
766FB	273	N	Garage	1971
767DS	277	NW	Garage	1965
768DS	277	NW	Garage	1952
769DS	277	NW	Garage	1948
770DS	277	NW	Garage	1964
771DS	277	NW	Garage	1971
772DS	278	NW	Garage	1955
773BJ	284	NW	Garage	1948
774BJ	284	NW	Garage	1971
775FC	286	NW	Garage	1971
776FC	286	NW	Garage	1948
777FC	287	NW	Garage	1971
778FD	307	W	Garage	1968
779FD	307	W	Garage	1955
780FD	307	W	Garage	1950
781FE	307	E	Garage	1996
782FE	307	E	Garage	1994
783FD	308	W	Garage	1965
784FD	308	W	Garage	1965
785FD	308	W	Garage	1964
786FD	308	W	Garage	1948
787FD	309	W	Garage	1990
788FD	309	W	Garage	1990
789FD	309	W	Garage	1985
790FF	323	S	Garage	1986
791FF	323	S	Garage	1968
792FF	324	S	Garage	1965
793FF	324	S	Garage	1965
794FF	324	S	Garage	1969
795FF	324	S	Garage	1960
796FG	328	S	Automobile Engineering Works	1953
797FE	350	E	Garage	1964
798FE	350	E	Garage	1987
799FE	350	E	Garage	1986
800FE	369	E	Garage	1977
801FE	371	E	Garage	1988

802FH	372	SE	Garage	1954
803FH	372	SE	Garage	1948
804FH	372	SE	Garage	1965
805FH	372	SE	Garage	1968
806FH	372	SE	Garage	1965
807	373	N	Garage	1948
808BS	374	N	Garage	1953
809BS	374	N	Garage	1953
810BS	374	N	Garage	1965
811BS	374	N	Garage	1967
812BS	374	N	Garage	1953
813BS	375	N	Garage	1971
814BS	398	N	Garage	1960
815BS	398	N	Garage	1971
816FI	419	NE	Garage	1996
817FI	419	NE	Garage	1994
818CP	424	NW	Coach Station and Car Park	1994
819CP	424	NW	Coach Station and Car Park	1998
820FJ	439	NE	Garage	1989
821FJ	439	NE	Garage	1990
822FJ	440	NE	Garage	1994
823FJ	440	NE	Garage	1997
824FK	451	NE	Co-operation Garage and Workshops	1948
825FK	484	NE	Co-op Garage and Workshops	1948
826	484	NE	Garage and Workshops	1951
827FL	497	SW	Garage	1984
828FL	498	SW	Garage	1998
829	500	N	Garage	1948

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 104

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

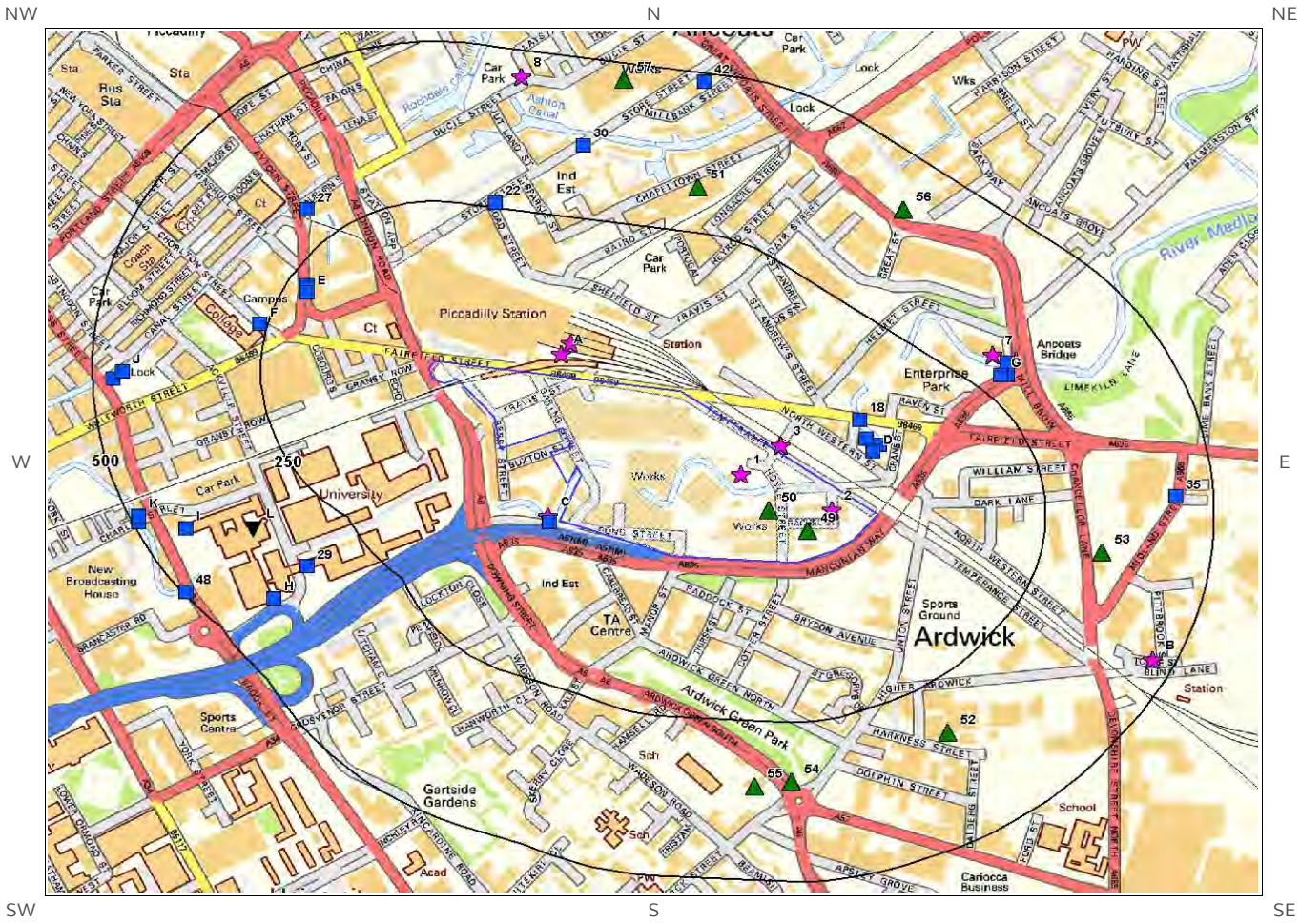
ID	Distance(m)	Direction	Use	Date
830FM	0	On Site	Ponds	1890
831DD	0	On Site	Pond	1851
832	0	On Site	Ponds	1851
833DP	160	S	Pond	1851
834AR	178	NW	Unspecified Ground Workings	1938
835AR	178	NW	Unspecified Ground Workings	1934

836AP	194	NE	Pond	1851
837DS	200	W	Ponds	1890
838FN	209	W	Unspecified Wharf	1890
839AW	222	NE	Pond	1851
840BE	249	NW	Unspecified Wharf	1915
841BE	250	NW	Unspecified Wharf	1923
842DV	297	N	Unspecified Ground Workings	1851
843	305	N	Pond	1905
844FO	312	N	Water Body	1890
845FO	312	N	Canal	1938
846FO	312	N	Canal	1934
847FO	312	N	Canal	1915
848	313	N	Canal	1923
849EM	314	NE	Unspecified Ground Workings	1851
850	316	N	Canal	1991
851	321	NW	Canal	1956
852BZ	324	N	Canal	1890
853BZ	327	N	Water Body	1905
854BZ	332	N	Canal	1938
855BZ	332	N	Canal	1934
856BZ	332	N	Canal	1915
857BP	347	SE	Cemetery	1851
858	352	W	Canal	1896
859FP	354	W	Canal	1938
860FP	354	W	Canal	1905
861FP	354	W	Canal	1932
862FP	354	W	Canal	1923
863FP	354	W	Canal	1916
864BP	360	SE	Cemetery	1890
865FO	361	N	Water Body	1905
866BS	367	N	Unspecified Wharf	1934
867BS	367	N	Unspecified Wharf	1915
868BS	367	N	Unspecified Wharf	1938
869BP	368	SE	Cemetery	1915
870BP	368	SE	Cemetery	1938
871BP	368	SE	Cemetery	1934
872BP	368	SE	Cemetery	1956
873FQ	370	N	Canal	1968
874FQ	370	N	Canal	1956
875BP	371	SE	Cemetery	1923
876BP	371	SE	Cemetery	1905
877FR	372	N	Canal	1971
878FR	372	N	Canal	1988
879FR	372	N	Canal	1978

880FR	372	N	Canal	1994
881FR	372	N	Canal	1985
882FS	372	N	Canal	1971
883FS	372	N	Canal	1994
884FS	372	N	Canal	1985
885FS	372	N	Canal	1978
886FS	372	N	Canal	1988
887CC	375	N	Unspecified Wharf	1956
888FT	376	N	Canal	1985
889FT	376	N	Canal	1978
890FR	382	N	Unspecified Wharf	1923
891BW	382	N	Unspecified Wharves	1923
892BW	382	N	Unspecified Wharves	1915
893BW	382	N	Unspecified Wharves	1938
894BW	382	N	Unspecified Wharves	1934
895BZ	387	N	Unspecified Wharf	1923
896BZ	387	N	Unspecified Wharf	1890
897BZ	387	N	Unspecified Wharf	1905
898CB	387	SW	Cemetery	1851
899CA	387	NE	Cuttings	1923
900CA	387	NE	Cuttings	1905
901CB	392	SW	Cemetery	1956
902BZ	394	N	Unspecified Wharf	1915
903BZ	394	N	Unspecified Wharf	1934
904CA	395	NE	Cuttings	1915
905CA	395	NE	Cuttings	1938
906CA	395	NE	Cuttings	1934
907	397	W	Canal	1988
908CB	402	SW	Cemetery	1923
909CB	402	SW	Cemetery	1915
910CB	402	SW	Cemetery	1905
911CB	402	SW	Cemetery	1934
912CB	402	SW	Cemetery	1890
913CB	402	SW	Cemetery	1938
914CJ	410	N	Unspecified Wharf	1923
915CA	412	NE	Cuttings	1890
916CA	419	NE	Cuttings	1978
917CJ	433	N	Unspecified Wharf	1934
918CJ	433	N	Unspecified Wharf	1938
919CJ	447	N	Unspecified Wharf	1915
920FU	459	NE	Ponds	1890
921CW	478	NE	Refuse Heap	1938
922CW	479	NE	Refuse Heap	1934
923CO	479	NE	Refuse Heap	1956
924FV	479	NE	Unspecified Ground Workings	1923

925CY	485	E	Unspecified Heap	1923
926CY	487	E	Cuttings	1938
927CY	487	E	Cuttings	1915
928CY	487	E	Cuttings	1934
929CY	491	E	Cuttings	1923
930FW	494	E	Cuttings	1956
931DA	499	N	Unspecified Wharf	1938
932DA	499	N	Unspecified Wharf	1915
933DA	499	N	Unspecified Wharf	1934

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- Search Buffers (m) (250, 500)
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

9

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
49	0	On Site	385323 397493	Address: Ardwick Spares, 2 Hoyle Street, Ardwick, M12 6HG Process: Non-ferrous Metal Foundry Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
50	0	On Site	385265 397525	Address: Tj Stafford Ltd, Hoyle Street, Ardwick, M12 6HG Process: Other mineral processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
51	317	N	385160 398031	Address: Central Taxi Spares Ltd, Chapletown Street, Ancoats, M1 2NN Process: Waste oil Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
52	334	SE	385532 397177	Address: Chartrange Ltd, 33 Harkness Street, Ardwick, M12 6BT Process: Other mineral processes. Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
53	339	E	385761 397459	Address: Ardwick Service Station, Chancellor Lane, Ardwick, M12 6JZ Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
54	346	S	385300 397100	Address: Ardwick Green Serv Stn, Ardwick Green, M13 9XF Process: Petrol Vapour Recovery Process Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
55	356	S	385245 397093	Address: Tesco Express Ardwick, Ardwick Green South, Ardwick, Manchester, M13 9XF Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
56	418	NE	385466 397997	Address: Advent Manchester, 309 Great Ancoats Street, Manchester M4 7DF Process: Respraying of Road Vehicles Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
57	472	N	385051 398201	Address: Presbar Diecastings Ltd, Store Street, Piccadilly Village, Ancoats, Manchester, M1 2WD Process: Non-ferrous Metal Foundry Processes Status: Current Permit Permit Type: Part B	Enforcement: 2 Enforcement Notified Date of Enforcement: 12/09/2013, 09/01/2014 Comment: Statutory noise nuisance

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

6

The following RAS Licence (3 or 4) records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Address	Operator	Type	Permission Number	Dates	Status
64L	355	SW	384500 397500	Umist, Po Box 88, Sackville Street, Manchester, M60 1QD	Umist	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AC8878	Date of Approval:31/3/1991 Effective from:31/3/1991 Last date of update:2015-01-01	Revoked/cancelled
65L	355	SW	384500 397500	Umist, Po Box 88, Sackville Street, Manchester, M60 1QD	Umist	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AG4009	Date of Approval:13/11/1997 Effective from:11/12/1997 Last date of update:2015-01-01	Superseded By Variation
66L	355	SW	384500 397500	Umist, Po Box 88,sackville Street, Manchester, M60 1QD	Umist	Keeping And Use Of Radioactive Materials (was Rsa60 Section 1).	AC8886	Date of Approval:6/3/2001 Effective from:6/3/2001 Last date of update:2015-01-01	Revoked/cancelled
67L	355	SW	384500 397500	Umist, Po Box 88, Sackville Street, Manchester, M60 1QD	Umist	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AG4009	Date of Approval:9/4/2002 Effective from:6/5/2002 Last date of update:2015-01-01	Revoked/cancelled
68L	355	SW	384500 397500	Umist, Po Box 88, Sackville Street, Manchester, M60 1QD	Umist	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AG4009	Date of Approval:16/1/1995 Effective from:16/2/1995 Last date of update:2015-01-01	Superseded By Variation
69L	355	SW	384500 397500	Umist, Po Box 88, Sackville Street, Manchester, M60 1QD	Umist	Disposal Of Radioactive Waste (was Rsa60 Section 6).	AG4009	Date of Approval:30/1/1997 Effective from:25/2/1997 Last date of update:2015-01-01	Superseded By Variation

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
13C	15	W	384940 397510	Address: MANCUNIAN WAY SLIPROAD CSO, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016982729 Permit Version: 2	Receiving Water: RIVER MEDLOCK Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: - Effective Date: 30-Nov-1999 Revocation Date: -
14D	78	NE	385420 397620	Address: MANCUNIAN WAY, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0192 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 18/07/1995
15D	89	NE	385410 397640	Address: FAIRFIELD ST/CRANE ST, ARDWICK, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016982727 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: CONSENT REVOKED - DISCHARGE CEASED (WRA 91, SCHED 10 & 6) Issue date: - Effective Date: 28-Nov-1994 Revocation Date: 31/03/1998
16D	92	NE	385430 397630	Address: FAIRFIELD ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016982730 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 30-Sep-1994 Revocation Date: -
17D	92	NE	385430 397630	Address: FAIRFIELD ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0309 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: CONSENT REVOKED OR REVISED - NEW CONSENT ISSUED (37(1)) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 01/01/1995
18	109	NE	385400 397670	Address: RAVEN STREET, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0198 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 31/03/1998
19E	217	NW	384580 397870	Address: MINSHULL ST/WHITWORTH ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0355 Permit Version: 1	Receiving Water: - Status: SURRENDERED UNDER EPR 2010 Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 18/07/2014

ID	Distance (m)	Direction	NGR	Details	
20E	223	NW	384580 397880	Address: AYTOUN ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0318 Permit Version: 1	Receiving Water: SHOOTERS BROOK Status: CONSENT REVOKED OR REVISED - NEW CONSENT ISSUED (37(1)) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 01/01/1995
21E	223	NW	384580 397880	Address: AYTOUN ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016982630 Permit Version: 1	Receiving Water: SHOOTERS BROOK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 30-Sep-1994 Revocation Date: -
22	258	N	384860 398010	Address: STORE STREET, ANCOATS, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0371 Permit Version: 1	Receiving Water: - Status: SURRENDERED UNDER EPR 2010 Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 05/12/2014
23F	261	W	384510 397820	Address: CHORLTON STREET, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0162 Permit Version: 1	Receiving Water: DUKES TUNNEL Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 02/09/2010
24F	261	W	384510 397820	Address: CHORLTON STREET, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0162 Permit Version: 2	Receiving Water: DUKES TUNNEL Status: VARIED UNDER EPR 2010 Issue date: 03/09/2010 Effective Date: 03-Sep-2010 Revocation Date: -
25G	285	NE	385610 397740	Address: BLACKETT STREET, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0194 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 18/07/1995
26G	291	NE	385620 397740	Address: PIN MILL BROW, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0193 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 17/08/1999
27	304	NW	384580 398000	Address: AYTOUN ST/AUBURN ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0370 Permit Version: 1	Receiving Water: - Status: SURRENDERED UNDER EPR 2010 Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 27/03/2015
28G	307	NE	385620 397760	Address: GREAT ANCOATS ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0257 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 13/06/1999

ID	Distance (m)	Direction	NGR	Details	
29	341	SW	384580 397440	Address: MOUNT ST/RUTLAND ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0287 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: -
30	364	N	384990 398100	Address: STORE STREET, ANCOATS, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016982994 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 23-Jun-1995 Revocation Date: -
31H	411	SW	384530 397390	Address: MOUNT ST/GREEK ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0187 Permit Version: 2	Receiving Water: RIVER MEDLOCK Status: VARIED UNDER EPR 2010 Issue date: 03/09/2010 Effective Date: 03-Sep-2010 Revocation Date: -
32H	411	SW	384530 397390	Address: MOUNT ST/GREEK ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0187 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 02/09/2010
33I	435	SW	384400 397500	Address: 112-116 PRINCESS STREET, MANCHESTER, GREATER MANCHESTER Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: 016991403 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 24-Apr-1989 Revocation Date: 31/03/1992
34I	435	SW	384400 397500	Address: 112-116 PRINCESS STREET, MANCHESTER, GREATER MANCHESTER Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: 016991403 Permit Version: 2	Receiving Water: RIVER MEDLOCK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 01-Apr-1992 Revocation Date: 10/02/1993
35	444	E	385870 397550	Address: BERRY ST/BUXWORTH ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0255 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: -
36J	455	W	384306 397746	Address: GSHP SERVING ORIGIN DEVELOPMENT, 56 PRINCESS STREET, MANCHESTER, ., ., M1 6JA Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: NPSWQD004449 Permit Version: 3	Receiving Water: GROUNDWATER Status: SURRENDERED UNDER EPR 2010 Issue date: 28/10/2011 Effective Date: 01-Apr-2013 Revocation Date: 03/10/2014
37J	455	W	384306 397746	Address: GSHP SERVING ORIGIN DEVELOPMENT, 56 PRINCESS STREET, MANCHESTER, ., ., M1 6JA Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: NPSWQD004449 Permit Version: 1	Receiving Water: GROUNDWATER Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 05/03/2009 Effective Date: 01-Apr-2009 Revocation Date: 15/04/2009

ID	Distance (m)	Direction	NGR	Details	
38J	455	W	384306 397746	Address: GSHP SERVING ORIGIN DEVELOPMENT, 56 PRINCESS STREET, MANCHESTER, ., ., M1 6JA Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: NPSWQD004449 Permit Version: 2	Receiving Water: GROUNDWATER Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 16/04/2009 Effective Date: 16-Apr-2009 Revocation Date: 31/03/2013
39J	470	W	384291 397734	Address: GSHP SERVING ORIGIN DEVELOPMENT, 56 PRINCESS STREET, MANCHESTER, ., ., M1 6JA Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: NPSWQD004449 Permit Version: 3	Receiving Water: GROUNDWATER Status: SURRENDERED UNDER EPR 2010 Issue date: 28/10/2011 Effective Date: 01-Apr-2013 Revocation Date: 03/10/2014
40J	470	W	384291 397734	Address: GSHP SERVING ORIGIN DEVELOPMENT, 56 PRINCESS STREET, MANCHESTER, ., ., M1 6JA Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: NPSWQD004449 Permit Version: 1	Receiving Water: GROUNDWATER Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 05/03/2009 Effective Date: 01-Apr-2009 Revocation Date: 15/04/2009
41J	470	W	384291 397734	Address: GSHP SERVING ORIGIN DEVELOPMENT, 56 PRINCESS STREET, MANCHESTER, ., ., M1 6JA Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: NPSWQD004449 Permit Version: 2	Receiving Water: GROUNDWATER Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 16/04/2009 Effective Date: 16-Apr-2009 Revocation Date: 31/03/2013
42	486	N	385170 398200	Address: GREAT ANCOATS STREET, SSO, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 01MAN0023 Permit Version: 1	Receiving Water: SHOOTERS BROOK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 15-Sep-1993 Revocation Date: 15/09/1993
43K	487	SW	384330 397520	Address: PRINCESS ST/GRANBY ROW CS, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016982956 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: CONSENT REVOKED - DISCHARGE CEASED (WRA 91, SCHED 10 & 6) Issue date: - Effective Date: 23-Jun-1995 Revocation Date: 31/03/1998
44K	487	SW	384330 397520	Address: PRINCESS ST/WHITWORTH ST CSO, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016982950 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 23-Jun-1995 Revocation Date: -
45K	491	SW	384330 397510	Address: CHARLES ST/PRINCESS ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0166 Permit Version: 2	Receiving Water: RIVER MEDLOCK Status: VARIED UNDER EPR 2010 Issue date: 03/09/2010 Effective Date: 03-Sep-2010 Revocation Date: -
46K	491	SW	384330 397510	Address: CHARLES ST/PRINCESS ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0166 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: 02/09/2010

ID	Distance (m)	Direction	NGR	Details	
47K	491	SW	384330 397510	Address: WHITWORTH ST/SACKVILLE ST, MANCHESTER, GREATER MANCHESTER Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01MAN0253 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Jan-1995 Revocation Date: -
48	496	SW	384400 397400	Address: BBC VEHICLE MAINTENANCE BASE SWO, PRITCHARD STREET, MANCHESTER, GREATER MANCHESTER Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: 016991346 Permit Version: 1	Receiving Water: RIVER MEDLOCK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 22-Sep-1994 Revocation Date: 22/09/1994

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

12

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	0	On Site	385224 397584	Incident Date: 31-Jul-2001 Incident Identification: 20628 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
2	0	On Site	385358 397528	Incident Date: 13-Oct-2001 Incident Identification: 36400 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
3	10	NE	385282 397629	Incident Date: 30-May-2001 Incident Identification: 7029 Pollutant: Oils and Fuel Pollutant Description: Diesel	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
4C	19	W	384937 397518	Incident Date: 17-Jan-2003 Incident Identification: 131596 Pollutant: Contaminated Water Pollutant Description: Urban Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
5A	35	N	384956 397773	Incident Date: 08-Mar-2001 Incident Identification: 96 Pollutant: Oils and Fuel Pollutant Description: Diesel	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
6A	54	N	384970 397790	Incident Date: 30-May-2001 Incident Identification: 6998 Pollutant: Oils and Fuel Pollutant Description: Diesel	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
7	303	NE	385597 397772	Incident Date: 16-Aug-2015 Incident Identification: 1365039 Pollutant: Sewage Materials Pollutant Description: Storm Sewage	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
8	459	N	384898 398208	Incident Date: 22-Feb-2003 Incident Identification: 138638 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
9B	467	SE	385835 397293	Incident Date: 11-Sep-2001 Incident Identification: 30107 Pollutant: Specific Waste Materials:Specific Waste Materials:Specific Waste Materials Pollutant Description: Commercial Waste:Containers:Household Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
10B	467	SE	385835 397293	Incident Date: 11-Sep-2001 Incident Identification: 30107 Pollutant: Specific Waste Materials Pollutant Description: Commercial Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
11B	467	SE	385835 397293	Incident Date: 11-Sep-2001 Incident Identification: 30107 Pollutant: Specific Waste Materials Pollutant Description: Containers	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

ID	Distance (m)	Direction	NGR	Details	
12B	467	SE	385835 397293	Incident Date: 11-Sep-2001 Incident Identification: 30107 Pollutant: Specific Waste Materials Pollutant Description: Household Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

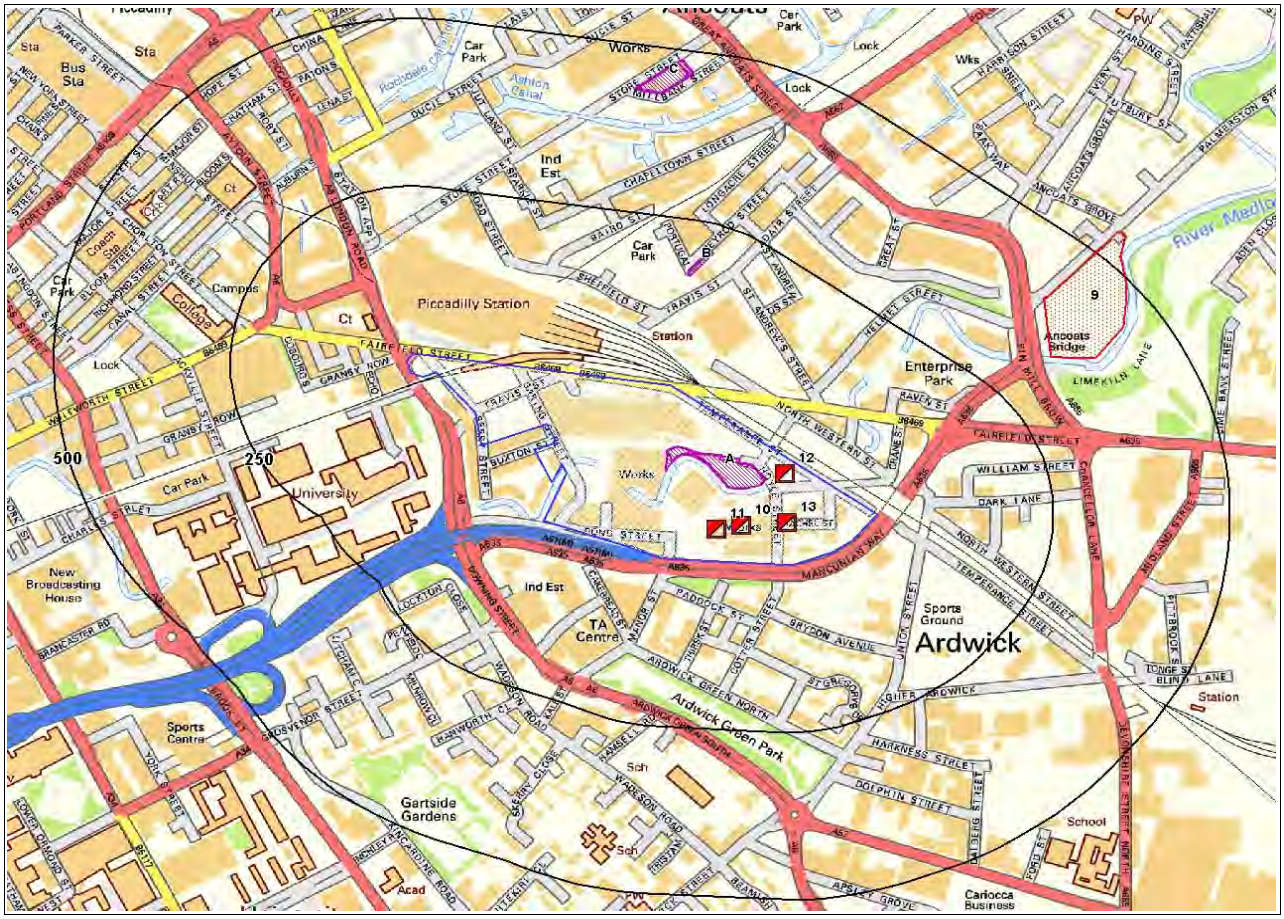
Database searched and no data found.

3. Landfill and Other Waste Sites Map

NW N NE

W E

SW S SE



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Site Outline

250 Search Buffers (m)
500

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

1

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
9	341	NE	385700 397800	Site Address: Palmerston Street Landfill, Great Ancoats Street, River Medlock, Ardwick, Manchester, Greater Manchester Waste Licence: Yes Site Reference: RD/LIC/440/86, F046 Waste Type: Inert, Industrial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 20-Aug-1986 Licence Surrendered: 21-Jul-1988 Licence Holder Address: Clarence House, Mellor Road, Cheadle Hulme, Stockport Operator: - Licence Holder: Peter Birse Limited First Recorded: 01-Sep-1986 Last Recorded: 31-Dec-1987

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

8

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details		
1A	0	On Site	385198 397591	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1994	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
2A	0	On Site	385199 397592	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1991	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
3B	165	N	385177 397897	Type of Site: Scrap Metal Works Site Address: N/A	Planning Application Reference: N/A Date: 1948	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
4B	166	N	385177 397897	Type of Site: Scrap Metal Works Site Address: N/A	Planning Application Reference: N/A Date: 1948	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
5C	430	N	385127 398176	Type of Site: Scrap Metal Yard Site Address: N/A	Planning Application Reference: N/A Date: 1967	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
6C	431	N	385125 398176	Type of Site: Scrap Metal Yard Site Address: N/A	Planning Application Reference: N/A Date: 1978	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
7C	431	N	385126 398176	Type of Site: Scrap Metal Yard Site Address: N/A	Planning Application Reference: N/A Date: 1955	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
8C	431	N	385122 398174	Type of Site: Scrap Metal Yard Site Address: N/A	Planning Application Reference: N/A Date: 1980	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

32

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
10	0	On Site	385235 397506	Site Address: Hoyle Trading Estate, Hoyle Street, Manchester, M12 6HL Type: Treatment of waste to produce soil <75,000 tpy Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: DEL043 EPR reference: EA/EPR/CB3601KL/A001 Operator: E Delaney Demolition Ltd Waste Management licence No: 402157 Annual Tonnage: 74999.0	Issue Date: 26/02/2015 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Aggregate Recycling Yard Correspondence Address: -
11	0	On Site	385200 397500	Site Address: 2, Hoyle Street, Ardwick, Manchester, M12 6HG Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ADO001 EPR reference: EA/EPR/AP3092CD/A001 Operator: Donnelly Mr. A. Waste Management licence No: 53582 Annual Tonnage: 310.0	Issue Date: 11/10/1996 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Suspended Site Name: Ardwick Auto Spares Correspondence Address: -
12	0	On Site	385296 397583	Site Address: Hoyle Street, Hoyle Trading Estate, Manchester, M12 6JL Type: Inert & excavation Waste TS + treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: CIT060 EPR reference: EA/EPR/CB3905MR/A001 Operator: City Excavations Ltd Waste Management licence No: 402399 Annual Tonnage: 75000.0	Issue Date: 01/06/2015 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: City Excavations Aggregate Yard Correspondence Address: -
13	0	On Site	385300 397510	Site Address: Temperance Street, Ardwick, Manchester, M12 6HS Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: PML001 EPR reference: EA/EPR/AP3992CN/A001 Operator: Pye Metals Ltd Waste Management licence No: 53583 Annual Tonnage: 1733.33	Issue Date: 11/10/1996 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Pye Metals Ltd Correspondence Address: -
Not shown	635	E	386052 397406	Site Address: Operational Depot, Hooper Street, Manchester, Lancs, M12 6LA Type: Inert & Excavation WTS with treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MAN114 EPR reference: EA/EPR/DB3839DD/A001 Operator: Manchester City Council Waste Management licence No: 103692 Annual Tonnage: 249999.0	Issue Date: 15/12/2011 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Hooper Street Depot Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	676	SE	386046 397248	Site Address: West Goods Yard, Rondin Road, Ardwick, Manchester, M12 6JT Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BIR103 EPR reference: EA/EPR/PP3291EE/V002 Operator: Birch Skip Hire Ltd Waste Management licence No: 102091 Annual Tonnage: 49999.0	Issue Date: 07/04/2011 Effective Date: - Modified: 02/12/2013 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Revoked Site Name: Birch Skip Hire Correspondence Address: -
Not shown	733	E	386160 397540	Site Address: Units 15, Rondin Close, Ardwick, Manchester, M12 6BF Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MCG002 EPR reference: EA/EPR/RP3098CB/A001 Operator: P Mc Guinness & Co Ltd Waste Management licence No: 50105 Annual Tonnage: 4999.0	Issue Date: 09/08/2002 Effective Date: - Modified: 21/12/2004 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: P Mc Guinness & Co Transfer Station Correspondence Address: -
Not shown	773	E	386200 397500	Site Address: Unit 12, Rondin Road, Ardwick, Manchester, M12 6BF Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BIR071 EPR reference: EA/EPR/CP3097LW/V002 Operator: Birch Skip Hire Ltd. Waste Management licence No: 53760 Annual Tonnage: 6250.0	Issue Date: 16/12/1993 Effective Date: 01/05/2008 Modified: 15/10/2008 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Revoked Site Name: Birch Skip Hire Correspondence Address: -
Not shown	773	E	386200 397500	Site Address: Unit 12, Rondin Road, Ardwick, Manchester, M12 6BF Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BIR071 EPR reference: - Operator: Birch Skip Hire Ltd. Waste Management licence No: 53760 Annual Tonnage: 6250.0	Issue Date: 16/12/1993 Effective Date: 01/05/2008 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Birch Skip Hire Correspondence Address: Unit 12, Rondin Close, Off Ashton Old Road, Manchester, M12 6LL
Not shown	773	E	386200 397500	Site Address: - Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ACA001 EPR reference: - Operator: Cash Anthony Waste Management licence No: 53760 Annual Tonnage: 6250.0	Issue Date: 16/12/1993 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Birch Plant & Waste Services Ltd Correspondence Address: -
Not shown	782	E	386200 397400	Site Address: Rondin House, Rondin Road, Ardwick, Manchester, M12 6BF Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MCG003 EPR reference: - Operator: P Mc Guinness & Company Ltd Waste Management licence No: 50363 Annual Tonnage: 0.0	Issue Date: 21/12/2004 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: P Mc Guinness & Co Ltd Correspondence Address: Pearl Environmental, 13, Middleton Road, Reddish, Stockport, SK5 6SG

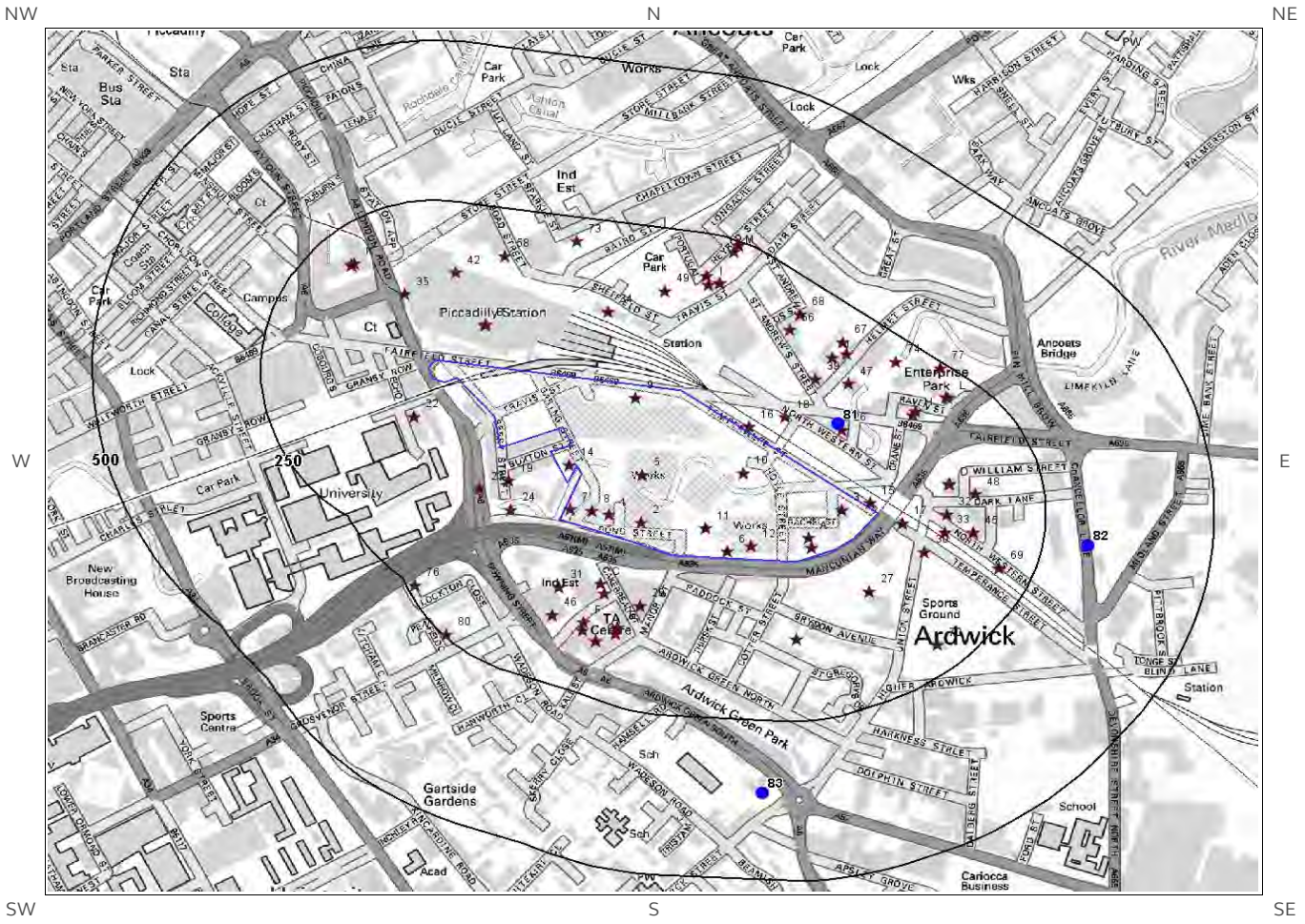
ID	Distance (m)	Direction	NGR	Details	
Not shown	824	E	386237 397366	Site Address: 22, Rondin Road, Ardwick, Manchester, M12 6BF Type: 75kte Metal Recycling Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: OES001 EPR reference: EA/EPR/MB3832AC/A001 Operator: One51 E S Metals (North) Limited Waste Management licence No: 104965 Annual Tonnage: 74999.0	Issue Date: 08/10/2013 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Howarth Metals Correspondence Address: -
Not shown	849	SW	383998 397374	Site Address: Little Ireland Phase B, Great Marlborough Street, Manchester, M1 5NN Type: Mobile Plant Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: TER003 EPR reference: - Operator: Terra Vac (uk) Ltd Waste Management licence No: 50191 Annual Tonnage: 0.0	Issue Date: 17/06/2002 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Terra Vac (uk) Ltd Correspondence Address: Unit 7a, Whitwood Enterprise Park, Castleford, WF10 5PX
Not shown	904	E	386314 397344	Site Address: Rondin House, Rondin Road, Ardwick, Manchester, M12 6BF Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MCG003 EPR reference: EA/EPR/CP3294CX/V004 Operator: P Mc Guinness & Co Ltd Waste Management licence No: 50363 Annual Tonnage: 74999.0	Issue Date: 21/12/2004 Effective Date: - Modified: 24/08/2012 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: P Mc Guinness & Co Ltd Correspondence Address: -
Not shown	943	E	386370 397545	Site Address: Ashton Old Road Recycling Depot, Ashton Old Road, Manchester, M11 2XX Type: Treatment of waste to produce soil <75,000 tpy Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WMA012 EPR reference: EA/EPR/GB3930AM/A001 Operator: W Maher & Sons Ltd Waste Management licence No: 104212 Annual Tonnage: 74999.0	Issue Date: 11/05/2012 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Ashton Old Road Recycling Depot Correspondence Address: -
Not shown	1079	N	384771 398842	Site Address: - Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: KER003 EPR reference: EA/EPR/TP3494CL/S002 Operator: Brendan J Kershaw & Winston Brown Waste Management licence No: 50328 Annual Tonnage: 0.0	Issue Date: 10/08/2004 Effective Date: - Modified: - Surrendered Date: 06/07/2010 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: French Parts Uk Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1216	NE	386000 398600	Site Address: - Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ME001 EPR reference: - Operator: Murray Mills Conservation Ltd Waste Management licence No: 50069 Annual Tonnage: 0.0	Issue Date: 16/05/2001 Effective Date: 07/10/2004 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Lumns Lane, Clifton Junction, Swinton Correspondence Address: Central House, 299, Grimshaw Lane, Middleton, Manchester, M40 2AT
Not shown	1216	NE	386000 398600	Site Address: - Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ME001 EPR reference: EA/EPR/VP3098CU/T002 Operator: Murray Mills Conservation Ltd Waste Management licence No: 50069 Annual Tonnage: 24999.0	Issue Date: 16/05/2001 Effective Date: 07/10/2004 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Lumns Lane, Clifton Junction, Swinton Correspondence Address: -
Not shown	1226	E	386652 397459	Site Address: 8, Tuley Street, Gorton, Manchester, Lancs, M11 2DY Type: Vehicle Depollution Facility <5000 tps Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ANY032 EPR reference: EA/EPR/AB3133RU/A001 Operator: Anyaeriuba Emmanuel Waste Management licence No: 102972 Annual Tonnage: 4999.0	Issue Date: 27/07/2011 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Breakers Yard, 8 Tuley Street Correspondence Address: -
Not shown	1240	E	386658 397372	Site Address: Iwaste Ltd, Gorton Road, Gorton, Manchester, M11 2DZ Type: Vehicle Depollution Facility <5000 tps Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: IWA002 EPR reference: EA/EPR/KB3238RL/A001 Operator: Iwaste Ltd Waste Management licence No: 104595 Annual Tonnage: 4999.0	Issue Date: 25/10/2012 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Iwaste Ltd Correspondence Address: -
Not shown	1301	E	386683 397182	Site Address: Vaughan Industrial Estate, Unit 10, Vaughan Street, West Gorton, Manchester, M12 5BT Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: CMR001 EPR reference: EA/EPR/ZP3098CT/A001 Operator: Concorde Metals Recycling Ltd Waste Management licence No: 50030 Annual Tonnage: 0.0	Issue Date: 29/08/2003 Effective Date: - Modified: - Surrendered Date: 06/12/2011 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Concorde Metals Recycling Correspondence Address: -
Not shown	1334	E	386750 397350	Site Address: Land/premises At, Gorton Road, Gorton, Manchester, M11 2DZ Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: AUT005 EPR reference: EA/EPR/UP3594CX/A001 Operator: Auto Salvage Holtown Ltd Waste Management licence No: 50275 Annual Tonnage: 2500.0	Issue Date: 14/05/2004 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Auto Salvage Holtown Ltd Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1350	NE	386084 398706	Site Address: Union Mill, 1, Cambrian Street, Ancoats, Manchester, M40 7EG Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: HUR001 EPR reference: EA/EPR/VP3594CG/A001 Operator: Hurstfield Paul Waste Management licence No: 50405 Annual Tonnage: 1040.0	Issue Date: 07/06/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Olympia Motor Services Correspondence Address: -
Not shown	1373	E	386785 397317	Site Address: Land/premises At, Gorton Road, Ardwick, Manchester, M11 2DZ Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: TDX002 EPR reference: EA/EPR/MP3594CJ/A001 Operator: T D X Ltd Waste Management licence No: 50264 Annual Tonnage: 2500.0	Issue Date: 28/02/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Southside Railway Sidings Correspondence Address: -
Not shown	1408	E	386816 397287	Site Address: Southside Railway Sidings, Gorton Road, Gorton, Manchester, M11 2DZ Type: Metal Recycling Site (Vehicle Dismantler) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: UCS002 EPR reference: EA/EPR/HB3534AU/T001 Operator: U C S (Manchester) Limited Waste Management licence No: 50464 Annual Tonnage: 2500.0	Issue Date: 19/12/2006 Effective Date: 14/06/2012 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Universal Car Spares Limited Correspondence Address: -
Not shown	1408	E	386816 397287	Site Address: Southside Railway Sidings, Gorton Road, Gorton, Manchester, M11 2DZ Type: Metal Recycling Site (Vehicle Dismantler) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: AHM002 EPR reference: EA/EPR/YP3494CK/A001 Operator: Tufail Ahmed And Mohammad Ahmed Waste Management licence No: 50464 Annual Tonnage: 2500.0	Issue Date: 19/12/2006 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Universal Car Spares Correspondence Address: -
Not shown	1422	E	386845 397409	Site Address: Singleton's Scrap Metal Ltd, Land Off Wolveton Street, Openshaw, Manchester, Lancs, M11 2DU Type: Vehicle Depollution Facility <5000 tps Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FWS011 EPR reference: EA/EPR/KB3534RB/S002 Operator: F W Singleton Limited Waste Management licence No: 104629 Annual Tonnage: 0.0	Issue Date: 20/08/2012 Effective Date: - Modified: - Surrendered Date: 24/10/2012 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Singleton's Scrap Metal Ltd Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1422	E	386845 397404	Site Address: Singleton's Scrap Metal, Land Of Wolveton Street, Manchester, Lancs, M11 2DU Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FWS010 EPR reference: EA/EPR/JB3731RJ/A001 Operator: F W Singleton Ltd Waste Management licence No: 104515 Annual Tonnage: 74999.0	Issue Date: 17/09/2012 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Singleton's Scrap Metal Correspondence Address: -
Not shown	1433	NE	386236 398704	Site Address: Holt Town Ind Est, Holt Town, Manchester, M40 7FQ Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MPC001 EPR reference: EA/EPR/JP3892CY/S002 Operator: Mc Guinness & Co Ltd Waste Management licence No: 53629 Annual Tonnage: 50000.0	Issue Date: 03/11/1995 Effective Date: - Modified: - Surrendered Date: 26/06/2002 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: P Mc Guiness & Co Ltd Correspondence Address: -
Not shown	1449	NE	386155 398777	Site Address: - Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WAR001 EPR reference: - Operator: Warrender David Waste Management licence No: 50069 Annual Tonnage: 0.0	Issue Date: 16/05/2001 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Upper Helena Street Correspondence Address: Bradley Hall Farm, Rhodes Green, Middleton, Manchester, M24 4SL
Not shown	1449	NE	386155 398777	Site Address: - Type: Household, Commercial & Industrial Waste T Stn Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: WAR001 EPR reference: - Operator: Warrender David Waste Management licence No: 50069 Annual Tonnage: 0.0	Issue Date: 16/05/2001 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Upper Helena Street Correspondence Address: Bradley Hall Farm, Rhodes Green, Middleton, Manchester, M24 4SL
Not shown	1480	NE	386180 398798	Site Address: - Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: DRS001 EPR reference: EA/EPR/MP3992CS/S002 Operator: Race Dennis Waste Management licence No: 53429 Annual Tonnage: 5000.0	Issue Date: 18/11/1999 Effective Date: - Modified: - Surrendered Date: 14/06/2004 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: D Race & Sons Correspondence Address: -

4. Current Land Use Map



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Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 80

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	0	On Site	F & B Hosiery	385028 397520	F & B Hosiery, 10, Nether Street, Manchester, M12 6HY	Lingerie and Hosiery	Consumer Products
2	0	On Site	Manchester Towbar & Trailer Centre	385076 397508	Manchester Towbar & Trailer Centre, Bond Street Industrial Estate, Mancunian Way, Manchester, M12 6HW	Vehicle Repair, Testing and Servicing	Repair and Servicing
3	0	On Site	Depot	385374 397528	Depot, M12	Container and Storage	Transport, Storage and Delivery
4A	0	On Site	Hoyle Street Industrial Estate	385325 397484	Hoyle Street Industrial Estate, M12	Business Parks and Industrial Estates	Industrial Features
5	0	On Site	Works	385077 397583	Works, M1	Unspecified Works Or Factories	Industrial Features
6	0	On Site	Tank	385204 397463	Tank, M12	Tanks (Generic)	Industrial Features
7	0	On Site	Works	384971 397529	Works, M1	Unspecified Works Or Factories	Industrial Features
8	0	On Site	Factory	385003 397526	Factory, M12	Unspecified Works Or Factories	Industrial Features
9	0	On Site	Electricity Sub Station	385068 397704	Electricity Sub Station, M1	Electrical Features	Infrastructure and Facilities
10	0	On Site	Scrap Yard	385228 397586	Scrap Yard, M12	Scrap Metal Merchants	Recycling Services
11	0	On Site	Tank	385172 397499	Tank, M12	Tanks (Generic)	Industrial Features
12	0	On Site	Works	385239 397471	Works, M12	Unspecified Works Or Factories	Industrial Features
13A	0	On Site	Mancunian Garage UK	385328 397469	Mancunian Garage UK, Unit 6, Hoyle Street, Manchester, M12 6HG	Vehicle Repair, Testing and Servicing	Repair and Servicing
14	0	On Site	Cozy Knitwear	384969 397598	Cozy Knitwear, 58, Baring Street, Manchester, M1 2PY	Clothing, Components and Accessories	Consumer Products
15	8	NE	Plastic Art Co	385416 397538	Plastic Art Co, 92, Temperance Street, Manchester, M12 6HU	Industrial Coatings and Finishings	Industrial Products
16	9	NE	Bantuway Manchester Ltd	385236 397658	Bantuway Manchester Ltd, 105, Temperance Street, Manchester, M12 6HR	Fish, Meat and Poultry Products	Foodstuffs

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
17	39	E	Autocare M O T & Engineers Ltd	385464 397507	Autocare M O T & Engineers Ltd, 86-87, Temperance Street, Manchester, M12 6HU	Vehicle Repair, Testing and Servicing	Repair and Servicing
18	52	NE	Supply UK Ltd	385290 397673	Supply UK Ltd, 102, North Western Street, Manchester, M12 6DY	Construction and Tool Hire	Hire Services
19	52	S	Electricity Sub Station	384879 397574	Electricity Sub Station, M1	Electrical Features	Infrastructure and Facilities
20B	65	N	Manchester Piccadilly Rail Station	384844 397818	Manchester Piccadilly Rail Station, M1	Railway Stations, Junctions and Halts	Public Transport, Stations and Infrastructure
21B	66	N	Sixt	384845 397819	Sixt, Manchester Piccadilly Station, Boad Street, Manchester, M1 2RP	Vehicle Hire and Rental	Hire Services
22	66	SW	Depot	384738 397674	Depot, M1	Container and Storage	Transport, Storage and Delivery
23	71	SW	Gantry	384835 397561	Gantry, M1	Travelling Cranes and Gantries	Industrial Features
24	75	W	Pumping House	384882 397528	Pumping House, M1	Water Pumping Stations	Industrial Features
25C	77	S	Downing Street Industrial Estate	385015 397412	Downing Street Industrial Estate, M12	Business Parks and Industrial Estates	Industrial Features
26	80	NE	Auto Care Assist	385374 397653	Auto Care Assist, 102, Fairfield Street, Manchester, M1 2WR	Vehicle Repair, Testing and Servicing	Repair and Servicing
27	82	SE	Electricity Sub Station	385415 397400	Electricity Sub Station, M12	Electrical Features	Infrastructure and Facilities
28C	90	S	Electricity Sub Station	385021 397397	Electricity Sub Station, M12	Electrical Features	Infrastructure and Facilities
29	90	S	Euro Beds Ltd	385074 397377	Euro Beds Ltd, 1, Manor Street, Manchester, M12 6HE	Beds and Bedding	Consumer Products
30	91	SE	Electricity Sub Station	385496 397462	Electricity Sub Station, M12	Electrical Features	Infrastructure and Facilities
31	101	S	Calumet Photographic	384953 397407	Calumet Photographic, Unit 4 Downing Street Industrial Estate, Charlton Place, Ardwick, Manchester, M12 6HH	Photographic and Optical Equipment	Household, Office, Leisure and Garden
32	103	E	Works	385530 397521	Works, M12	Unspecified Works Or Factories	Industrial Features
33	104	E	J K Dairies	385527 397493	J K Dairies, 83, North Western Street, Manchester, M12 6DY	Dairy Farming	Farming
34	109	N	Aline Services Ltd	385026 397838	Aline Services Ltd, Unit 8, Sheffield Street, Manchester, M1 2ND	Distribution and Haulage	Transport, Storage and Delivery
35	113	NW	Piccadilly (Manchester Metrolink)	384725 397866	Piccadilly (Manchester Metrolink), M1	Tram, Metro and Light Railway Stations and Stops	Public Transport, Stations and Infrastructure
36D	115	NE	Warehouse	385533 397568	Warehouse, M12	Container and Storage	Transport, Storage and Delivery

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
37D	116	NE	Cooneen	385533 397568	Cooneen, Unit 1, Dark Lane, Manchester, M12 6FA	Clothing, Components and Accessories	Consumer Products
38	120	S	Electricity Sub Station	385306 397326	Electricity Sub Station, M12	Electrical Features	Infrastructure and Facilities
39	126	NE	Warehouse	385335 397733	Warehouse, M1	Container and Storage	Transport, Storage and Delivery
40E	134	S	33 Joints	385040 397343	33 Joints, Tanzaro House, Ardwick Green North, Manchester, M12 6FZ	Distribution and Haulage	Transport, Storage and Delivery
41E	134	S	Progress Centre	385040 397343	Progress Centre, Progress Centre, Charlton Place, Ardwick, Manchester, M12 6HS	Business Parks and Industrial Estates	Industrial Features
42	140	N	Hertz Car Hire	384800 397900	Hertz Car Hire, Piccadilly Railway Station, Boad Street, Manchester, M1 2RP	Vehicle Hire and Rental	Hire Services
43F	142	S	Works	384990 397352	Works, M12	Unspecified Works Or Factories	Industrial Features
44E	143	S	Reachout Healthcare Manchester Ltd	385038 397334	Reachout Healthcare Manchester Ltd, Unit 8 Progress Centre, Charlton Place, Ardwick, Manchester, M12 6HS	Medical Equipment, Supplies and Pharmaceuticals	Industrial Products
45	145	E	Works	385569 397492	Works, M12	Unspecified Works Or Factories	Industrial Features
46	146	S	Speedy Hire Plc	384943 397363	Speedy Hire Plc, Unit 1-3 Downing Street Industrial Estate, Charlton Place, Ardwick, Manchester, M12 6HH	Construction and Tool Hire	Hire Services
47	147	NE	Jack Cohen & Sons	385383 397725	Jack Cohen & Sons, 107, Fairfield Street, Manchester, M1 2WG	Rag Merchants	Recycling Services
48	148	E	Works	385572 397553	Works, M12	Unspecified Works Or Factories	Industrial Features
49	152	N	Depot	385111 397871	Depot, M1	Container and Storage	Transport, Storage and Delivery
50F	155	S	Works	384989 397339	Works, M12	Unspecified Works Or Factories	Industrial Features
51H	158	NE	Works	385479 397677	Works, M12	Unspecified Works Or Factories	Industrial Features
52G	164	S	Area Headquarters Duke of Lancaster's Regiment	385009 397323	Area Headquarters Duke of Lancaster's Regiment, Army Reserve Centre, Ardwick Green North, Manchester, M12 6HD	Armed Services	Central and Local Government
53G	164	S	D Company 4 Lancs Baduke of Lancasters Regiment	385008 397322	D Company 4 Lancs Baduke of Lancasters Regiment, Territorial Army Centre, Ardwick Green North, Manchester, M12 6HD	Armed Services	Central and Local Government
54H	165	NE	Cheeper Van Hire	385483 397682	Cheeper Van Hire, 137, Fairfield Street, Manchester, M12 6FJ	Vehicle Hire and Rental	Hire Services

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
55J	167	NE	Climate Center	385359 397766	Climate Center, 2, Helmet Street, Manchester, M1 2NT	Cooling and Refrigeration	Industrial Products
56	168	NE	Depot	385296 397810	Depot, M1	Container and Storage	Transport, Storage and Delivery
57I	172	N	Works	385176 397881	Works, M1	Unspecified Works Or Factories	Industrial Features
58	176	N	Electricity Sub Station	384873 397926	Electricity Sub Station, M1	Electrical Features	Infrastructure and Facilities
59I	178	N	Depot	385192 397883	Depot, M1	Container and Storage	Transport, Storage and Delivery
60I	179	N	Manchester Van Hire	385192 397884	Manchester Van Hire, Manchester Van Hire, Travis Street, Manchester, M1 2NG	Vehicle Hire and Rental	Hire Services
61I	184	N	Works	385173 397894	Works, M1	Unspecified Works Or Factories	Industrial Features
62J	184	NE	Evans Textile Sales Ltd	385381 397771	Evans Textile Sales Ltd, Helmet Street, Manchester, M1 2NT	Curtains and Blinds	Consumer Products
63K	193	NW	Advanced Valve Solutions UK Ltd	384649 397913	Advanced Valve Solutions UK Ltd, 3, Piccadilly Place, Manchester, M1 3BN	Seals, Tapes, Taps and Valves	Industrial Products
64K	194	NW	Pita Pit	384646 397911	Pita Pit, 3, Piccadilly Place, Manchester, M1 3BN	General Manufacturing	Industrial Products
65K	194	NW	Global Commercial Projects Ltd	384646 397911	Global Commercial Projects Ltd, 3, Piccadilly Place, Manchester, M1 3BN	Office and Shop Equipment	Industrial Products
66K	194	NW	Ove Arup & Partners	384646 397911	Ove Arup & Partners, 3, Piccadilly Place, Manchester, M1 3BN	Industrial Engineers	Engineering Services
67	196	NE	Depot	385375 397791	Depot, M1	Container and Storage	Transport, Storage and Delivery
68	198	NE	Amato Food Products Ltd	385312 397834	Amato Food Products Ltd, St. Andrews Square, Manchester, M1 2NS	Catering and Non Specific Food Products	Foodstuffs
69	199	SE	Tom Blackburn Garage Ltd	385606 397436	Tom Blackburn Garage Ltd, 74, North Western Street, Manchester, M12 6DX	Vehicle Repair, Testing and Servicing	Repair and Servicing
70	207	SE	Anvic Development	385516 397316	Anvic Development, City View House 5, Union Street, Ardwick, Manchester, M12 4JD	Business Parks and Industrial Estates	Industrial Features
71L	209	NE	Mr Clutch Autocentres	385531 397703	Mr Clutch Autocentres, Blackett Street, Manchester, M12 6EJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
72L	209	NE	Works	385529 397705	Works, M12	Unspecified Works Or Factories	Industrial Features
73	213	N	Warehouse	384981 397949	Warehouse, M1	Container and Storage	Transport, Storage and Delivery
74	214	NE	Electricity Sub Station	385454 397760	Electricity Sub Station, M1	Electrical Features	Infrastructure and Facilities
75M	231	N	Works	385213 397932	Works, M1	Unspecified Works Or Factories	Industrial Features

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
76	238	SW	Electricity Sub Station	384740 397410	Electricity Sub Station, M1	Electrical Features	Infrastructure and Facilities
77	242	NE	Adlow Industrial Park	385520 397750	Adlow Industrial Park, M12	Business Parks and Industrial Estates	Industrial Features
78M	244	N	Gorman Shorrock & Davies Ltd	385220 397942	Gorman Shorrock & Davies Ltd, 52, Heyrod Street, Manchester, M1 2WW	Published Goods	Industrial Products
79M	244	N	K M Print Design Ltd	385220 397942	K M Print Design Ltd, 52, Heyrod Street, Manchester, M1 2WW	Published Goods	Industrial Products
80	247	SW	Factory	384786 397333	Factory, M1	Unspecified Works Or Factories	Industrial Features

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 3

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
81	85	NE	385368 397662	Unbranded	Fletcher Garages, 100, Fairfield Street, Fairfield Street, Manchester, Greater Manchester, M1 2WR	Not Applicable	Obsolete
82	316	E	385740 397472	BP	Ardwick Service Station, Chancellor Lane, Chancellor Lane, Ardwick, Manchester, Greater Manchester, M12 6JZ	No	Open
83	364	S	385256 397084	Esso	Ardwick Green Express, Ardwick Green South, Ardwick Green South, Manchester, Greater Manchester, M13 9XF	No	Open

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

5.3 Bedrock and Solid Geology

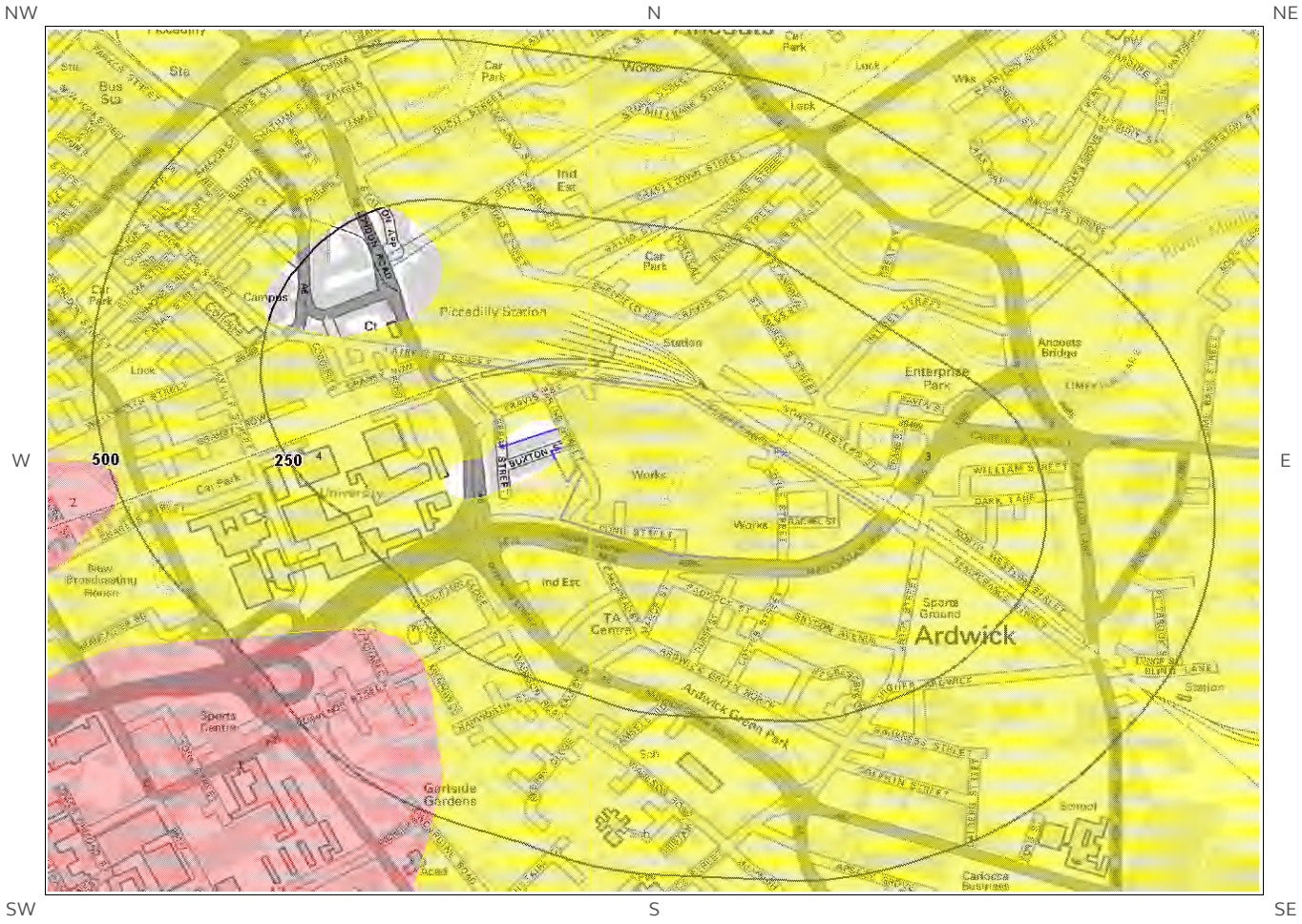
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
CHES-SDST	CHESTER FORMATION	SANDSTONE
MM-MDST	MANCHESTER MARLS FORMATION	MUDSTONE
CHES-SDST	CHESTER FORMATION	SANDSTONE

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

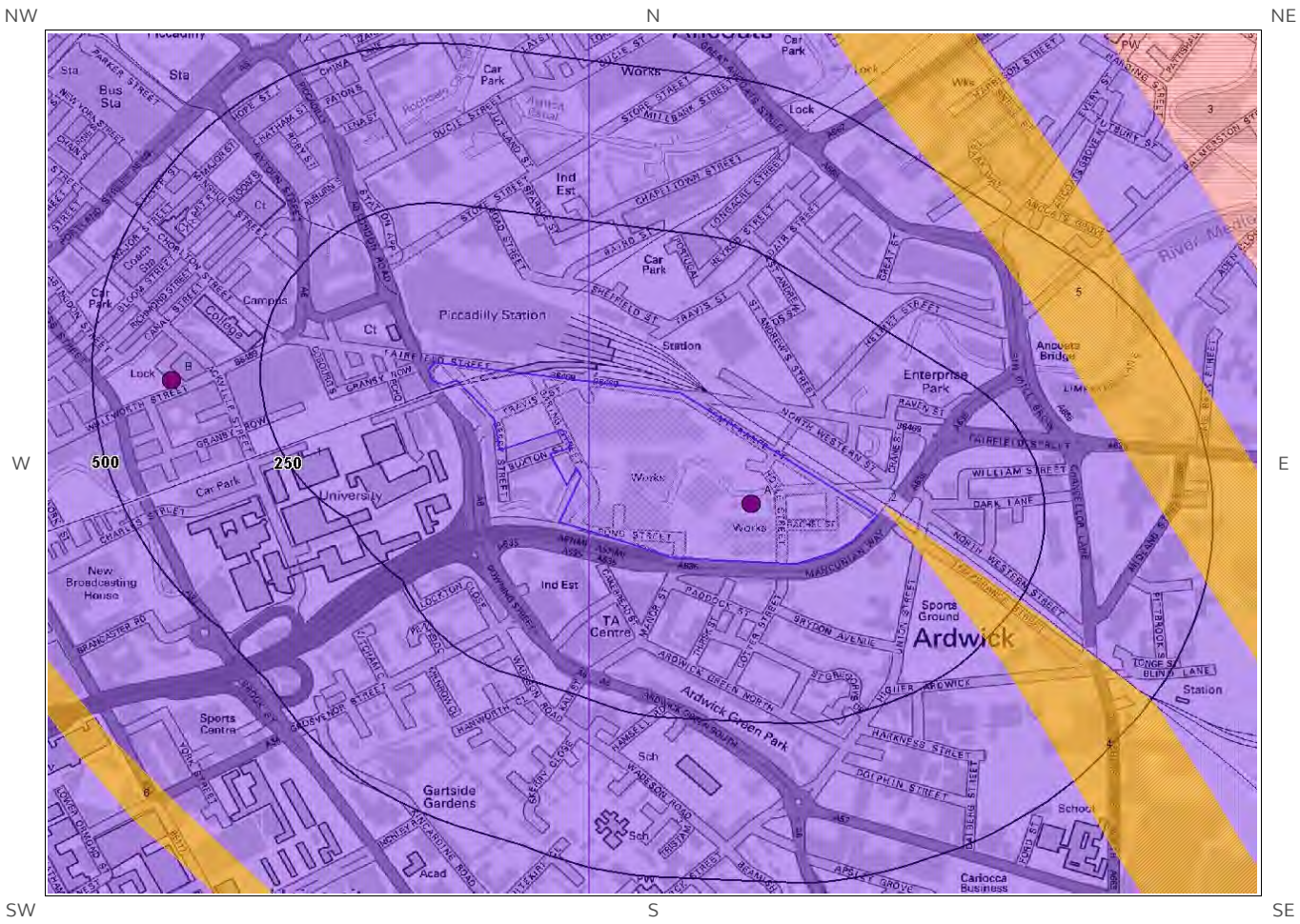
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licenses



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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

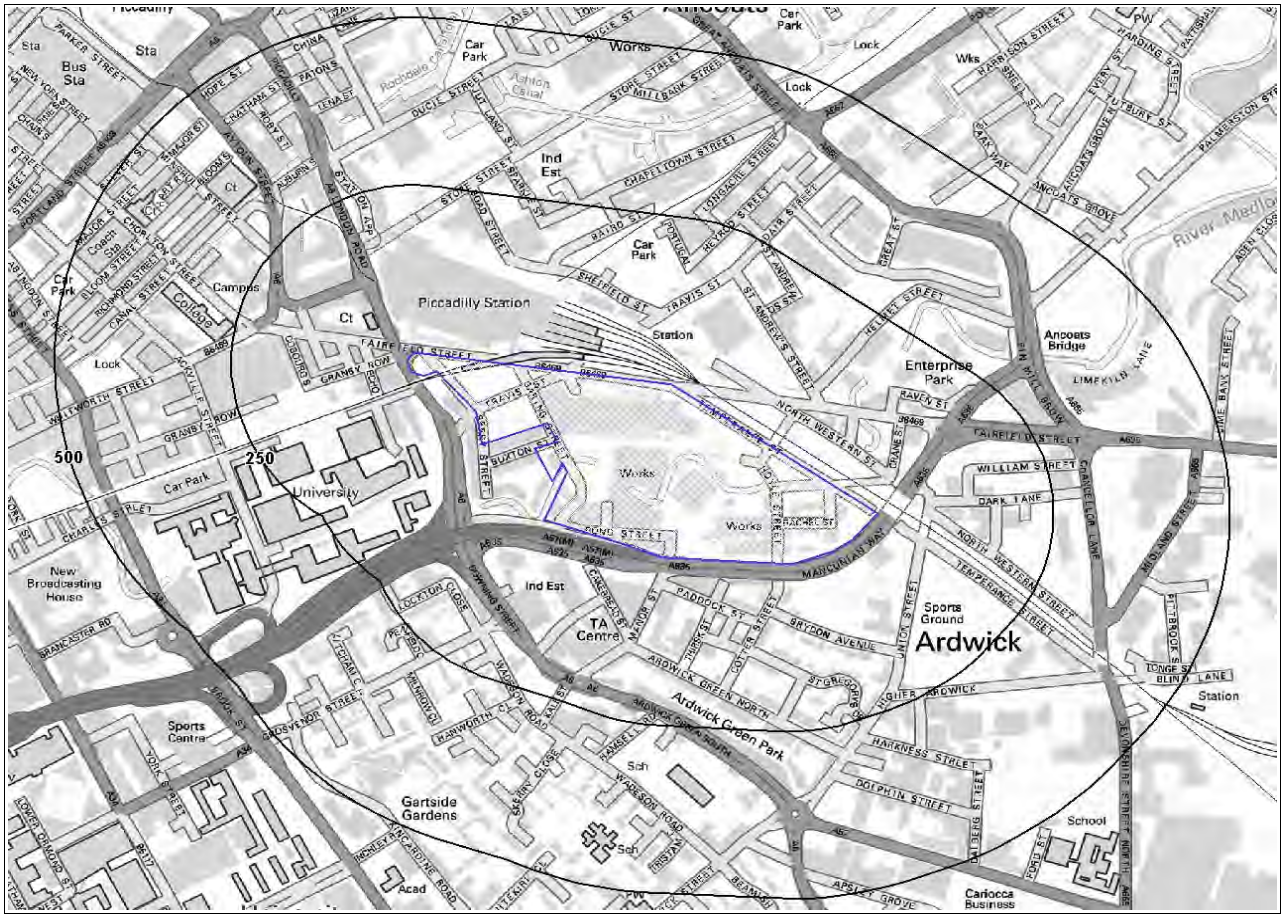
Groundsure
LOCATION INTELLIGENCE

6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses

NW N NE

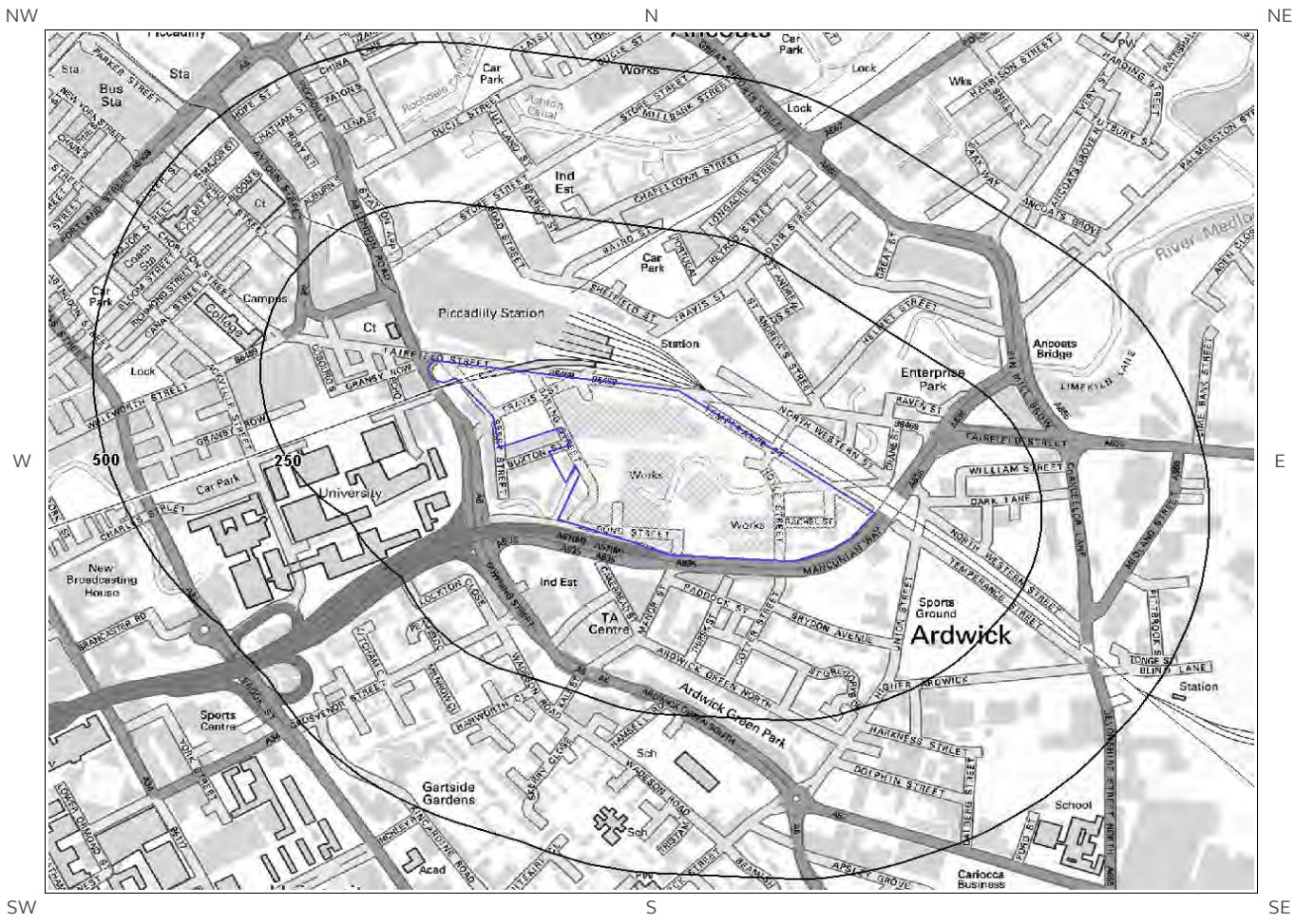
W E

SW S SE



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6d. Hydrogeology – Source Protection Zones within confined aquifer



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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

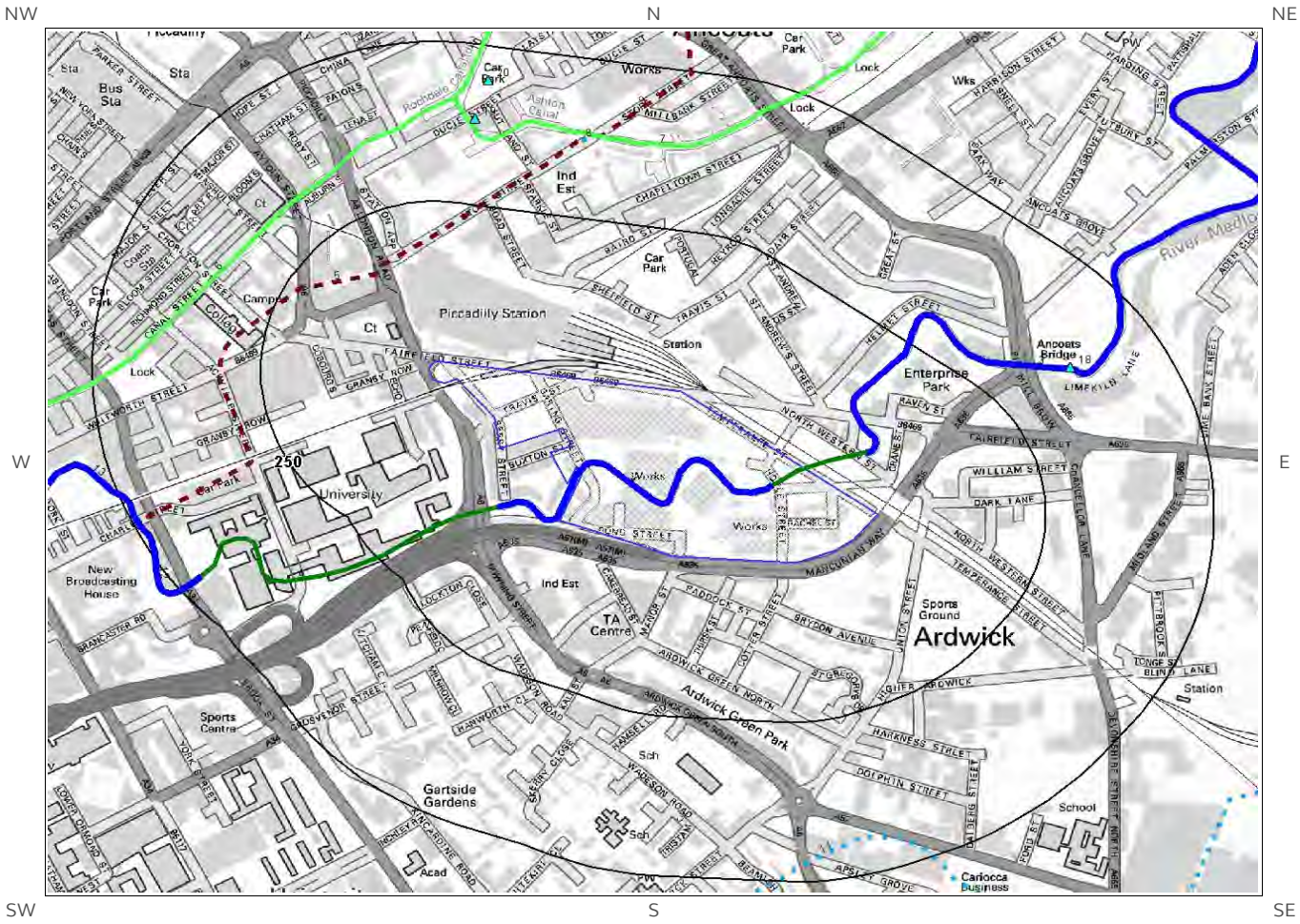
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

Site Outline

250
500
Search Buffers (m)

6e. Hydrology – Detailed River Network and River Quality



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Site Outline

250 — 500 — Search Buffers (m)

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
3	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
4	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
1	297	SW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	493	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
2	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
4	18	NE	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeablehorizons and weathering. These are generally the water-bearing parts of the former non-aquifers
5	371	NE	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeablehorizons and weathering. These are generally the water-bearing parts of the former non-aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
8A	0	On Site	385240 397540	Status: Historical Licence No: 2569006001 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Ground Water - North West Region Point: "borehole At Premises, Broadie St, Ardwick, Manchester" Data Type: Point Name: MOSELEY RUBBER CO LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 6 Original Start Date: 8/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 8/2/1966 Version End Date:
9A	0	On Site	385240 397540	Status: Historical Licence No: 2569006001 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Ground Water - North West Region Point: Borehole At Premises, Broadie St, Ardwick, Manchester Data Type: Point Name: MOSELEY RUBBER CO LTD	Annual Volume (m^3): 331858 Max Daily Volume (m^3): 909.2 Original Application No: 0006 Original Start Date: 8/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 8/2/1966 Version End Date:
10B	383	W	384378 397733	Status: Historical Licence No: NW0690006001 Details: Non-Evaporative Cooling Direct Source: Ground Water - North West Region Point: Boreholes At Origin Developments, Manchester Data Type: Point Name: West Contracting	Annual Volume (m^3): 139128 Max Daily Volume (m^3): 1010 Original Application No: 7623 Original Start Date: 19/1/2009 Expiry Date: 31/3/2015 Issue No: 1 Version Start Date: 19/1/2009 Version End Date:
11B	383	W	384378 397733	Status: Historical Licence No: NW/069/0006/001 Details: Non-Evaporative Cooling Direct Source: Ground Water - North West Region Point: Boreholes At Origin Developments, Manchester Data Type: Point Name: West Contracting	Annual Volume (m^3): 139128 Max Daily Volume (m^3): 1010 Original Application No: 7623 Original Start Date: 19/1/2009 Expiry Date: 31/3/2015 Issue No: 1 Version Start Date: 19/1/2009 Version End Date:
Not shown	707	W	384100 398000	Status: Historical Licence No: 2569007069 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Ground Water - North West Region Point: "borehole At George St, Manchester" Data Type: Point Name: BRITISH TELECOM	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 2332 Original Start Date: 27/1/1971 Expiry Date: - Issue No: 100 Version Start Date: 27/1/1971 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	707	W	384100 398000	Status: Historical Licence No: 2569007069 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Ground Water - North West Region Point: Borehole At George St, Manchester Data Type: Point Name: BRITISH TELECOMMUNICATIONS PLC	Annual Volume (m^3): 1100 Max Daily Volume (m^3): 860 Original Application No: 2332 Original Start Date: 1/4/1984 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2007 Version End Date:
Not shown	778	SE	385729 396778	Status: Active Licence No: NW/069/0004/005 Details: Heat Pump Direct Source: Ground Water - North West Region Point: Area Of Abstraction - Lower Carboniferous Limestone Data Type: Region Name: G T Energy UK Limited	Annual Volume (m^3): 2049840 Max Daily Volume (m^3): 8640 Original Application No: NPS/WR/013554 Original Start Date: 17/1/2013 Expiry Date: 16/1/2037 Issue No: 2 Version Start Date: 11/6/2013 Version End Date:
Not shown	870	SW	384180 397091	Status: Active Licence No: NW/069/0006/003 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Ground Water - North West Region Point: Borehole 1 At Lower Chatham Street Data Type: Point Name: Manchester Metropolitan University	Annual Volume (m^3): 283240 Max Daily Volume (m^3): 1532 Original Application No: NPS/WR/015264 Original Start Date: 4/4/2014 Expiry Date: 31/3/2027 Issue No: 2 Version Start Date: 4/4/2014 Version End Date:
Not shown	870	SW	384180 397091	Status: Active Licence No: NW/069/0006/003 Details: Heat Pump Direct Source: Ground Water - North West Region Point: Borehole 1 At Lower Chatham Street Data Type: Point Name: Manchester Metropolitan University	Annual Volume (m^3): 283240 Max Daily Volume (m^3): 1532 Original Application No: NPS/WR/015264 Original Start Date: 4/4/2014 Expiry Date: 31/3/2027 Issue No: 2 Version Start Date: 4/4/2014 Version End Date:
Not shown	1423	NW	383700 398700	Status: Historical Licence No: 2569007070 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Ground Water - North West Region Point: "borehole At Dial House, Chapel St, Salford" Data Type: Point Name: BRITISH TELECOM	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 2333 Original Start Date: 27/1/1971 Expiry Date: - Issue No: 100 Version Start Date: 27/1/1971 Version End Date:
Not shown	1423	NW	383700 398700	Status: Historical Licence No: 2569007070 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Ground Water - North West Region Point: Borehole At Dial House, Chapel St, Salford Data Type: Point Name: BRITISH TELECOMMUNICATIONS PLC	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 2333 Original Start Date: 27/1/1971 Expiry Date: - Issue No: 101 Version Start Date: 1/4/1984 Version End Date:
Not shown	1423	NW	383700 398700	Status: Active Licence No: 2569007070 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Ground Water - North West Region Point: Borehole At Dial House Chapel Street Salford Data Type: Point Name: BRITISH TELECOMMUNICATIONS PLC	Annual Volume (m^3): 45 Max Daily Volume (m^3): 30 Original Application No: 2333 Original Start Date: 27/1/1971 Expiry Date: - Issue No: 101 Version Start Date: 1/4/2007 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1443	SW	383715 396746	Status: Active Licence No: NW/069/0004/003 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Ground Water - North West Region Point: Borehole At Manchester Metropolitan University Data Type: Point Name: Manchester Metropolitan University	Annual Volume (m^3): 274115 Max Daily Volume (m^3): 751 Original Application No: NPS/WR/008077 Original Start Date: 20/9/2013 Expiry Date: 31/3/2027 Issue No: 1 Version Start Date: 1/1/2015 Version End Date:
Not shown	1443	SW	383715 396746	Status: Active Licence No: NW/069/0004/003 Details: Heat Pump Direct Source: Ground Water - North West Region Point: Borehole At Manchester Metropolitan University Data Type: Point Name: Manchester Metropolitan University	Annual Volume (m^3): 274115 Max Daily Volume (m^3): 751 Original Application No: NPS/WR/008077 Original Start Date: 20/9/2013 Expiry Date: 31/3/2027 Issue No: 1 Version Start Date: 1/1/2015 Version End Date:
Not shown	1531	W	383335 398310	Status: Historical Licence No: 2569007089 Details: Non-Evaporative Cooling Direct Source: Ground Water - North West Region Point: 2 Boreholes At Gartside Street Manchester Data Type: Line Name: HER MAJESTY'S COURT SERVICE	Annual Volume (m^3): 200000 Max Daily Volume (m^3): 1179 Original Application No: 7546 Original Start Date: 26/1/2005 Expiry Date: 31/3/2011 Issue No: 2 Version Start Date: 10/7/2008 Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: "borehole (no 2) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 9/8/2000 Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "borehole (no 2) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 9/8/2000 Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole (no 2) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: Borehole (no 2) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 2 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: Borehole Number 2 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 2 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Process Water Direct Source: Ground Water - North West Region Point: Borehole Number 2 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: "borehole (no 3) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 9/8/2000 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "borehole (no 3) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 9/8/2000 Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole (no 3) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: Borehole (no 3) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 3 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: Borehole Number 3 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 3 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Process Water Direct Source: Ground Water - North West Region Point: Borehole Number 3 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "borehole (no 1) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 9/8/2000 Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: "borehole (no 1) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 9/8/2000 Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole (no 1) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: Process water Direct Source: Ground Water - North West Region Point: Borehole (no 1) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 1 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: Process Water Direct Source: Ground Water - North West Region Point: Borehole Number 1 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 1/1/2004 Version End Date:
Not shown	1927	SW	383900 395900	Status: Historical Licence No: 2569007007 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Ground Water - North West Region Point: Borehole At Premises, Moss Side, Manchester Data Type: Point Name: SCOTTISH COURAGE BREWING LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 0389 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 31/12/2003 Version End Date:
Not shown	1927	SW	383900 395900	Status: Historical Licence No: 2569007007 Details: Process water Direct Source: Ground Water - North West Region Point: Borehole At Premises, Moss Side, Manchester Data Type: Point Name: SCOTTISH COURAGE BREWING LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 0389 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 31/12/2003 Version End Date:
Not shown	1927	SW	383900 395900	Status: Historical Licence No: 2569007007 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Ground Water - North West Region Point: "borehole At Premises, Moss Side, Manchester" Data Type: Point Name: SCOTTISH COURAGE BREWING LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 389 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 16/8/1995 Version End Date:
Not shown	1927	SW	383900 395900	Status: Historical Licence No: 2569007007 Details: Process water Direct Source: Ground Water - North West Region Point: "borehole At Premises, Moss Side, Manchester" Data Type: Point Name: SCOTTISH COURAGE BREWING LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 389 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 100 Version Start Date: 16/8/1995 Version End Date:
Not shown	1927	SW	383900 395900	Status: Historical Licence No: 2569007007 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Ground Water - North West Region Point: Borehole At Premises Moss Side Manchester Data Type: Point Name: Heineken UK Ltd	Annual Volume (m^3): 227000 Max Daily Volume (m^3): 900 Original Application No: NPS/WR/002641 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 23/11/2009 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1927	SW	383900 395900	Status: Historical Licence No: 2569007007 Details: Process Water Direct Source: Ground Water - North West Region Point: Borehole At Premises Moss Side Manchester Data Type: Point Name: Heineken UK Ltd	Annual Volume (m^3): 227000 Max Daily Volume (m^3): 900 Original Application No: NPS/WR/002641 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 102 Version Start Date: 23/11/2009 Version End Date:
Not shown	1939	SW	383865 395909	Status: Active Licence No: 2569007007 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Ground Water - North West Region Point: Borehole At Premises Moss Side Manchester Data Type: Point Name: Heineken UK Ltd	Annual Volume (m^3): 227000 Max Daily Volume (m^3): 900 Original Application No: NPS/WR/015793 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 103 Version Start Date: 8/5/2014 Version End Date:
Not shown	1939	SW	383865 395909	Status: Active Licence No: 2569007007 Details: Process Water Direct Source: Ground Water - North West Region Point: Borehole At Premises Moss Side Manchester Data Type: Point Name: Heineken UK Ltd	Annual Volume (m^3): 227000 Max Daily Volume (m^3): 900 Original Application No: NPS/WR/015793 Original Start Date: 15/2/1966 Expiry Date: - Issue No: 103 Version Start Date: 8/5/2014 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? Yes

The following Potable Water Abstraction Licences records are represented as points, lines and regions on the SPZ and Potable Water Abstraction Licences Map (6c):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 2 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 2 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "borehole (no 2) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1715	NW	383820 399190	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole (no 2) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 3 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 3 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "borehole (no 3) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1735	NW	383830 399220	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole (no 3) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "borehole (no 1) At Premises, Strangeways, Manchester" Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023 Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole (no 1) At Premises, Strangeways, Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1749	NW	383850 399250	Status: Historical Licence No: 2569004023 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Borehole Number 1 At Premises Strangeways Manchester Data Type: Point Name: INTERBREW UK LTD	Annual Volume (m^3): 500000 Max Daily Volume (m^3): 2500 Original Application No: CW0023R Original Start Date: 18/2/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
Not shown	1495	NW	383800 398900	River Name: Irk Reach: Moston Bk. To Irwell End/Start of Stretch: End of Stretch NGR	E	E	E	E	E

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
18	367	NE	385714 397750	River Name: Medlock Reach: Lords Bk. To Irwell End/Start of Stretch: Sample Point NGR	B	B	B	C	C
19	382	N	384830 398140	River Name: Rochdale Canal Reach: Ashton Canal To Knott Mill End/Start of Stretch: Start of Stretch NGR	A	A	A	A	A
20	444	N	384850 398200	River Name: Rochdale Canal Reach: Empress Processing To Ashton Canal End/Start of Stretch: End of Stretch NGR	A	A	A	A	A
Not shown	706	N	384950 398450	River Name: Rochdale Canal Reach: Empress Processing To Ashton Canal End/Start of Stretch: Start of Stretch NGR	A	A	A	A	A
Not shown	706	N	384950 398450	River Name: Rochdale Canal Reach: Qsl At Summit To Empress Processing End/Start of Stretch: End of Stretch NGR	A	A	A	A	A
Not shown	1444	W	383330 397558	River Name: Rochdale Canal Reach: Ashton Canal To Knott Mill End/Start of Stretch: Sample Point NGR	A	A	A	A	A
Not shown	1495	NW	383800 398900	River Name: Irk Reach: Moston Bk. To Irwell End/Start of Stretch: End of Stretch NGR	C	C	C	C	D

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1	0	On Site	River Name: River Medlock Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
2	0	On Site	River Name: River Medlock Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
3	72	NE	River Name: River Medlock Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
4	92	S	River Name: River Medlock Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
5	161	NW	River Name: Shooters Brook Downstream Welsh River Name: - Alternative Name: -	River Type: Underground River (Potential Sewer) Main River Status: Currently Undefined
6	326	NW	River Name: Rochdale Canal Welsh River Name: - Alternative Name: -	River Type: Canal Main River Status: Currently Undefined
7	356	N	River Name: Ashton Canal Welsh River Name: - Alternative Name: -	River Type: Canal Main River Status: Currently Undefined
8	370	N	River Name: Shooters Brook Downstream Welsh River Name: - Alternative Name: -	River Type: Underground River (inferred) Main River Status: Currently Undefined
9	381	N	River Name: Shooters Brook Downstream Welsh River Name: - Alternative Name: -	River Type: Underground River (Potential Sewer) Main River Status: Currently Undefined
10	413	N	River Name: Rochdale Canal Welsh River Name: - Alternative Name: -	River Type: Canal Main River Status: Currently Undefined
11	440	S	River Name: Corn Brook Welsh River Name: - Alternative Name: -	River Type: Underground River (inferred) Main River Status: Currently Undefined
12	462	SW	River Name: River Medlock Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
13	490	SW	River Name: River Medlock Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined

6.11 Surface Water Features

Are there any surface water features within 250m of the study site? Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
0	On Site
0	On Site
69	NE
113	NE
224	NE

7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)

NW N NE

W E

SW S SE



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Site Outline

Search Buffers (m)

Zone 2 Floodplain

Zone 3 Floodplain

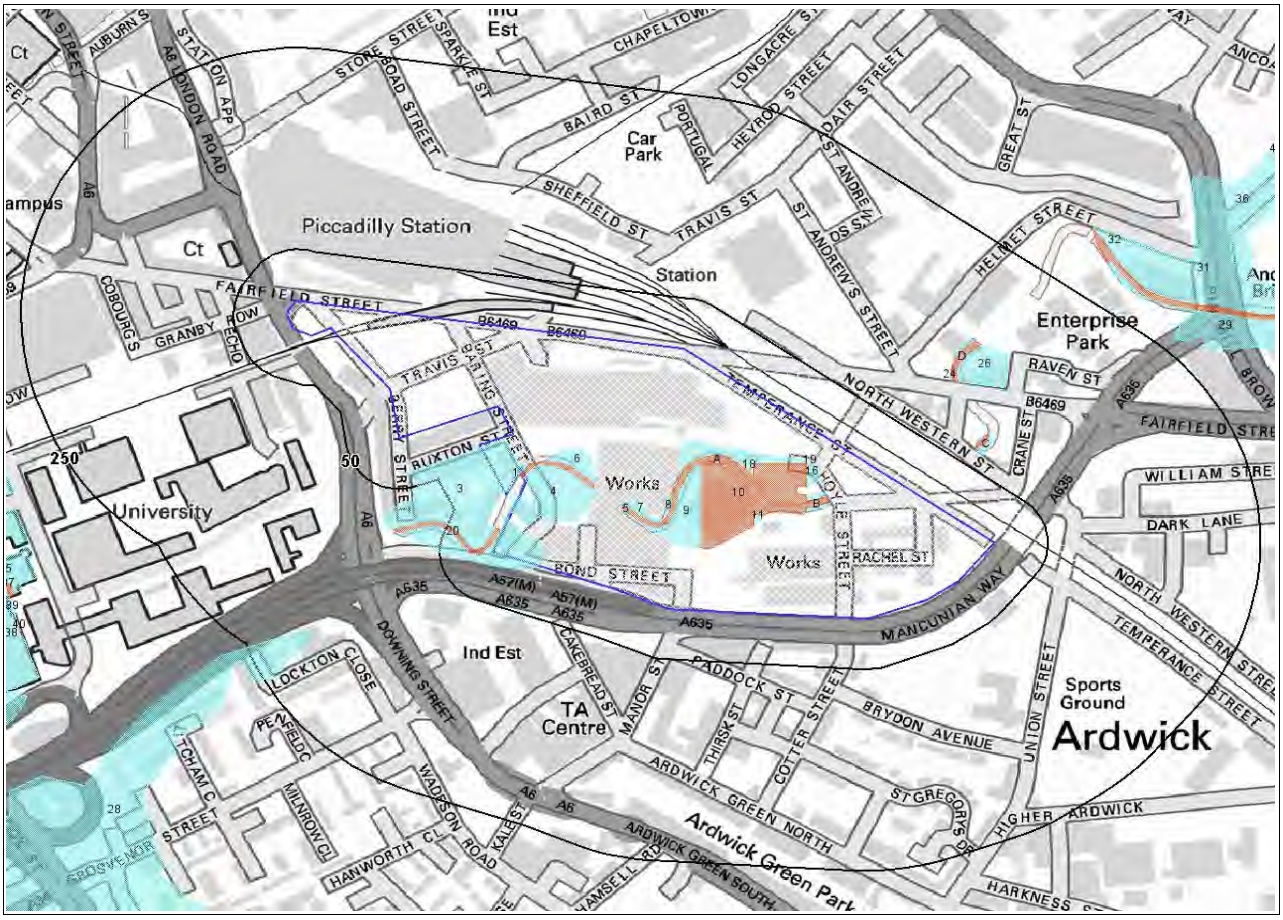
Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map

NW N NE



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Site Outline

100 250 Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

Report Reference: GS-4028399
Client Reference: 035548

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? Yes

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	0	On Site	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
2	68	NE	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)
3	186	SW	19-Jun-2017	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? Yes

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	0	On Site	19-Jun-2017	Zone 3 - (Fluvial Models)
2	0	On Site	19-Jun-2017	Zone 3 - (Fluvial Models)
3	0	On Site	19-Jun-2017	Zone 3 - (Fluvial Models)
	68	NE	19-Jun-2017	Zone 3 - (Fluvial Models)
	82	W	19-Jun-2017	Zone 3 - (Fluvial Models)
	113	NE	19-Jun-2017	Zone 3 - (Fluvial Models)
	226	NE	19-Jun-2017	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? High

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a High (1 in 30 or greater) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRas flood Risk
1	0.0	On Site	High
2	0.0	On Site	Low
3	0.0	On Site	Low
4	0.0	On Site	Low
5	0.0	On Site	Low
6	0.0	On Site	Low
7	0.0	On Site	Low
8	0.0	On Site	Low
9	0.0	On Site	Low
10	0.0	On Site	High
11	0.0	On Site	Low
12A	0.0	On Site	Low
13A	0.0	On Site	Low
14B	0.0	On Site	Low
15B	0.0	On Site	Low
16	0.0	On Site	Low
17	0.0	On Site	High
18	0.0	On Site	Low
19	0.0	On Site	Low
20	2.0	NW	High

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Clearwater Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

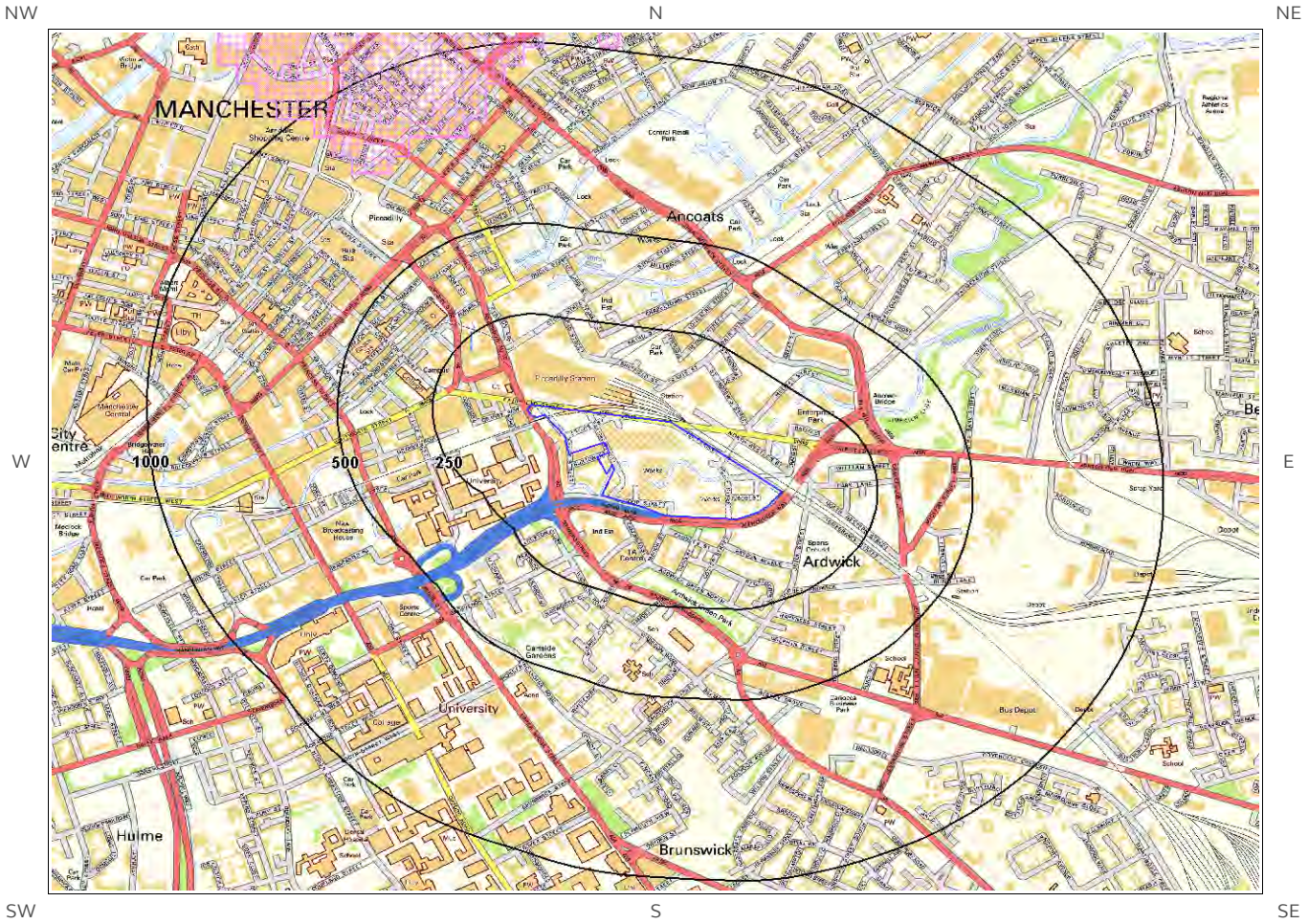
7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? Low

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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Site Outline

100
250
Search Buffers (m)

AONB

National Park

SSSI

Special Protection Areas

Nitrate Vulnerable Zones

Green Belt

Environmentally Sensitive Areas

Special Areas of Conservation

World Heritage Sites

Nitrate Sensitive Areas

Ancient Woodland

National Nature Reserve

Local Nature Reserves

Ramsar Sites

8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?	Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

0

Database searched and no data found.

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

2

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
1	737	NW	Existing	DEFRA
Not shown	1495	NW	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

What is the maximum Running Sand** hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.



9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? Yes

The following coal mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
0	On Site	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? No

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries
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https://www.groundsure.com/terms-and-conditions-sept-2016

Groundsure
LOCATION INTELLIGENCE

Buro Happold Engineering

17 BURO HAPPOLD ENGINEERS LTD,
NEWMAN STREET,
LONDON, W1T 1PD

Groundsure Reference:	GS-4028400
Your Reference:	035548
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Geo Insight

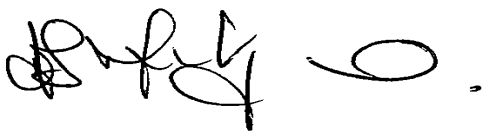
Address: UNIT 6, TEMPERANCE STREET, MANCHESTER, M12 6HR

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**UNIT 6, TEMPERANCE STREET, MANCHESTER, M12 6HR**
Date:	**28 Jun 2017**
Reference:	**GS-4028400**
Client:	**Buro Happold Engineering**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	11-Jun-2015
Grid Reference:	385104,397611
Site Size:	10.25ha

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale		
1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	Yes
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	Yes
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of faults within 500m of the study site boundary at 1:10,000 scale?	Yes

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	Yes
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	Yes
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No



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Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	Yes

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	1	0	5	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	10

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	1	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	2	0	1	3	5
5.4 Non-Coal Mining*	0	0	0	0	1
5.5 Non–Coal Mining Cavities	0	0	0	1	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

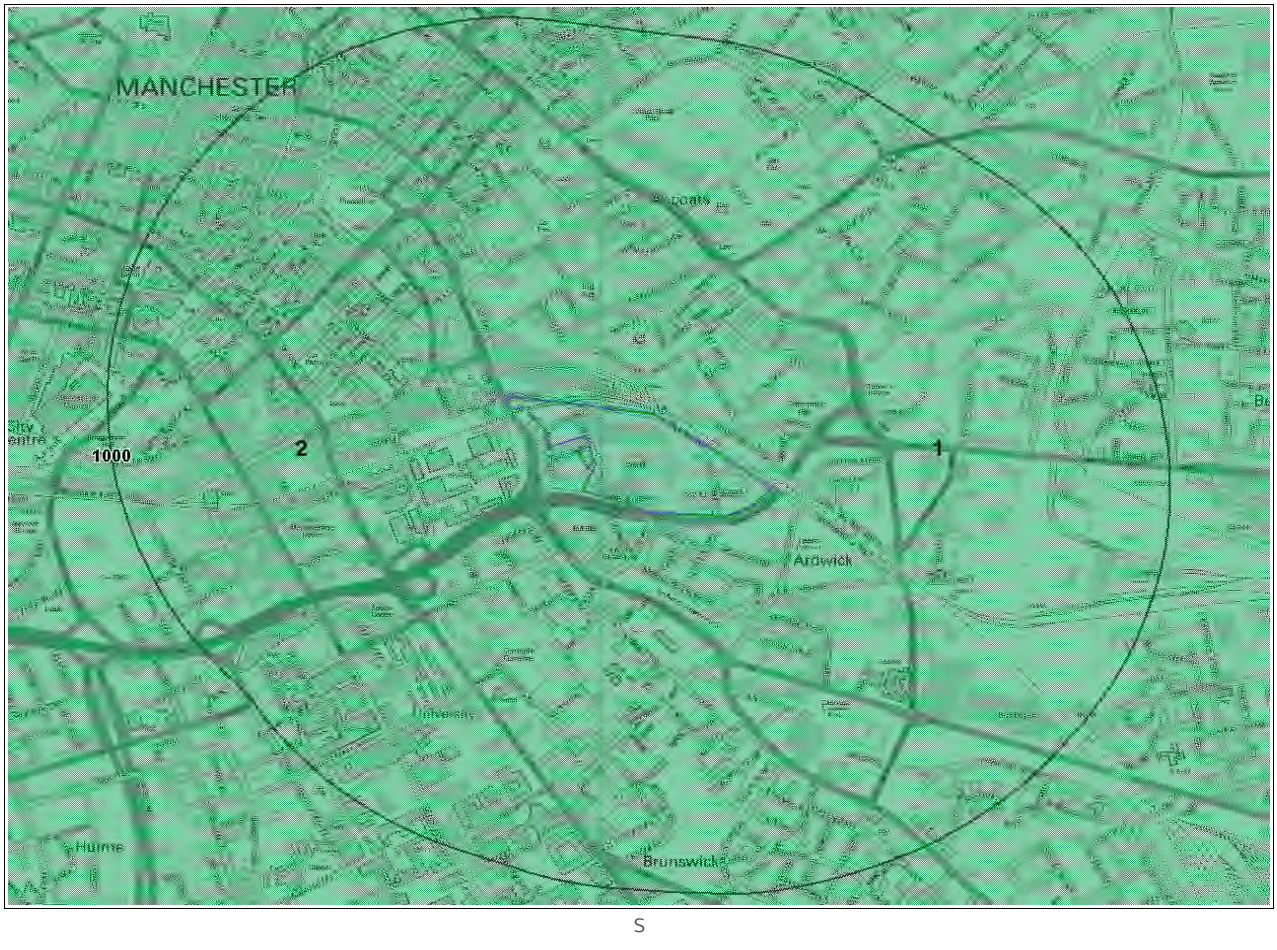
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Moderate
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Low

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	16	8	74

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	7	3	0

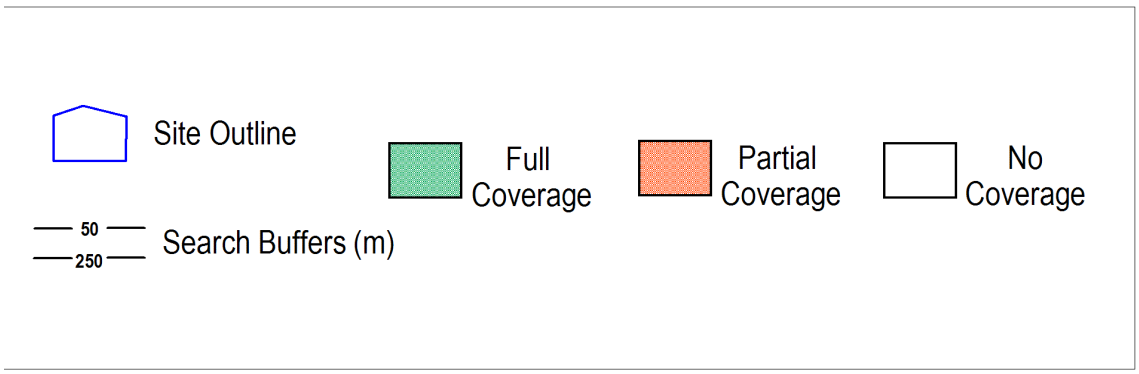
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	40	32	88	Not Searched
9.3 Historical Railways	15	0	0	Not Searched
9.4 Active Railways	14	128	50	Not Searched
9.5 Railway Projects	0	0	4	3

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	Some deposits are mapped
2	0.0	Some deposits are mapped	Full	Full	No coverage

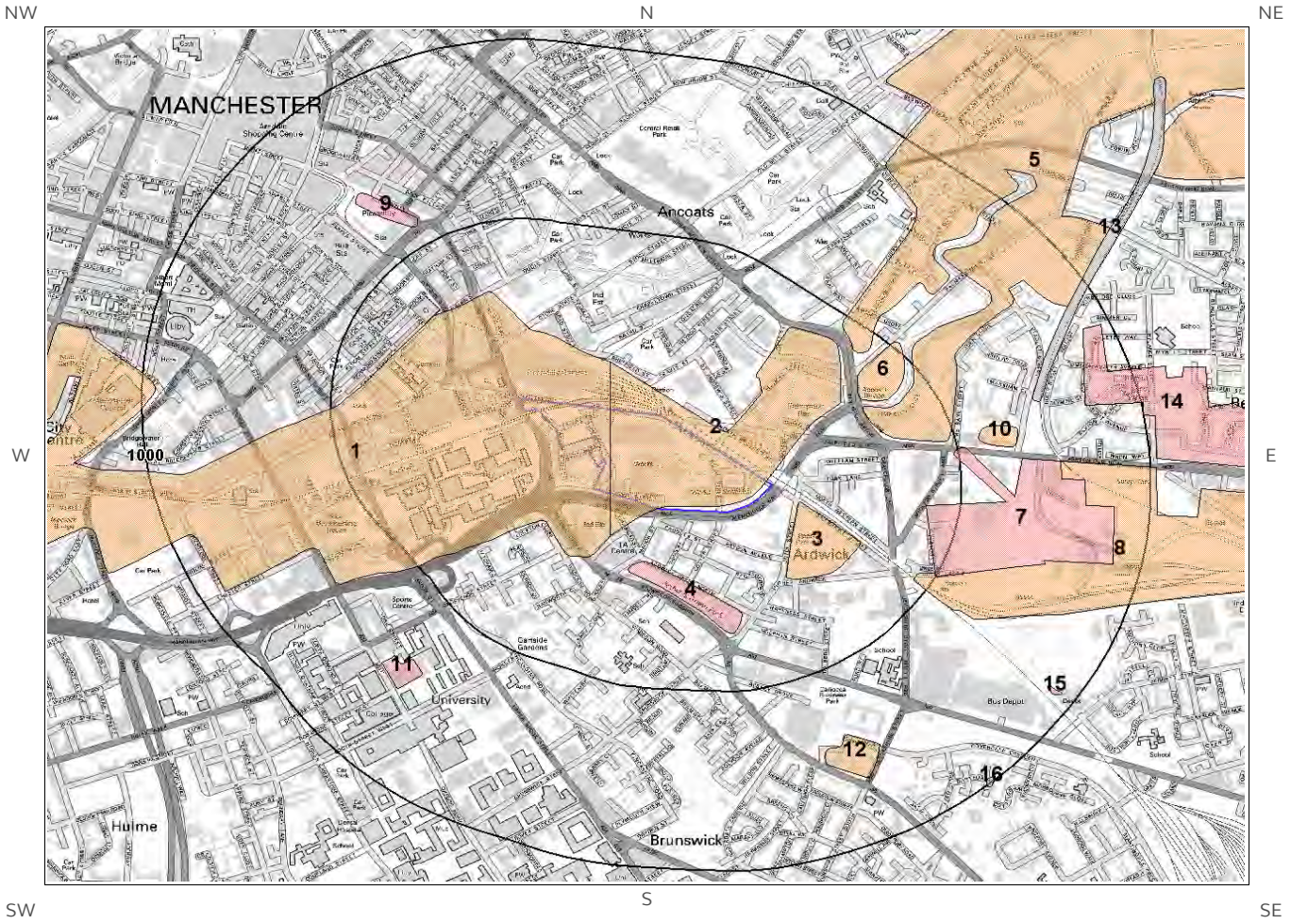
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

1 Geology (1:10,000 scale).

1.1 Artificial Ground Map (1:10,000 scale)



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Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

1. Geology 1:10,000 scale

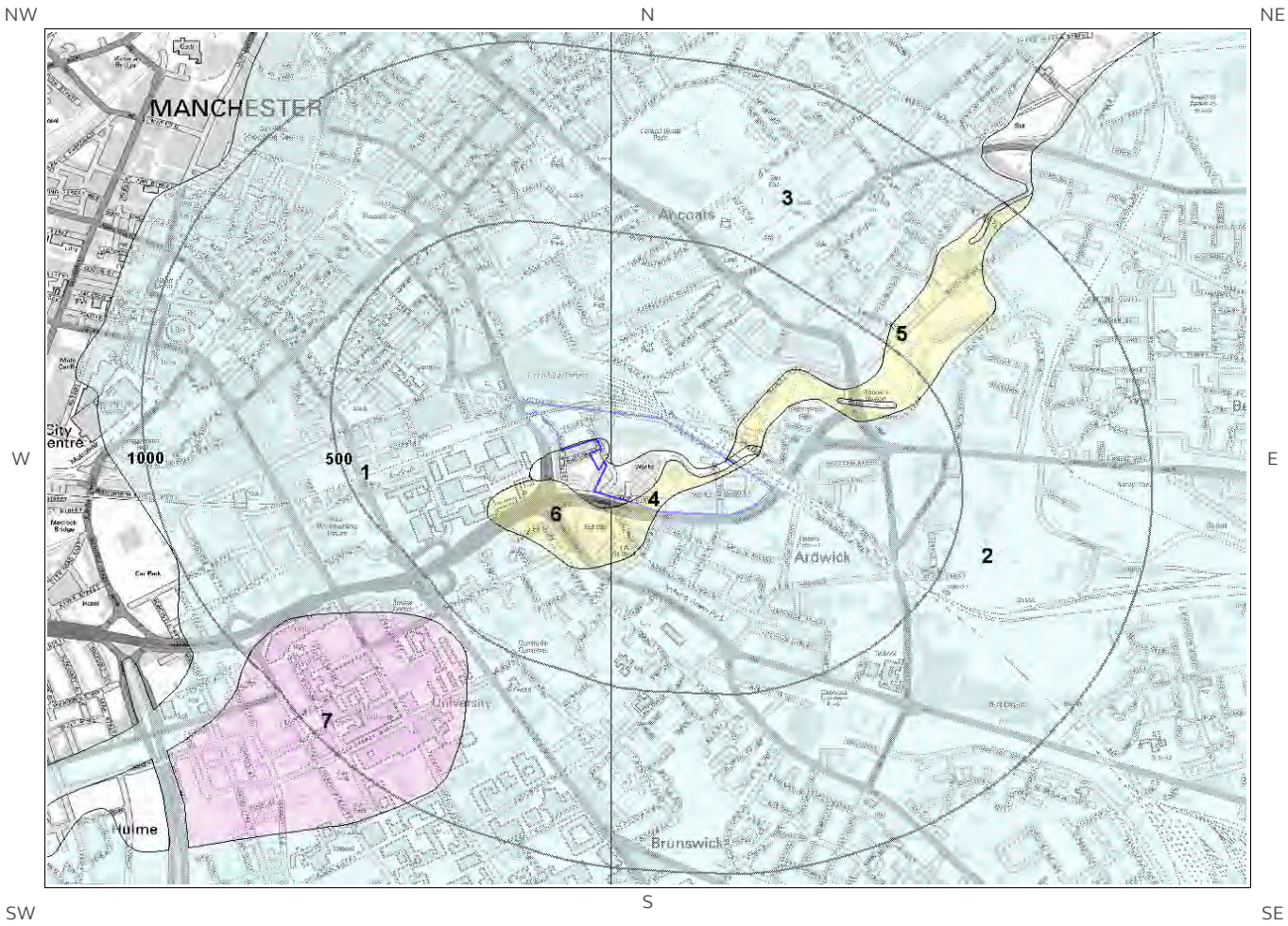
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	0.0	On Site	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	84.0	SE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
4	151.0	S	WMGR-ARTDP	Infilled Ground	Artificial Deposit
5	314.0	NE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
6	334.0	NE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
7	410.0	E	WMGR-ARTDP	Infilled Ground	Artificial Deposit
8	454.0	SE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit

1.2 Superficial Deposits and Landslips Map (1:10,000 scale)



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton
2	0.0	On Site	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton
3	0.0	On Site	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton
4	0.0	On Site	ALV-XCZSV	Alluvium - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel
5	0.0	On Site	ALV-XCZSV	Alluvium - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel
6	31.0	S	ALV-XCZSV	Alluvium - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

No

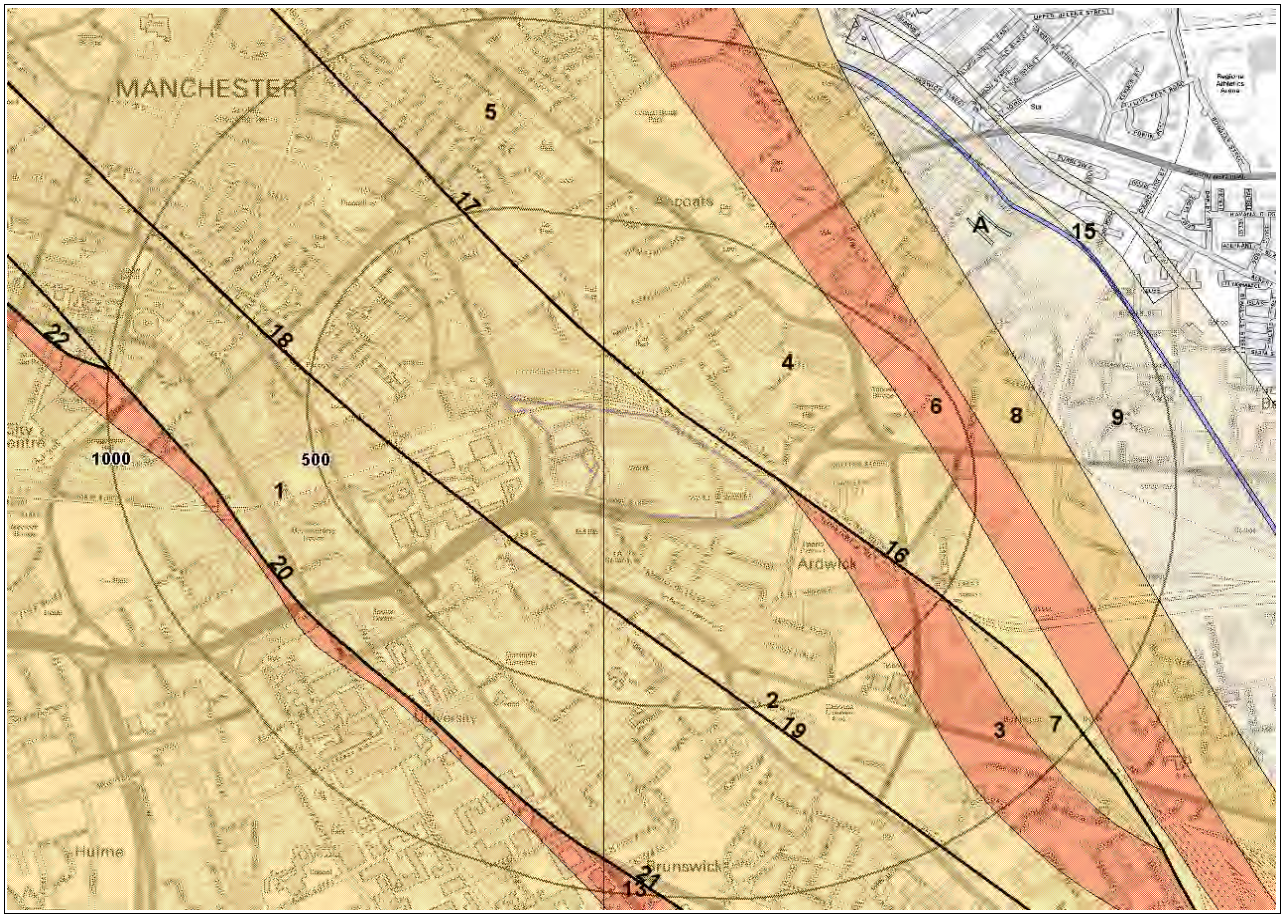
Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and Faults Map (1:10,000 scale)

NW N NE



W E

SW S SE

Bedrock and Faults Legend

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Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	CPB-SDST	Chester Pebble Beds Formation - Sandstone	Early Triassic Epoch
2	0.0	On Site	CPB-SDST	Chester Pebble Beds Formation - Sandstone	Early Triassic Epoch
3	23.0	NE	MM-MDST	Manchester Marls Formation - Mudstone	Late Permian Epoch [Obsolete name]
4	27.0	NE	CPB-SDST	Chester Pebble Beds Formation - Sandstone	Early Triassic Epoch
5	162.0	N	CPB-SDST	Chester Pebble Beds Formation - Sandstone	Early Triassic Epoch
6	390.0	NE	MM-MDST	Manchester Marls Formation - Mudstone	Late Permian Epoch [Obsolete name]

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? Yes

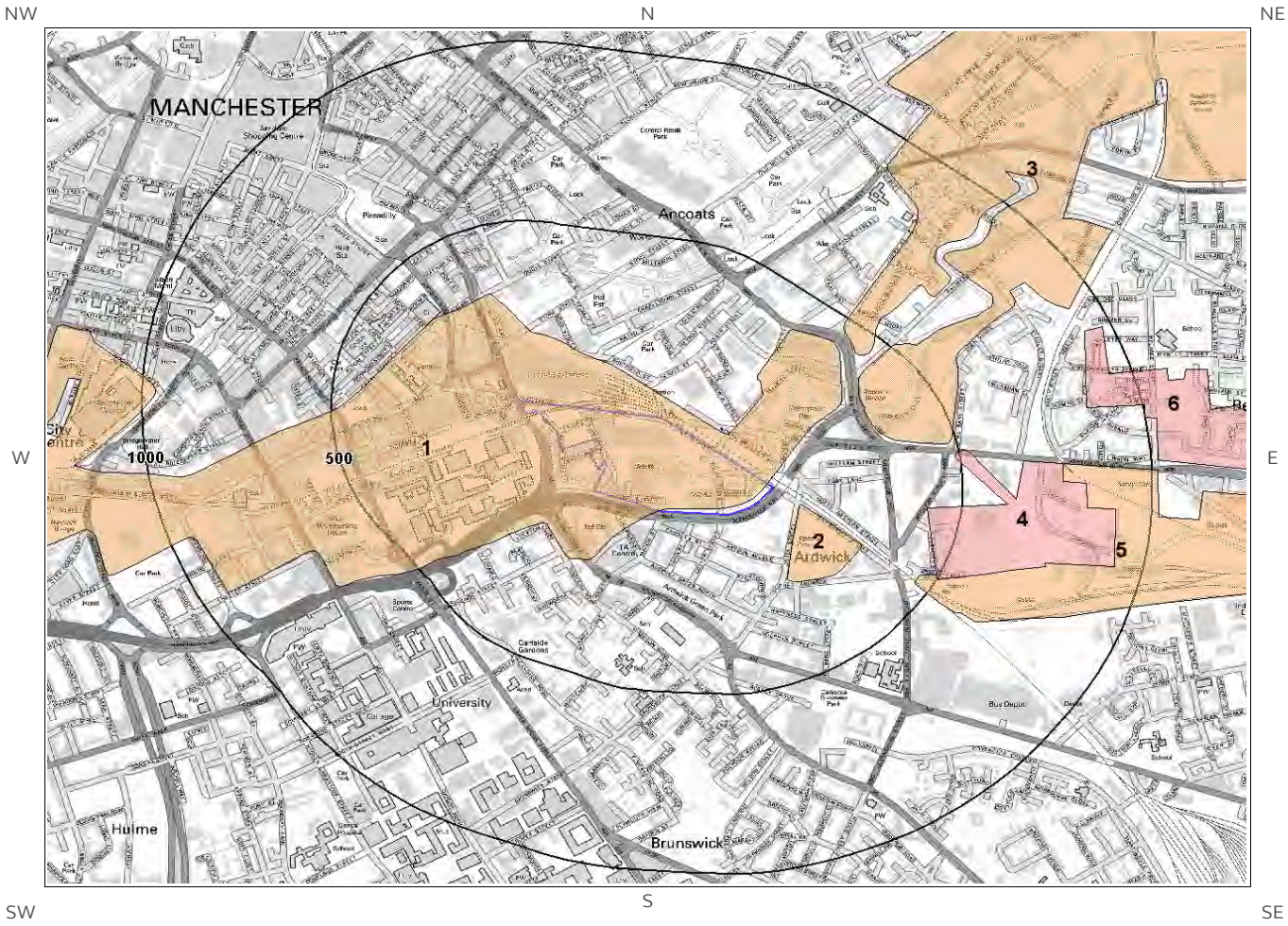
ID	Distance (m)	Direction	Category Description	Feature Description
16	27.0	NE	FAULT	Normal fault, inferred; crossmarks on downthrow side
17	162.0	N	FAULT	Normal fault, inferred; crossmarks on downthrow side
18	207.0	SW	FAULT	Normal fault, inferred; crossmarks on downthrow side
19	261.0	S	FAULT	Normal fault, inferred; crossmarks on downthrow side

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 085

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

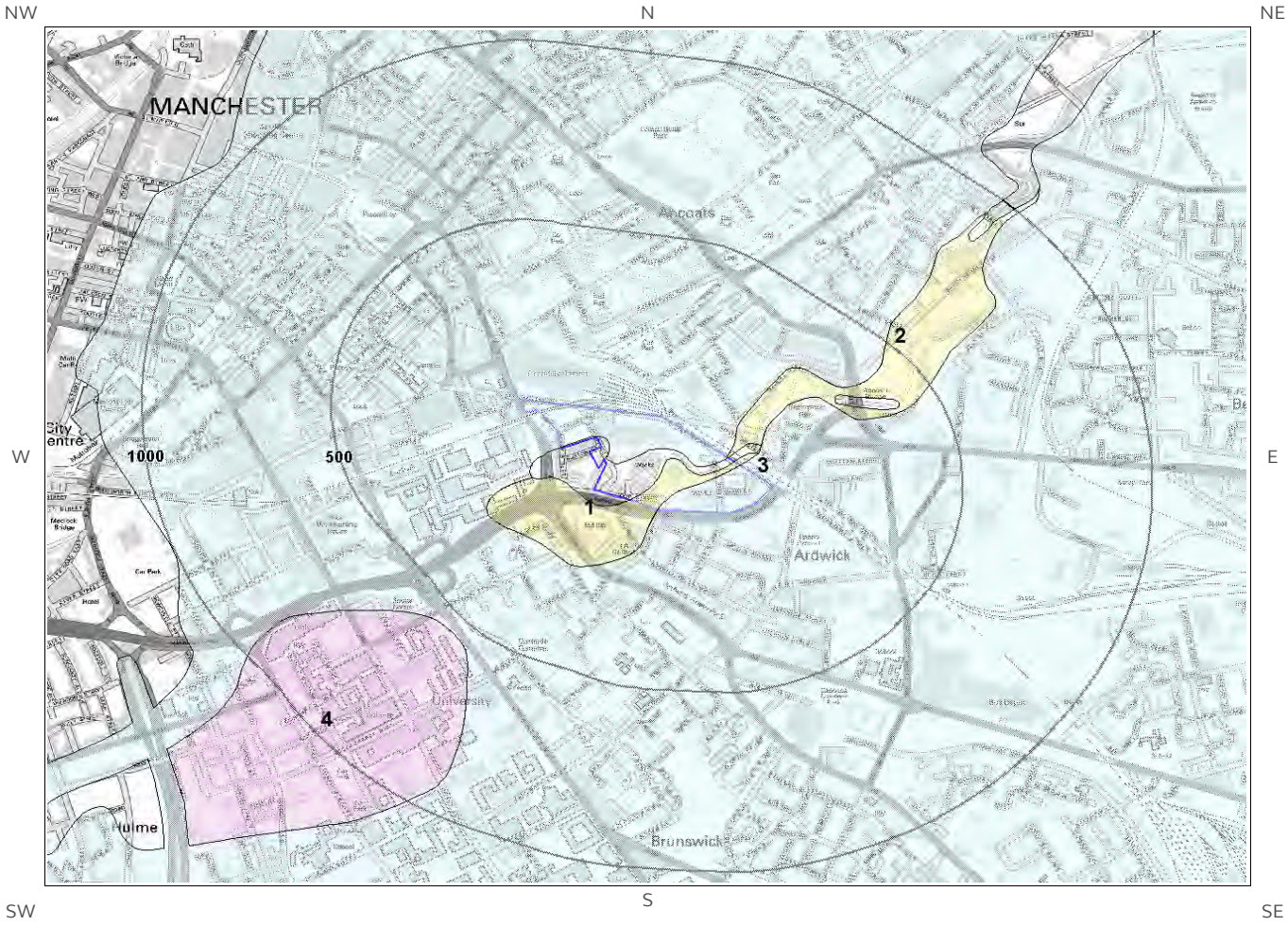
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	84.0	SE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	313.0	NE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
4	409.0	E	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
5	454.0	SE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Very High	Low
0.0	On Site	Mixed	Very High	Low

2.2 Superficial Deposits and Landslips Map (1:50,000 scale)



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
2	0.0	On Site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	0.0	On Site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Low
0.0	On Site	Intergranular	High	Very Low
0.0	On Site	Mixed	High	Low
0.0	On Site	Mixed	High	Low
0.0	On Site	Intergranular	High	Very Low
31.0	S	Intergranular	High	Very Low

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

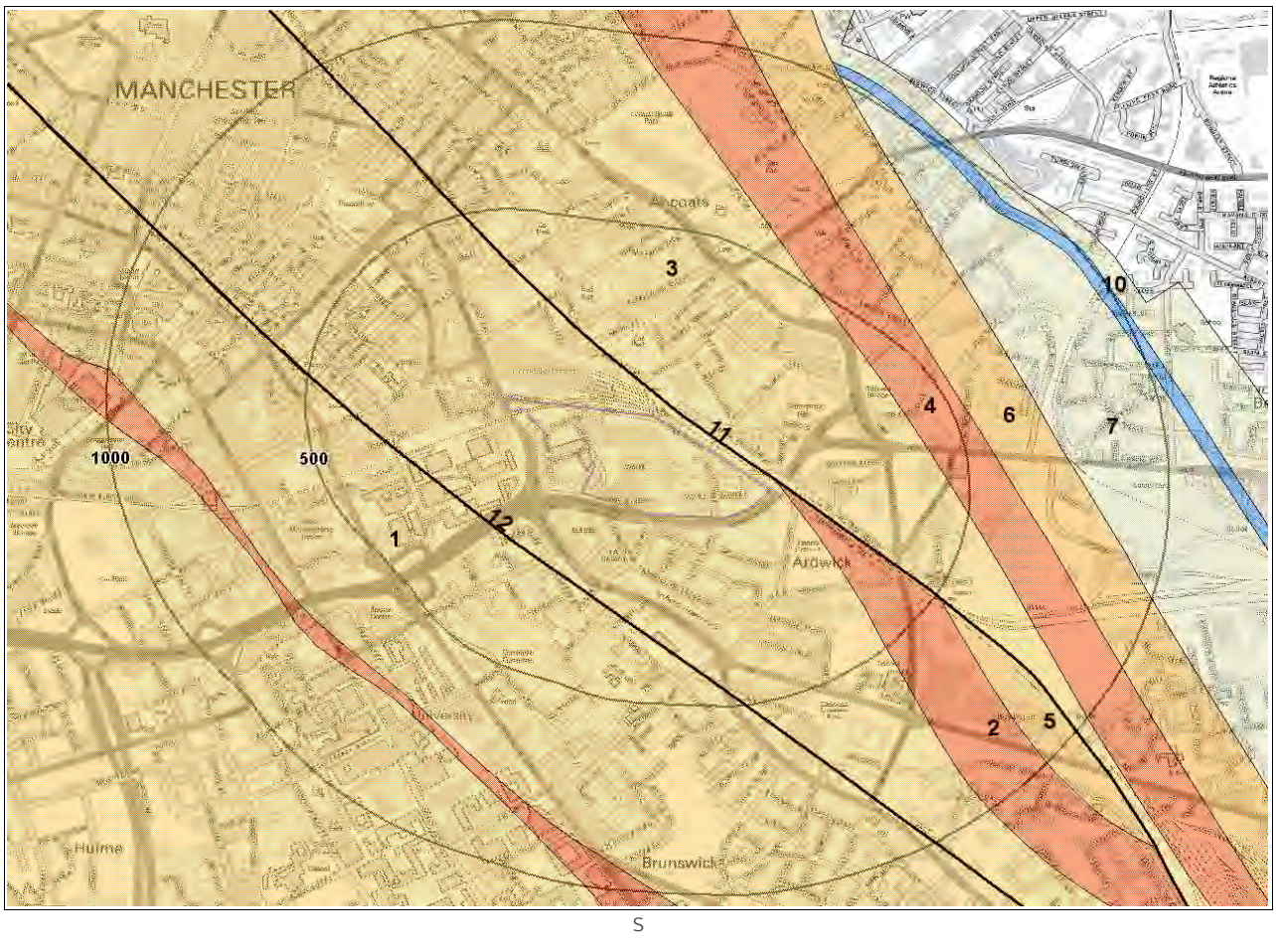


2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and Faults Map (1:50,000 scale)



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 085

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	CHES-SDST	CHESTER FORMATION - SANDSTONE	OLENEKIAN
2	23.0	NE	MM-MDST	MANCHESTER MARLS FORMATION - MUDSTONE	-
3	26.0	NE	CHES-SDST	CHESTER FORMATION - SANDSTONE	OLENEKIAN
4	390.0	NE	MM-MDST	MANCHESTER MARLS FORMATION - MUDSTONE	-

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Moderate
0.0	On Site	Mixed	High	Moderate
23.0	NE	Fracture	Low	Low

2.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? Yes

ID	Distance	Direction	Category Description	Feature Description
11	27.0	NE	FAULT	Fault, inferred
12	207.0	SW	FAULT	Fault, inferred

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

3.2 Radon Protection

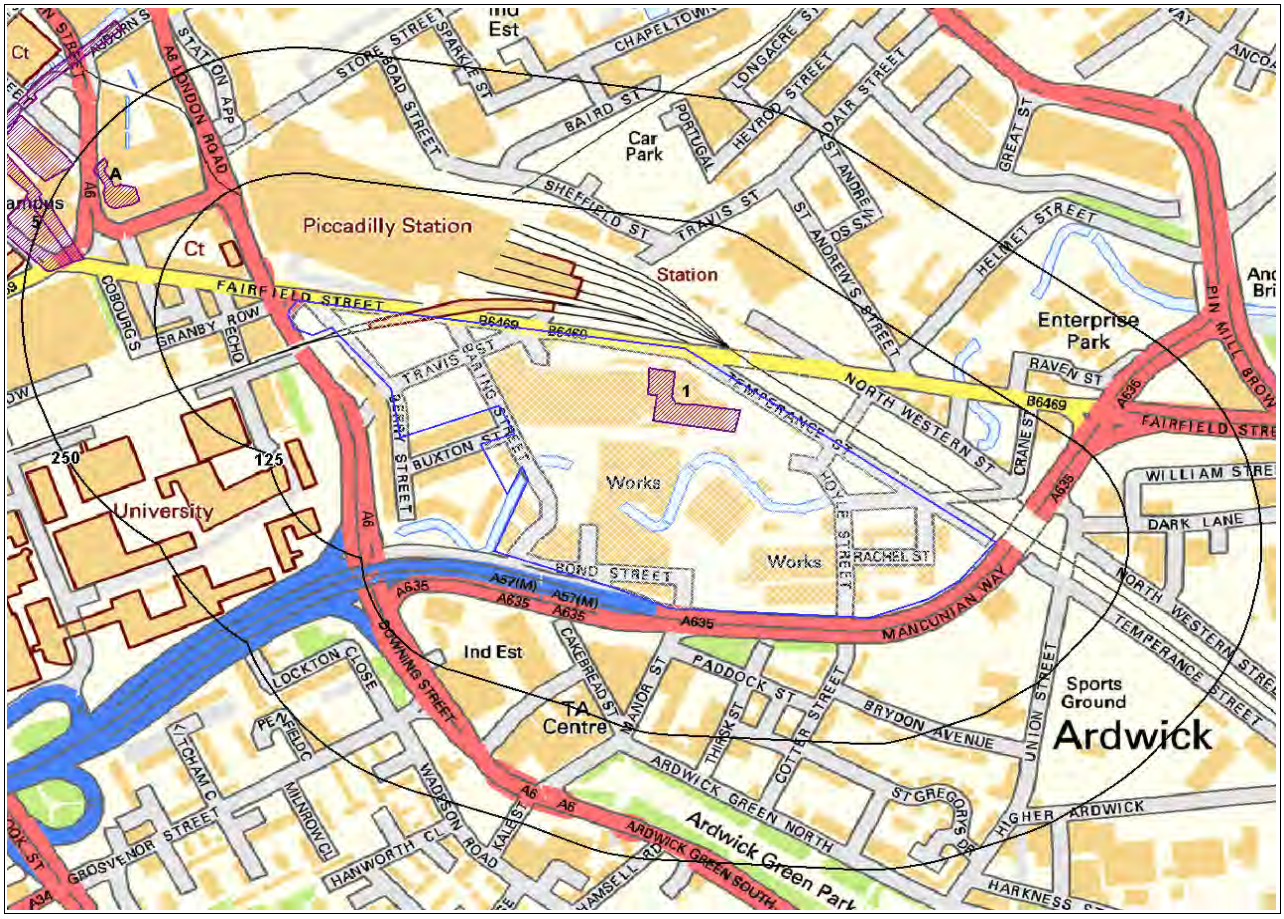
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings Map

NW N NE

W E

SW S SE



Ground Workings Legend

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Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1	0.0	On Site	385116 397663	Ponds	1890
2A	178.0	NW	384592 397878	Unspecified Ground Workings	1938
3A	178.0	NW	384592 397878	Unspecified Ground Workings	1934
4B	200.0	W	384555 397996	Ponds	1890
5	209.0	W	384525 397828	Unspecified Wharf	1890
6B	249.0	NW	384524 397912	Unspecified Wharf	1915

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

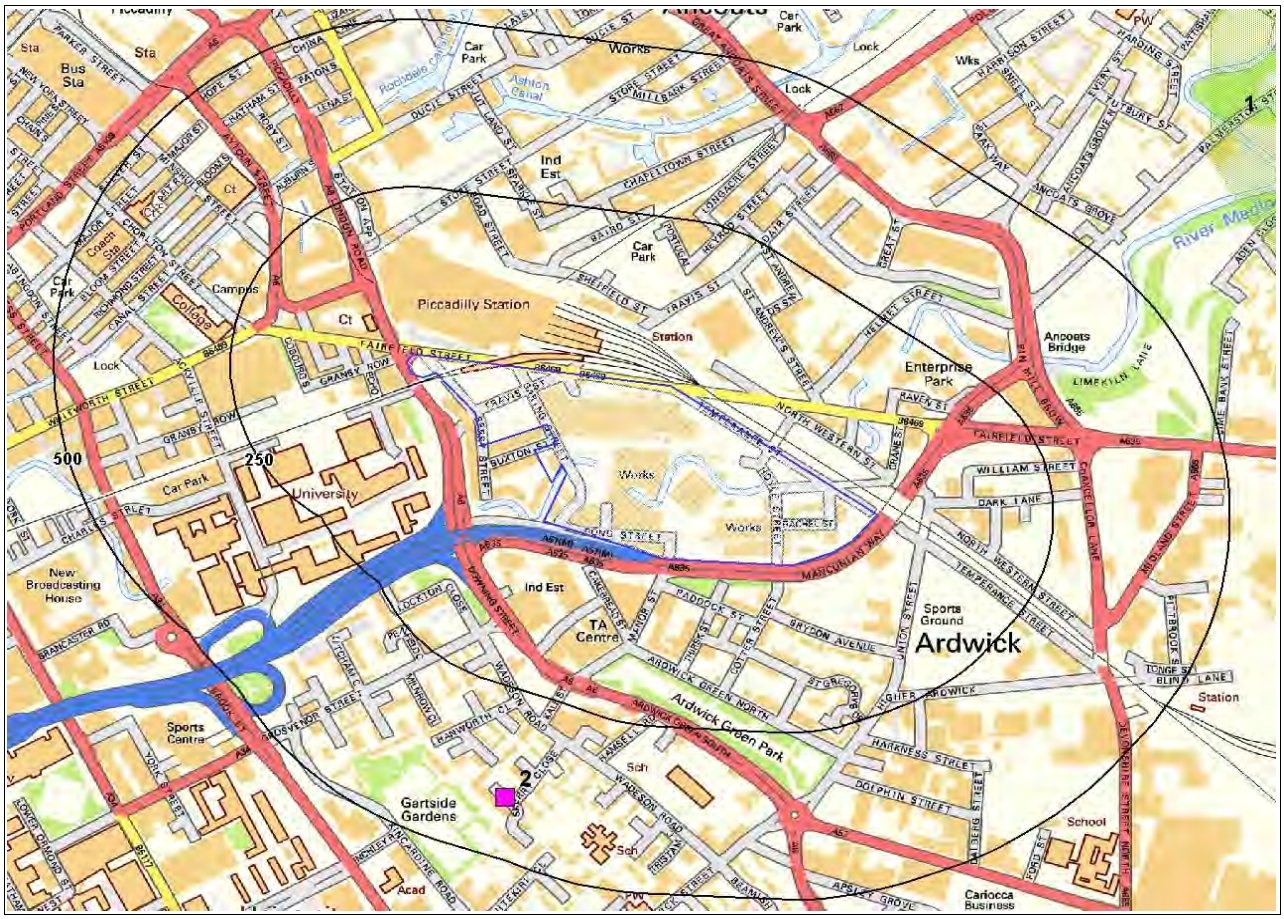
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	703.0	E	386130 397500	Clay & Shale	Ardwick Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	736.0	NE	386070 397880	Clay & Shale	Alderman Street Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	756.0	NE	386050 397950	Limestone	Ardwick Lime Works Pit	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
Not shown	793.0	E	386170 397800	Limestone	Ardwick Lime Works Pits	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	804.0	NE	386020 398065	Limestone	Ardwick Lime Works Pit	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
Not shown	880.0	E	386295 397670	Limestone	Ardwick Lime Works Pits	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	881.0	E	386280 397745	Clay & Shale	Beswick Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	883.0	E	386305 397620	Clay & Shale	Ashton Road Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	886.0	E	386250 397850	Clay & Shale	Beswick Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	916.0	E	386340 397600	Limestone	Ardwick Lime Works Pit	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased

5 Mining, Extraction & Natural Cavities Map

NW N NE

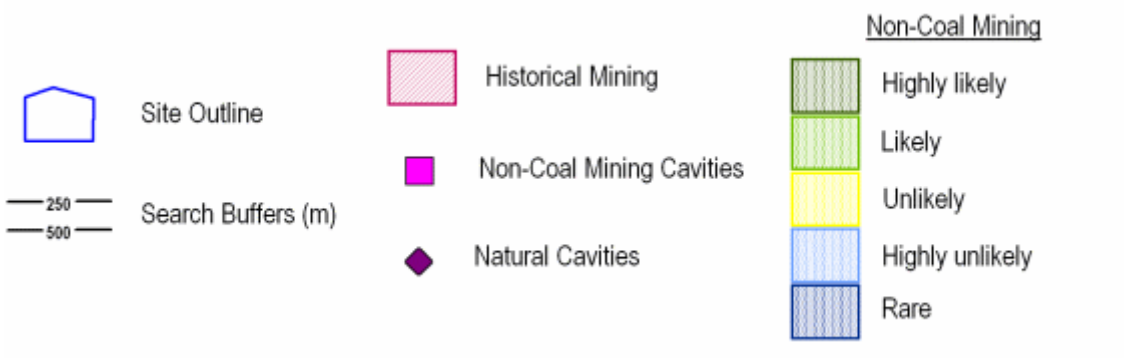
W E

SW S SE



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? Yes

The following Coal Mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
0.0	On Site	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? Yes

The following information provided by JPB is not represented on mapping: In addition to being located inside an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) have information such as mining plans and maps held within their archive of mining activities that have occurred within 1km of this property which may supplement this information. Further details and a quote for services can be obtained by emailing this report to enquiries.gs@jpb.co.uk.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	682.0	NE	Ardwick	Limestone - Ardwick	Underground mining is known or considered likely to have occurred within or close to the area. Potential for difficult ground conditions are at a level where they should be considered

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? Yes

The following Non-Coal Mining Cavities information provided by Peter Brett Associates:

ID	Distance (m)	Direction	NGR	Address	Superficial Deposits	Bedrock Deposits	Extracted Mineral
2	410.0	S	384900 397100	Manchester, Greater Manchester	Glacial Till	Bunter Sandstone, Manchester Marls, Collyhurst Sandstone	Firestone, Freestone, Hearthstone, Honestone, Ragstone, Sandstone, Scythestone, Silver Sand, Whetstone

5.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map



Shrink Swell Clay Legend

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6.2 Landslides Map

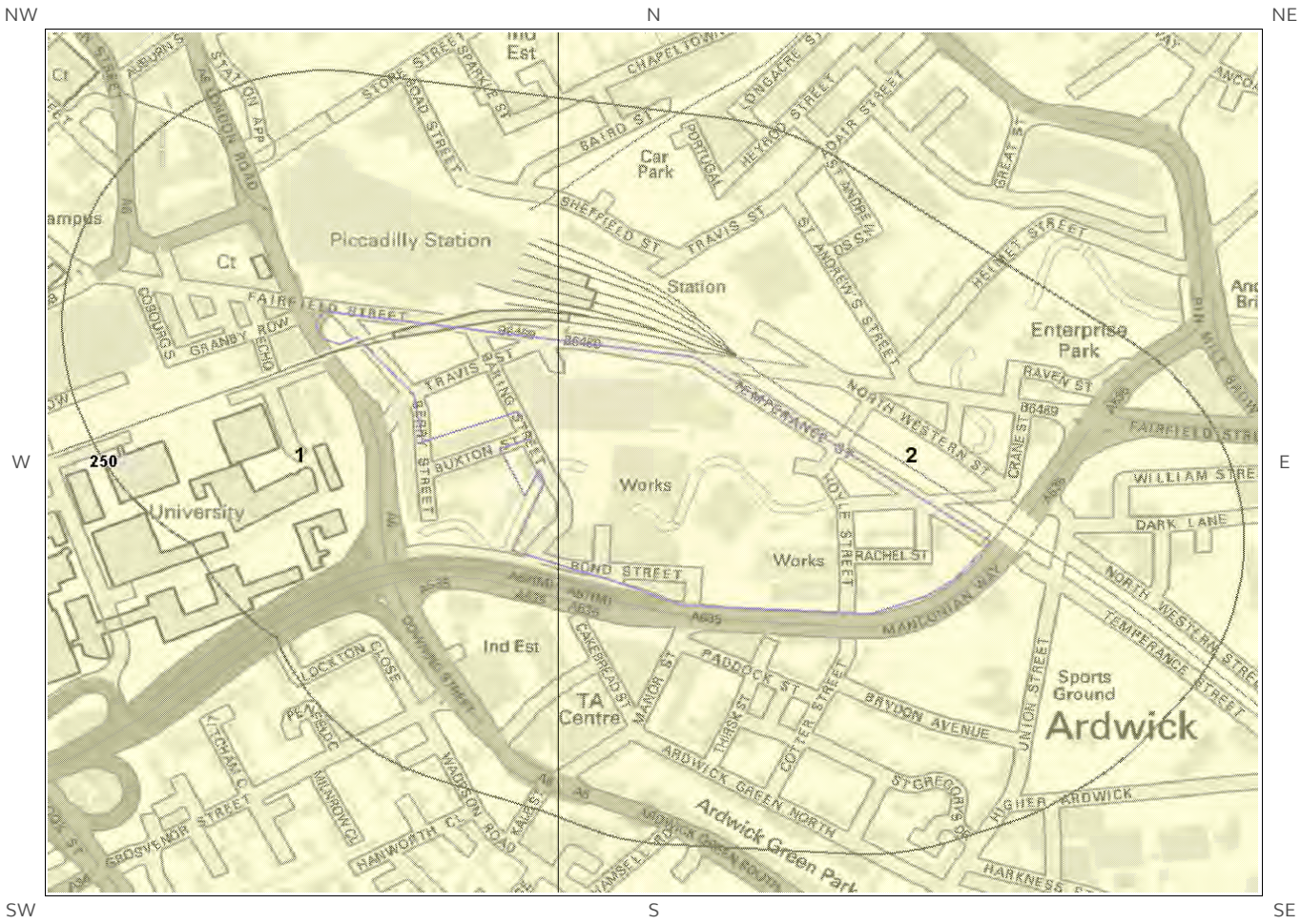


Landslides Legend

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6.3 Ground Dissolution of Soluble Rocks Map

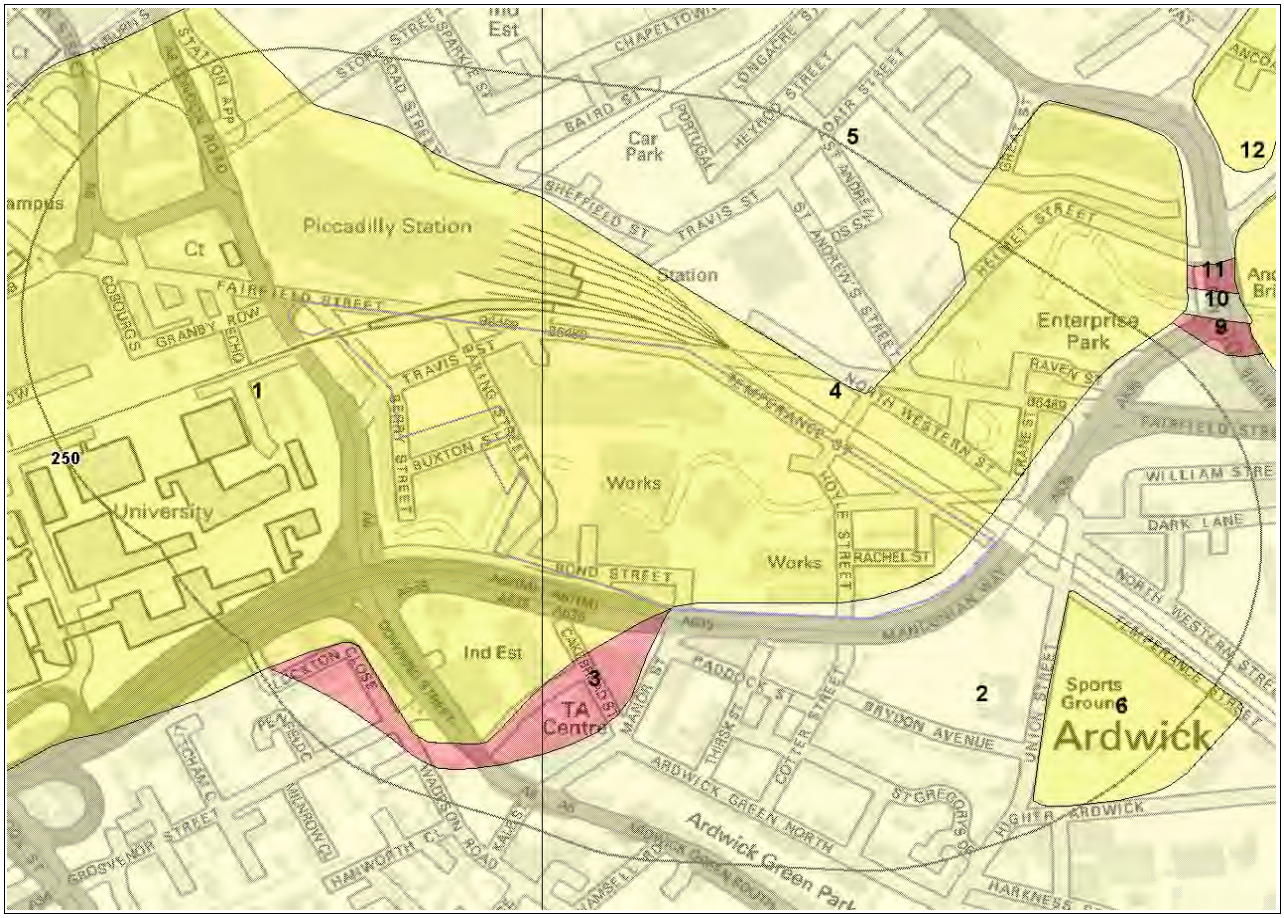


Ground Dissolution Soluble Rocks Legend

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6.4 Compressible Deposits Map

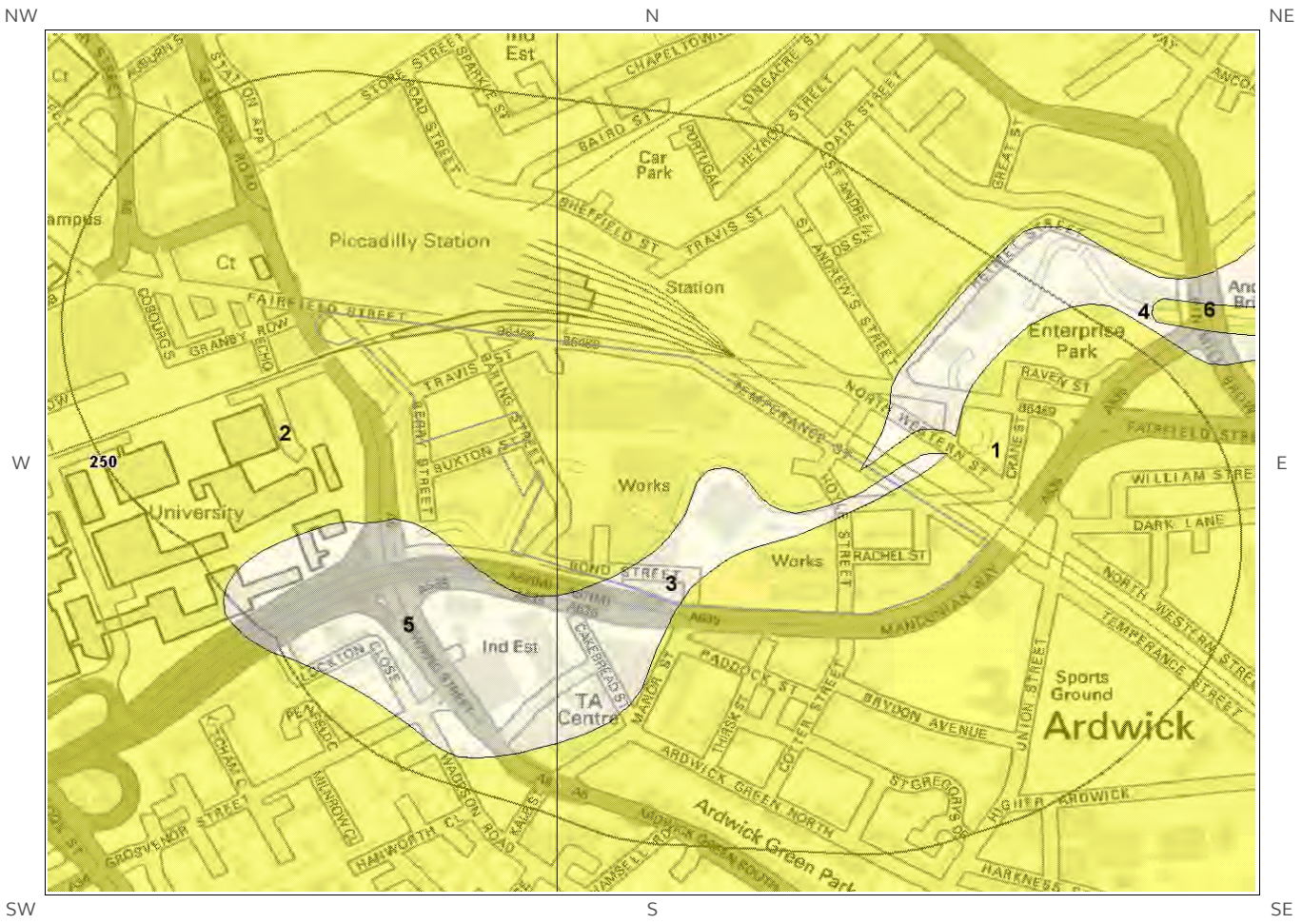


Compressible Deposits Legend

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6.5 Collapsible Deposits Map



Collapsible Deposits Legend

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6.6 Running Sand Map



Running Sand Legend

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6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Moderate

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
2	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
3	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
4	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

* This includes an automatically generated 50m buffer zone around the site

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.
2	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.
2	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

ID	Distance (m)	Direction	Hazard Rating	Details
3	0.0	On Site	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.
4	0.0	On Site	Very Low	Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
3	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
4	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
5	30.0	S	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

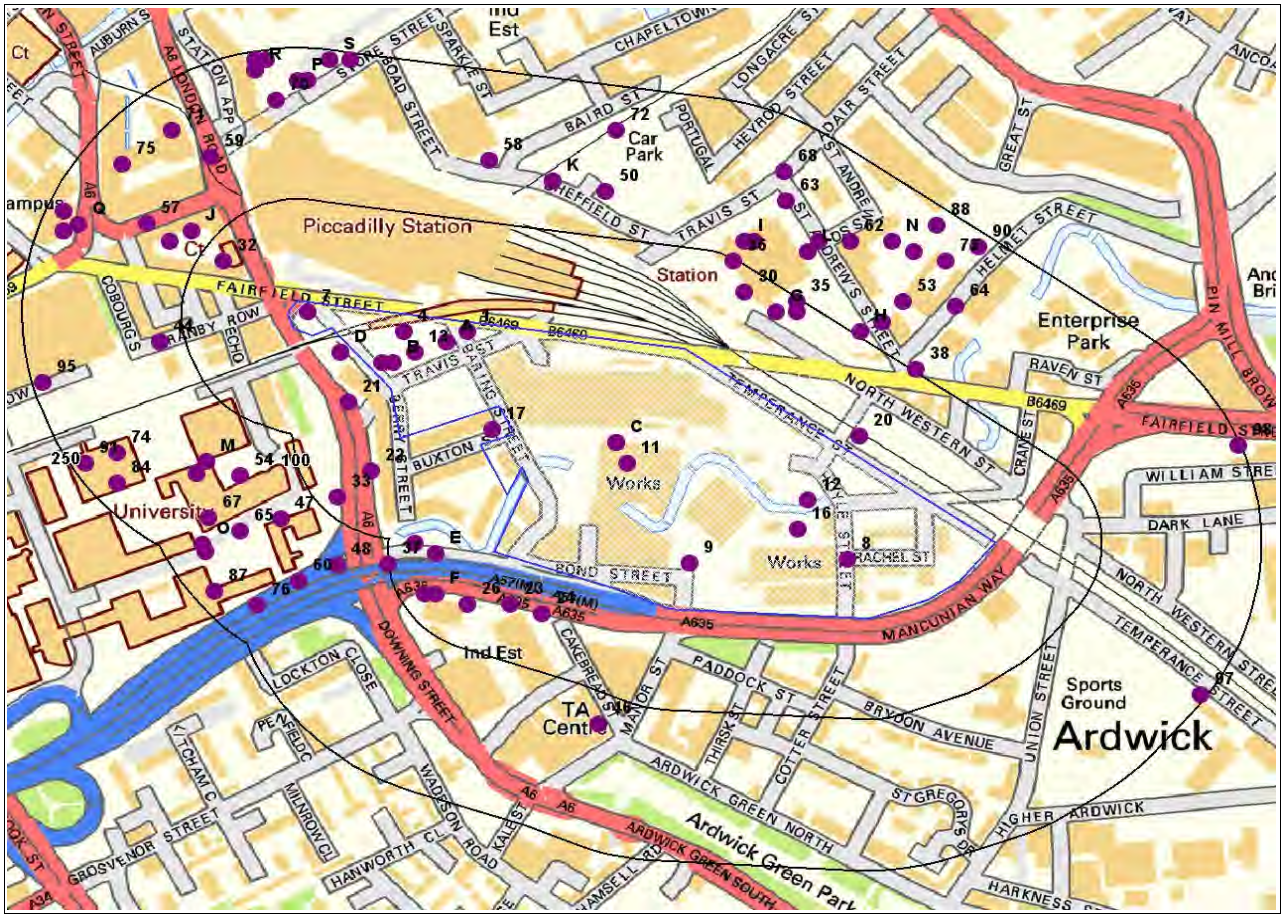
ID	Distance (m)	Direction	Hazard Rating	Details
3	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.

7 Borehole Records Map

NW N NE

W E

SW S SE



Borehole Records Legend

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Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 98

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	0.0	On Site	384930 397730	SJ89NW868	-1.0	NATIONAL EXPRESS COACH STATION TP 5
2A	0.0	On Site	384910 397720	SJ89NW867	-1.0	NATIONAL EXPRESS COACH STATION TP 4
3A	0.0	On Site	384910 397720	SJ89NW872	-1.0	NATIONAL EXPRESS COACH STATION 4
4	0.0	On Site	384870 397730	SJ89NW866	-1.0	NATIONAL EXPRESS COACH STATION TP 3
5B	0.0	On Site	384860 397700	SJ89NW865	-1.0	NATIONAL EXPRESS COACH STATION TP 2
6B	0.0	On Site	384850 397700	SJ89NW871	-1.0	NATIONAL EXPRESS COACH STATION 3
7	0.0	On Site	384780 397750	SJ89NW869	-1.0	NATIONAL EXPRESS COACH STATION 1
8	0.0	On Site	385288 397504	SJ89NE16	11.58	MANCHESTER CORP. NEW YORK STREET
9	0.0	On Site	385139 397501	SJ89NE113	141.12	MOSELEY & SONS, CHAPELFIELD RUBBER WORKS
10C	0.0	On Site	385070 397620	SJ89NE1390	73.15	HOYLE MAYFIELD PRINT WORKS
11	0.0	On Site	385080 397600	SJ89NE1391	108.64	HOYLE MAYFIELD PRINT WORKS
12	0.0	On Site	385250 397563	SJ89NE112	149.35	DEAKINS BREWERY, BROADIE STREET
13	0.0	On Site	384880 397710	SJ89NW3280	-1.0	FAIRFIELD STREET MANCHESTER OB
14C	0.0	On Site	385070 397620	SJ89NE1388	160.27	HOYLE MAYFIELD PRINT WORKS
15C	0.0	On Site	385070 397620	SJ89NE1389	53.04	HOYLE MAYFIELD PRINT WORKS
16	0.0	On Site	385241 397534	SJ89NE179	152.4	BROADIE STREET ANDWICH
17	10.0	N	384953 397633	SJ89NW15	7.62	MANCHESTER CORP. L SEWER
18D	11.0	SW	384810 397710	SJ89NW864	-1.0	NATIONAL EXPRESS COACH STATION TP 1
19D	11.0	SW	384810 397710	SJ89NW870	-1.0	NATIONAL EXPRESS COACH STATION 2
20	17.0	NE	385299 397627	SJ89NE17	8.23	MANCHESTER CORP. TEMPERANCE STREET UNDER RAILWAY
21	40.0	SW	384818 397660	SJ89NW18	10.06	MANCHESTER CORP. CORNER OF TRAVIS STREET



Groundsure
LOCATION INTELLIGENCE

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
22	43.0	SW	384839 397592	SJ89NW14	6.71	MANCHESTER CORP. L SEWER
23	45.0	S	384970 397460	SJ89NW2031	-1.0	LOWER MEDLOCK UCSO'S C/1 SITE 0308 525A
24	46.0	S	385000 397450	SJ89NE911	-1.0	LOWER MEDLOCK ECSO'S C/1 SITE 0308 525B
25E	55.0	W	384900 397510	SJ89NW2027	-1.0	LOWER MEDLOCK UCSO'S C/1 SITE 0308 520
26	58.0	SW	384930 397460	SJ89NW2029	-1.0	LOWER MEDLOCK UCSO'S C/1 SITE 0308 523
27F	70.0	SW	384900 397470	SJ89NW2028	-1.0	LOWER MEDLOCK UCSO'S C/1 SITE 0308 522
28E	76.0	W	384880 397520	SJ89NW2030	-1.0	LOWER MEDLOCK UCSO'S C/1 SITE 0308 525
29G	76.0	NE	385220 397750	SJ89NE585	-1.0	MANCHESTER PARCELS OFFICE 8
30	77.0	NE	385190 397770	SJ89NE586	-1.0	MANCHESTER PARCELS OFFICE 9
31F	78.0	SW	384890 397470	SJ89NW2026	-1.0	LOWER MEDLOCK UCSO'S C/1 SITE 0308 227
32	79.0	NW	384700 397800	SJ89NW1154	-1.0	LONDON ROAD FIRE STATION MANCHESTER 1
33	83.0	SW	384808 397566	SJ89NW17	6.71	MANCHESTER CORP. CORNER OF JACKSON STREET
34G	87.0	NE	385240 397750	SJ89NE578	7.32	MANCHESTER PARCELS OFFICE 1
35	96.0	NE	385240 397760	SJ89NE922	7.32	MANCHESTER PARCELS OFFICE
36	97.0	NE	385180 397800	SJ89NE587	-1.0	MANCHESTER PARCELS OFFICE 10
37	101.0	W	384855 397500	SJ89NW333	6.1	MANCUNIAN WAY 12
38	102.0	NE	385352 397693	SJ89NE18	9.3	MANCHESTER CORP. FAIRFIELD STREET
39H	104.0	NE	385300 397730	SJ89NE584	4.42	MANCHESTER PARCELS OFFICE 7
40I	119.0	NE	385190 397820	SJ89NE923	11.43	MANCHESTER PARCELS OFFICE
41J	121.0	NW	384670 397830	SJ89NW1156	-1.0	LONDON ROAD FIRE STATION MANCHESTER 3
42H	123.0	NE	385320 397740	SJ89NE925	4.88	MANCHESTER PARCELS OFFICE
43I	124.0	NE	385200 397820	SJ89NE579	11.43	MANCHESTER PARCELS OFFICE 2
44	124.0	W	384640 397720	SJ89NW3618	-1.0	GRANBY ROW / WHITWORTH STREET 1A
45J	131.0	NW	384650 397820	SJ89NW1155	-1.0	LONDON ROAD FIRE STATION MANCHESTER 2
46	131.0	S	385053 397341	SJ89NE116	124.05	JEWSBURY & BROWNS ANDWICH GREEN

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
47	138.0	SW	384754 397545	SJ89NW4205	3.66	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT 3
48	139.0	SW	384808 397499	SJ89NW4212	5.94	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT E
49L	143.0	NE	385250 397810	SJ89NE924	9.14	MANCHESTER PARCELS OFFICE
50	145.0	N	385060 397870	SJ89NE1954	-1.0	MANCHESTER METRO PHASE 3 EXTENSION TO COMMONWEALTH WEALTH GAMES STADIUM TPA2
51K	148.0	N	385010 397880	SJ89NE2002	-1.0	MANCHESTER METRO PHASE 3 EXTENSION TO COMMONWEALTH WEALTH GAMES STADIUM BHA1
52K	148.0	N	385010 397880	SJ89NE2003	-1.0	MANCHESTER METRO PHASE 3 EXTENSION TO COMMONWEALTH WEALTH GAMES STADIUM BHA1A
53	151.0	NE	385340 397760	SJ89NE581	4.88	MANCHESTER PARCELS OFFICE 4
54	154.0	S	384716 397588	SJ89NW4204	2.13	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT 2
55M	156.0	SW	384684 397602	SJ89NW249	68.88	BOYD DAWKINS, JACKSON STREET MILL
56L	157.0	NE	385260 397820	SJ89NE580	9.14	MANCHESTER PARCELS OFFICE 3
57	160.0	NW	384628 397838	SJ89NW1	9.14	MANCHESTER CORP. NEAR LONDON ROAD STATION
58	160.0	N	384950 397900	SJ89NW4009	-1.0	MANCHESTER METRO PHASE 3 EXTENSION TO COMMONWEALTH WEALTH GAMES STADIUM TPA1
59	164.0	NW	384688 397904	SJ89NW2	8.84	MANCHESTER CORP. NEAR LONDON ROAD STATION
60	171.0	SW	384771 397483	SJ89NW4211	7.16	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT D
61M	172.0	SW	384675 397589	SJ89NW4203	3.05	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT 1
62	173.0	NE	385290 397820	SJ89NE927	6.4	MANCHESTER PARCELS OFFICE
63	174.0	NE	385230 397860	SJ89NE588	-1.0	MANCHESTER PARCELS OFFICE 11
64	175.0	NE	385389 397756	SJ89NE19	9.45	MANCHESTER CORP. HELME STREET



ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
65	177.0	SW	384716 397532	SJ89NW4206	3.66	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT 4
66N	195.0	NE	385330 397820	SJ89NE583	6.4	MANCHESTER PARCELS OFFICE 6
67	197.0	SW	384686 397546	SJ89NW13	5.49	MANCHESTER CORP. L SEWER
68	198.0	NE	385228 397889	SJ89NE33	23.77	MANCHESTER CORP. ST. ANDREW'S STREET
69N	198.0	NE	385350 397810	SJ89NE926	5.79	MANCHESTER PARCELS OFFICE
70	198.0	N	384750 397960	SJ89NW3965	-1.0	MANCHESTER INTERNATIONAL TRADE CENTRE TP 9
71	205.0	NW	384652 397930	SJ89NW3	10.06	MANCHESTER CORP. NEAR LONDON ROAD STATION
72	205.0	N	385070 397930	SJ89NE1955	-1.0	MANCHESTER METRO PHASE 3 EXTENSION TO COMMONWEALTH WEALTH GAMES STADIUM TPA 3
73	206.0	NE	385380 397800	SJ89NE582	5.79	MANCHESTER PARCELS OFFICE 5
74	208.0	SW	384600 397610	SJ89NW3643	7.62	MANCHESTER COLLEGE X
75	213.0	NW	384605 397897	SJ89NW314	10.97	AYTOUN STREET MULTI-STOREY CAR PARK. 1-4
76	214.0	SW	384732 397459	SJ89NW4210	7.93	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT C
77O	214.0	SW	384681 397519	SJ89NW12	6.1	MANCHESTER CORP. L SEWER
78O	216.0	SW	384683 397512	SJ89NW4207	3.35	MANCHESTER COLLEGE OF SCIENCE & TECHNOLOGY RIVER MEDLOCK CULVERT 5
79Q	216.0	NW	384564 397837	SJ89NW243	108.05	MANCHESTER PURE ICE WORKS, WHITWORTH STREET
80P	217.0	N	384770 397980	SJ89NW3955	-1.0	MANCHESTER INTERNATIONAL TRADE CENTRE 5
81P	217.0	N	384780 397980	SJ89NW3959	-1.0	MANCHESTER INTERNATIONAL TRADE CENTRE TT 3
82Q	226.0	W	384550 397830	SJ89NW1178	4.1	MANCHESTER METROPOLITAN UNIVERSITY TP1
83Q	226.0	W	384550 397830	SJ89NW1176	11.4	MANCHESTER METROPOLITAN UNIVERSITY 2
84	227.0	SW	384600 397580	SJ89NW3636	15.24	MANCHESTER COLLEGE A
85R	231.0	N	384730 397990	SJ89NW3964	-1.0	MANCHESTER INTERNATIONAL TRADE CENTRE TP 8/8A
86R	231.0	N	384730 397990	SJ89NW4078	7.0	STORE STREET MANCHESTER 2

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
87	232.0	SW	384692 397473	SJ89NW11	7.62	MANCHESTER CORP. SOUTH OF LONDON ROAD STATION
88	232.0	NE	385372 397836	SJ89NE2540	-1.0	PICCADILLY TRADING ESTATE 2
89Q	234.0	NW	384550 397850	SJ89NW1175	10.6	MANCHESTER METROPOLITAN UNIVERSITY 1
90	235.0	NE	385411 397814	SJ89NE2539	-1.0	PICCADILLY TRADING ESTATE 1
91	238.0	SW	384570 397600	SJ89NW3639	7.16	MANCHESTER COLLEGE D
92S	239.0	N	384800 398000	SJ89NW4079	9.0	STORE STREET MANCHESTER 3
93R	239.0	N	384740 398000	SJ89NW3951	-1.0	MANCHESTER INTERNATIONAL TRADE CENTRE 1
94R	241.0	N	384730 398000	SJ89NW3966	-1.0	MANCHESTER INTERNATIONAL TRADE CENTRE TT 10
95	241.0	W	384530 397680	SJ89NW3619	-1.0	GRANBY ROW / WHITWORTH STREET 2
96S	242.0	N	384820 398000	SJ89NW3962	-1.0	MANCHESTER INTERNATIONAL TRADE CENTRE TP 6
97	245.0	SE	385620 397370	SJ89NE2486	6.09	MANCHESTER 14A
98	247.0	NE	385655 397617	SJ89NE109	64.01	GATESHOUSE & YATES, CASTLE BREWERY

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#8: scans.bgs.ac.uk/sobi_scans/boreholes/936415
#9: scans.bgs.ac.uk/sobi_scans/boreholes/936518
#10C: scans.bgs.ac.uk/sobi_scans/boreholes/937807
#11: scans.bgs.ac.uk/sobi_scans/boreholes/937808
#12: scans.bgs.ac.uk/sobi_scans/boreholes/936517
#13: scans.bgs.ac.uk/sobi_scans/boreholes/1045474
#14C: scans.bgs.ac.uk/sobi_scans/boreholes/937805
#15C: scans.bgs.ac.uk/sobi_scans/boreholes/937806
#16: scans.bgs.ac.uk/sobi_scans/boreholes/936584
#17: scans.bgs.ac.uk/sobi_scans/boreholes/1042157
#20: scans.bgs.ac.uk/sobi_scans/boreholes/936416
#21: scans.bgs.ac.uk/sobi_scans/boreholes/1042160
#22: scans.bgs.ac.uk/sobi_scans/boreholes/1042156
#33: scans.bgs.ac.uk/sobi_scans/boreholes/1042159
#34G: scans.bgs.ac.uk/sobi_scans/boreholes/936995
#35: scans.bgs.ac.uk/sobi_scans/boreholes/937339
#37: scans.bgs.ac.uk/sobi_scans/boreholes/1042499
#38: scans.bgs.ac.uk/sobi_scans/boreholes/936417
#39H: scans.bgs.ac.uk/sobi_scans/boreholes/937001
#40I: scans.bgs.ac.uk/sobi_scans/boreholes/937340
#42H: scans.bgs.ac.uk/sobi_scans/boreholes/937342
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#55M: scans.bgs.ac.uk/sobi_scans/boreholes/1042403
#56L: scans.bgs.ac.uk/sobi_scans/boreholes/936997
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#62: scans.bgs.ac.uk/sobi_scans/boreholes/937344
#64: scans.bgs.ac.uk/sobi_scans/boreholes/936419
#65: scans.bgs.ac.uk/sobi_scans/boreholes/19952930
#66N: scans.bgs.ac.uk/sobi_scans/boreholes/937000
#67: scans.bgs.ac.uk/sobi_scans/boreholes/1042155
#68: scans.bgs.ac.uk/sobi_scans/boreholes/936434
#69N: scans.bgs.ac.uk/sobi_scans/boreholes/937343
#71: scans.bgs.ac.uk/sobi_scans/boreholes/1042145
#73: scans.bgs.ac.uk/sobi_scans/boreholes/936999
#74: scans.bgs.ac.uk/sobi_scans/boreholes/1045837
#75: scans.bgs.ac.uk/sobi_scans/boreholes/1042480
#76: scans.bgs.ac.uk/sobi_scans/boreholes/19952935
#77O: scans.bgs.ac.uk/sobi_scans/boreholes/1042154
#78O: scans.bgs.ac.uk/sobi_scans/boreholes/19952931
#79Q: scans.bgs.ac.uk/sobi_scans/boreholes/1042397
#82Q: scans.bgs.ac.uk/sobi_scans/boreholes/1043372
#83Q: scans.bgs.ac.uk/sobi_scans/boreholes/1043370
#84: scans.bgs.ac.uk/sobi_scans/boreholes/1045830
#86R: scans.bgs.ac.uk/sobi_scans/boreholes/15992209
#87: scans.bgs.ac.uk/sobi_scans/boreholes/1042153
#89Q: scans.bgs.ac.uk/sobi_scans/boreholes/1043369
#91: scans.bgs.ac.uk/sobi_scans/boreholes/1045833

#92S: scans.bgs.ac.uk/sobi_scans/boreholes/15992210
#97: scans.bgs.ac.uk/sobi_scans/boreholes/18425194
#98: scans.bgs.ac.uk/sobi_scans/boreholes/936511

8 Estimated Background Soil Chemistry

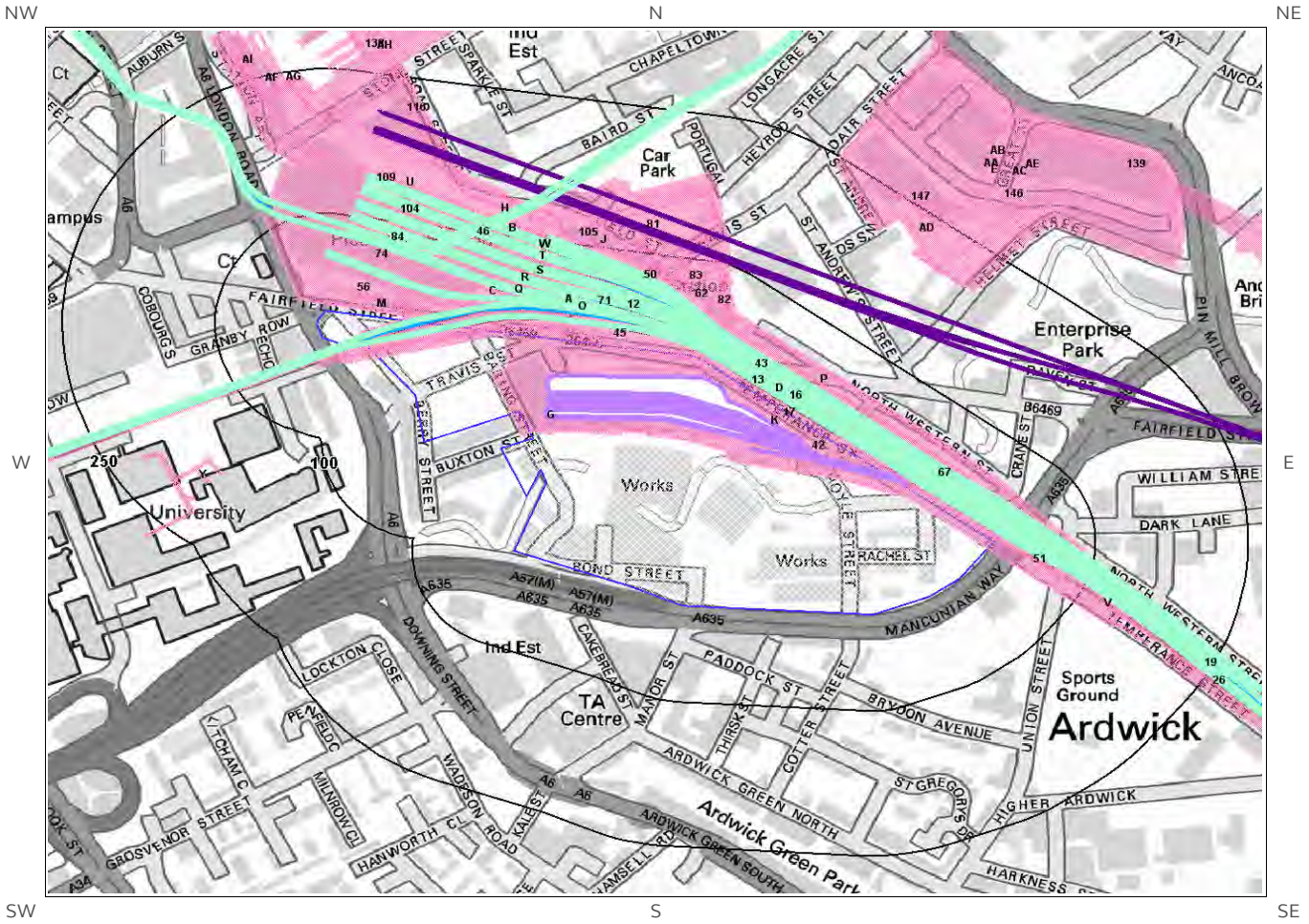
Records of background estimated soil chemistry within 250m of the study site boundary: 10

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	100 - 200 mg/kg
18.0	NE	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
18.0	NE	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	100 - 200 mg/kg
44.0	SE	RuralSoil	25 - 35 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels Map



Railways and Tunnels Legend

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- Site Outline
- Search Buffers (m) — 250, 500
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? Yes

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1O	0	On Site	385072 397799	Railway Sidings	1934
2A	0	On Site	385072 397799	Railway Sidings	1938
3A	0	On Site	385072 397799	Railway Sidings	1915
4B	0	On Site	384834 397906	Railway Sidings	1905
5B	0	On Site	384834 397906	Railway Sidings	1890
6U	0	On Site	384834 397924	Railway Sidings	1956

ID	Distance (m)	Direction	NGR	Details	Date
7C	0	On Site	384958 397790	Railway Sidings	1988
8C	0	On Site	384958 397790	Railway Sidings	1978
9C	0	On Site	384958 397790	Railway Sidings	1994
10C	0	On Site	384958 397790	Railway Sidings	1985
11C	0	On Site	384958 397790	Railway Sidings	1971
12	0	On Site	385121 397744	Railway Sidings	1923
13	0	On Site	385106 397768	Railway Sidings	1968
14D	0	On Site	385269 397661	Railway Sidings	1978
15D	0	On Site	385269 397661	Railway Sidings	1985
16	0	On Site	385269 397661	Railway Sidings	1991
17	0	On Site	385401 397558	Railway Sidings	1956
27D	0	On Site	385196 397710	Railway Sidings	1968
28F	0	On Site	385400 397536	Railway Sidings	1932
29F	0	On Site	385400 397536	Railway Sidings	1922
30G	0	On Site	384991 397650	Railway Sidings	1950
31G	0	On Site	384992 397649	Railway Sidings	1952
32G	0	On Site	384992 397649	Railway Sidings	1971
33G	0	On Site	384992 397649	Railway Sidings	1964
34G	0	On Site	384992 397649	Railway Sidings	1948
35H	0	On Site	384968 397858	Railway Sidings	1955
36H	0	On Site	384968 397858	Railway Sidings	1955
37I	0	On Site	385196 397710	Railway Sidings	1965
38J	0	On Site	384842 397903	Railway Sidings	1889
39J	0	On Site	384842 397903	Railway Sidings	1922
40J	0	On Site	384842 397903	Railway Sidings	1908
41J	0	On Site	384842 397903	Railway Sidings	1932
42	0	On Site	385259 397614	Railway Sidings	1977
43	0	On Site	385250 397697	Railway Sidings	1948
44	0	On Site	385259 397615	Railway Sidings	1963

ID	Distance (m)	Direction	NGR	Details	Date
45	0	On Site	385066 397728	Railway Sidings	1891
46	0	On Site	n/a	Railway	1889
47K	0	On Site	385215 397643	Railway Sidings	1948
48K	0	On Site	385215 397644	Railway Sidings	1985
49G	0	On Site	384991 397651	Railway Sidings	1984
50	3	NE	385105 397792	Railway Sidings	1948
51	4	NE	385476 397497	Railway Sidings	1948
18I	6	NE	385320 397607	Railway Sidings	1851
52L	6	N	384763 397775	Railway Sidings	1908
53L	6	N	384763 397775	Railway Sidings	1889
54M	7	N	384819 397765	Railway Sidings	1922
55M	7	N	384819 397765	Railway Sidings	1932
56	7	N	384828 397790	Railway Sidings	1891
57M	14	N	384823 397775	Railway Sidings	1950
58N	15	N	384851 397775	Railway Sidings	1955
59N	15	N	384851 397775	Railway Sidings	1955
60L	16	N	384805 397777	Railway Sidings	1955
61L	16	N	384805 397777	Railway Sidings	1955
62	24	NE	385125 397773	Railway Sidings	1891
63C	24	N	384939 397769	Railway Sidings	1964
64C	24	N	384939 397769	Railway Sidings	1971
65R	26	N	384986 397800	Railway Sidings	1984
66C	26	N	384940 397770	Railway Sidings	1995
67	28	NE	385379 397591	Railway Sidings	1948
68O	32	N	385026 397763	Railway Sidings	1891
69P	34	NE	385289 397673	Railway Sidings	1985
70P	35	NE	385293 397669	Railway Sidings	1977
71	36	N	385045 397769	Railway Sidings	1891
72Q	36	N	384960 397781	Railway Sidings	1971

ID	Distance (m)	Direction	NGR	Details	Date
73Q	36	N	384960 397781	Railway Sidings	1964
74	37	N	384826 397818	Railway Sidings	1891
75R	40	N	384975 397792	Railway Sidings	1952
76R	40	N	384975 397792	Railway Sidings	1948
77R	40	N	384975 397792	Railway Sidings	1950
78R	45	N	384978 397787	Railway Sidings	1995
79R	47	N	384978 397789	Railway Sidings	1964
80R	47	N	384978 397789	Railway Sidings	1971
81	53	N	385080 397831	Railway Sidings	1891
82	54	NE	385163 397769	Railway Sidings	1963
83	56	N	385121 397790	Railway Sidings	1963
84	57	N	384840 397835	Railway Sidings	1891
85S	59	N	384980 397800	Railway Sidings	1995
86S	60	N	384980 397801	Railway Sidings	1971
87S	60	N	384980 397801	Railway Sidings	1964
88T	73	N	384983 397815	Railway Sidings	1995
89T	74	N	384983 397814	Railway Sidings	1950
90T	74	N	384983 397814	Railway Sidings	1948
91T	74	N	384983 397814	Railway Sidings	1952
92T	74	N	384983 397816	Railway Sidings	1971
93T	74	N	384983 397816	Railway Sidings	1964
94U	79	N	384850 397906	Railway Sidings	1948
95U	79	N	384850 397906	Railway Sidings	1952
96V	81	SE	385543 397453	Railway Sidings	1989
97V	81	SE	385543 397453	Railway Sidings	1977
98V	81	SE	385543 397453	Railway Sidings	1948
99V	81	SE	385543 397453	Railway Sidings	1954
100U	81	N	384850 397907	Railway Sidings	1950
101W	85	N	384985 397827	Railway Sidings	1995

ID	Distance (m)	Direction	NGR	Details	Date
102W	86	N	384985 397828	Railway Sidings	1971
103W	86	N	384985 397828	Railway Sidings	1964
104	87	N	384848 397863	Railway Sidings	1891
105	92	N	385037 397837	Railway Sidings	1963
106W	95	N	384989 397834	Railway Sidings	1995
107W	96	N	384989 397836	Railway Sidings	1971
108U	96	N	384850 397914	Railway Sidings	1964
109	114	N	384825 397899	Railway Sidings	1891
110U	159	N	384847 397920	Railway Sidings	1891
111X	167	SW	384629 397571	Railway Sidings	1889
112X	167	SW	384629 397571	Railway Sidings	1889
113X	169	SW	384629 397571	Tramway Sidings	1891
114Y	183	SW	384650 397589	Railway Sidings	1889
115Y	184	SW	384649 397589	Tramway Sidings	1891
116	188	N	384860 397970	Railway Sidings	1968
19	197	SE	385690 397352	Railway Sidings	1934
117X	198	SW	384629 397571	Railway Sidings	1908
20E	203	NE	385439 397907	Railway Sidings	1915
21E	203	NE	385439 397907	Railway Sidings	1905
22E	203	NE	385439 397907	Railway Sidings	1934
23E	203	NE	385439 397907	Railway Sidings	1938
24E	203	NE	385439 397907	Railway Sidings	1923
118AA	203	NE	n/a	Railway	1893
25E	205	NE	385439 397907	Railway Sidings	1890
119AF	205	N	384717 398010	Railway Sidings	1891
120Z	206	NE	385373 397811	Railway Sidings	1908
121Z	206	NE	385373 397811	Railway Sidings	1922
122Z	206	NE	385373 397811	Railway Sidings	1932
26	207	SE	386478 397231	Railway Sidings	1923

ID	Distance (m)	Direction	NGR	Details	Date
123A A	211	NE	385457 397926	Railway Sidings	1889
124A B	214	NE	n/a	Railways	1893
125A B	214	NE	n/a	Railways	1922
126A C	217	NE	n/a	Railway	1932
127A C	217	NE	n/a	Railway	1916
128A C	222	NE	385552 397909	Railway Sidings	1968
129A C	222	NE	385552 397909	Railway Sidings	1965
130A C	222	NE	385552 397909	Railway Sidings	1965
131	222	NE	385439 397860	Railway Sidings	1963
132A D	231	NE	385362 397844	Railway Sidings	1908
133A D	231	NE	385362 397844	Railway Sidings	1922
134A D	234	NE	385377 397852	Railway Sidings	1891
135A E	234	NE	385459 397953	Railway Sidings	1922
136A E	234	NE	385459 397953	Railway Sidings	1908
137A A	235	NE	385459 397953	Railway Sidings	1932
138	235	N	384811 398048	Railway Sidings	1891
139	238	NE	385491 397905	Railway Sidings	1948
140A F	238	N	384739 398001	Railway Sidings	1953
141A G	239	N	384738 398002	Railway Sidings	1960
142A G	239	N	384738 398002	Railway Sidings	1948
143A G	239	N	384738 398002	Railway Sidings	1953
144A G	239	N	384738 398002	Railway Sidings	1953
145A G	239	N	384739 398002	Railway Sidings	1965
146	242	NE	385471 397880	Railway Sidings	1948
147	242	NE	385355 397877	Railway Sidings	1891
148A H	245	N	384816 398058	Railway Sidings	1953
149A H	245	N	384816 398058	Railway Sidings	1967
150A H	245	N	384816 398058	Railway Sidings	1953
151A H	245	N	384816 398058	Railway Sidings	1965

ID	Distance (m)	Direction	NGR	Details	Date
152AH	245	N	384816 398058	Railway Sidings	1953
153AI	245	N	384693 398020	Railway Sidings	1948
154AI	245	N	384693 398020	Railway Sidings	1960
155AH	246	N	384823 398056	Railway Sidings	1960
156AH	246	N	384823 398056	Railway Sidings	1948
157AI	246	N	384692 398022	Railway Sidings	1953
158AI	246	N	384692 398022	Railway Sidings	1953
159AI	246	N	384692 398021	Railway Sidings	1953
160AI	246	N	384692 398022	Railway Sidings	1965

Any records that have been identified are represented on the Railways and Tunnels Map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? Yes

Have any historical railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Status
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Abandoned
0	On Site	Disused
0	On Site	Disused
0	On Site	Disused

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? Yes

Have any active railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Name	Type
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Multi Track
0	On Site	Not given	Multi Track
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
0	On Site	Not given	Rail
3	S	Not given	Rail
3	S	Not given	Rail
6	S	Not given	Rail
6	S	Not given	Rail
10	NE	Not given	Rail
10	NE	Not given	Rail
12	NE	Not given	Rail
12	NE	Not given	Rail
12	NE	Not given	Rail
12	NE	Not given	Rail
12	NE	Not given	Rail
12	NE	Not given	Rail
13	NE	Manchester-Crewe Line	Rail
13	N	Not given	Rail
13	NE	Manchester-Crewe Line	Rail
13	N	Not given	Rail
14	NE	Not given	Rail
14	NE	Not given	Rail
14	N	Not given	Multi Track
14	N	Not given	Multi Track
14	NE	Not given	Rail
14	NE	Not given	Rail
15	NE	Not given	Rail
15	NE	Not given	Rail
15	NE	Not given	Rail
15	NE	Manchester-Crewe Line	Rail
15	NE	Not given	Rail
15	NE	Not given	Rail
15	NE	Not given	Rail

Distance (m)	Direction	Name	Type
15	NE	Not given	Rail
15	NE	Manchester-Crewe Line	Rail
15	NE	Not given	Rail
16	NE	Not given	Rail
16	NE	Not given	Rail
17	N	Not given	Rail
17	N	Not given	Rail
18	NE	Not given	Rail
18	NE	Not given	Rail
20	NE	Manchester-Crewe Line	Rail
20	NE	Not given	Multi Track
20	NE	Not given	Multi Track
20	NE	Manchester-Crewe Line	Rail
21	NE	Not given	Multi Track
21	NE	Not given	Multi Track
22	N	Not given	Rail
22	NE	Not given	Rail
22	N	Not given	Rail
22	NE	Not given	Rail
23	NE	Not given	Rail
23	NE	Not given	Rail
23	NE	Not given	Rail
23	NE	Not given	Rail
23	NE	Not given	Rail
23	NE	Not given	Rail
24	NE	Not given	Rail
24	NE	Not given	Rail
24	NE	Not given	Rail
24	NE	Not given	Rail
24	NE	Manchester-Crewe Line	Rail
24	NE	Not given	Rail
24	NE	Manchester-Crewe Line	Rail
24	N	Not given	Multi Track
24	N	Not given	Multi Track
24	NE	Not given	Multi Track
24	NE	Not given	Multi Track
24	NE	Not given	Multi Track
24	N	Not given	Multi Track
24	N	Not given	Multi Track
24	NE	Not given	Multi Track
24	NE	Not given	Multi Track
24	NE	Not given	Multi Track
24	NE	Not given	Rail
24	NE	Not given	Rail
24	NE	Not given	Rail
24	NE	Not given	Rail
24	NE	Manchester-Crewe Line	Rail
24	NE	Not given	Rail
24	NE	Manchester-Crewe Line	Rail
25	NE	Not given	Rail
25	NE	Not given	Rail
27	NE	Not given	Rail
27	NE	Not given	Rail

Distance (m)	Direction	Name	Type
27	NE	Not given	Rail
27	NE	Not given	Rail
28	NE	Not given	Rail
28	NE	Not given	Rail
28	NE	Not given	Rail
28	NE	Not given	Rail
29	NE	Not given	Rail
29	NE	Not given	Rail
29	NE	Not given	Rail
29	NE	Manchester-Crewe Line	Rail
29	N	Not given	Multi Track
29	N	Not given	Multi Track
29	NE	Not given	Rail
29	NE	Not given	Rail
29	NE	Not given	Rail
29	NE	Manchester-Crewe Line	Rail
31	N	Not given	Rail
31	NE	Not given	Rail
31	N	Not given	Rail
31	NE	Not given	Rail
32	NE	Not given	Rail
32	N	Not given	Rail
32	N	Not given	Rail
32	NE	Not given	Rail
32	N	Not given	Rail
32	N	Not given	Rail
33	NE	Not given	Rail
33	NE	Not given	Rail
33	NE	Not given	Rail
33	NE	Not given	Rail
34	N	Not given	Rail
34	N	Not given	Rail
34	N	Not given	Rail
34	N	Not given	Rail
35	NE	Not given	Rail
35	NE	Hope Valley Line	Rail
35	NE	Not given	Rail
35	NE	Hope Valley Line	Rail
36	NE	Not given	Rail
36	NE	Not given	Rail
37	N	Not given	Rail
37	N	Not given	Rail
40	N	Not given	Rail
40	N	Not given	Rail
46	N	Not given	Rail
46	N	Not given	Rail
59	E	Not given	Rail
59	E	Not given	Rail
61	N	Not given	Rail
61	N	Not given	Rail
69	N	Not given	Tram
69	N	Not given	Tram
70	N	Not given	Rail

Distance (m)	Direction	Name	Type
70	N	Not given	Rail
71	N	Not given	Tram
71	N	Not given	Tram
76	N	Not given	Tram
76	N	Not given	Tram
79	E	Manchester-Crewe Line	Rail
79	E	Manchester-Crewe Line	Rail
82	E	Manchester-Crewe Line	Rail
82	E	Manchester-Crewe Line	Rail
96	N	Not given	Rail
96	N	Not given	Rail
104	SE	Manchester-Crewe Line	Rail
104	SE	Manchester-Crewe Line	Rail
104	SE	Manchester-Crewe Line	Rail
104	SE	Manchester-Crewe Line	Rail
108	NW	Not given	Tram
108	NW	Not given	Tram
117	NW	Not given	Multi Track
117	NW	Not given	Multi Track
121	NW	Not given	Tram
121	NW	Not given	Tram
134	N	Not given	Tram
134	N	Not given	Tram
136	N	Not given	Tram
136	N	Not given	Tram
140	SE	Manchester-Crewe Line	Rail
140	SE	Manchester-Crewe Line	Rail
154	SE	Not given	Rail
154	SE	Not given	Rail
154	SE	Not given	Rail
154	SE	Not given	Rail
165	N	Not given	Tram
165	N	Not given	Tram
172	N	Not given	Tram
172	N	Not given	Tram
188	SE	Manchester-Crewe Line	Rail
188	SE	Manchester-Crewe Line	Rail
194	N	Not given	Tram
194	N	Not given	Tram
201	SE	Manchester-Crewe Line	Rail
201	SE	Manchester-Crewe Line	Rail
239	SE	Manchester-Crewe Line	Rail
239	SE	Manchester-Crewe Line	Rail

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project?	Yes
Is the study site within 500m of the route of the Crossrail 1 rail project?	No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a ***Groundsure HS2 and Crossrail 1 Report****.*

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

Contact Details

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Keyworth, Nottingham NG12 5GG
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Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
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Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
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DY5 3LH
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Email:**enquiries.gs@jpb.co.uk**
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Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**





Peter Brett Associates

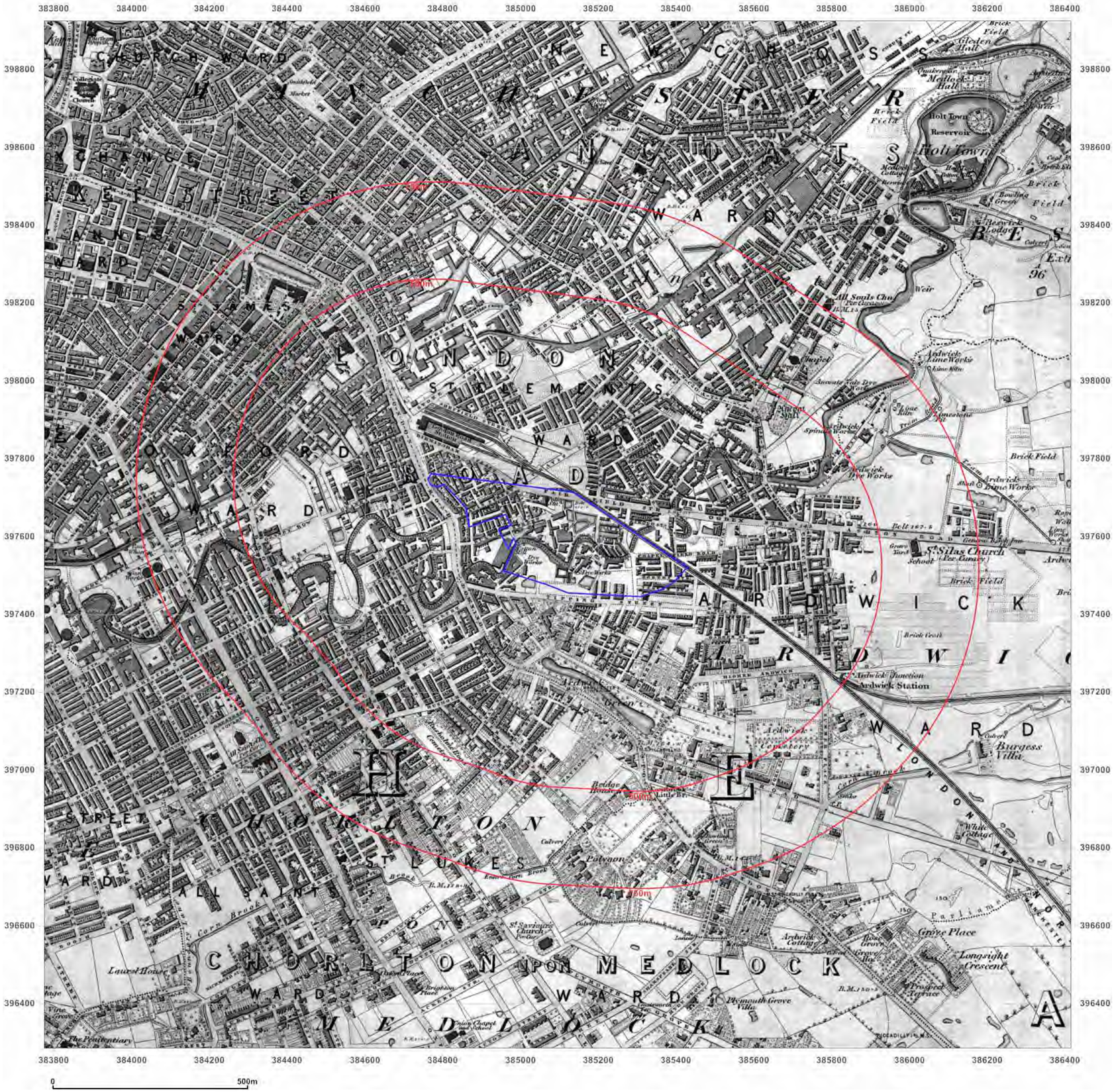
Caversham Bridge House
Waterman Place
Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
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Client Ref: 035548
Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: County Series

Map date: **1848**

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Surveyed 1845
Revised N/A
Edition 1848
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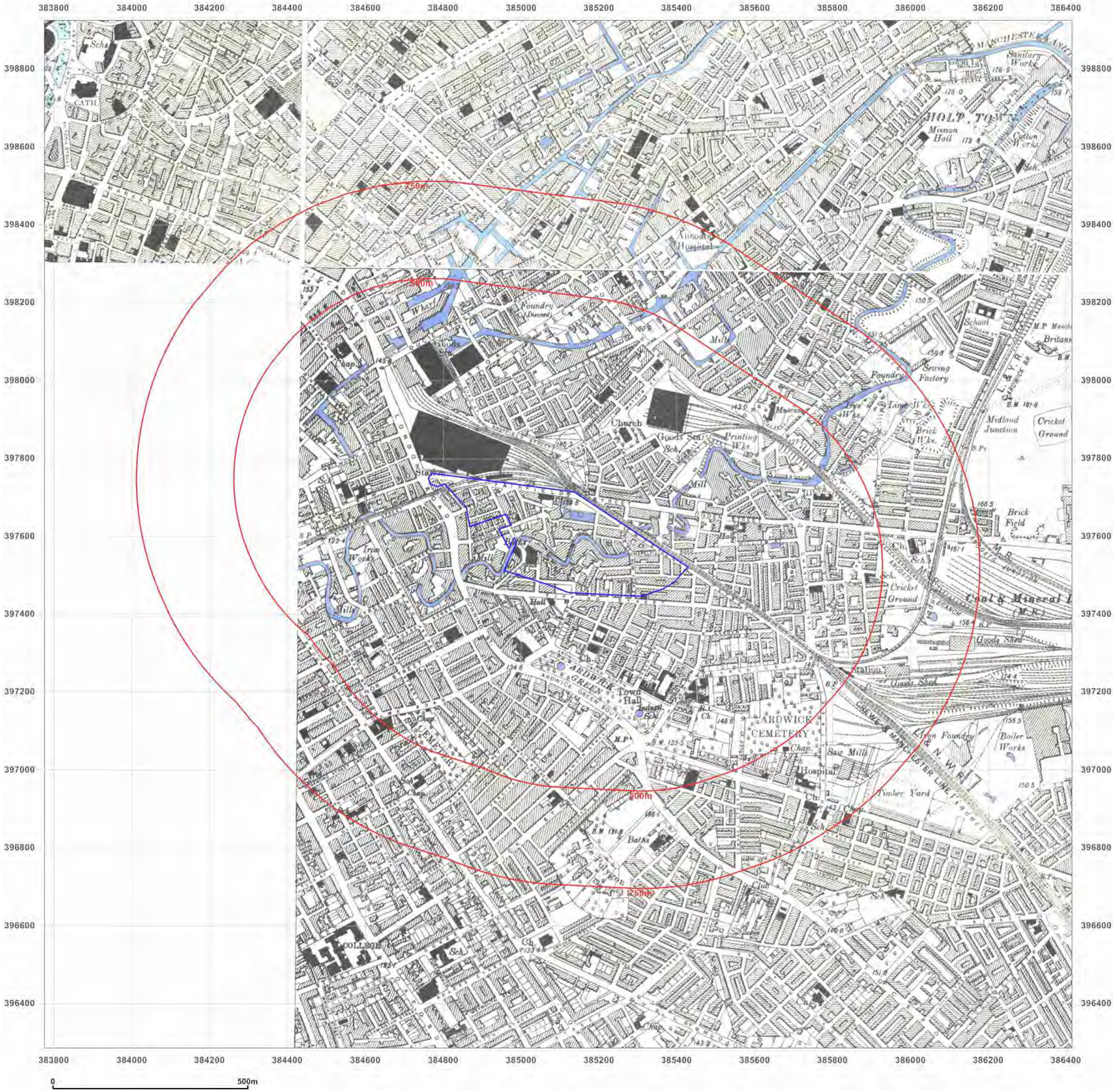
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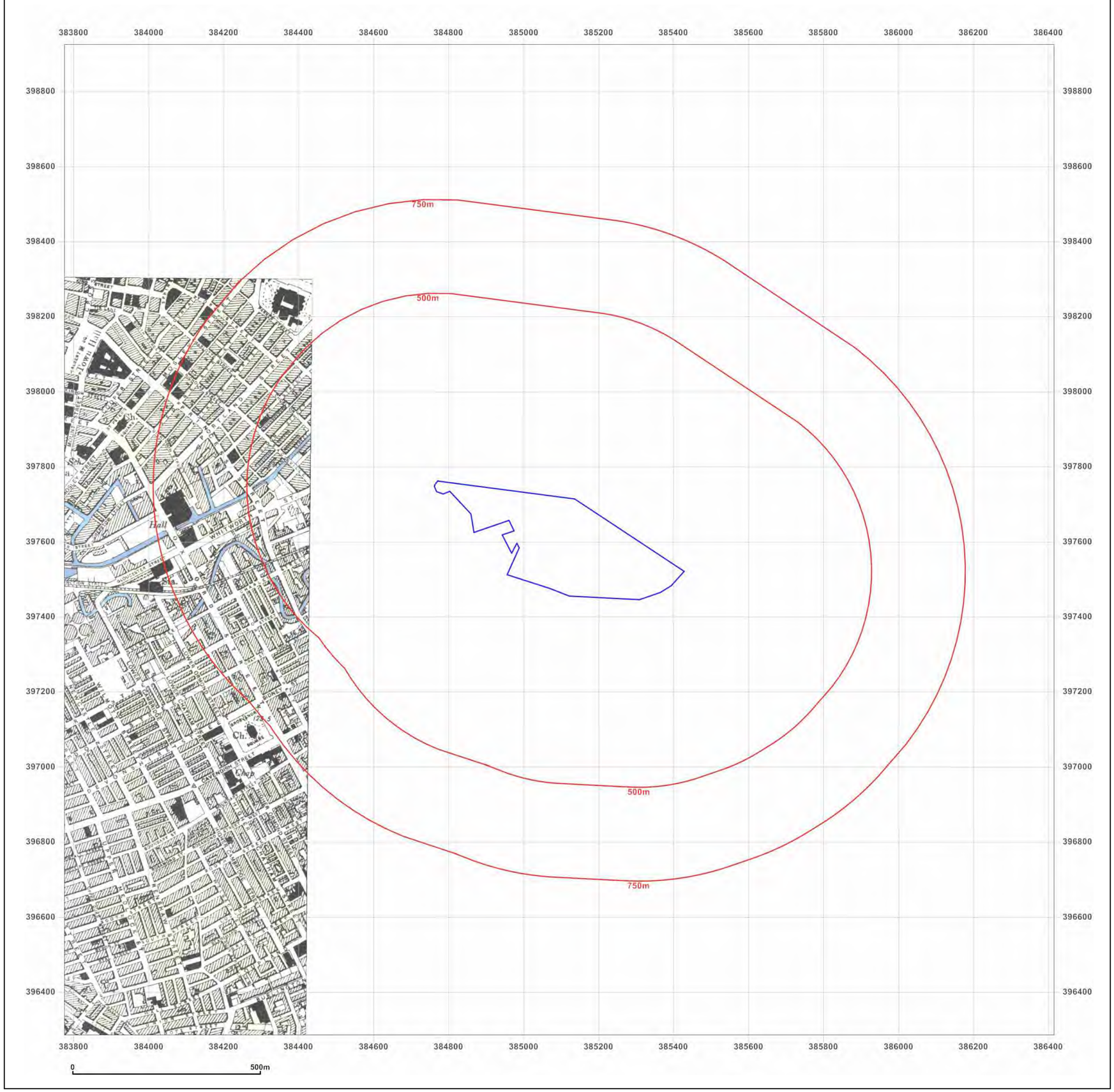
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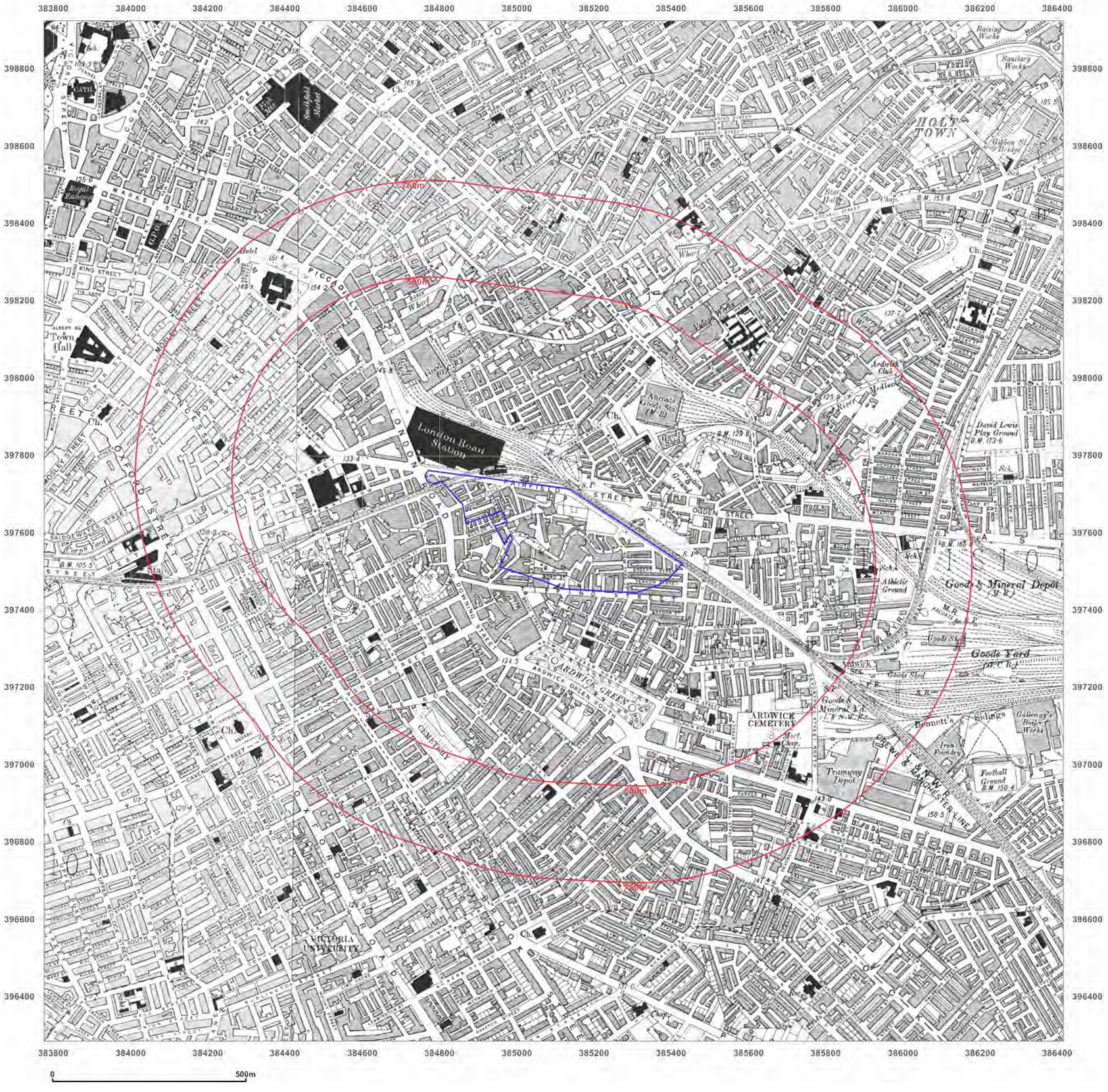
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Client Ref: 035548
Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: County Series

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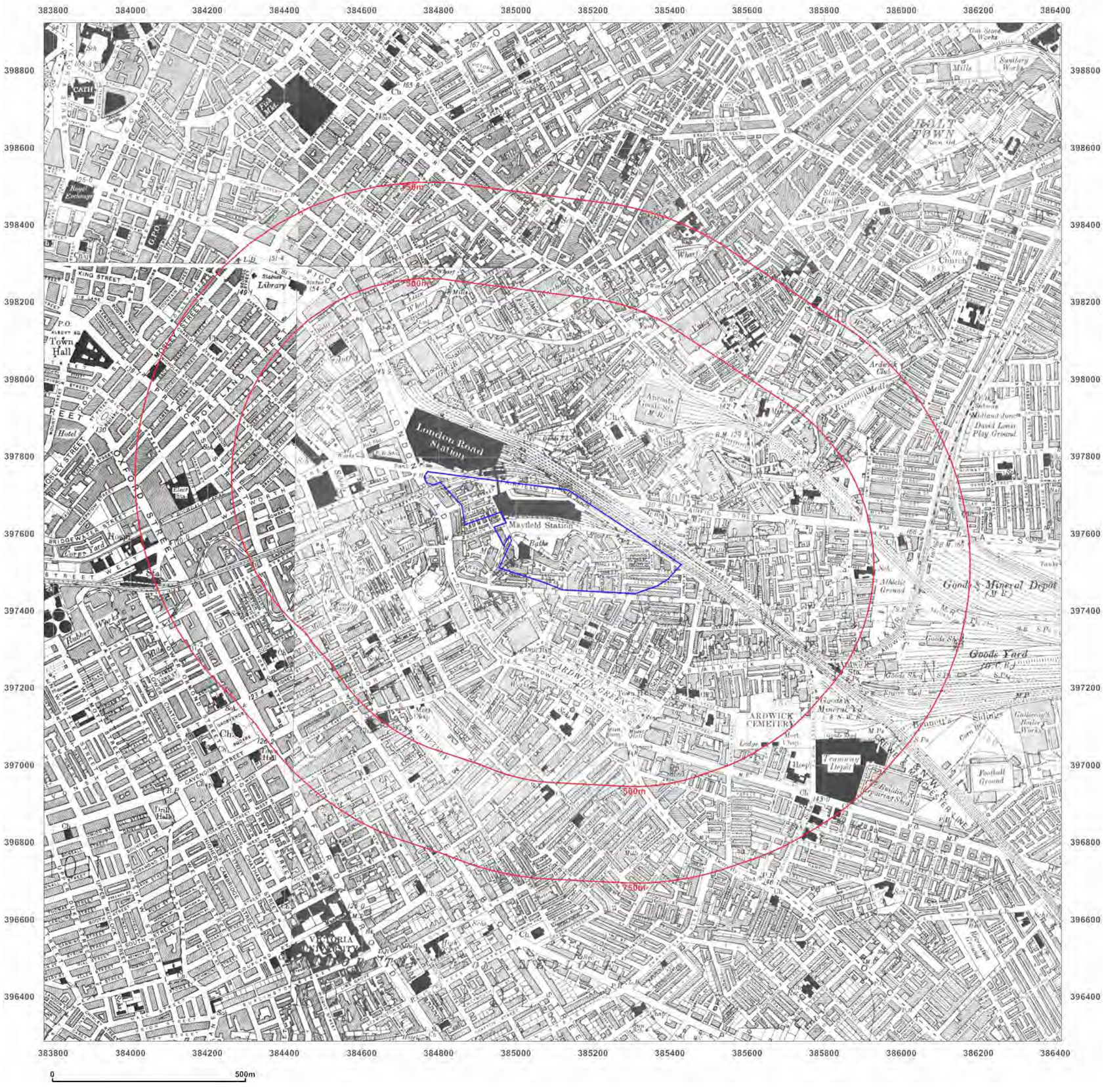
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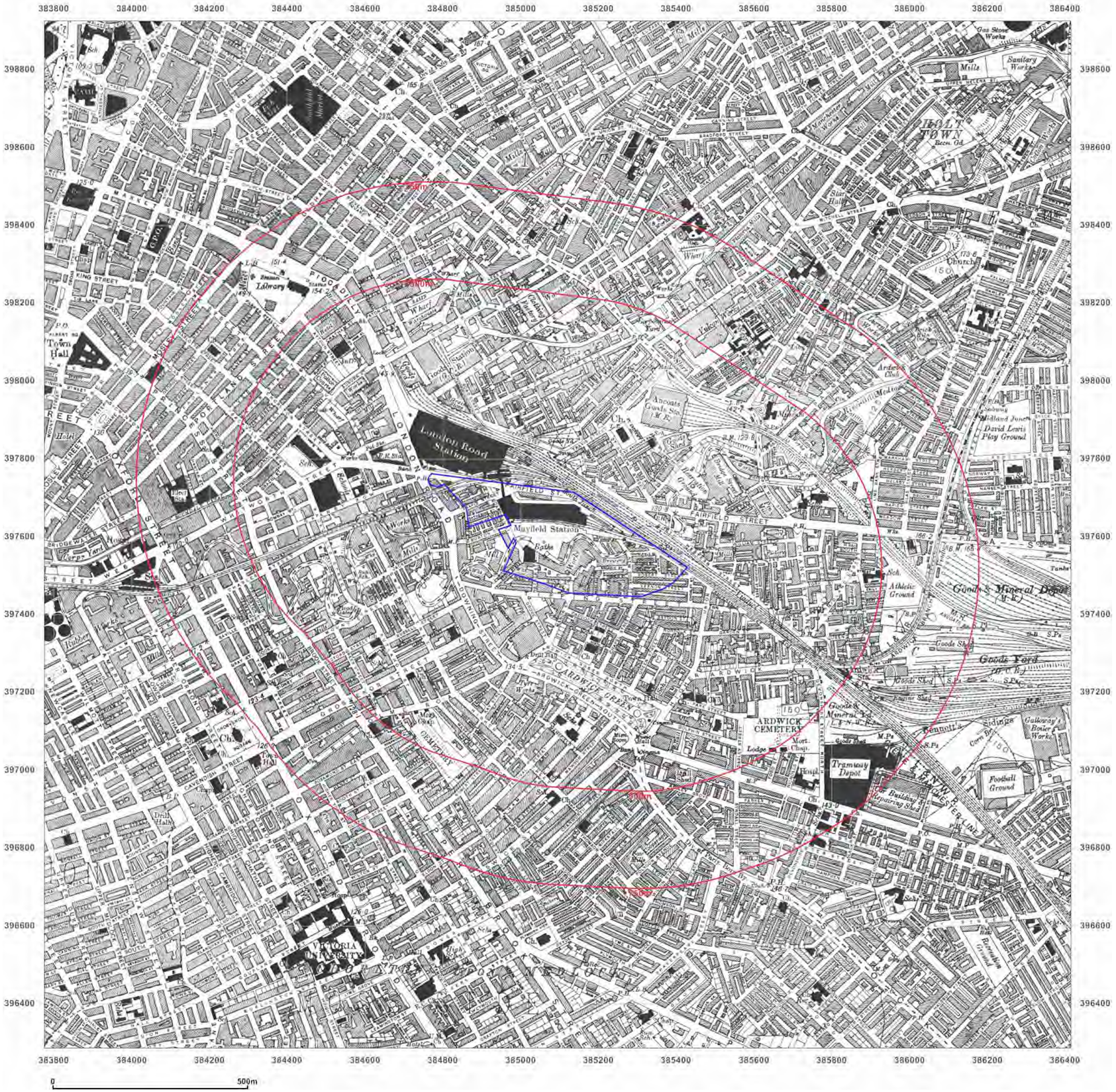
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Client Ref: 035548
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Grid Ref: 385094, 397604

Map Name: County Series

Map date: **1923**

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Surveyed 1844
Revised 1916
Edition 1923
Copyright N/A
Levelled 1915

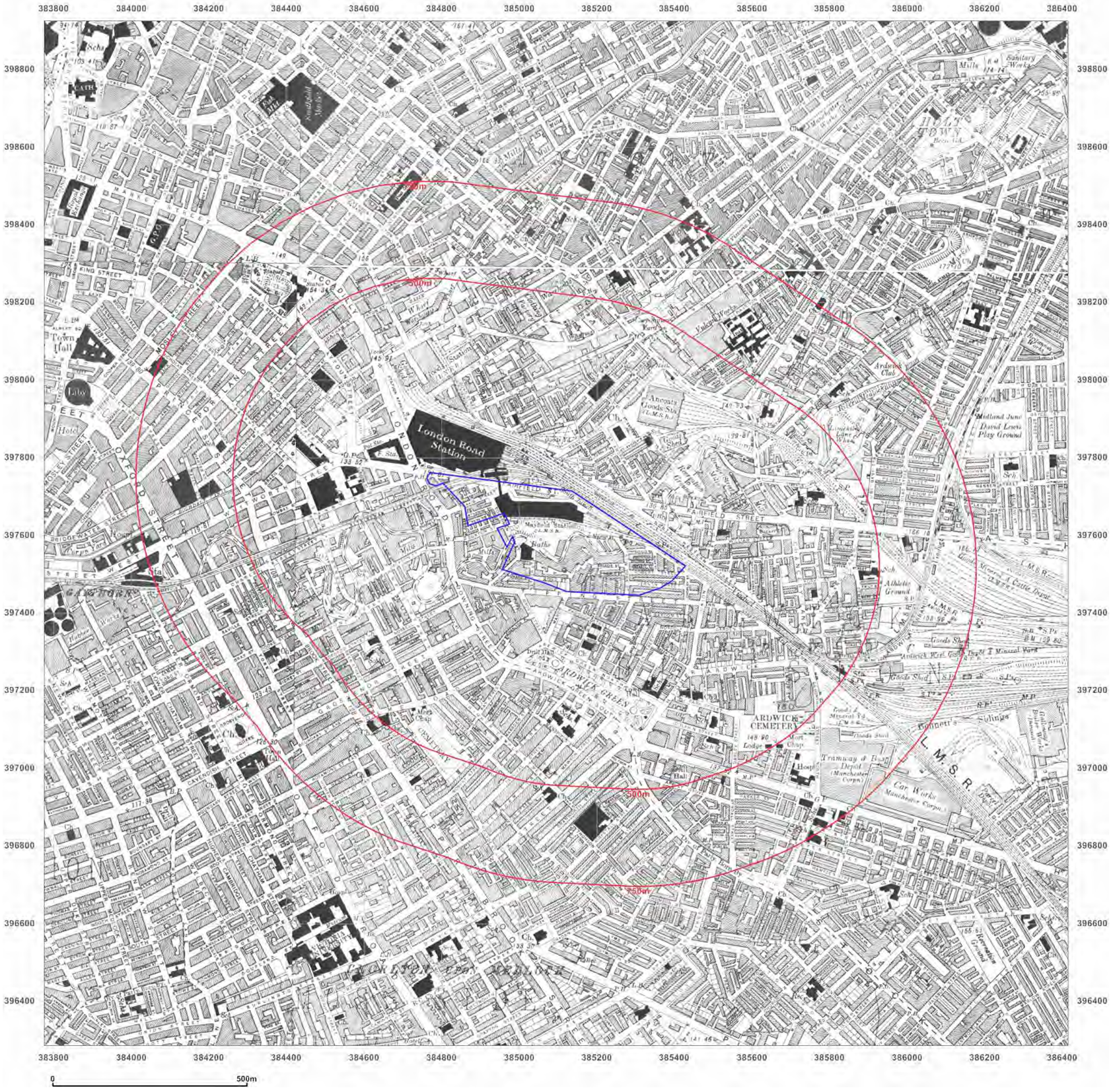
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Client Ref: 035548
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Map Name: County Series

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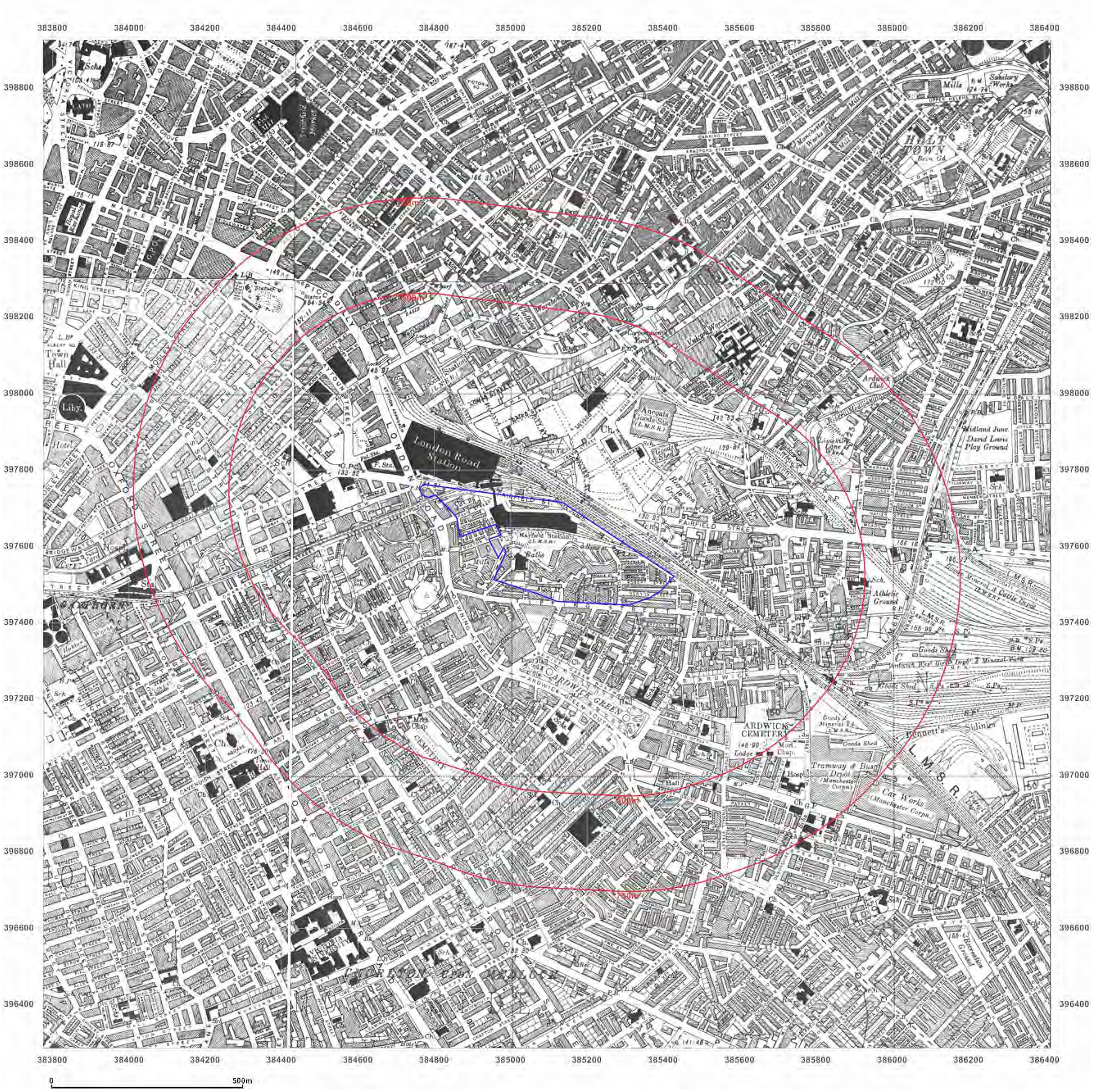
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Grid Ref: 385094, 397604

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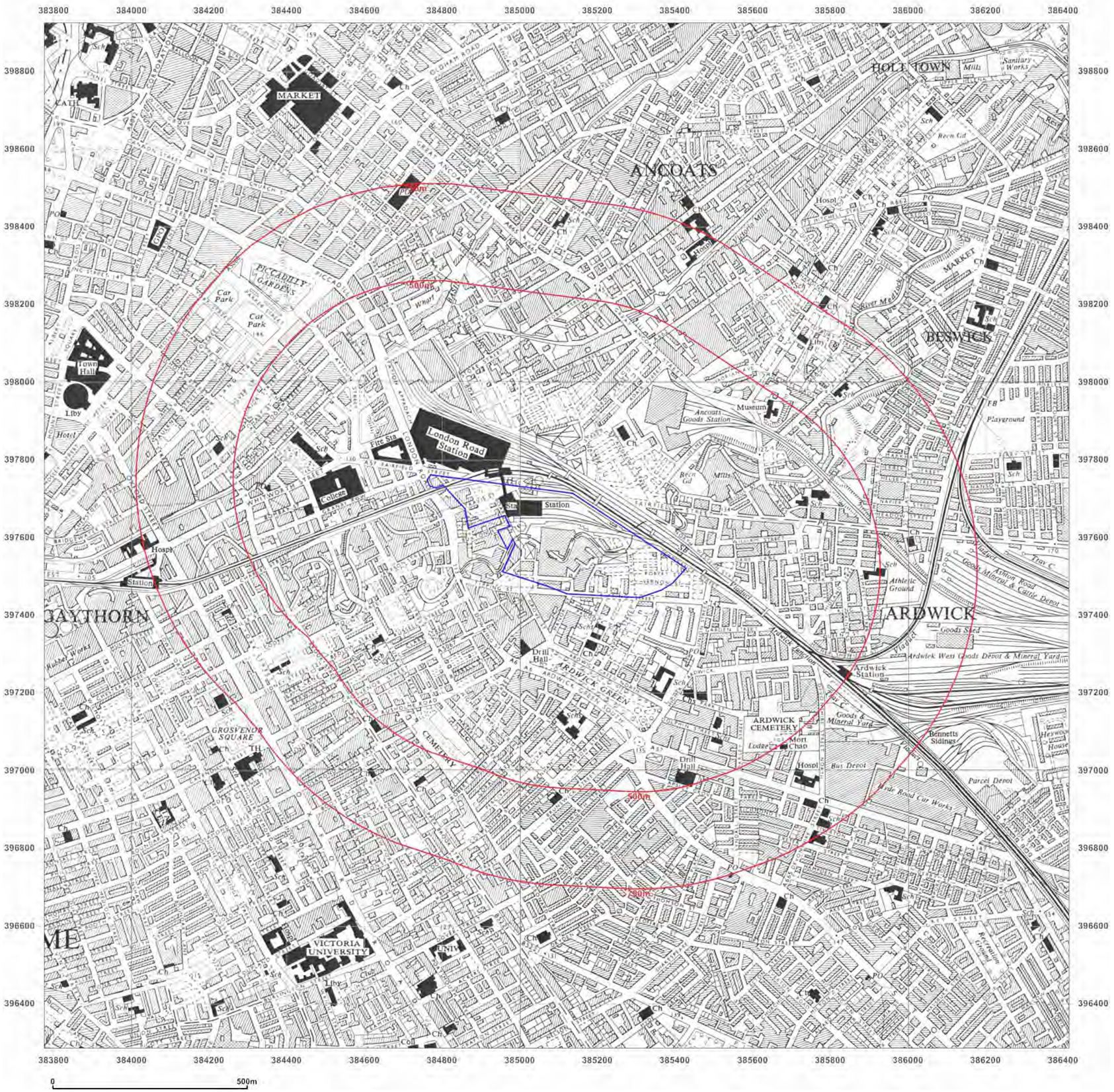
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Client Ref: 035548
Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: Provisional

Map date: **1956**

Scale: 1:10,560

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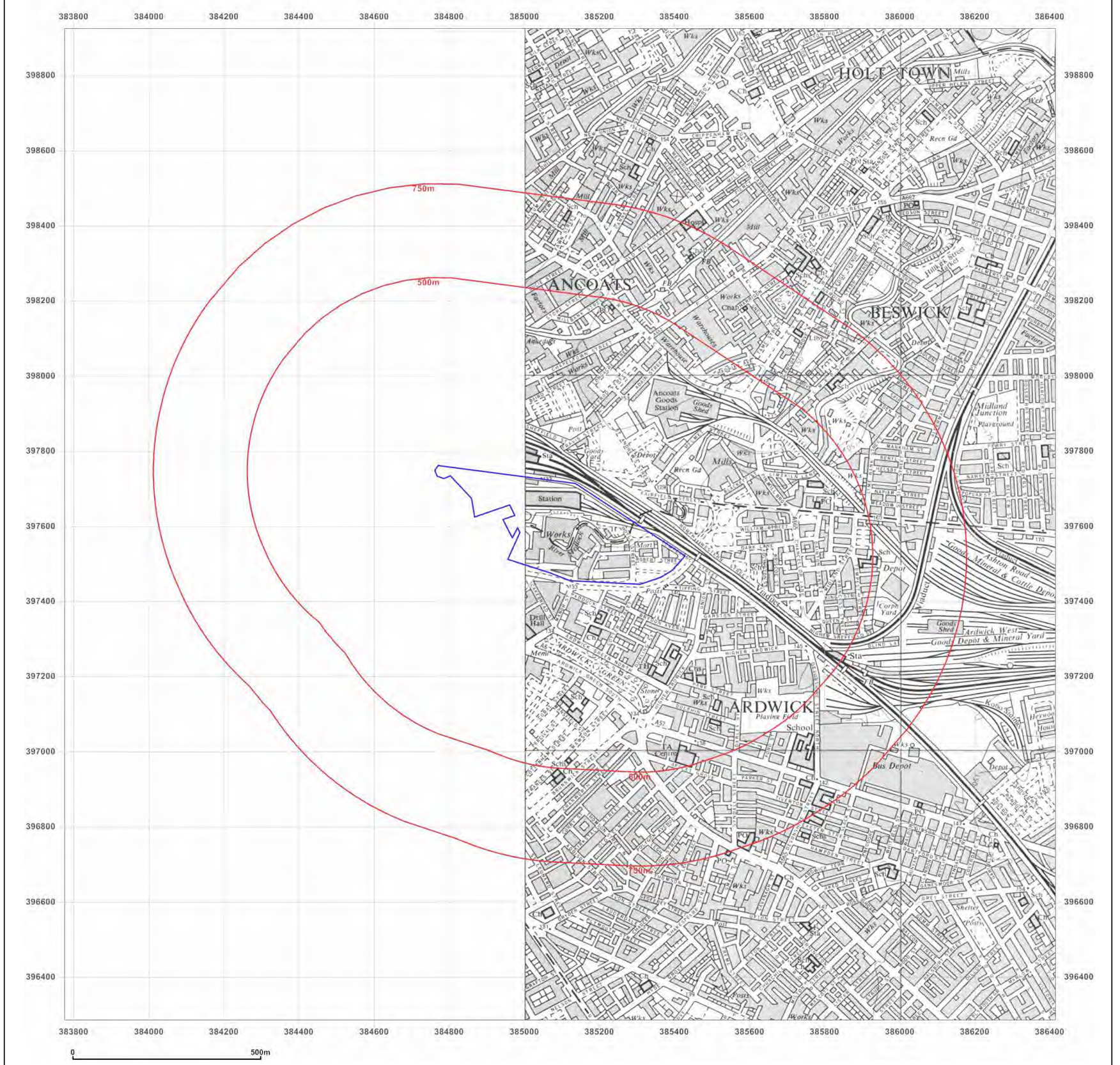
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Client Ref: 035548
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Grid Ref: 385094, 397604

Map Name: Provisional

Map date: **1968**

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Surveyed 1968
Revised 1968
Edition N/A
Copyright 1968
Levelled N/A

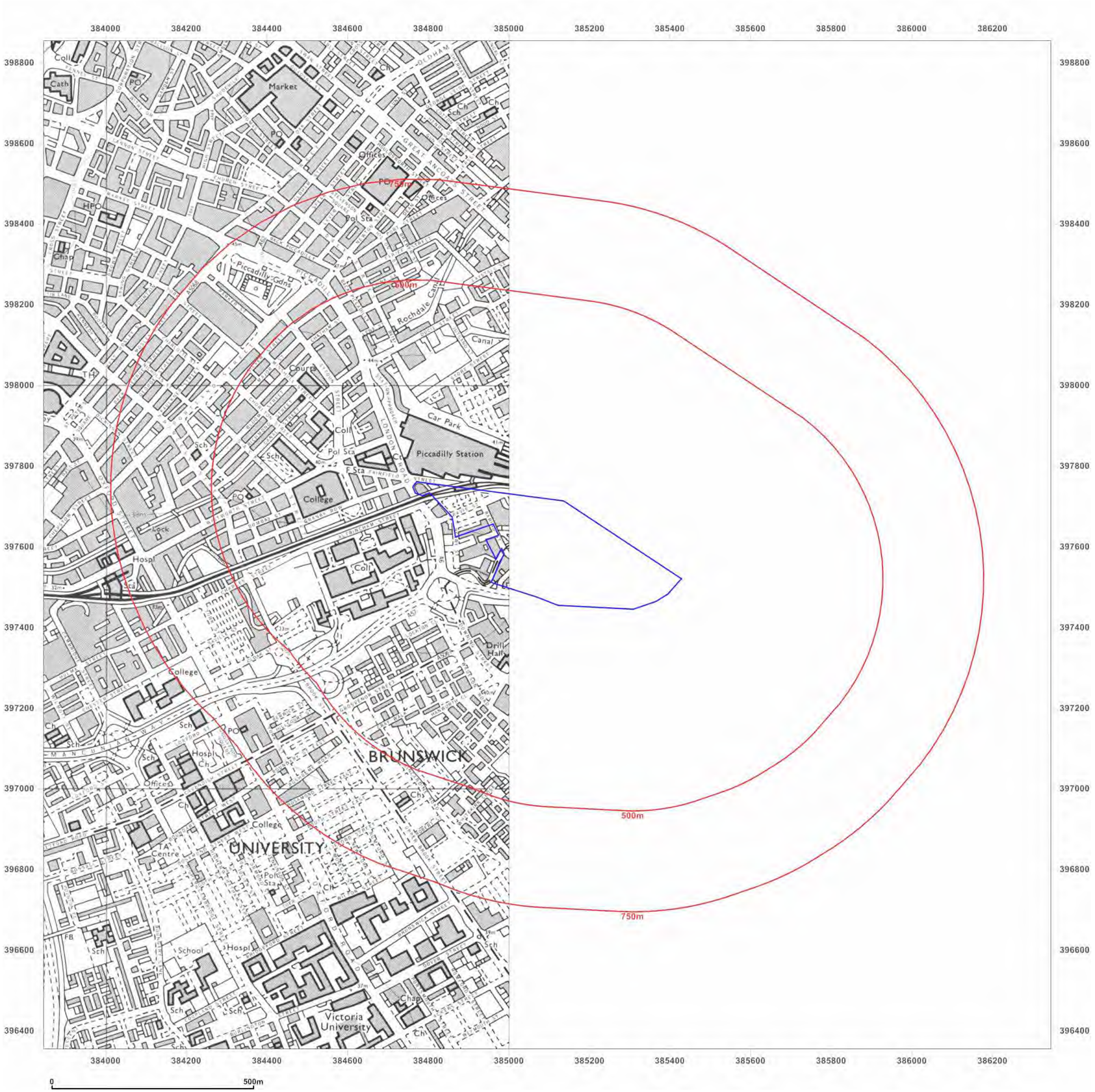
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Client Ref: 035548
Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: National Grid

Map date: **1972**

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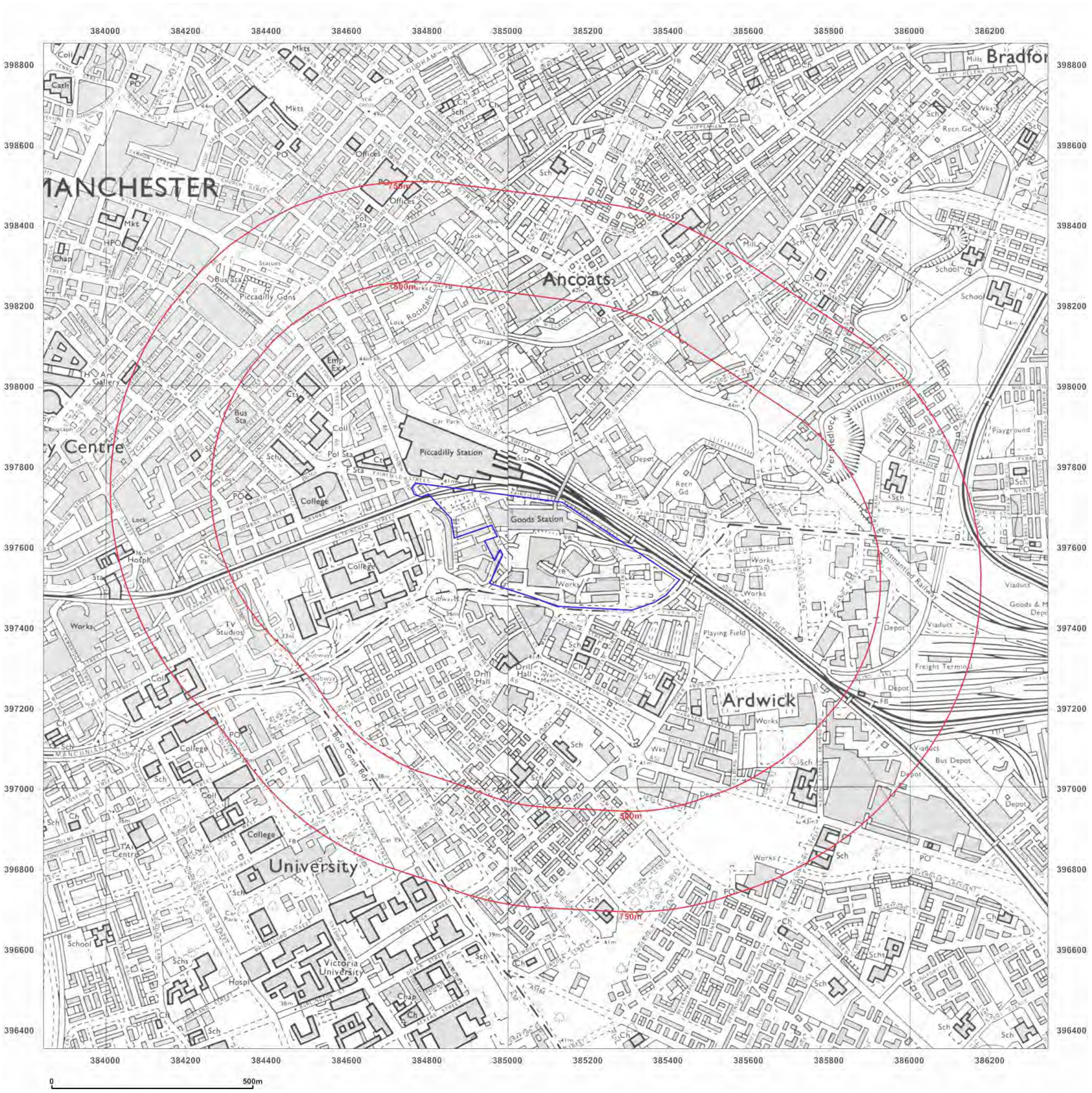
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Client Ref: 035548
Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: National Grid

Map date: **1980-1981**

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Printed at: 1:10,000

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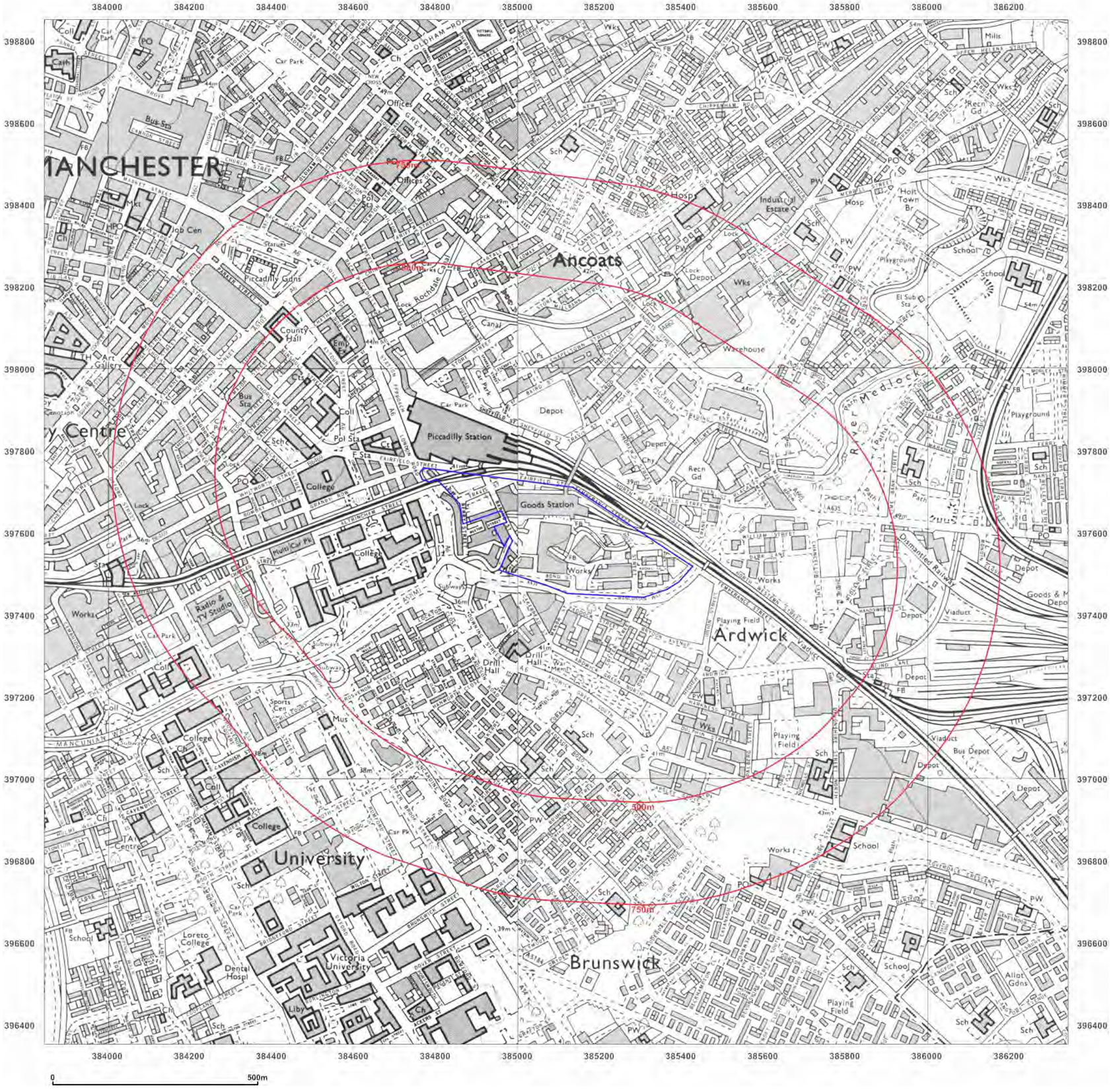
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Client Ref: 035548
Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: National Grid

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Scale: 1:10,000

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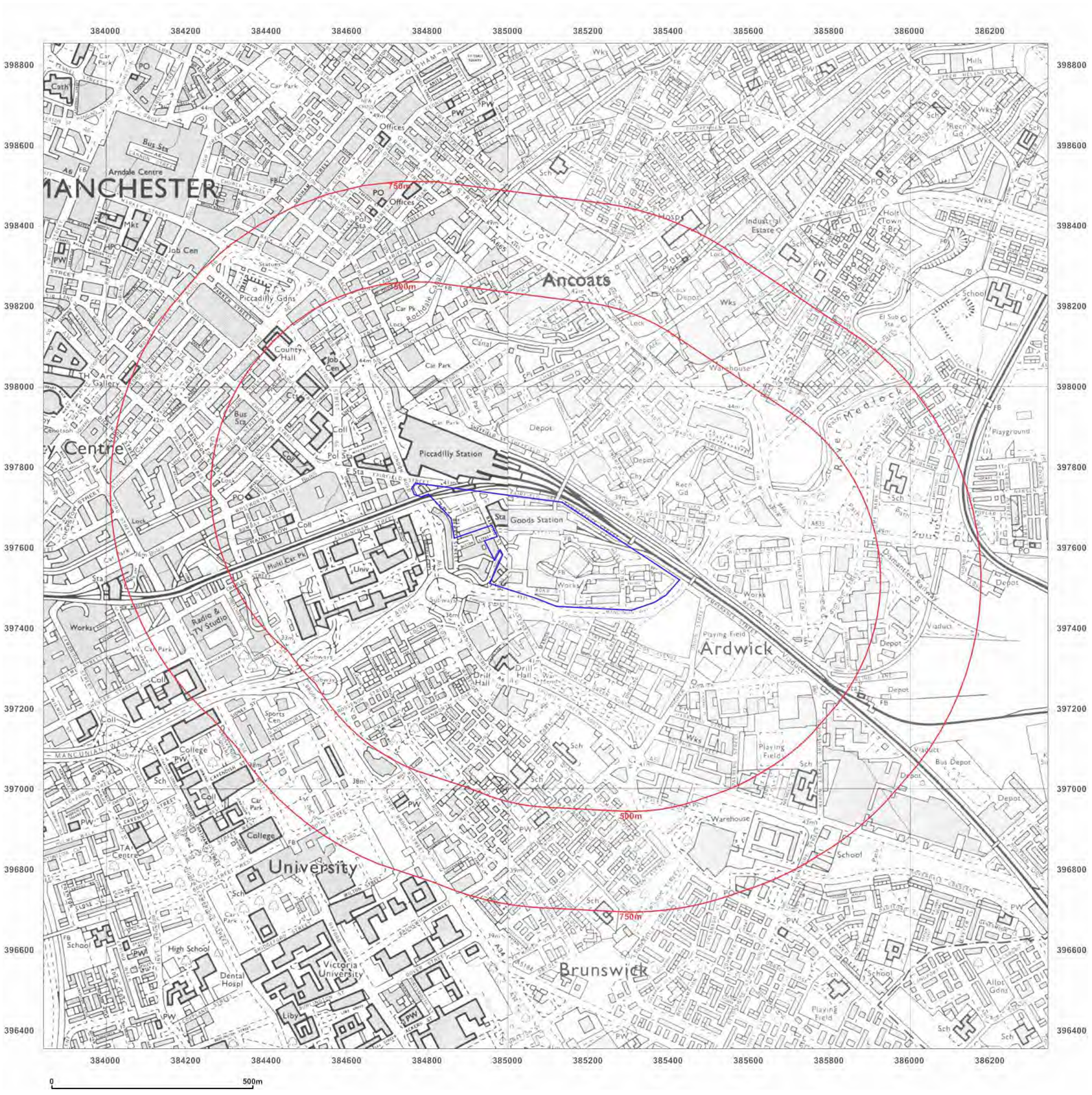
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Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: National Grid

Map date: **1988-1991**

Scale: 1:10,000

Printed at: 1:10,000

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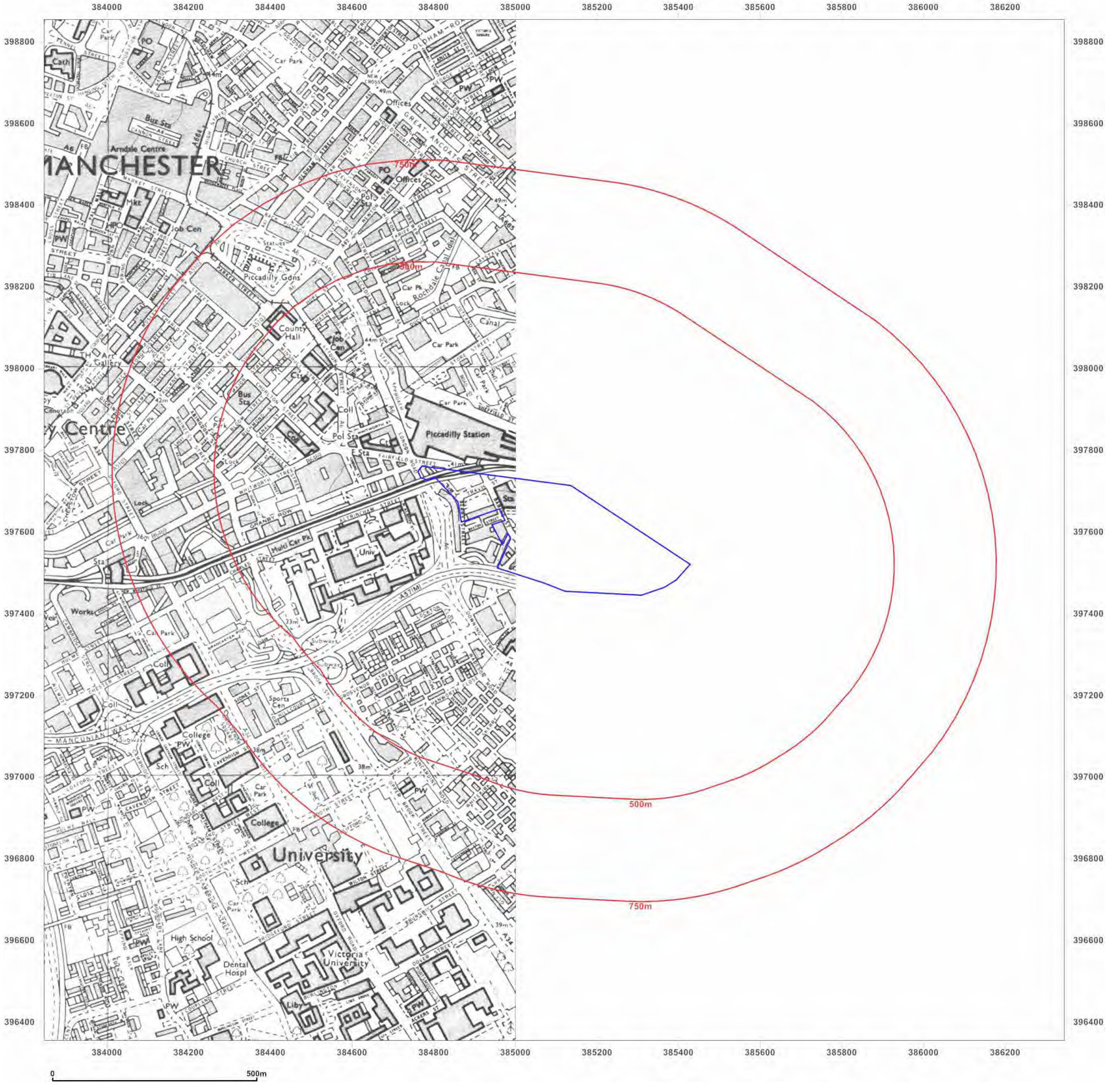
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Map Name: National Grid

Map date: **1994**

Scale: 1:10,000

Printed at: 1:10,000

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Client Ref: 035548
Report Ref: GS-4028401
Grid Ref: 385094, 397604

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

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2002

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Client Ref: 035548
Report Ref: GS-4028401
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Map Name: National Grid

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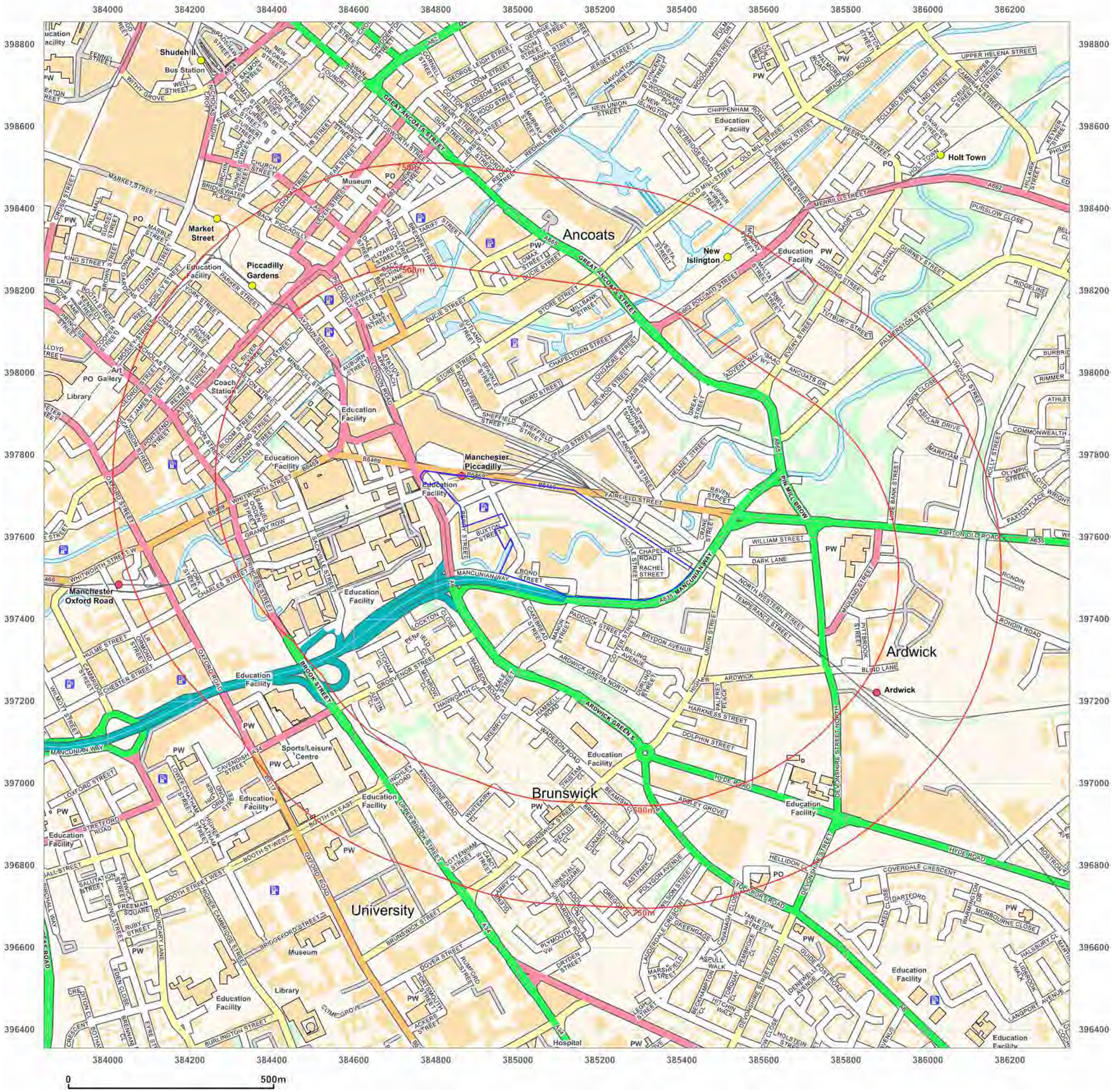
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Map Name: National Grid

Map date: **2014**

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Appendix C BuroHappold Design Note

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BUROHAPPOLD ENGINEERING

Design Note

Project	Mayfield Regeneration Development
Subject	Void underneath Unit 4 car park
Project no	035548
Date	23 June 2017

Revision	Description	Issued by	Date	Approved
00	Issue	JH	23/06/2017	RF

1 Background

At the request of Guy Illingworth of U and I Group a BuroHappold engineer visited the area around Unit 4 at the Mayfield site on the 22/6.2017 to inspect a void that had appeared within their car park in the preceding days. This Design Note provides details of that visit and its findings and includes recommendation for further actions.

2 Site Visit

Identify/record void under car park on site

The purpose of the site visit was to identify and determine the cause of the void under the car park present on site. The void is located approximately 1.50 m away from the Unit 4 Building. The void dimensions are approximately 1.50m x 1.00m (length and width, respectively) however there is a degree of undermining beneath the tarmac. The depth is approximately 1.50m bgl. Within the void, it was noted to comprise Made Ground (brick and concrete). There appears to be a concrete slab underlying the tarmac, approximately 300 – 500mm in thickness, which has a type of mesh within/underneath it (slightly unclear due to viewing distance necessitated by health and safety concerns).

The void in the car park is located at the base of a gentle slope where surface water is likely to flow toward during heavy periods of rainfall (this was confirmed by site staff).

The nearby slot drainage run was tested (water added with a hose) and no evidence of leaks from the drainage was noted into the void, this suggest that the void was not caused by leakage from the slot drain. Site staff suggested that during the winter the greater volumes of rainfall overwhelms the capacity of the drains in the area which leads to overflowing and ponding of water on the tarmac in the area of the void. The undulating nature of the tarmac within much of the northern part of the Unit 4 car park including the area where the void is present suggests that differential settlement of the underlying poorly compacted Made Ground has and possibly is still occurring (best illustrated in image 4 below). This may be in part the cause of the void but it seems likely that the ponding of water in this area may also have contributed to its formation.

In addition to the void, while on site it was recorded that the concrete retaining wall to the northwest of the carpark was bulging and cracking due to possible movement of the material behind the wall (see images 3 and 4), site staff reported that some of the material behind the wall was thought to include asbestos containing materials. The wall is located adjacent to the river and failures within the river wall were noted in the area. It is possible that the wall which is clearly under stress may pose a risk to site users.

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3 Recommendations

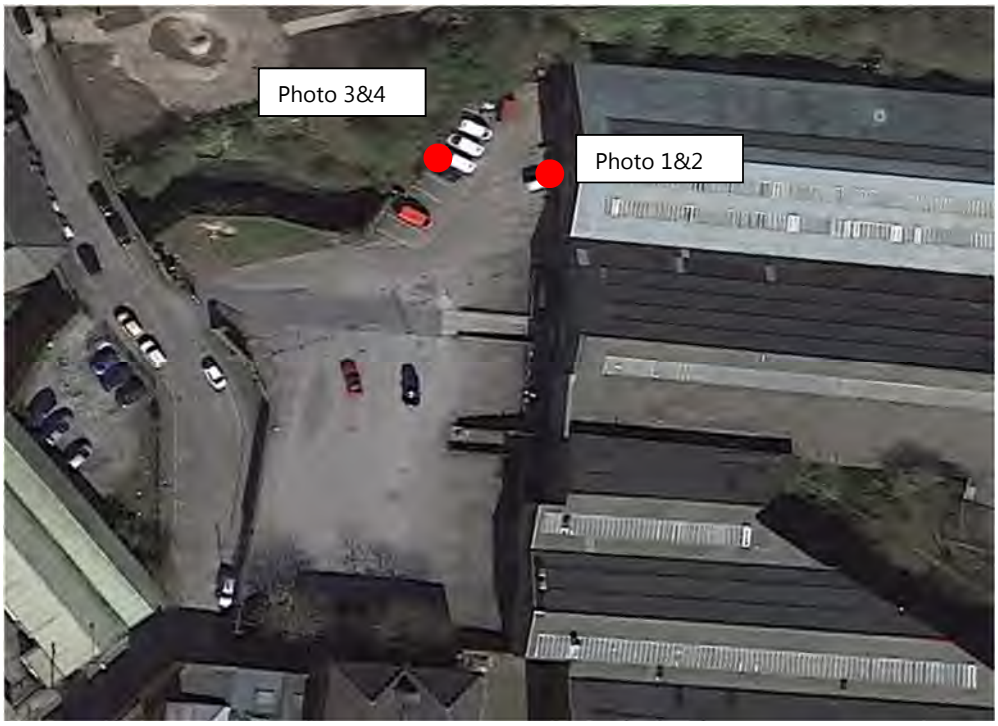
The recommendations are dependent to some degree on the length of time that it is proposed for tenants to remain using Unit 4 and the car park. Should occupation be planned to continue for a number of years these recommendations will need to be revisited following the further onsite inspections recommended.

Retaining wall

- A BuroHappold Structural Engineer to inspect the wall to determine its condition and risk it poses to site users;
- In the interim cars and personnel not to use the area directly next to the retaining wall;
- Following the conclusion of the inspection and information on the intended length of time of use of the area recommendations on either allowing use of the area, maintaining an exclusion zone or introducing supports to the wall to be made.

Void under the car park

- BuroHappold to supervise excavation around area of void to identify any potential features for the likely cause of the void. – Guy Illingworth can provide contractor next week.
- Depending on the proposed use and time period – removing an amount of the Made Ground in the area and replacing with suitable compacted material and reinstatement of a reinforced concrete slab.



Site Location Plan

Images



1. Location of void under car park



2. Void ground profile.



3. Bulging and cracking of retaining wall.



4. Depression in tarmac in front of retaining wall.

Appendix D BGS Historic Borehole Logs

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Nos. 26–40. No vertical sections.

(B10068) Wt. 5086—S111—2,000 6/25 Gp. 160. O.A.

SECTION OF Manholes in M. Sewer **at** Manchester

Maps: One-inch 85 Six-inch 104 S.E. County Lancashire

Height above O.D. Latitude Longitude

Communicated by Manchester Corporation. Date of Sinking

Made by Dip of Strata

SJ 89 NE 16-20/1

			Thickness.		Depth from Surface.	
1. 16	In New York St. opposite Robert St.					
No. 26.	Made ground	SJ 8529 9751	1. 52		1. 52	
			5 —		5 —	
	Soft red sand rock.		2. 44		3. 96	
			8 —		13 —	
	New red sandstone.		7. 62		11. 58	
			25 —		38 —	
2. 17	In Temperance St. under railway.					
	Made ground	SJ 8530 9762	2. 74		2. 74	
			9 —		9 —	
No. 27	Loamy sand		1. 83		4. 57	
			6 —		15 —	
	Sharp sand & fine ballast.		0. 61		5. 18	
			2 —		17 —	
	Sharp sand & rough ballast.		0. 61		3. 79	
			2 —		19 —	
	New red sandstone.		2. 44		8. 23	
			8 —		27 —	
4. 18	In Fairfield St. near St. Andrews St.					
	Made ground	SJ 8535 9769	0. 61		0. 61	
			2		2 —	
	Stiff clay		0. 31		0. 91	
			1 —		3 —	
No. 28	Yellow sand & clay		1. 52		2. 44	
			5 —		8 —	
	Gravel & clay		0. 31		2. 74	
			1 —		9 —	
	Red sand		0. 61		3. 35	
			2 —		11 —	
	New red sandstone		5. 94		9. 30	
			19 6		30 6	
5. & 6. 19 & 19A	In Helme St.	SJ 8530 9776				
5.	Made ground 8ft.	2.44	1. 37		1. 37	
6.			4 6		4 6	
	New red sandstone 8ft to 31ft.	9.45	0. 61		1. 98	
No. 30.	Rough ballast		2 —		6 6	
			7. 32		9. 30	
	New red sandstone		24 —		30 6	
		SJ 8551 9704				
No. 31	Made ground 21ft.	6.40				
7. 20	Loamy sand & soil 10ft.	3.05 9.45				
	to 31ft.					
No. 32.	Made ground 22ft.	6.71				
8. 20A	New red sandstone 5ft to 27ft.	1. 52 8.23				

(621) WT. 33 S.33 2000 6/22 Gp. 147 M.R.Co.,Ltd.

27

SECTION OF Manholes in Sewer, cont. SJ 89 NW 12 - 15 2

Maps: One-inch ..... Six-inch 104 S.E.W County Lancashire.

Height above O.D. ..... Latitude ..... Longitude .....

Communicated by ..... Date of sinking .....

Made by ..... Dip of Strata .....

		Thickness.			Depth from Surface.		
		METRES.			METRES.		
12	No. 6. Corner of Jackson St. & Temple St.						
	Soil	0·61	2	-	0·61	2	-
	Coloured sandy silt.	2·44	8	-	3·05	10	-
	Red sand rock.	3·05	10	-	6·10	20	-
13	No. 7. Near Jackson Street Bridge.						
	Filling	0·91	3	-	0·91	3	-
	Clayey Marl.	1·98	6	6	2·90	9	6
	Ballast.	0·61	2	-	3·51	11	6
	Red sand rock.	1·98	6	6	5·49	18	-
14	No. 8. Near London Road – Buxton St. corner.						
	Filling	2·13	7	-	2·13	7	-
	Old roadway.	0·61	2	-	2·74	9	-
	Red sand rock.	3·96	13	-	6·71	22	-
15	No. 10. Corner of Boardman Road & Buxton St.						
	Filling	1·52	5	-	1·52	5	-
	Red sand rock.	6·10	20	-	7·62	25	-

SJ89NW17

29 No. 20. No retained

(B11857) Wt. 17855 [illegible]

SEOTION OF Borehole No 87 **at** Corner of Jackson St. & Downing St, Ch. Manch.

Maps: One-inch 85 Six-inch 104 S.E.? County Lancs.

Height above O.D. Latitude Longitude

Communicated by Manchester Corporation [B.H.97] Date of Sinking

Made by Dip of Strata

	Thickness.			Depth from Sur
	Metres			Metres.
Filling	2.29	7	6	2.29
Old Roadway	0.46	1	6	2.74
Red sand rock	3.96	13	-	6.71

30 No. 21. No vertical section.

SJ 89 NW 18

7) Wt. 17852—8154—5,000. 12/26 Gp. 160. O.A.

SEOTION OF Sewer Shaft at Corner of Travis St. & London Rd. Manchester

Maps: One-inch 85 Six-inch 104 S.E.W County Lancashire.

Height above O.D. Latitude Longitude

Communicated by Manchester Corporation Date of Sinking

Made by Dip of Strata

	Thickness.			Depth from Surface.		
	Metres			metres		
Filling	0·46	1	6	0·46	1	6
Old roadway	0·31	1	-	0·76	2	6
Gravel	0·76	2	6	1·52	5	-
Red sandstone	8·53	28	-	10·06	33	-

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Appendix 10.3 Ground Investigation (REC, 2019)

REC
a spectris company

PHASE II GEO-ENVIRONMENTAL AND GEOTECHNICAL ASSESSMENT

PLOTS N + O MAYFIELD, BARING STREET, MANCHESTER

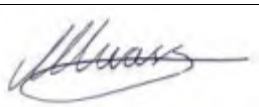
REC REFERENCE: 106841P2R0

REPORT PREPARED FOR: CIVIC ENGINEERS LTD

DATE: APRIL 2019



DELIVERING ENVIRONMENTAL AND RISK MANAGEMENT SOLUTIONS

Issue/revision	Issue 1	Revision 1	Revision 2
Remarks	-		
Date	30.04.2019		
Prepared by	C.Lima		
Signature			
Position	Consultant		
Checked by	R.Hodkin		
Signature			
Position	Senior Consultant		
Verified by	M.Lucass		
Signature			
Position	Associate Director		
Project Number	1CO106841		

EXECUTIVE SUMMARY	
Site Address	Plots N + O, Mayfield, Baring Street, Manchester
Grid Reference	385008, 397501
Site Area	0.68 hectares
Environmental Setting	**Geology / Hydrogeology:** Alluvium/ Diamicton Till underlain by Chester Formation sandstone. The site is underlain by a secondary (undifferentiated) aquifer in the drift, overlying a principal aquifer within the solid geology.
Intrusive Ground Investigation	
Ground Conditions	**Made Ground:** Typically composed of cement or tarmacadam (approximately 0.08m to 0.15m thick) overlying a sub base of white concrete, sandstone cobbles or brick (to approximately 0.20mbgl). Lower levels of made ground are composed of brown, locally reddish brown, gravelly sand with high cobble content and soft, brown, locally reddish brown, gravelly sand clay (to maximum depth of 5.50mbgl). **Superficial:** Soft grey to very dark brown slightly gravelly sandy clay. **Bedrock:** Sandstone was encountered at approximately 4m bgl and becoming competent from 7.7m bgl. **Groundwater:** Groundwater was encountered between 3.25m and 7.03m.
Geotechnical Assessment	
Foundation Options	**Foundations:** Given the size of the development it is recommended that a piled foundation solution is utilised and that piles are socked within the underlying solid geology. Preliminary socket capacities indicate competent bearing strata. Foundation design should be undertaken by a specialist contractor.
Sulphate Assessment	Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).
Developed Conceptual Site Model (CSM)	
Human Health The Tier II Human Health Risk concluded that the screening values were only exceeded in a single sample of shallow materials in CPBH02. This coincided with a PID reading in the same stratum. However, as the proposed development will include hardstanding in this area, this will effectively break the pollutant linkage. **Ground Gas** After 2 No. ground gas monitoring visits the site is characterised as Characteristic Situation 1 indicating that no ground gas mitigation measures are required.	
Recommendations	
No further works are recommended with respect to land contamination. It is recommended that plate testing is undertaken to confirm CBR values for roads and pavements given the variable ground conditions identified.	

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Drawing No. 106841-002 – Exploratory Hole Location Plan
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Appendix VII Monitoring results
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1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants Ltd (REC) has been commissioned by Civic Engineers Ltd to undertake an intrusive Geo-Environmental and Geotechnical site investigation at Plots N+O, Mayfield, Baring Street, Manchester, M1 2PY.

1.2 Proposed Development

The proposed development at Plots N+O includes:

- Plot N - a maximum 13-storey car park structure with integrated substation and energy centres; and
- Plot O - a maximum 8-storey office building with ground floor commercial/ communal space.

1.3 Previous Reports

REC has previously produced the following reports for the site:

- Phase 1 Geo-Environmental Assessment, REC Reference: 106841p1r1, dated March 2019.

This report identified a number of potential on-site and off-site sources of contamination, and recommended that a Phase II Site Investigation is undertaken. This report has been designed to supplement the previous reports and should be read in conjunction with it.

1.4 Objectives & Scope

The objectives of the geo-environmental and geotechnical investigation are to:

- Undertake an intrusive investigation with sampling and analysis to provide an overview of potential environmental issues;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
- Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and
- Provide recommendations regarding future works required.

The initial scope of the required intrusive investigation, supplied by the Client and dated 7th January 2019, comprised 5no. boreholes to up to 25m bgl, trial pitting including to expose existing foundations, and 4no. windowless sample boreholes. Due to obstructions on site, it was not possible to access one of the boreholes and this was removed from the scope as agreed with the Client.

The cable percussion with rotary follow-on boreholes were installed in order to monitor groundwater and gas monitoring. The scope of works also comprised targeted chemical and geotechnical laboratory analysis and interpretive reporting.

1.5 Confidentiality and Limitations

REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC. The limitations of this report are presented in Appendix I.

2.0 SITE SETTING

2.1 Site Details

Site details are included within Table 2.1 below. All acronyms used within this report are defined in the Glossary presented in Appendix II. A site location plan drawing No 106841-001 is presented in Appendix III.

Table 2.1 Key Site Details

Site Address	Plots N + O, Mayfield, Baring Street, Manchester
National Grid Reference	385008, 397501
Site Area	0.68 hectares

The site is a rectangular shaped parcel of land located east of Baring Street in Manchester and is currently divided by a brick wall (roughly in the centre of the site, running east to west). The northern section is a disused industrial building with car park area. River Medlock is located at the north boundary of the site.

The southern section of the site is mainly occupied by industrial buildings which are currently undergoing demolition. A fenced enclosure is present in the southwest corner. A cobbled access road is located to the south boundary of the site.

2.2 Geology & Hydrogeology

As detailed in the Phase I report, the British Geological Survey (BGS) maps and GeoIndex indicate that the site is underlain by the following geological sequence:

Table 2.2 Geological Setting

Geological Unit	Classification	Comments	Aquifer Classification	Permeability	Sensitivity
Made Ground	Artificial Deposit	Site Wide	n/a	n/a	n/a
Superficial (local)	Alluvium (Clay, Silt, Sand and Gravel)	Mapped only along southern edge of site.	Secondary (undifferentiated)	Low	Low
Superficial (local)	Till – Diamicton	Mapped only along northern edge of site.	Secondary (undifferentiated)	Low	Low
Bedrock	Chester Formation (Sandstone)	Site Wide	Principal	High	High

No active groundwater abstractions have been identified within a 2km radius of the site. No surface or potable water abstractions are located within 1km of the site and it is not within a Source Protection Zone (SPZ). The River Medlock, located to the north boundary of the site, is the nearest water body to the site.

3.0 SITE INVESTIGATION

3.1 Desk Study Information

Potential contamination sources have been identified from the desk study and these are listed in Table 3.1 below. A full Conceptual site model (CSM) is provided within the Phase I Geo-Environmental Site Assessment (REC Reference: 106841p1r1, dated March 2019).

Table 3.1 Summary of Potential Contaminant Sources

On-Site / Off-Site	Potential Source	Potential Contaminants	Potential Impact
On-site	Made ground from development and demolition of historical structures	Chemical contamination; asbestos fibres	Human health, controlled waters and buildings
Off-site	Historical adjacent land use including dye works, a tannery and rubber works; various active factories and works identified in the vicinity of the site	Chemical contamination	Human health, controlled waters and buildings

3.2 Site Investigation Rationale

The ground investigation scope was refined based on the findings of the desk study with a sampling strategy designed determine general conditions across the site to confirm the CSM. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was undertaken between the 11th and 20th March 2019. The works are summarised in Table 3.2, below. Due to shallow obstructions and difficult drilling conditions, a number of locations were terminated and relocated. An Exploratory Hole Location Plan (ref. 106841-002) is presented in Appendix III).

Table 3.2 Summary of Fieldwork

Location	Potential Source / Rationale	Type	Maximum Depth (m bgl)	Monitoring Wells Response Zone
WSBH01 – WSBH04	General shallow ground conditions, ground gas and groundwater	Window Sample Borehole	5.00	1.00 - 5.00 (WSBH04 only)
TP01 – TP06	Ground conditions / In-Situ Testing	Trial Pit Excavation	2.10	N/A
CPBH01	General shallow ground conditions, ground gas and groundwater	Cable Percussion with rotary follow-on	20.00	5.00 – 16.00
CPBH02	General shallow ground conditions, ground gas and groundwater	Cable Percussion with rotary follow-on	20.00	4.00 – 19.00

Location	Potential Source / Rationale	Type	Maximum Depth (m bgl)	Monitoring Wells Response Zone
CPBH03	General shallow ground conditions, ground gas and groundwater	Cable Percussion	0.40	N/A
CPBH03A	General shallow ground conditions, ground gas and groundwater	Cable Percussion with rotary follow-on	25.00	6.00 – 19.00
CPBH04	General shallow ground conditions, ground gas and groundwater	Cable Percussion	1.60	N/A
CPBH04A	General shallow ground conditions, ground gas and groundwater	Cable Percussion	0.65	N/A
CPBH04B	General shallow ground conditions, ground gas and groundwater	Cable Percussion with rotary follow-on	20.00	5.50 - 19.00
CPBH05	General shallow ground conditions, ground gas and groundwater	Cable Percussion	0.90	N/A

Notes
m bgl – metres below ground level.

All samples were collected using appropriate personal protective equipment (PPE) and sampling equipment that was cleaned at each sampling location. A detailed copy of REC sampling methodology, quality assurance (QA) procedures and laboratory chain of custody forms can be provided upon request.

3.3 In-Situ Testing

3.3.1 Hand Shear Vanes

In-situ geotechnical testing was carried using a hand shear vane within fine grained deposits. The results of the in-situ testing are presented on the exploratory hole logs in Appendix IV, summarised in Section 4 and discussed in 6 of this report.

3.3.2 Standard Penetration Tests

Standard Penetration Tests (SPT) were carried out in all window sample and cable percussion borehole locations at 1m intervals to the top of the bedrock. The testing was carried out to provide validation of ground consistency, strength observations and hand shear vane test results. The results of the in-situ testing are presented on the exploratory hole logs in Appendix IV, summarised in Section 4 and discussed in 6 of this report.

3.3.3 Photo-Ionization Detector (PID) results

Photo-ionization detection (PID) tests were carried out on samples retained from the Made Ground and Superficial Deposits at 0.5m intervals and localised in samples containing visual and olfactory

evidence of contamination. The PID is used to qualitatively record volatile organic compound concentrations. The results of the PID tests are presented on the exploratory hole logs in Appendix IV and discussed in Section 4.

3.4 Soils Laboratory Analysis

Selected soil samples were submitted for a range of chemical analyses comprising, metals, pH, total sulphate, water soluble sulphate, sulphide, cyanide, phenols, total and speciated poly-aromatic hydrocarbons (PAHs), asbestos identification, total organic carbon (TOC), banded total petroleum hydrocarbons (TPH) and BTEX.

Concept Life Sciences of Manchester undertook the analytical work, the results of which are included in Appendix VI and discussed in Section 5.

3.5 Geotechnical Laboratory Analysis

Selected soil samples were submitted to Professional Soil Laboratories (PSL) Ltd of Doncaster, where the following geotechnical tests were undertaken:

- 2 No. BRE SD1 Short Suite;
- 2 No. Atterberg Limits Determinations,
- 12 No. Unconfined Compressive Strength;
- 12 No. Point Load tests, and;
- 1 No. Particle Size Distribution.

The results of the geotechnical testing are presented in Appendix V, summarised in Section 4 and used for the geotechnical assessment given as Section 6.

3.6 Gas and Groundwater Monitoring

REC was instructed to undertake a total of two monitoring visits within a one-month period following the intrusive phase of site works. Gas and groundwater monitoring was undertaken on the 28th March and 9th April 2019.

Concentrations of methane (CH_4), carbon dioxide (CO_2), oxygen (O_2), hydrogen sulphide (H_2S) and carbon monoxide (CO) were measured using an infra-red gas analyser (GFM436), calibrated to a reference standard (before and after each survey). Gas flow rates were measured using an attached flow pod. Gas measurements were recorded for a minimum of sixty seconds at each location, and until concentrations had stabilised, at which point the maximum concentration of CH_4, CO_2, H_2S and CO together with the lowest concentration of O_2 were recorded.

Groundwater monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free phase hydrocarbon product, if present.

The recorded groundwater levels are summarised as Section 4.2. Ground gas and groundwater monitoring results are presented in Section 4.3. Ground gas results are discussed as Section 5.2.

4.0 GROUND AND GROUNDWATER CONDITIONS

4.1 Ground Conditions

The ground investigation generally confirms the published geology and identifies the strata set out in Table 4.1 below.

Table 4.1 Summary of Strata

Strata	Typical Description	Min Depth to Top of Strata (mbgl)	Max Depth to Top of Strata (mbgl)	Max Thickness (m)
Made Ground	Tarmacadam / Concrete	Ground Level	Ground Level	5.50
	Granular made ground: white concrete gravel; light brown, very sandy gravel; dark brown, gravelly fine to medium sand.	0.08	2.80	
	Cohesive made ground: brown to dark brown, sandy, slightly gravelly to gravelly clay.	Ground Level	2.40	
Cohesive natural ground	Soft grey and brown to very dark brown slightly gravelly sandy clay.	1.50	2.80	2.50
Granular natural ground	Brown and multi-coloured slightly sandy gravel and gravelly sand	3.00	4.00	>2.00
Bedrock (Sandstone)	Red sandstone	3.30	5.50	Unproven (>20m)

An Exploratory Hole Location Plan (ref. 106841-002) is presented in Appendix III).

4.1.1 Made Ground

Made Ground was encountered at surface across the site and found to be heterogeneous. The stratum comprised clay, sand, gravel and cobbles in varying proportions. Gravel was angular to rounded fine to coarse brick, concrete, limestone (road stone), sandstone and coal, with infrequent ceramic, slate and oxidised iron objects.

Soils were screened at regular intervals with a PID in order to test for the presence of Volatile Organic Compounds (VOCs) within the stratum. Results of the PID screening have been given on the exploratory hole logs presented in Appendix IV.

4.1.2 Superficial Deposits

Superficial deposits were encountered to maximum depth of >5.00m bgl (WSBH04) and generally comprised granular material. The granular deposits were described as brown to multi-coloured slightly sandy gravel and gravelly sand.

Cohesive material was encountered in 5no. locations to a maximum depth of 2.4m bgl. The cohesive deposits were described as soft grey and brown to dark brown sandy, slightly gravelly to gravelly clay. Hand shear vane tests were undertaken within suitable cohesive soils.

No visual or olfactory evidence of contamination was identified within this stratum during the works.

4.1.3 Solid Geology (Chester Formation)

Bedrock was proven in all cable percussive boreholes where sufficient penetration was achieved, with rotary follow on boreholes completed to allow for coring of solid geology. This stratum comprised red sandstone. Competent rock was encountered from circa 7.7m bgl. Sections of no recovery were identified within all locations

4.2 Foundation Inspection pits

2No. Foundation Inspection Pits were advanced to identify foundations of existing buildings (locations TP01 and TP02). A further 4No. trial pits were advanced in the north area of the site to identify the nature of possible redundant foundations from a previous building onsite. Foundation pit drawings are included within Appendix II (ref. 106841 – 003 and 106841 – 004).

A small raft was encountered in TP01 at 0.08m bgl and, in TP02, a strip foundation (0.30m thick) was identified at 0.85m bgl.

4.3 Soil Consistency

The natural clay was found to be low strength and varying consistency. Results of the Standard Penetration Tests, including undrained shear strengths derived from SPTs are presented on the exploratory hole logs in Appendix IV.

Natural clays were identified in CPBH01 and CPBH02, to the south boundary of the site. The natural materials in CPBH01 were found to have higher composition of granular secondary components in its matrix. Granular materials in CPBH01 at 4.00 are of medium density. The clay in CPBH01 was logged as a very stiff clay and in CPBH02 as a soft clay. Geotechnical results are consistent with these descriptions.

4.4 Soil Plasticity

The Atterberg Limits determination of a single sample of clay, summarised as Table 4.2, shows the fine grained natural soil to be of low to intermediate plasticity.

Table 4.2 Summary of Plasticity Index Test Results

Location	Depth (mbgl)	Natural Moisture Content (%)	Plastic Limit (%)	Liquid Limit (%)	Plasticity Index (%)	Percentage passing 425µm sieve (%)	Modified Plasticity Index (%)	Plasticity	Volume Change Potential
CPBH02	2.90	27	19	37	18	100	18	Low	Low

4.5 Particle Size Distribution

A single sample of coarse grained material was scheduled for Particle Size Distribution by wet sieve analysis. Results are presented in Appendix VI and summarised as Table 4.3. The test carried out on representative soils confirmed on-site engineer's descriptions.

Table 4.3 Summary of Particle Size Distribution by Wet Sieve Analysis Tests

Location	Depth (mbgl)	Stratum	Granulometric Composition (%)			
			Cobbles	Gravel	Sand	Silt / Clay
WSBH04	4.00 – 4.70	Alluvium	0	2	77	21

4.6 pH and Sulphate

Chemical analyses for pH and soluble sulphate content, with results summarised as Table 4.4 (testing certificate given in Appendix V), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).

Table 4.4 Summary of pH and Sulphate Data

Location	Depth (mbgl)	Stratum	pH Value	Sulphate Aqueous Extract as SO_4 (g/l)	Concrete Classification
WS104	0.10	Made Ground	6.6	<0.1	DS-1 AC-1s
WS03	0.10		6.6	<0.1	DS-1 AC-1s
CPBH04	0.10		8.1	<0.1	DS-1 AC-1s
TP02	0.10 - 0.20		9.0	<0.1	DS-1 AC-1s
CPBH03	0.20		8.7	<0.1	DS-1 AC-1s
CPBH01	0.20 - 0.25		9.9	<0.1	DS-1 AC-1s
TP03	0.20 - 0.30		8.9	<0.1	DS-1 AC-1s
CPBH03A	0.20 - 0.30		7.6	<0.1	DS-1 AC-1s
TP01	0.20 - 0.30		9.5	0.1	DS-1 AC-1s
TP104	0.30 - 0.35		10.2	<0.1	DS-1 AC-1s
CPBH05	0.40		10.3	<0.1	DS-1 AC-1s
WSBH02	0.40		8.7	<0.1	DS-1 AC-1s
TP05	0.50 - 0.60		8.3	<0.1	DS-1 AC-1s
WS02	0.50 - 0.60		9.9	<0.1	DS-1 AC-1s
WS104	0.50 - 0.60		9.7	0.2	DS-1 AC-1s
WS101	0.60		8.8	0.1	DS-1 AC-1s
CPBH04	0.60 - 0.70		8.9	0.2	DS-1 AC-1s
WSBH01	0.60 - 0.70		9.8	<0.1	DS-1 AC-1s
CPBH04B	0.70		8.2	<0.1	DS-1 AC-1s
TP04	0.70 - 0.80		8.6	<0.1	DS-1 AC-1s
CPBH01	1.50 - 1.70	Alluvium	7.9	<0.1	DS-1 AC-1s
CPBH02	1.70 - 1.80	Glacial Till	7.4	<0.1	DS-1 AC-1s
CPBH02	2.50 - 2.60		8.1	0.1	DS-1 AC-1s
CPBH02	3.00 – 3.45		7.2	0.018	DS-1 AC-1s
WSBH04	3.20 - 3.30	Alluvium	8.3	<0.1	DS-1 AC-1s
CPBH01	5.00 – 5.45	Sandstone	7.9	<0.001	DS-1 AC-1s

4.7 Photo-Ionization Detector (PID) results

PID readings above the limit of detection were recorded in samples from CPBH02 and CPBH04. The highest concentration encountered was 10.7ppm at 0.20mbgl in CPBH02, which is relatively low. A sample from this location was submitted for laboratory chemical testing. Results of chemical testing are given and discussed as Section 5.1.

4.8 Groundwater Conditions

Groundwater was not recorded during drilling of any of the exploratory hole locations. During the return monitoring visits, groundwater was recorded at depths ranging between 3.25m bgl to 7.60m bgl (see Table 4.5).

4.9 Ground Gas

Ground gas response zones were installed to target natural soils and deep made ground (WSBH04). The results of the ground gas and groundwater monitoring are presented in Table 4.5.

Table 4.5 Summary of ground gas and groundwater monitoring results

Location	Date	CH_4 Max %v/v	CH_4 Steady %v/v	CO_2 Max %v/v	CO_2 Steady %v/v	Low O_2 %v/v	Flow Max (l/hr)	Flow Steady (l/hr)	Response Zone (mbgl)	Depth to Base (mbgl)	Depth to Water (mbgl)
WSBH04	28/03/19	<0.1	<0.1	3.3	3.3	13.8	0.1	0.1	1.00 – 5.00	5.0	3.2
	09/04/19	<0.1	<0.1	3.2	3.2	14.5	0.1	0.1		5.0	3.3
CPBH01	28/03/19	<0.1	<0.1	<0.1	<0.1	19.7	0.1	0.1	5.00 – 16.0	15.6	6.8
	09/04/2019	Not possible to monitor as position is under demolition rubble									
CPBH02	28/03/19	<0.1	<0.1	0.7	<0.1	18.7	0.1	0.1	4.00 – 19.0	18.4	7.3
	09/04/19	<0.1	<0.1	0.6	0.1	18.8	0.1	0.1		18.4	7.6
CPBH03A	28/03/19	<0.1	<0.1	0.1	<0.1	19.6	0.1	0.1	6.00 – 20.0	18.9	5.8
	09/04/19	<0.1	<0.1	<0.1	<0.1	20.2	0.1	0.1		18.9	5.9
CPBH04B	28/03/19	<0.1	<0.1	0.4	0.1	18.7	0.2	0.1	5.00 – 20.0	18.9	5.3
	09/04/19	<0.1	<0.1	0.7	<0.1	19.2	0.1	0.1		18.9	5.4

5.0 TIER II GENERIC QUANTITATIVE CONTAMINATED LAND RISK ASSESSMENT

REC has undertaken a Tier II qualitative risk assessment to determine if any potential contaminants within the underlying soils pose an unacceptable level of risk to the identified receptors.

5.1 Human Health Risk Assessment

At a Tier II stage, the long term (chronic) toxicity risk to human health is assessed by utilising appropriate and conservative generic assessment criteria (GAC) to determine whether there are actual or potential unacceptable risks at the site and if any viable pollutant linkages are present.

To undertake the Tier II assessment within the context of the development proposal, REC has determined that the most appropriate GAC values available will be those based upon a commercial end use. A conservative 1.0% has been used for initial screening purposes.

The following assessment, summarised below and overleaf in Table 5.1, has primarily adopted the S4UL (Suitable for Use Levels reference values published by LQM/CIEH in 2015, the S4ULs). Currently, no published GAC value is available for cyanide and therefore REC has utilised the Environment Agency Contaminated Land Exposure Assessment Tool (CLEA v1.06) to derive the relevant GAC for this proposed land use. Due to the absence of a published lead GAC for direct use within the planning regime, the 2014 Defra C4SL (Category 4 Screening Level) has been used as this value is considered to incorporate the latest toxicological, bioaccessibility and exposure modelling research to date.

Table 5.1 Summary of Human Health Toxicity Assessment for a Commercial End (1.0% SOM)

Determinand	Units	GAC	GAC Source	n	[mc]	Location / Strata	Primary Pathway	Assessment
Inorganics								
Arsenic	mg/kg	640	(i)	16	1100	CPBH04 @ 0.1m / MG	1	See Discussion
Cadmium	mg/kg	190	(i)	16	4	N/A	1	No Further Action
Chromium (VI)	mg/kg	33	(i)	16	<1		1	
Lead	mg/kg	2330	(iv)	16	1500		1	
Mercury [Inorganic]	mg/kg	1100	(i)	16	<1		1	
Nickel	mg/kg	980	(i)	16	54		1	
Selenium	mg/kg	12000	(i)	16	<3		1	
Copper	mg/kg	68000	(i)	16	680		1	
Zinc	mg/kg	730000	(i)	16	830		1	
Cyanide [Total]	mg/kg	1200	(v)	16	<1		1	
Asbestos	-	D.	-	16	N.D			
Organics – PAHs and Phenol								
Phenols	mg/kg	760	(ii)	16	<1	N/A	5	No Further Action
Naphthalene	mg/kg	190	(ii)	16	15		4	
Acenaphthylene	mg/kg	83000	(ii)	16	1.2		1	
Acenaphthene	mg/kg	84000	(ii)	16	42		1	
Fluorene	mg/kg	63000	(ii)	16	27		1	
Phenanthrene	mg/kg	22000	(ii)	16	100		1	
Anthracene	mg/kg	520000	(ii)	16	40		1	
Fluoranthene	mg/kg	23000	(ii)	16	81	N/A	1	

Determinand	Units	GAC	GAC Source	n	[mc]	Location / Strata	Primary Pathway	Assessment
Pyrene	mg/kg	54000	(ii)	16	72		1	No Further Action
Benzo(a) Anthracene	mg/kg	170	(ii)	16	39		1	
Chrysene	mg/kg	350	(ii)	16	36		1	
Benzo(b) Fluoranthene	mg/kg	44	(ii)	16	38		1	
Benzo(k) Fluoranthene	mg/kg	1200	(ii)	16	24		1	
Benzo(a)Pyrene	mg/kg	35	(ii)	16	42	CPBH02 @ 0.2m / MG	1	See Discussion
Indeno (123-cd)Pyrene	mg/kg	500	(ii)	16	26	N/A	1	No Further Action
Dibenzo(a,h) Anthracene	mg/kg	3.5	(ii)	16	12		1	
Benzo(ghi) Perylene	mg/kg	3900	(ii)	16	28		1	
Organics – TPHs								
TPH C_5-C_6	mg/kg	3200	(iii)	16	<0.10	N/A	4	No Further Action
TPH C_6-C_8	mg/kg	7800	(iii)	16	<0.10		4	
TPH C_8-C_{10}	mg/kg	2000	(iii)	16	0.23		4	
TPH C_{10}-C_{12}	mg/kg	9700	(iii)	16	57		4	
TPH C_{12}-C_{16}	mg/kg	36000	(iii)	16	700		1, 4	
TPH C_{16}-C_{21}	mg/kg	28000	(iii)	16	2500		1	
TPH C_{21}-C_{35}	mg/kg	28000	(iii)	16	5000		1	
Poly Chlorinated Biphenyls (PCBs)								
All species	µg/kg	LOD	-	1	<10	N/A	1	No Further Action

Key
[mc] Maximum Concentration Recorded
D. Detected
N.D. None Detected (Limit of Detection = <0.0001%)

Primary Pathways
1 Ingestion of soil and indoor dust and / or oral background exposure;
2 Consumption of home-grown produce and attached soil;
3 Inhalation of dust (background and indoor);
4 Inhalation of vapour (background and indoor);
5 Direct dermal / skin contact.

Generic Assessment Criteria (GAC) Source
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);
(ii) S4UL – Conservative Assessment Approach of 1% SOM;
(iii) S4UL –1% SOM and assumed worst case aliphatic / aromatic compound;
(iv) Defra Category 4 Screening Level (2014);
(v) CLEA 1.06 Derived Value.

Referring to Table 5.1, the results of this direct comparison indicates that the screening values have been exceeded for a single determinand in two separate samples. These samples were obtained from shallow soils beneath areas proposed to be used for car parking. The exceedance in PAH coincides with a PID reading of 10.7 at 0.20m bgl in CPBH02.

5.2 Ground Gas

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007) and CL:AIRE Research Bulletin 17 (*A Pragmatic Approach to Hazardous Ground Gas Risk Assessment*, 2012) (RB17).

Slightly elevated concentrations of carbon dioxide were recorded on two monitoring visits in WSBH04, where a maximum concentration of 3.3 %v/v of carbon dioxide was recorded. Flow rates were 0.1 l/hr.

In accordance with the methodology outlined with BS 8485:2015 + A1:2019, REC has utilised the results of the ground gas monitoring surveys to calculate a tentative Gas Screening Value (GSV). This is given as Table 5.2.

Table 5.2 Summary of Hazardous Gas Flow Rates

Max Flow Rate (L/hr)	Maximum CH_4 (%)	Maximum CO_2 (%)	CH_4 Qhg (L/hr)	CO_2 Qhg Rate (L/hr)	Implied CH_4 CS	Implied CO_2 CS
0.1	<0.1	3.3	0.0001	0.0033	**1**	**1**

CS : Characteristic Situation
Qhg : Hazardous gas flow rate

No specialist gas protection measures would be required for a site meeting Characteristic Situation 1.

5.3 Revised Conceptual Site Model

The conceptual site model has been revised in light of the ground investigation and the chemical analysis results presented the previous sections. The revised conceptual site model (Table 5.3 overleaf) has been developed for the proposed future land use based upon the current understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors.

Table 5.3 Revised Conceptual Site Model

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood of Occurrence	Severity	Overall Risk Rating	Active / Inactive
On-Site							
Made Ground in relation to historic development	Heavy Metals	Dermal contact, ingestion or inhalation of soils	Future site users	Unlikely	Minor	Very Low	**Inactive** – No unacceptable risk identified
		Inhalation of site generated dusts	Adjacent residents	Unlikely	Minor	Very Low	
	Total Petroleum Hydrocarbons (TPH)	Inhalation of vapours or dermal contact, ingestion or inhalation of soils	Future Site Users	Unlikely	Mild	Low	
			Adjacent residents	Unlikely	Mild	Low	
		Leaching to groundwater, vertical and lateral migration.	Groundwater aquifers	Unlikely	Minor	Very Low	
	Poly-Aromatic Hydrocarbons (PAHs)	Inhalation of vapours or dermal contact, ingestion or inhalation of soils	Future site users	Unlikely	Mild	Low	
			Adjacent residents	Unlikely	Mild	Low	
		Leaching to groundwater, vertical and lateral migration.	Groundwater aquifers	Unlikely	Minor	Very Low	
	Asbestos fibres	Inhalation of fibres	Future site users	Unlikely	Medium	Low / Moderate	
			Adjacent residents	Unlikely	Medium	Low/Moderate	
	Ground gases	Inhalation of gases	Future site users	Unlikely	Mild	Low	
Off-Site							
Electricity Sub Station	PCBs	Leaching to groundwater, vertical and lateral migration.	Future site users	Unlikely	Mild	Low	**Inactive** – No unacceptable risk identified
Various active and historical factories and works	Heavy Metals, PAH and TPH.	Lateral and vertical migration onto site	Future site users	Unlikely	Mild	Low	**Inactive** – No unacceptable risk identified
			Controlled waters	Unlikely	Minor	Very Low	

6.0 GEOTECHNICAL ASSESSMENT

6.1 Proposed Development

The proposed development at Mayfield Plots N + O include:

- Plot N consists of a maximum 13-storey car park structure with integrated substation and energy centres; and
- Plot O consists of a maximum 8-storey office building with ground floor commercial/ communal space

6.2 Summary of Ground Conditions

Ground conditions identified at the site are summarised in Table 4.1, Section 4.0 and comprise Made ground to maximum depth of 5.50m bgl overlying superficial deposits of mainly granular composition with localised areas of clay. Bedrock of the Chester Formation was encountered during the ground investigation.

Groundwater was encountered during the ground investigation at depths between 5.35m bgl and 6.80m bgl. During subsequent monitoring visits groundwater was found to vary between 3.25m bgl and 7.6m bgl. Detailed information on groundwater levels is presented in Appendix VII.

Soil plasticity testing indicates the cohesive material is of low plasticity and low volume change potential.

6.3 Foundation Conditions and Bearing Capacity

General Ground Conditions

Taking into account the nature of the proposed development, it is considered that the most appropriate foundation solution would comprise a piled foundation solution, bearing within the underlying rock.

In consideration of prevailing ground conditions alone, a choice of pile types of various lengths and diameters can be designed to bear into the strata encountered beneath the site. However, general site conditions, environs and proximity to adjacent structures and foundations are all influential in choice of piling system.

Foundation Options

where foundations are to be socketed into the bedrock, reference should be made to the results of Unconfined Compressive Strength and Point Load tests presented in Appendix V. Based on these results Tables 6.1 and 6.2 present preliminary indicative strengths of the bedrock geology across the site.

Table 6.1 Indicative Bearing Capacities - Piled Foundations within Sandstone Using UCS Data

Location	Depth (mbgl)	UCS (MPa) for Pile Design
CPBH01	19.71	10.60
CPBH02	13.70	1.00
CPBH02	19.50	0.90
CPBH03A	16.48	1.20
CPBH03A	20.12	2.00
CPBH04B	15.70	2.30
CPBH04	19.10	2.60

Table 6.2 Indicative Bearing Capacities - Piled Foundations within Sandstone Using Point Load Data

Location	Depth (mbgl)	Diametric I_{s50} (MPa) for Pile Design	Axial I_{s50} (MPa) for Pile Design
CPBH01	7.70	0.20	0.60
CPBH01	9.89	0.60	0.60
CPBH01	13.12	0.60	0.26
CPBH02	8.50	0.20	0.20
CPBH02	14.70	0.40	1.40
CPBH02	15.90	0.40	0.60
CPBH02	19.80	0.20	1.00
CPBH03A	14.05	0.20	0.40
CPBH03A	15.50	0.40	0.60
CPBH03A	19.75	0.00	0.20
CPBH03A	24.63	1.80	1.40
CPBH04B	9.21	0.40	0.40
CPBH04B	12.68	1.20	1.20
CPBH04B	16.35	0.20	0.40
CPBH04B	17.24	0.20	0.60
CPBH04B	18.20	0.40	0.60
CPBH04B	21.17	0.20	1.40

Note that the above MPa values have been calculated using a conversion factor (K) of 20.

Given that UCS analysis indicated a worst case strength of 0.90MPa, REC recommends that this conservative “worst case” is utilised for design purposes as this gives a more conservative capacity considering the foundation style.

An outline preliminary bearing capacity has therefore been derived using the formula presented below. Total capacity will ultimately be dependant upon socketed section length and installation methodology

$$Q_a = \left(c_{u1} N_c \frac{\pi B^2}{4F_s} \right) + \left(\alpha c_{u2} \frac{\pi BL}{F_s} \right)$$

Q_a = Allowable load capacity of pile
Cu_1 = Shear strength of rock below the base of the pile in kN/m^2
Cu_2 = Average shear strength of rock below the base of the pile in kN/m^2
(Both Assumed as 900N/m^2)
N_c = Bearing capacity factor (assumed as 9)
F_s = Factor of Safety (assumed as 2.5)
α = Adhesion Factor (Assumed as 0.9)
B = Minimum width of pile shaft (or dia.) in m (Taken as 0.3m)
L = Socketed Length of pile in m (Assumed 1m)

Q_a = (900 x 9 x 0.028) + (0.9 x 900 x 0.377)
Qa = 226.8 + 305.28
Qa = End Bearing Resistance + Socketed Section Bond Strength
Qa = 532.08kN

6.4 Concrete Durability

Chemical analyses for pH and water-soluble sulphate (2:1 aqueous extract) contained in Appendix V and summarised in Appendix VII indicates that the near surface soils generally meet class DS-1 / AC-1 in accordance with BRE Special Digest 1 (2005).

6.5 Excavations & Stability

Although excavations far in excess of 1.2m bgl are unlikely given the nature of the proposed development, consideration should be given to the implementation of shoring should excavations exceed this depth especially considering the depth of Made Ground encountered within areas of the site. Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 utilised.

Excavations should be protected within areas of fine grained deposits during construction in order to avoid potential liquefaction, caused by wet weather, or potential shrink and swell of fine grained material caused by periods of hot weather.

Clay soils with a Plasticity Index of <20% are considered frost susceptible. As such, fine grained soils below circa 4.40mbgl could potentially be susceptible to frost damage if left exposed in periods of cold weather.

6.6 Floor Slabs

Given the significant thickness of Made Ground across the site, and that piled foundations and likely to be used, a suspended floor slab should be utilised in the scheme. It is recommended that advice should be sought from a suitably qualified structural engineer with regard to the design and construction of the floor slab.

6.7 Construction Activity and Inspection

The following should be considered:

- It is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations, floor slabs and areas of hardstanding; and
- Spoil recovered from excavations should be suitably separated to ensure that soil disposal costs are minimised.

6.8 Pavements and Construction

Given the thickness of Made Ground encountered across the site, shallow ground conditions are anticipated to be highly variable for design of roads and pavements. It is recommended that CBR values are proven using plate bearing or similar methods to inform the depth requirements for subbase and the overlying asphalt.

As with good construction practice it is recommended that the formation level be inspected and that any areas of soft/loose deleterious strata are replaced with an appropriately compacted coarse grained medium. Likewise, any hard spots should also be removed to guard against reflective cracking in the pavement. Proof rolling/compaction of the formation level should be carried out prior to laying the new pavement.

7.0 CONCLUSIONS & RECOMMENDATIONS

Geotechnical Assessment
Foundation Recommendation Given the size of the development it is recommended that a piled foundation solution is utilised and that piles are socked within the underlying solid geology. Preliminary socket capacities indicate competent bearing strata.
Revised Conceptual Site Model
Human Health The Tier II Human Health Risk identified slightly elevated concentrations in 2no. locations. As the proposed development will include hardstanding above both of these locations, the contaminant pathway will be broken and no unacceptable risk remains. **Ground Gas** After 2 No. ground gas monitoring visits the site is characterised as Characteristic Situation 1. As such, no protection measures are recommended.
Recommendations
It is recommended that plate testing is undertaken to confirm CBR values for roads and pavements given the variable ground conditions identified.

END OF REPORT

APPENDIX I

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd and the Client.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

5. In addition to the above REC Ltd note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.

6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

8. This report presents an interpretation of the geotechnical information established by excavation, observation and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that man-made deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation.

9. REC cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.

10. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II

GLOSSARY

TERMS

ABC	Actual Bearing Capacity
ACM	Asbestos Containing Materials
AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
C4SLs	Category 4 Screening Levels
CBR	California Bearing Ratio
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
S4UL	Suitable for Use Levels
SGV	Soil Guideline Value
SPT	Standard Penetration Test
SuDS	Sustainable Urban Drainage System
SVOC	Semi Volatile Organic Compound
TPH	Total Petroleum Hydrocarbon
TPHCWG	Total Petroleum Hydrocarbon (Criteria Working Group)
UKWIR	United Kingdom Water Industry Research
UST	Underground Storage Tank
VCCs	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation

APPENDIX III

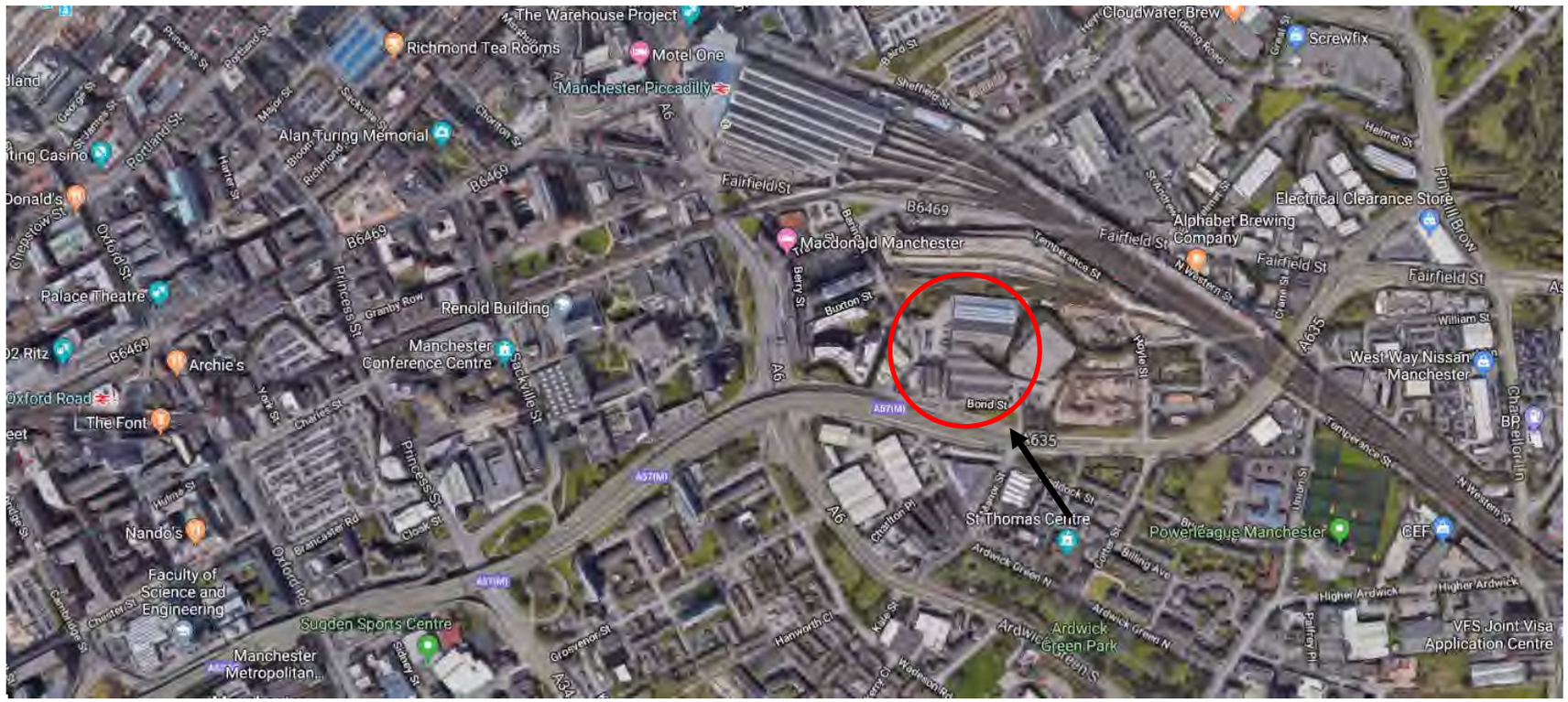
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Site Boundary





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Client:

Civic Engineers Ltd

Drawing no. 106841-001

Drawn By: CL

Approved by: ML

Notes:

Not to scale

Drawing Title:

Site Location Plan

KEY:

N

Approximate Window Sample Location

Approximate Window Sample Location (with install)

Approximate Trial Pit Location

Approximate Cable Percussion Location

Approximate Cable Percussion with Rotary Follow-on Location (with install)

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Approved by: ML

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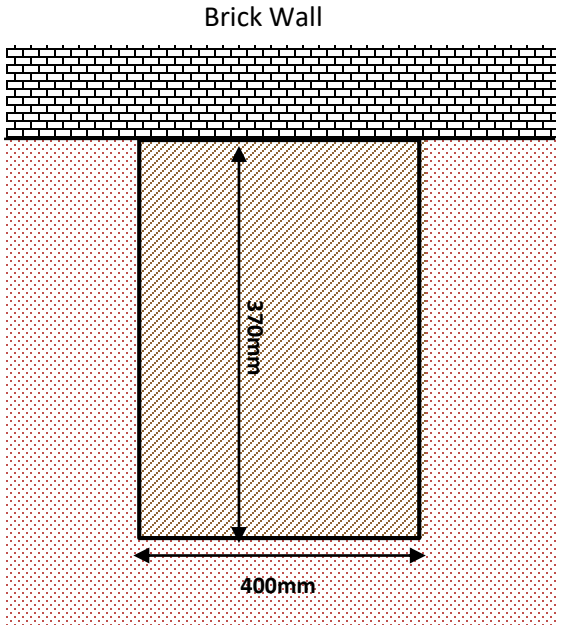
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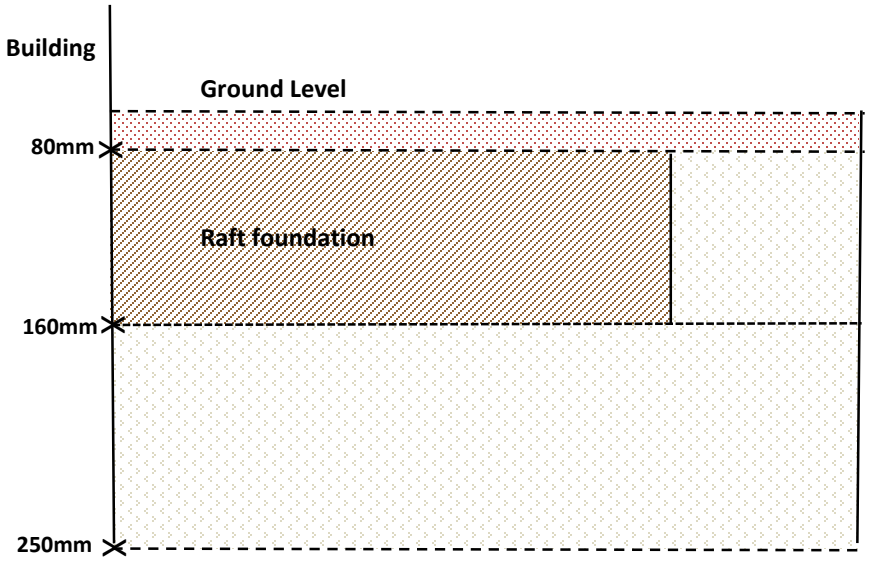
- Paving Slab at Ground Level
- Gravelly Sand (Made Ground)
- Concrete Foundation
- Brick Wall

Plan Section

TP01



Cross Section



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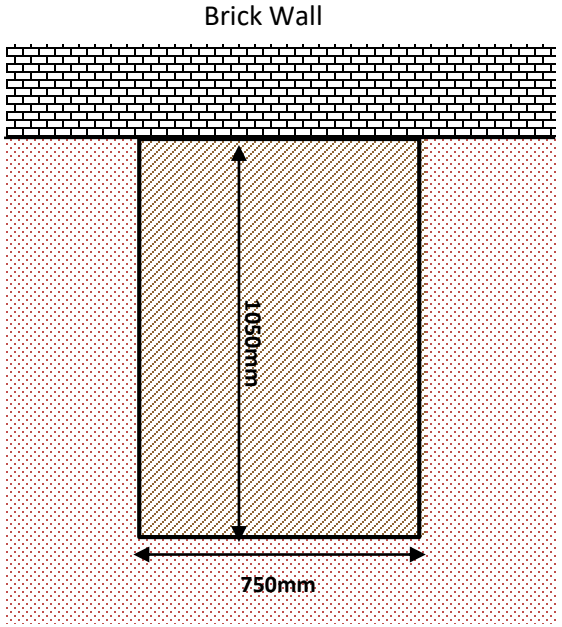
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Client:	Civic Engineers
Job No:	106841 -003
Drawn By:	CL
Approved by:	ML
Notes:	NOT DRAWN TO SCALE
Drawing Title:	106841 – 001 Foundation Inspection Pit Drawing

KEY:

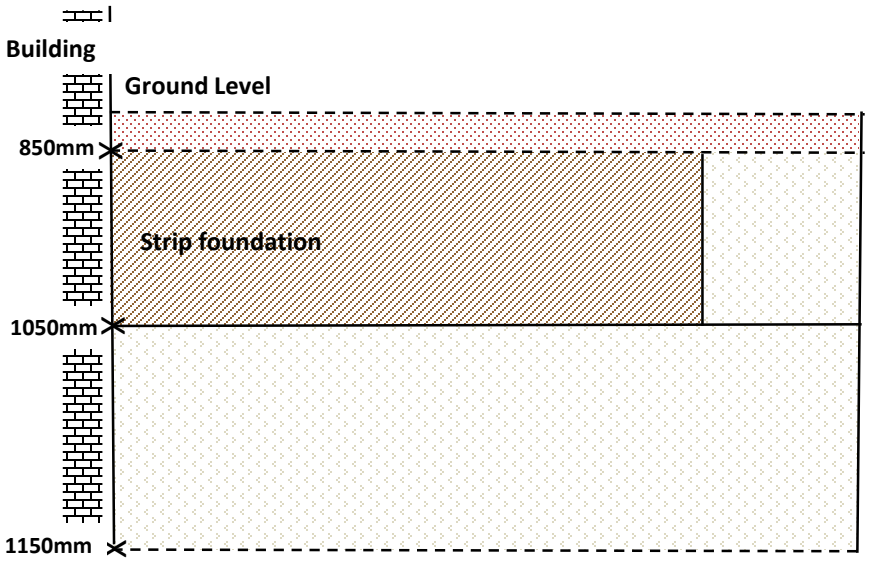
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- Gravelly Sand (Made Ground)
- Concrete Foundation
- Brick Wall

Plan Section

TP02



Cross Section



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Notes:	NOT DRAWN TO SCALE
Drawing Title:	106841 – 002 Foundation Inspection Pit Drawing

APPENDIX IV

EXPLORATORY LOGS

Borehole Log

Borehole No. **CPBH01**

Sheet 1 of 5

Project Name:	Mayfield Plots N and O	Proj. ID:	106841	Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Dando 2000 and Comaccio 205	Level (m AOD): / Final Depth (m):	Scale: 1:20 / 20.00
Client:	Civic Engineers	Crew:	Geotron	Start Date: / End Date:	REC Engineer: CL / 11/03/2019 / 14/03/2019

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								White Concrete MADE GROUND
		0.20 - 0.25	ES		0.20			
		0.30 - 0.35	ES		0.25			Dark grey gravelly fine to coarse SAND. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of concrete and brick MADE GROUND
					0.65			Brown locally reddish brown gravelly SAND with high cobble content. Sand is fine to coarse. Gravel is subangular to subrounded, medium to coarse of brick. Cobbles are angular of brick MADE GROUND
		0.80 - 0.85	ES					Soft brown locally reddish brown slightly gravelly sandy CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of concrete and brick. Cobbles are angular of brick MADE GROUND
		1.20 - 1.65 1.20	D SPT	N=1 (0,1/0,0,1,0)				
		1.50 - 1.70 1.50 - 2.00	ES B		1.50			Very stiff grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of mudstone ALLUVIUM
		2.00 - 2.45 2.00	D SPT	N=37 (1,3/5,8,10,14)				*clayey sand*
		3.00 - 3.50 3.00	B SPT	N=35 (2,4/5,7,8,15)				
		4.00	SPT	N=26 (3,4/5,5,8,8)	4.00			

Continued on Next Sheet

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Borehole Log

Borehole No. **CPBH01**

Sheet 2 of 5

Project Name:	Mayfield Plots N and O	Proj. ID:	106841	Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Dando 2000 and Comaccio 205	Level (m AOD): / Final Depth (m):	20.00 / Scale: 1:20
Client:	Civic Engineers	Crew:	Geotron	Start Date: / End Date:	11/03/2019 / 14/03/2019 / REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Medium dense multicoloured slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mudstone and sandstone. ALLUVIUM
					4.75			Red SANDSTONE recovered as red sand. CHESTER SANDSTONE FORMATION
		5.00 - 5.45	D		5.00			NO RECOVERY
		5.00	SPT	50 (25 for 125mm/50 for 65mm)				CHESTER SANDSTONE FORMATION
		5.00 - 6.50	NR	0 0 0				
			25+		6.78			Weak to very weak orangish red SANDSTONE. Discontinuity set 1: fractures are subhorizontal to horizontal closely spaced clean undulating rough. Discontinuity set 2: fractures are subhorizontal closely to medium spaced clean undulating rough
			25+					CHESTER SANDSTONE FORMATION
			25+					
			25+					
		6.50 - 8.00	25+	81 70 15				
			25+					
			25+					
			25+					
			NI		8.00			NO RECOVERY
								Continued on Next Sheet

5 6 7 8

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Rotary Core Log

Borehole No. **CPBH01** Sheet 3 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 11/03/2019 - 14/03/2019	Logged By CL

Well	Water Strikes	Depth (m)	Type /FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
										CHESTER SANDSTONE FORMATION
			NI							
			NR				8.65			
		8.00 - 9.50	20	57	53	14				Weak to very weak orangish red SANDSTONE. Discontinuity set 1: fractures are subhorizontal to horizontal closely spaced clean undulating rough. CHESTER SANDSTONE FORMATION
			10							
			NI							*Non-intact recovered as reddish brown gravel of sandstone*
			20							
			NI							
			25+							
			NR				9.50			NO RECOVERY CHESTER SANDSTONE FORMATION
			22				9.57			Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
			NI							*Non-intact recovered as reddish brown gravel of sandstone*
			20							
			21							
		9.50 - 11.00	23	95	85	45				
			23							
			10							*Between 10.86 and 10.88m bgl: rare gravel of mudstone.*
			NR							
			25+				11.00			NO RECOVERY CHESTER SANDSTONE FORMATION
			25+				11.08			*From 11.00m bgl: Rock becomes medium strong*
			23							Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
			25+							
			25+							*Non-intact recovered as reddish brown gravel of sandstone*
			25+							
			25+							
			NI							
		11.00 - 12.50	25+	95	83	35				
			25+							
			18							
			25							
			NI							
			25+							

Continued on Next Sheet

9 10 11 12

Remarks:

CONCEPT LIFE SCIENCES

Rotary Core Log

Borehole No. **CPBH01** Sheet 4 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 11/03/2019 - 14/03/2019	Logged By CL

Well	Water Strikes	Depth (m)	Type /Fl	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
			22							*Between 12.17 and 12.18m bgl: rare calcite nodule.*
			NR				12.50			NO RECOVERY CHESTER SANDSTONE FORMATION
		12.50 - 14.00	NR 25+ 25+ 25+ 25+ 25+ 25+ 25 25+ 25+ 25+ NR	67	67	16	13.00			Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		14.00 - 15.50	NR	0	0	0	14.00			NO RECOVERY CHESTER SANDSTONE FORMATION
							16.17			Continued on Next Sheet

13 14 15 16

Remarks:

Rotary Core Log

Borehole No. **CPBH01** Sheet 5 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 11/03/2019 - 14/03/2019	Logged By CL

Well	Water Strikes	Depth (m)	Type /FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	
			NR							Very weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION	
			25+								
		15.50 - 17.00	NI	55	27	15				*Non-intact recovered as reddish brown gravel of sandstone*	
			25+								
			15								
			NI							*Non-intact recovered as reddish brown gravel of sandstone*	
							17.00			NO RECOVERY CHESTER SANDSTONE FORMATION	17
			NR								
		17.00 - 18.50		17	3	0					
			NI				18.00			Very weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION	18
										Non-intact recovered as reddish brown gravel of sandstone	
			NR				18.50			NO RECOVERY CHESTER SANDSTONE FORMATION	
							18.80			Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION	19
			NI							*Non-intact recovered as reddish brown gravel of sandstone*	
			NR							*Non-intact recovered as reddish brown gravel of sandstone*	
		18.50 - 20.00	NI	70	33	7					
			15								
			25+								
			NI							*Non-intact recovered as reddish brown gravel of sandstone*	
			25+				20.00			End of Borehole at 20.00m	20

Remarks:

Borehole Log

Borehole No. **CPBH02**

Sheet 1 of 5

Project Name:	Mayfield Plots N and O	Proj. ID:	106841	Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Dando 2000 and Comaccio 205	Level (m AOD): / Final Depth (m):	Scale: 1:20 / 20.00
Client:	Civic Engineers	Crew:	Geotron	Start Date: / End Date:	REC Engineer: CL / 12/03/2019 / 15/03/2019

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Sandstone road cobbles. MADE GROUND
		0.20 - 0.30	ES		0.15			
		0.20	PID	PID=11				Dark brown ashy gravelly SAND. Sand is fine to coarse. Gravel is fine to medium angular coal. MADE GROUND
		0.30 - 0.40	ES		0.30			
		0.50	PID	PID=4				Soft light brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse angular brick, coal, concrete limestone and sandstone. MADE GROUND
		0.60 - 0.70	ES					
								At 0.70m bgl: Clay becomes slightly sandy.
		1.00 - 1.10	ES					1
		1.00	PID	PID=1				
		1.20 - 1.65	D					
		1.20	SPT	N=4 (1,0/1,1,1,1)				
					1.60			Soft very dark brown CLAY. GLACIAL TILL
		1.70 - 1.80	ES					
		2.00 - 2.45	D					*At 2.0m bgl: Clay becomes slightly sandy.* 2
		2.00 - 2.50	B					
		2.00	SPT	N=4 (1,0/1,1,1,1)				
		2.00	PID	PID=0				
		2.90	D					
		3.00 - 3.45	D					3
		3.00		HVP=9				
		3.00	SPT	N=9 (1,1/1,1,3,4)				
								At 3.70m bgl: Clay becomes grey, soft and sandy.
		3.80		HVP=38				
		4.00 - 4.45	D		4.00			4
		4.00	SPT	50 (25 for 95mm/50 for 65mm)				
								Continued on Next Sheet

Remarks:

Borehole Log

Borehole No. **CPBH02**

Sheet 2 of 5

Project Name:	Mayfield Plots N and O	Proj. ID:	106841	Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Dando 2000 and Comaccio 205	Level (m AOD): / Final Depth (m):	20.00 / Scale: 1:20
Client:	Civic Engineers	Crew:	Geotron	Start Date: / End Date:	12/03/2019 / 15/03/2019 / REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Orangeish red SANDSTONE recovered as orangeish red sand CHESTER SANDSTONE FORMATION
		6.50 - 8.00	NR	0 0 0	6.50			NO RECOVERY CHESTER SANDSTONE FORMATION
								Continued on Next Sheet

Remarks:

Rotary Core Log

Borehole No. **CPBH02**

Sheet 3 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 12/03/2019 - 15/03/2019	Logged By CL

Well	Water Strikes	Depth (m)	Type /Fl	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							8.30			
		8.00 - 9.50	NI 25+ 25+ 25+ 25+ 25+ 25+ 10 25+ 25+ 20	53	33	18				Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		9.50 - 11.00	NR	0	0	0	9.50			NO RECOVERY CHESTER SANDSTONE FORMATION
		11.00 - 12.50		0	0	0				

9 10 11 12

Continued on Next Sheet

Remarks:

Rotary Core Log

Borehole No. **CPBH02** Sheet 4 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 12/03/2019 - 15/03/2019	Logged By CL

Well	Water Strikes	Depth (m)	Type /Fl	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		12.50 - 14.00	NI 25+ 25+ 25+ 25+ 25+ 25+ 24	67	31	9	13.00			Very weak to weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION *Non-intact recovered as reddish brown gravel of sandstone*
		14.00 - 15.50	NR	48	28	0	14.00			NO RECOVERY CHESTER SANDSTONE FORMATION *No recovery*
			NI 25+ 25+ 25+ 25+				14.78			Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION *Non-intact recovered as reddish brown gravel of sandstone*
			NR 25+				15.50 16.14			*Non-intact recovered as reddish brown gravel of sandstone* NO RECOVERY CHESTER SANDSTONE FORMATION *No recovery*

13 14 15 16

Continued on Next Sheet

Remarks:

Rotary Core Log

Borehole No. **CPBH02** Sheet 5 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 12/03/2019 - 15/03/2019	Logged By CL

Well	Water Strikes	Depth (m)	Type /FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	
		15.50 - 17.00	NI 25+ 25+ NI 25+ NI 25+ 25+ NI 25+ 25+	57	19	0	17.00			Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION *Non-intact recovered as reddish brown gravel of sandstone* *Non-intact recovered as reddish brown gravel of sandstone* *Non-intact recovered as reddish brown gravel of sandstone* *Non-intact recovered as reddish brown gravel of sandstone*	17
		17.00 - 18.50	NR	0	0	0				NO RECOVERY CHESTER SANDSTONE FORMATION	18
		18.50 - 20.00	NR NI 25+ 25+ 25+ 25+ 25+ 25+ 25+ NI 25+ 13 25+ 25+ 25+ NR	91	85	46	18.64			*No recovery* Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION *Non-intact recovered as reddish brown gravel of sandstone* *Non-intact recovered as reddish brown gravel of sandstone*	19
							20.00			End of Borehole at 20.00m	20

Remarks:

CONCEPT LIFE SCIENCES

Borehole Log

Borehole No. **CPBH03**

Sheet 1 of 1

Project Name:	Mayfield Plots N and O	Proj. ID: 106841		Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.40	Scale: 1:50
Client:	Civic Engineers	Crew:	Geotron	Start Date: 13/03/2019 / End Date: 13/03/2019	REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.10 - 0.20	ES		0.08			Tarmacadam MADE GROUND
		0.30 - 0.40	ES		0.32			Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
					0.40			Brick MADE GROUND
								Non-intact CHESTER SANDSTONE FORMATION
					10.00			End of Borehole at 0.40m

Remarks:

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DELIVERING SCIENCE

Borehole Log

Borehole No. **CPBH03A**

Sheet 1 of 3

Project Name:	Mayfield Plots N and O	Proj. ID: 106841	Easting:	Hole Type	CP
Location:	Manchester	Plant: Dando 2000 and Comaccio 205	Northing: Level (m AOD):	Scale:	1:50
Client:	Civic Engineers	Crew: Geotron	Final Depth (m): 25.00	REC Engineer:	CL
			Start Date: 13/03/2019		
			End Date: 18/03/2019		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.20	ES		0.08			Tarmacadam MADE GROUND
		0.10	PID	PID=0	0.30			White GRAVEL. Gravel is very angular to angular medium to coarse of concrete MADE GROUND
		0.50 - 0.60	ES					
		0.50	PID	PID=0				
		0.70 - 1.20	B					White ashy gravel of concrete and brick (driller's description) White sandy GRAVEL. Sand is fine. Gravel is subangular to angular medium to coarse of concrete. MADE GROUND
		1.00	PID	PID=0				
		1.20 - 1.65	B					
		1.20	SPT	N=3 (1,0/0,1,0,2)				
		2.00 - 2.45	D					
		2.00 - 2.80	B					
		2.00	SPT	N=11 (1,2/1,1,3,6)				
					2.80			Red SANDSTONE recovered as red sand CHESTER SANDSTONE FORMATION
					3.30			NO RECOVERY CHESTER SANDSTONE FORMATION *Non-intact recovered as reddish brown gravel of sandstone*
					4.45			Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					4.60			NO RECOVERY CHESTER SANDSTONE FORMATION *Non-intact recovered as reddish brown gravel of sandstone*
					6.85			Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					7.00			NO RECOVERY CHESTER SANDSTONE FORMATION
					8.35			Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					8.50			NO RECOVERY CHESTER SANDSTONE FORMATION
					9.50			Non-intact CHESTER SANDSTONE FORMATION
					10.00			*Non-intact recovered as reddish brown gravel of* Continued on Next Sheet

Remarks:

CONCEPT LIFE SCIENCES
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Borehole Log

Borehole No. **CPBH03A**

Sheet 2 of 3

Project Name:	Mayfield Plots N and O	Proj. ID:	106841	Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Dando 2000 and Comaccio 205	Level (m AOD): / Final Depth (m): 25.00	Scale: 1:50
Client:	Civic Engineers	Crew:	Geotron	Start Date: 13/03/2019 / End Date: 18/03/2019	REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								sandstone Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					11.35			Weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					11.50			*Non-intact recovered as reddish brown gravel of sandstone*
					12.07			NO RECOVERY CHESTER SANDSTONE FORMATION
		12.30 - 12.38	U					*Non-intact recovered as reddish brown gravel of sandstone*
		12.68 - 12.92	U					Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		12.92 - 13.00	U		13.00			*Non-intact recovered as reddish brown gravel of sandstone*
					13.55			*Non-intact recovered as reddish brown gravel of sandstone*
		14.05 - 14.12	U					NO RECOVERY CHESTER SANDSTONE FORMATION
					14.50			*Non-intact recovered as reddish brown gravel of sandstone*
		14.65 - 14.73	U		14.55			Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
								Non-intact recovered as reddish brown gravel of sandstone
		15.50 - 15.63	U					*Non-intact recovered as reddish brown gravel of sandstone*
		15.85 - 15.93	U					NO RECOVERY CHESTER SANDSTONE FORMATION
					16.00			*Non-intact recovered as reddish brown gravel of sandstone*
					16.25			Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		16.48 - 16.63	U					*Non-intact recovered as reddish brown gravel of sandstone*
		17.00 - 17.17	U					NO RECOVERY CHESTER SANDSTONE FORMATION
					17.50			Weak to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION NO RECOVERY CHESTER SANDSTONE FORMATION
					18.60			Medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					19.00			*Non-intact recovered as reddish brown gravel of sandstone*
					19.40			NO RECOVERY CHESTER SANDSTONE FORMATION
		19.75 - 19.80	U					Medium strong orangish red SANDSTONE.
								Continued on Next Sheet

Remarks:

CONCEPT LIFE SCIENCES
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Borehole Log

Borehole No. **CPBH03A**

Sheet 3 of 3

Project Name:	Mayfield Plots N and O	Proj. ID: 106841	Easting:		Hole Type: CP
			Northing:		
Location:	Manchester	Plant: Dando 2000 and Comaccio 205	Level (m AOD):		Scale: 1:50
			Final Depth (m):	25.00	
Client:	Civic Engineers	Crew: Geotron	Start Date:	13/03/2019	REC Engineer: CL
			End Date:	18/03/2019	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		20.12 - 20.27	U					Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					20.50			*Non-intact recovered as reddish brown gravel of sandstone*
					20.94			*Non-intact recovered as reddish brown gravel of sandstone*
		21.12 - 21.14	U					NO RECOVERY CHESTER SANDSTONE FORMATION
		21.35 - 21.47	U					Medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		21.70 - 21.92	U					*Non-intact recovered as reddish brown gravel of sandstone*
					22.00			NO RECOVERY CHESTER SANDSTONE FORMATION
		22.90 - 22.97	U		22.90			Medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		23.30 - 23.44	U					*Non-intact recovered as reddish brown gravel of sandstone*
					23.50			*Non-intact recovered as reddish brown gravel of sandstone*
								Non-intact recovered as reddish brown gravel of sandstone
		24.63 - 24.72	U					NO RECOVERY CHESTER SANDSTONE FORMATION
					24.60			Medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
					25.00			*Non-intact recovered as reddish brown gravel of sandstone*
								Non-intact recovered as reddish brown gravel of sandstone
								End of Borehole at 25.00m

Remarks:

Borehole Log

Borehole No. **CPBH04**

Sheet 1 of 1

Project Name:	Mayfield Plots N and O	Proj. ID: 106841	Easting:	Hole Type	CP
Location:	Manchester	Plant: Breaker and hand tools	Northing: Level (m AOD):	Scale:	1:50
Client:	Civic Engineers	Crew: Geotron	Final Depth (m): 1.60	REC Engineer:	CD
			Start Date: 11/03/2019		
			End Date: 11/03/2019		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.25 - 0.30	ES		0.10			Tarmacadam MADE GROUND
		0.50 - 0.60	ES					Light brown very sandy GRAVEL. Sand is fine to coarse. Gravel is angular of limestone. MADE GROUND
		0.50	PID	PID=0	0.50			Dark brown clayey slightly gravelly fine to medium sand. Gravel is fine to coarse angular brick and concrete. MADE GROUND
		1.00	PID	PID=1				*At 1.30m bgl: Sand becomes slightly clayey.*
		1.30 - 1.40	ES					
		1.50	PID	PID=7	1.60			End of Borehole at 1.60m

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Borehole Log

Borehole No. **CPBH04A**

Sheet 1 of 2

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: CP
Location: Manchester	Plant: Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.65	Scale: 1:50
Client: Civic Engineers	Crew: Geotron	Start Date: 11/03/2019 / End Date: 12/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Tarmacadam MADE GROUND
					0.50			Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
		0.80	PID	PID=0	0.65			Dark brown clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular brick and concrete. MADE GROUND
								End of Borehole at 0.65m

Continued on Next Sheet

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Borehole Log

Borehole No. **CPBH04A**

Sheet 2 of 2

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: CP
Location: Manchester	Plant: Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.65	Scale: 1:50
Client: Civic Engineers	Crew: Geotron	Start Date: 11/03/2019 / End Date: 12/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				

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Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Borehole Log

Borehole No. **CPBH04B**

Sheet 1 of 5

Project Name:	Mayfield Plots N and O	Proj. ID:	106841	Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Comaccio 205	Level (m AOD): / Final Depth (m):	20.00 / Scale: 1:20
Client:	Civic Engineers	Crew:	Geotron	Start Date: / End Date:	19/03/2019 / 19/03/2019 / REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.10	ES		0.10			Tarmacadam MADE GROUND
		0.50	ES		0.50			Light brown very sandy GRAVEL. Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
		0.70	ES					Dark brown clayey slightly gravelly fine to medium SAND. Gravel is angular fine to coarse of brick and concrete. MADE GROUND
					1.60			Grey clayey GRAVEL. Gravel is very angular to subangular, fine to medium of concrete and brick MADE GROUND
		2.70	SPT	N=4 (1,0/1,1,1,1)				
		2.80 - 3.15	D					
		~~2.70 - 4.00~~		~~100 0 0~~				

1 2 3 4

Continued on Next Sheet

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Rotary Core Log

Borehole No. **CPBH04B**

Sheet 2 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 19/03/2019	Logged By CD

Well	Water Strikes	Depth (m)	Type /FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		4.00 - 5.50	NI	5	0	0				
		5.50 - 6.60	NR	5	0	0	5.50			NO RECOVERY CHESTER SANDSTONE FORMATION
			NI				6.20			Non Intact recovered as grey subangular to subrounded, fine to coarse GRAVEL of mudstone. CHESTER SANDSTONE FORMATION
		6.60 - 7.20	NR	0	0	0	6.60			NO RECOVERY CHESTER SANDSTONE FORMATION
		7.20 - 8.40		0	0	0				

5 6 7 8

Continued on Next Sheet

Remarks:

CONCEPT LIFE SCIENCES

Rotary Core Log

Borehole No. **CPBH04B**

Sheet 3 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 19/03/2019	Logged By CD

Well	Water Strikes	Depth (m)	Type /FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		8.40 - 9.50	NR	0	0	0				
			NI							
			25+				9.35			Very weak to weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		9.50 - 11.00	NR	27	15	7	9.50			NO RECOVERY CHESTER SANDSTONE FORMATION
			NI							
			25+				10.60			Very weak to weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		11.00 - 12.50	NR	37	13	13	11.00			NO RECOVERY CHESTER SANDSTONE FORMATION
							11.95			Very weak to weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating

9 10 11 12

Continued on Next Sheet

Remarks:

Rotary Core Log

Borehole No. **CPBH04B** Sheet 4 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 19/03/2019	Logged By CD

Well	Water Strikes	Depth (m)	Type /FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
			NI							rough. CHESTER SANDSTONE FORMATION
			25+							
			25+				12.50			
		12.50 - 14.00	NR	10	3	0				NO RECOVERY CHESTER SANDSTONE FORMATION
			NI							
			25+				13.85			Very weak to weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
			NI							
			25+				14.00			
		14.00 - 15.50	NI	67	0	0				NO RECOVERY CHESTER SANDSTONE FORMATION
			25+				14.50			Very weak to weak orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
			25+				15.50			Weal to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
			NI							
			20							
			25+							
			NR							
			25+							
			25+							
			NI							

Continued on Next Sheet

13 14 15 16

Remarks:

Rotary Core Log

Borehole No. **CPBH04B**

Sheet 5 of 5

Project Name: Mayfield Plots N and O	Project No. 106841	Co-ords:	Hole Type CP
Location: Manchester		Level:	Scale 1:20
Client: Civic Engineers		Dates: 19/03/2019	Logged By CD

Well	Water Strikes	Depth (m)	Type /Fl	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		15.50 - 17.00	23, 25+, 25+, 25+, NI, 25+, 25+, NI	100	75	20	17.00			
		17.00 - 18.50	NR, 25+, 25+, 25+, 25+, 25+, NI, 8, 25+, 19, 25+, 25+, 25+, 25+	93	93	87	17.10			NO RECOVERY CHESTER SANDSTONE FORMATION Weal to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
		18.50 - 20.00	NR, 25+, NI, 25+, NR, 25+, 25+, 25+, 25+, 23, NR, 25+, NR, 20, 20, 25+	94	72	50	18.50 18.59			NO RECOVERY CHESTER SANDSTONE FORMATION Weal to medium strong orangish red SANDSTONE. Discontinuities are subhorizontal to horizontal closely to medium spaced clean undulating rough. CHESTER SANDSTONE FORMATION
							20.00			End of Borehole at 20.00m

17 18 19 20

Remarks:

CONCEPT LIFE SCIENCES

Borehole Log

Borehole No. **CPBH05**

Sheet 1 of 1

Project Name:	Mayfield Plots N and O	Proj. ID: 106841		Easting: / Northing:	Hole Type: CP
Location:	Manchester	Plant:	Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.90	Scale: 1:50
Client:	Civic Engineers	Crew:	Geotron	Start Date: 13/03/2019 / End Date: 13/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.20 - 0.30	ES		0.08			Tarmacadam MADE GROUND
		0.60 - 0.70	ES		0.30			Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
					0.90			Dark brown gravelly SAND. Sand is fine to coarse. Gravel is angular fine to coarse of brick and concrete. MADE GROUND
								End of Borehole at 0.90m

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Trial Pit Log

Borehole No. **TP01** Sheet 1 of 1

Project Name:	Mayfield Plots N and O	Proj. ID: 106841	Easting:		Hole Type: TP
Location:	Manchester	Plant: Breaker and hand tools	Northing:	Level (m AOD):	Scale: 1:20
Client:	Civic Engineers	Crew: Geotron	Final Depth (m): 0.37	Start Date: 13/03/2019	REC Engineer: CL
				End Date: 13/03/2019	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 0.25	ES		0.08			Concrete base with rebar (approximate diameter is 0.01m) MADE GROUND
					0.16			Concrete footing MADE GROUND
					0.25			Dark grey gravelly SAND. Sand is fine to coarse. Gravel is angular to subangular fine to medium of brick MADE GROUND
								End of Borehole at 0.37m

Remarks:

Stability:

Pit Dimensions *(m)*
Length:
Width:
Depth: 0.37

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Trial Pit Log

Borehole No. **TP02**

Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: TP
Location: Manchester	Plant: Breaker and hand tools	Level (m AOD): / Final Depth (m): 1.15	Scale: 1:20
Client: Civic Engineers	Crew: Geotron	Start Date: 13/03/2019 / End Date: 13/03/2019	REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.20 - 0.30	ES		0.09			Concrete MADE GROUND
					0.25			Mortar and brick MADE GROUND
								Dark grey gravelly SAND. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, concrete, slate and iron. MADE GROUND
					1.05			End of Borehole at 1.15m

Remarks:

Stability:

Pit Dimensions *(m)*

Length:

Width:

Depth: 1.15

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Trial Pit Log

Borehole No. **TP03**

Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: TP
Location: Manchester	Plant:	Level (m AOD): / Final Depth (m): 0.40	Scale: 1:20
Client: Civic Engineers	Crew: Geotron	Start Date: 12/03/2019 / End Date: 12/03/2019	REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.10 - 0.20	ES		0.40			Very soft dark grey very gravelly CLAY. Gravel is angular to subangular, fine to coarse of brick and concrete with occasional rootlets throughout. MADE GROUND
								End of Borehole at 0.40m

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2
3
4

Remarks:

Stability:

Pit Dimensions *(m)*

Length:

Width:

Depth: 0.40

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Trial Pit Log

Borehole No. **TP04**

Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: TP
Location: Manchester	Plant:	Level (m AOD): / Final Depth (m): 2.10	Scale: 1:20
Client: Civic Engineers	Crew:	Start Date: 12/03/2019 / End Date: 12/03/2019	REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.09			Tarmacadam MADE GROUND
		0.20 - 0.30	ES					White very sandy GRAVEL. Sand is fine to coarse. Gravel is angular of limestone and brick MADE GROUND
					0.35			
					0.45			Orange slightly sandy GRAVEL. Sand is medium to coarse. Gravel is very angular to angular of brick MADE GROUND
		0.50 - 0.60	ES					Soft grey to dark grey sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular, fine to medium of brick and concrete. MADE GROUND
		0.70 - 0.80	ES		0.70			Dark grey gravelly ashy sand. Gravel is subangular to subrounded, fine to medium of brick, porcelain and slate. MADE GROUND
					2.10			End of Borehole at 2.10m

Remarks:

Stability:

Pit Dimensions *(m)*
Length:
Width:
Depth: 2.10

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Trial Pit Log

Borehole No. **TP05** Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: TP
Location: Manchester	Plant:	Level (m AOD): / Final Depth (m): 0.97	Scale: 1:20
Client: Civic Engineers	Crew: Geotron	Start Date: 12/03/2019 / End Date: 12/03/2019	REC Engineer: CL

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.20 - 0.30	ES		0.10			Tarmacadam MADE GROUND
					0.40			White very sandy gravel with high cobble content. Sand is fine to coarse. Gravel is angular to subangular, fine to medium of concrete and limestone. Cobbles are angular of concrete MADE GROUND
					0.97			Orange slightly sandy GRAVEL. Sand is medium of coarse. Gravel is angular to very angular medium to coarse of brick MADE GROUND
								End of Borehole at 0.97m

Remarks:

Stability:

Pit Dimensions *(m)*
Length:
Width:
Depth: 0.97

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Trial Pit Log

Borehole No. **TP06**

Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: TP
Location: Manchester	Plant: Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.90	Scale: 1:20
Client: Civic Engineers	Crew: Geotron	Start Date: 14/03/2019 / End Date: 14/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Tarmacadam MADE GROUND
					0.20			Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
								Dark brown gravelly SAND. Sand is fine to medium. Gravel is fine to coarse angular brick and concrete. MADE GROUND
					0.90			End of Borehole at 0.90m

Remarks:

Stability:

Pit Dimensions (m)

Length:	0.55
Width:	0.39
Depth:	0.90

CONCEPT LIFE SCIENCES

Borehole Log

Borehole No. **WSBH01**

Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: WS
Location: Manchester	Plant: Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.80	Scale: 1:30
Client: Civic Engineers	Crew: Geotron	Start Date: 14/03/2019 / End Date: 14/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Tarmacadam MADE GROUND
					0.27			Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
		0.40	ES		0.50			Dark brown gravelly fine to medium SAND. Sand is fine to coarse. Gravel is fine to coarse angular brick and concrete. MADE GROUND
		0.60 - 0.70	ES		0.80			Light brown gravelly fine to medium SAND. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded sandstone and concrete. MADE GROUND End of Borehole at 0.80m

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Borehole Log

Borehole No. **WSBH02**

Sheet 1 of 1

Project Name:	Mayfield Plots N and O	Proj. ID: 106841		Easting: / Northing:	Hole Type: WS
Location:	Manchester	Plant:	Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.90	Scale: 1:30
Client:	Civic Engineers	Crew:	Geotron	Start Date: 14/03/2019 / End Date: 14/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	ES		0.10			Tarmacadam MADE GROUND
		0.40	ES					Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND *Between 0.10m and 0.80m bgl: Blueish green staining on MOT.*
					0.80			Orange GRAVEL. Gravel is angular coarse of brick MADE GROUND
					0.90			End of Borehole at 0.90m

Remarks:

Borehole Log

Borehole No. **WSBH03**

Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: WS
Location: Manchester	Plant: Breaker and hand tools	Level (m AOD): / Final Depth (m): 0.85	Scale: 1:30
Client: Civic Engineers	Crew: Geotron	Start Date: 14/03/2019 / End Date: 14/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Tarmacadam MADE GROUND
					0.50			Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
		0.60	ES		0.85			Dark brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular brick and concrete. MADE GROUND
								End of Borehole at 0.85m

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Borehole Log

Borehole No. **WSBH04**

Sheet 1 of 1

Project Name: Mayfield Plots N and O	Proj. ID: 106841	Easting: / Northing:	Hole Type: WS
Location: Manchester	Plant: Archway Dart	Level (m AOD): / Final Depth (m): 5.45	Scale: 1:30
Client: Civic Engineers	Crew: Geotron	Start Date: 14/03/2019 / End Date: 14/03/2019	REC Engineer: CD

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Tarmacadam MADE GROUND
					0.30			Light brown very sandy GRAVEL (MOT). Sand is fine to coarse. Gravel is angular limestone. MADE GROUND
		0.50	PID	PID=0				Dark brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular brick and concrete. MADE GROUND
		0.60	ES		0.70			
		0.90	ES					Brown slightly sandy gravelly reworked CLAY. Sand is fine to medium. Gravel is fine to medium subangular to subrounded brick, sandstone and coal. MADE GROUND
		1.00	D					
		1.30 - 1.75	D					
		1.30	SPT	N=4 (1,0/1,1,1,1)				
		1.50	PID	PID=0	1.50			
		1.60 - 1.80	ES					Brown clayey gravelly SAND. Sand is fine to coarse. Gravel is angular fine to coarse of brick, ceramics and sandstone. MADE GROUND
		2.00 - 2.45	D					
		2.00	SPT	N=5 (1,0/0,2,1,2)				
		2.00	PID	PID=1				
					2.40			
		2.50 - 2.60	ES					Soft dark brown sandy slightly gravelly CLAY with organic odour. Sand is fine to medium. Gravel is fine to coarse angular to subrounded sandstone and brick. MADE GROUND
		2.50	PID	PID=0				
		2.80 - 2.90	ES		2.80			Soft brown sandy CLAY. Sand is fine to medium. ALLUVIUM
		3.00 - 3.45	D		3.00			Soft dark brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular sandstone. ALLUVIUM
		3.00	SPT	N=3 (0,0/1,0,1,1)				
		3.20 - 3.30	ES					
					3.40			lose orange fine to medium SAND. ALLUVIUM
		4.00 - 4.45	D					
		4.00 - 4.70	B					
		4.00	SPT	N=6 (1,0/0,1,2,3)				
					4.80			very dense multicoloured slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse of limestone and sandstone. ALLUVIUM
		5.00	SPT	N=50 (5,8/8,16,16,10)				
					5.45			End of Borehole at 5.45m

Remarks:

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

APPENDIX V
GEOTECHNICAL TESTING

LABORATORY REPORT

4043

Contract Number: PSL19/2033

Report Date: 23 April 2019

Client's Reference: 106841

Client Name: REC Manchester
Osprey House
Pacific Quay
Broadway
Manchester
M50 2UE

For the attention of: Martin Lucass

Contract Title: Plots N + O Mayfield Ground Investigation

Date Received: 27/3/2019
Date Commenced: 27/3/2019
Date Completed: 23/4/2019

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
S Royle (Laboratory Manager)	S Eyre (Senior Technician)	L Knight (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
CPBH01		D	2.00	2.45	Brown very sandy GRAVEL.
CPBH02		D	2.90		Brown sandy CLAY.
WSBH04		B	4.00	4.70	Brown slightly gravelly very silty SAND.

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
CPBH01		D	2.00	2.45	7.8				NP			
CPBH02		D	2.90		27			37	19	18	100	Intermediate plasticity CI.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Plots N + O Mayfield Ground Investigation

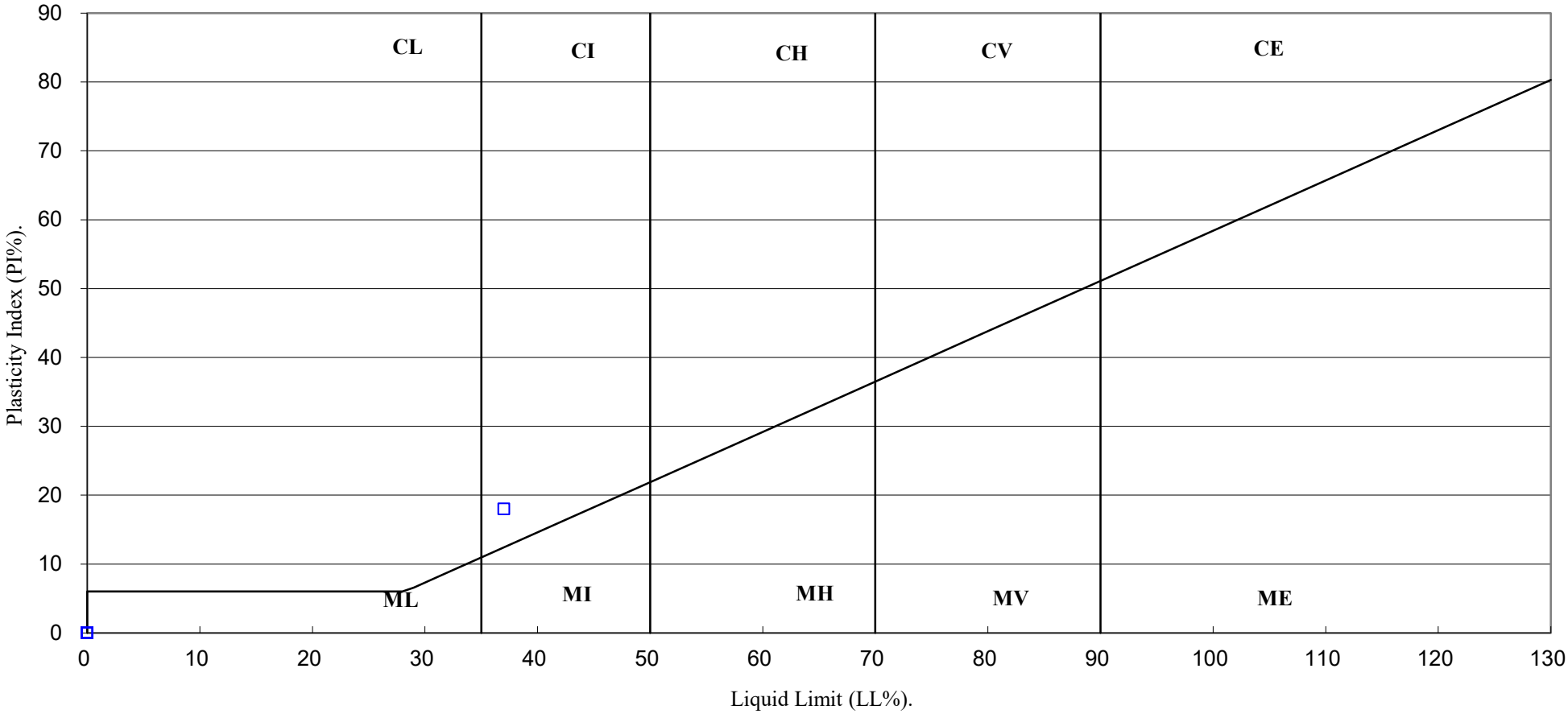
Contract No:

PSL19/2033

Client Ref:

106841

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Plots N + O Mayfield Ground Investigation	Contract No: PSL19/2033 Client Ref: 106841

PARTICLE SIZE DISTRIBUTION TEST

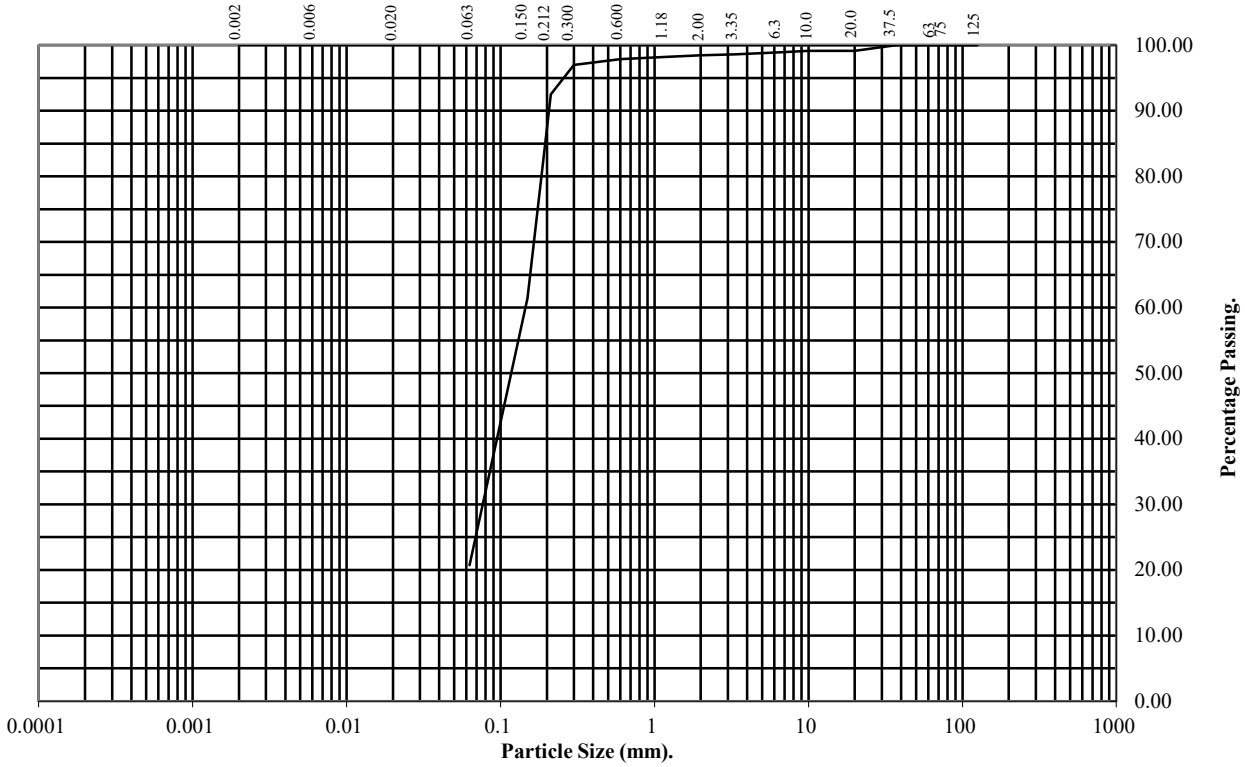
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WSBH04** **Top Depth (m):** **4.00**

Sample Number: **Base Depth(m):** **4.70**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	99
10	99
6.3	99
3.35	99
2	98
1.18	98
0.6	98
0.3	97
0.212	92
0.15	61
0.063	21

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	77
Silt/Clay	21

Remarks:

See Summary of Soil Descriptions

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
CPBH01	7.70		A	Perp	70	21	1470	1871.66	43.26	-	0.06	0.03	0.937	0.03	Valid	
CPBH01	9.89		A	Perp	70	27	1890	2406.42	49.06	-	0.07	0.03	0.991	0.03	Valid	
CPBH01	13.12		A	Perp	70	44	3080	3921.58	62.62	-	0.45	0.11	1.107	0.13	Valid	
CPBH02	8.50		A	Perp	70	35	2450	3119.44	55.85	-	0.04	0.01	1.051	0.01	Valid	
CPBH02	14.70		A	Perp	70	36	2520	3208.56	56.64	-	0.21	0.07	1.058	0.07	Valid	
CPBH02	15.90		A	Perp	70	24	1680	2139.04	46.25	-	0.06	0.03	0.966	0.03	Valid	
CPBH02	19.80		A	Perp	75	28	2100	2673.80	51.71	-	0.14	0.05	1.015	0.05	Valid	
CPBH03A	14.05		A	Perp	70	27	1890	2406.42	49.06	-	0.04	0.02	0.991	0.02	Valid	
CPBH03A	15.50		A	Perp	75	42	3150	4010.70	63.33	-	0.11	0.03	1.112	0.03	Valid	
CPBH03A	19.75		A	Perp	70	31	2170	2762.93	52.56	-	0.04	0.01	1.023	0.01	Valid	
CPBH03A	24.63		A	Perp	70	29	2030	2584.68	50.84	-	0.18	0.07	1.008	0.07	Valid	
CPBH04B	9.21		A	Perp	75	38	2850	3628.73	60.24	-	0.07	0.02	1.087	0.02	Valid	
CPBH04B	12.68		A	Perp	75	24	1800	2291.83	47.87	-	0.13	0.06	0.981	0.06	Valid	
CPBH04B	16.35		A	Perp	75	34	2550	3246.76	56.98	-	0.07	0.02	1.061	0.02	Valid	
CPBH04B	17.24		A	Perp	75	27	2025	2578.31	50.78	-	0.08	0.03	1.007	0.03	Valid	
CPBH04B	18.20		A	Perp	75	40	3000	3819.72	61.80	-	0.12	0.03	1.100	0.03	Valid	
CPBH04B	21.17		A	Perp	75	36	2700	3437.75	58.63	-	0.21	0.06	1.074	0.07	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

Plots N + O Mayfield Ground Investigation

Contract No:

PSL19/2033

Client Ref:

106841

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
CPBH01	7.70		D	Par	-	70	4900	70.00	-	0.03	0.006	1.163	0.01	Valid	
CPBH01	9.89		D	Par	-	70	4900	70.00	-	0.12	0.024	1.163	0.03	Valid	
CPBH01	13.12		D	Par	-	70	4900	70.00	-	0.12	0.024	1.163	0.03	Valid	
CPBH02	8.50		D	Par	-	70	4900	70.00	-	0.05	0.010	1.163	0.01	Valid	
CPBH02	14.70		D	Par	-	70	4900	70.00	-	0.09	0.018	1.163	0.02	Valid	
CPBH02	15.90		D	Par	-	70	4900	70.00	-	0.07	0.014	1.163	0.02	Valid	
CPBH02	19.80		D	Par	-	75	5625	75.00	-	0.05	0.009	1.200	0.01	Valid	
CPBH03A	14.05		D	Par	-	70	4900	70.00	-	0.03	0.006	1.163	0.01	Valid	
CPBH03A	15.50		D	Par	-	75	5625	75.00	-	0.09	0.016	1.200	0.02	Valid	
CPBH03A	19.75		D	Par	-	70	4900	70.00	-	0.01	0.002	1.163	0.00	Valid	
CPBH03A	24.63		D	Par	-	70	4900	70.00	-	0.37	0.076	1.163	0.09	Valid	
CPBH04B	9.21		D	Par	-	75	5625	75.00	-	0.08	0.014	1.200	0.02	Valid	
CPBH04B	12.68		D	Par	-	75	5625	75.00	-	0.26	0.046	1.200	0.06	Valid	
CPBH04B	16.35		D	Par	-	75	5625	75.00	-	0.07	0.012	1.200	0.01	Valid	
CPBH04B	17.24		D	Par	-	75	5625	75.00	-	0.03	0.005	1.200	0.01	Valid	
CPBH04B	18.20		D	Par	-	75	5625	75.00	-	0.11	0.020	1.200	0.02	Valid	
CPBH04B	21.17		D	Par	-	75	5625	75.00	-	0.06	0.011	1.200	0.01	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

UKAS TESTING 4043

PSL Professional Soils Laboratory

Plots N + O Mayfield Ground Investigation

Contract No:

PSL19/2033

Client Ref:

106841

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
CPBH01		U	19.71	19.91	75	131	1.7	1344	2.32	16	2.01	47.0	10.6	Brittle	02/04/19	
CPBH02		U	13.70	14.00	75	177	2.4	1922	2.46	12	2.20	4.3	1.0	Brittle	02/04/19	
CPBH02		U	19.50	19.80	75	127	1.7	1229	2.19	11	1.98	3.8	0.9	Brittle	02/04/19	
CPBH03A		U	16.48	16.63	75	117	1.6	1067	2.06	14	1.81	5.1	1.2	Brittle	02/04/19	
CPBH03A		U	20.12	20.27	75	126	1.7	1289	2.32	12	2.06	8.9	2.0	Brittle	02/04/19	
CPBH04B		U	15.70	15.86	75	129	1.7	1313	2.30	15	2.00	10.0	2.3	Brittle	02/04/19	
CPBH04B		U	19.10	19.25	75	126	1.7	1289	2.32	15	2.01	11.4	2.6	Brittle	02/04/19	

PSL Professional Soils Laboratory

Plots N + O Mayfield Ground Investigation

Contract No:
PSL19/2033
Client Ref:
106841

Certificate of Analysis

Certificate Number 19-06163

04-Apr-19

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 19-06163

Client Reference PSL19/2033

Order No (not supplied)

Contract Title Plots N+O Mayfeild Ground Investigation

Description 2 Soil samples.

Date Received 02-Apr-19

Date Started 02-Apr-19

Date Completed 04-Apr-19

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-06163
Client Ref PSL19/2033
Contract Title Plots N+O Mayfeild Ground Investigation

			Lab No	1482784	1482785
			Sample ID	CPBH01	CPBH02
			Depth	5.00-5.45	3.00-3.45
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	n/s	n/s
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Inorganics					
pH	DETSC 2008#			7.9	7.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	18

Information in Support of the Analytical Results

Our Ref 19-06163
Client Ref PSL19/2033
Contract Plots N+O Mayfeild Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1482784	CPBH01 5.00-5.45 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1482785	CPBH02 3.00-3.45 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

APPENDIX VI
CHEMICAL TESTING

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 810169-2

Date of Report: 27-Mar-2019

Customer: Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Salford
M50 2UE

Customer Contact: Mr Martin Lucass

Customer Job Reference: 106841
Customer Purchase Order: 6451
Customer Site Reference: Mayfield
Date Job Received at Concept: 15-Mar-2019
Date Analysis Started: 18-Mar-2019
Date Analysis Completed: 27-Mar-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked
and authorised by :
Chloe Kitto
Customer Service Advisor

Issued by :
Chloe Kitto
Customer Service Advisor

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**810169 001**	**810169 002**	**810169 003**	**810169 004**	**810169 005**
				Customer Sample Reference	**TP03**	**TP05**	**TP104**	**CPBH01**	**TP01**
				Depth	**0.10**	**0.20**	**0.50**	**0.30**	**0.20**
				Bottom Depth		**0.30**	**0.60**	**0.35**	**0.25**
				Date Sampled	**12-MAR-2019**	**12-MAR-2019**	**12-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**
				Matrix Class	**Topsoil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Moisture @105C	T162	AR	0.1	%	**25**	**4.1**	**20**	**10**	**17**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	**26.5**	<0.1	<0.1	<0.1

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**810169 006**	**810169 007**	**810169 008**	**810169 009**	**810169 010**
				Customer Sample Reference	**TP02**	**CPBH03**	**WS02**	**CPBH03A**	**CPBH02**
				Depth	**0.20**	**0.10**	**0.20**	**0.50**	**0.20**
				Bottom Depth	**0.30**	**0.20**		**0.60**	**0.30**
				Date Sampled	**13-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**12-MAR-2019**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Moisture @105C	T162	AR	0.1	%	**7.1**	**0.8**	**1.1**	**1.2**	**17**
Retained on 10mm sieve	T2	M40	0.1	%	**45.3**	**45.8**	**61.7**	**30.8**	<0.1

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**810169 011**	**810169 012**	**810169 013**	**810169 014**	**810169 015**
				Customer Sample Reference	**WS104**	**CPBH04**	**CPBH05**	**WS101**	**WS03**
				Depth	**2.50**	**0.50**	**0.60**	**0.40**	**0.60**
				Bottom Depth	**2.60**	**0.60**	**0.70**		
				Date Sampled	**14-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**
				Matrix Class	**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Moisture @105C	T162	AR	0.1	%	**22**	**13**	**14**	**3.5**	**16**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	**47.8**	<0.1	**51.7**	**29.3**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
REC Ltd 002S

				Concept Reference	**810169 001**	**810169 002**	**810169 003**	**810169 004**	**810169 005**
				Customer Sample Reference	**TP03**	**TP05**	**TP104**	**CPBH01**	**TP01**
				Depth	**0.10**	**0.20**	**0.50**	**0.30**	**0.20**
				Bottom Depth		**0.30**	**0.60**	**0.35**	**0.25**
				Date Sampled	**12-MAR-2019**	**12-MAR-2019**	**12-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**
				Matrix Class	**Topsoil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**11**	**9**	**15**	**13**	**20**
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**21**	**5**	**20**	**12**	**22**
Lead	T6	M40	1	mg/kg	**90**	**19**	**87**	**72**	**370**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Copper	T6	M40	1	mg/kg	**59**	**8**	**49**	**23**	**89**
Nickel	T6	M40	1	mg/kg	**16**	**7**	**30**	**14**	**29**
Zinc	T6	M40	1	mg/kg	**130**	**35**	**68**	**88**	**480**
pH	T7	A40			**6.6**	**8.9**	**8.3**	**10.2**	**9.9**
SO4(Total)	T6	A40	0.01	%	**0.44**	**0.08**	**0.04**	**0.06**	**0.15**
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Barium	T6	A40	1	mg/kg	**100**	**1400**	**140**	**130**	**410**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2	<2
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T921	M105	1	mg/kg	<1	<1	<1	<1	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1	<1	<1	<1
Vanadium	T6	M40	1	mg/kg	**22**	**4**	**31**	**19**	**35**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
REC Ltd 002S

				Concept Reference	**810169 006**	**810169 007**	**810169 008**	**810169 009**	**810169 010**
				Customer Sample Reference	**TP02**	**CPBH03**	**WS02**	**CPBH03A**	**CPBH02**
				Depth	**0.20**	**0.10**	**0.20**	**0.50**	**0.20**
				Bottom Depth	**0.30**	**0.20**		**0.60**	**0.30**
				Date Sampled	**13-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**12-MAR-2019**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**16**	**5**	**4**	**28**	**44**
Cadmium	T6	M40	1	mg/kg	<1	**1**	**2**	<1	**1**
Chromium	T6	M40	1	mg/kg	**18**	**6**	**4**	**20**	**26**
Lead	T6	M40	1	mg/kg	**480**	**40**	**72**	**1500**	**1100**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Copper	T6	M40	1	mg/kg	**94**	**12**	**16**	**150**	**680**
Nickel	T6	M40	1	mg/kg	**19**	**11**	**11**	**27**	**54**
Zinc	T6	M40	1	mg/kg	**480**	**84**	**100**	**250**	**240**
pH	T7	A40			**9.5**	**9.0**	**8.7**	**9.9**	**7.6**
SO4(Total)	T6	A40	0.01	%	**0.13**	**0.09**	**0.06**	**0.15**	**0.06**
SO4(2:1)	T6	AR	0.1	g/l	**0.1**	<0.1	<0.1	<0.1	<0.1
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Barium	T6	A40	1	mg/kg	**340**	**2000**	**790**	**1000**	**230**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2	**3**
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T921	M105	1	mg/kg	<1	<1	<1	<1	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1	<1	<1	<1
Vanadium	T6	M40	1	mg/kg	**24**	**6**	**4**	**40**	**51**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
REC Ltd 002S

Concept Reference			**810169 011**	**810169 012**	**810169 013**	**810169 014**	**810169 015**
Customer Sample Reference			**WS104**	**CPBH04**	**CPBH05**	**WS101**	**WS03**
Depth			**2.50**	**0.50**	**0.60**	**0.40**	**0.60**
Bottom Depth			**2.60**	**0.60**	**0.70**		
Date Sampled			**14-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**
Matrix Class			**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**16**	**36**	**72**	**13**	**310**
Cadmium	T6	M40	1	mg/kg	<1	**1**	**1**	**1**	**4**
Chromium	T6	M40	1	mg/kg	**12**	**14**	**24**	**11**	**130**
Lead	T6	M40	1	mg/kg	**92**	**190**	**340**	**340**	**1000**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Copper	T6	M40	1	mg/kg	**86**	**46**	**180**	**26**	**220**
Nickel	T6	M40	1	mg/kg	**20**	**21**	**34**	**18**	**43**
Zinc	T6	M40	1	mg/kg	**52**	**410**	**250**	**120**	**830**
pH	T7	A40			**8.1**	**9.7**	**8.9**	**10.3**	**8.8**
SO4(Total)	T6	A40	0.01	%	**0.05**	**0.20**	**0.22**	**0.12**	**0.18**
SO4(2:1)	T6	AR	0.1	g/l	**0.1**	**0.2**	**0.2**	<0.1	**0.1**
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Barium	T6	A40	1	mg/kg	**72**	**670**	**1100**	**670**	**640**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2	**2**
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T921	M105	1	mg/kg	<1	<1	<1	<1	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1	<1	<1	<1
Vanadium	T6	M40	1	mg/kg	**19**	**20**	**40**	**17**	**42**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
PAH US EPA 16 (B and K split) and Phenol

Concept Reference			**810169 001**	**810169 002**	**810169 003**	**810169 004**	**810169 005**
Customer Sample Reference			**TP03**	**TP05**	**TP104**	**CPBH01**	**TP01**
Depth			**0.10**	**0.20**	**0.50**	**0.30**	**0.20**
Bottom Depth				**0.30**	**0.60**	**0.35**	**0.25**
Date Sampled			**12-MAR-2019**	**12-MAR-2019**	**12-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**
Matrix Class			**Topsoil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	**0.3**
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	<0.1	**0.5**
Fluorene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1	<0.1	**0.3**
Phenanthrene	T207	M105	0.1	mg/kg	**1.8**	<0.1	**0.4**	<0.1	**3.0**
Anthracene	T207	M105	0.1	mg/kg	**0.4**	<0.1	<0.1	<0.1	**0.7**
Fluoranthene	T207	M105	0.1	mg/kg	**2.3**	<0.1	**0.5**	**0.1**	**3.8**
Pyrene	T207	M105	0.1	mg/kg	**2.2**	<0.1	**0.5**	<0.1	**3.6**
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**1.1**	<0.1	**0.2**	<0.1	**2.1**
Chrysene	T207	M105	0.1	mg/kg	**1.1**	<0.1	**0.2**	<0.1	**1.9**
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	**0.9**	<0.1	**0.2**	<0.1	**1.9**
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	**0.7**	<0.1	**0.1**	<0.1	**1.2**
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**1.1**	<0.1	**0.2**	<0.1	**2.1**
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	**0.6**	<0.1	**0.1**	<0.1	**1.1**
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	<0.1	**0.6**
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	**0.7**	<0.1	**0.1**	<0.1	**1.2**
PAH(total)	T207	M105	0.1	mg/kg	**14**	<0.1	**2.5**	**0.1**	**24**
Phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
PAH US EPA 16 (B and K split) and Phenol

				Concept Reference	**810169 006**	**810169 007**	**810169 008**	**810169 009**	**810169 010**
				Customer Sample Reference	**TP02**	**CPBH03**	**WS02**	**CPBH03A**	**CPBH02**
				Depth	**0.20**	**0.10**	**0.20**	**0.50**	**0.20**
				Bottom Depth	**0.30**	**0.20**		**0.60**	**0.30**
				Date Sampled	**13-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**12-MAR-2019**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**0.5**	**15**
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**0.4**	**1.2**
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**0.4**	**42**
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**0.6**	**27**
Phenanthrene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1	**4.0**	**100**
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**1.0**	**40**
Fluoranthene	T207	M105	0.1	mg/kg	**0.5**	<0.1	<0.1	**3.5**	**81**
Pyrene	T207	M105	0.1	mg/kg	**0.5**	<0.1	<0.1	**3.5**	**72**
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	**2.0**	**39**
Chrysene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	**1.9**	**36**
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	**1.8**	**38**
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1	**1.0**	**24**
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	**1.9**	**42**
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1	**1.0**	**26**
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**0.5**	**12**
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1	**1.1**	**28**
PAH(total)	T207	M105	0.1	mg/kg	**3.0**	<0.1	<0.1	**25**	**620**
Phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<1.0[9]

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
PAH US EPA 16 (B and K split) and Phenol

				Concept Reference	**810169 011**	**810169 012**	**810169 013**	**810169 014**	**810169 015**
				Customer Sample Reference	**WS104**	**CPBH04**	**CPBH05**	**WS101**	**WS03**
				Depth	**2.50**	**0.50**	**0.60**	**0.40**	**0.60**
				Bottom Depth	**2.60**	**0.60**	**0.70**		
				Date Sampled	**14-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**
				Matrix Class	**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	**0.6**	**0.3**	**0.2**	**0.2**
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**0.1**	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	**0.1**	**0.2**	**0.3**	**0.2**
Fluorene	T207	M105	0.1	mg/kg	<0.1	**0.2**	**0.2**	**0.3**	**0.2**
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	**1.7**	**1.7**	**2.0**	**1.8**
Anthracene	T207	M105	0.1	mg/kg	<0.1	**0.4**	**0.4**	**0.5**	**0.4**
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	**1.8**	**2.3**	**2.3**	**2.6**
Pyrene	T207	M105	0.1	mg/kg	<0.1	**1.8**	**2.2**	**2.3**	**2.5**
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	**0.9**	**1.1**	**1.2**	**1.2**
Chrysene	T207	M105	0.1	mg/kg	<0.1	**0.9**	**1.0**	**1.2**	**1.1**
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	**0.6**	**1.0**	**1.1**	**0.9**
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	**0.7**	**0.7**	**0.7**	**1.0**
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	**0.9**	**1.1**	**1.2**	**1.2**
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	**0.4**	**0.6**	**0.6**	**0.7**
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	**0.2**	**0.2**	**0.3**	**0.3**
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	**0.5**	**0.6**	**0.7**	**0.7**
PAH(total)	T207	M105	0.1	mg/kg	<0.1	**12**	**13**	**15**	**15**
Phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
TPH UKCWG

				Concept Reference	**810169 001**	**810169 002**	**810169 003**	**810169 004**	**810169 005**
				Customer Sample Reference	**TP03**	**TP05**	**TP104**	**CPBH01**	**TP01**
				Depth	**0.10**	**0.20**	**0.50**	**0.30**	**0.20**
				Bottom Depth		**0.30**	**0.60**	**0.35**	**0.25**
				Date Sampled	**12-MAR-2019**	**12-MAR-2019**	**12-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**
				Matrix Class	**Topsoil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	M105	10	µg/kg	<10(13)	<10(13)	<10(13)	<10(13)	<10(13)
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	<1(13)	<1(13)	<1(13)
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	<1(13)	<1(13)	**2(13)**
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	**3(13)**	**2(13)**	<1(13)	**1(13)**	**4(13)**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**9(13)**	**2(13)**	**8(13)**	**9(13)**	**28(13)**
TPH (Aliphatic) total	T85	M105			**12(13)**	**4(13)**	**8(13)**	**10(13)**	**34(13)**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2(13)	<2(13)	<2(13)	<2(13)	<2(13)
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	**2(13)**	<1(13)	**2(13)**	<1(13)	**9(13)**
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	**9(13)**	<1(13)	**9(13)**	**3(13)**	**44(13)**
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	**28(13)**	<1(13)	**23(13)**	**8(13)**	**100(13)**
TPH (Aromatic) total	T85	M105			**39(13)**	N.D.(13)	**34(13)**	**11(13)**	**150(13)**
TPH (Aliphatic+Aromatic) (sum)	T85	M105			**51(13)**	**4(13)**	**42(13)**	**21(13)**	**190(13)**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
TPH UKCWG

				Concept Reference	**810169 006**	**810169 007**	**810169 008**	**810169 009**	**810169 010**
				Customer Sample Reference	**TP02**	**CPBH03**	**WS02**	**CPBH03A**	**CPBH02**
				Depth	**0.20**	**0.10**	**0.20**	**0.50**	**0.20**
				Bottom Depth	**0.30**	**0.20**		**0.60**	**0.30**
				Date Sampled	**13-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**12-MAR-2019**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	M105	10	µg/kg	<10[13]	<10[13]	<10[13]	<10[13]	<10[13]
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1[13]	<10[9,13]	<10[13,9]	<1[13]	**27[13]**
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	<1[13]	<10[13,9]	<10[9,13]	**2[13]**	**120[13]**
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	**1[13]**	**17[13]**	<10[13,9]	**8[13]**	**270[13]**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**15[13]**	**53[13]**	**39[13]**	**45[13]**	**380[13]**
TPH (Aliphatic) total	T85	M105			**16[13]**	**70[13]**	**39[13]**	**55[13]**	**800[13]**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	**0.23**
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2[13]	<10[13,9]	<10[13,9]	<2[13]	**57[13]**
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	**3[13]**	<10[9,13]	<10[13,9]	**9[13]**	**700[13]**
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	**26[13]**	<10[13,9]	<10[13,9]	**52[13]**	**2500[13]**
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	**74[13]**	**11[13]**	<10[9,13]	**110[13]**	**5000[13]**
TPH (Aromatic) total	T85	M105			**100[13]**	**11[13]**	N.D.[13]	**170[13]**	**8300[13]**
TPH (Aliphatic+Aromatic) (sum)	T85	M105			**120[13]**	**81[13]**	**39[13]**	**230[13]**	**9100[13]**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
TPH UKCWG

				Concept Reference	**810169 011**	**810169 012**	**810169 013**	**810169 014**	**810169 015**
				Customer Sample Reference	**WS104**	**CPBH04**	**CPBH05**	**WS101**	**WS03**
				Depth	**2.50**	**0.50**	**0.60**	**0.40**	**0.60**
				Bottom Depth	**2.60**	**0.60**	**0.70**		
				Date Sampled	**14-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**
				Matrix Class	**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	M105	10	µg/kg	<10(13)	<10(13)	<10(13)	<10(13)	<10(13)
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	<1(13)	<1(13)	<1(13)
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	**1(13)**	**2(13)**	**1(13)**
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	<1(13)	**1(13)**	**5(13)**	**14(13)**	**6(13)**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**4(13)**	**5(13)**	**12(13)**	**15(13)**	**17(13)**
TPH (Aliphatic) total	T85	M105			**4(13)**	**6(13)**	**18(13)**	**31(13)**	**24(13)**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2(13)	<2(13)	<2(13)	<2(13)	<2(13)
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	**3(13)**	**5(13)**	**5(13)**	**4(13)**	**5(13)**
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	**5(13)**	**18(13)**	**21(13)**	**21(13)**	**31(13)**
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	**12(13)**	**38(13)**	**53(13)**	**58(13)**	**66(13)**
TPH (Aromatic) total	T85	M105			**20(13)**	**61(13)**	**79(13)**	**83(13)**	**100(13)**
TPH (Aliphatic+Aromatic) (sum)	T85	M105			**24(13)**	**67(13)**	**97(13)**	**110(13)**	**130(13)**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
SVOC (USEPA 625) (B and K split)

Concept Reference	**810169 010**
Customer Sample Reference	**CPBH02**
Depth	**0.20**
Bottom Depth	**0.30**
Date Sampled	**12-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Phenol	T207	M105	0.1	mg/kg	<1.0(9)
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	<1.0(9)
2-Chlorophenol	T207	M105	0.1	mg/kg	<1.0(9)
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	<1.0(9)
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	<1.0(9)
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	<1.0(9)
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	<1.0(9)
2-methyl phenol	T207	M105	0.1	mg/kg	<1.0(9)
3/4-Methylphenol	T207	M105	0.1	mg/kg	<1.0(9)
Hexachloroethane	T207	M105	0.1	mg/kg	<1.0(9)
Nitrobenzene	T207	M105	0.1	mg/kg	<1.0(9)
Isophorone	T207	M105	0.1	mg/kg	<1.0(9)
2-Nitrophenol	T207	M105	0.1	mg/kg	<1.0(9)
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	<1.0(9)
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	<1.0(9)
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	<1.0(9)
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	<1.0(9)
Naphthalene	T207	M105	0.1	mg/kg	**15**
4-Chloroaniline	T207	M105	0.1	mg/kg	<1.0(9)
Hexachlorobutadiene	T207	M105	0.1	mg/kg	<1.0(9)
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	<1.0(9)
2-Methylnaphthalene	T207	M105	0.1	mg/kg	**10**
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	<1.0(9)
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	<1.0(9)
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	<1.0(9)
2-Chloronaphthalene	T207	M105	0.1	mg/kg	<1.0(9)
2-Nitroaniline	T207	M105	0.1	mg/kg	<1.0(9)
Dimethyl phthalate	T207	M105	0.1	mg/kg	<1.0(9)
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	<1.0(9)
Acenaphthylene	T207	M105	0.1	mg/kg	**1.2**
Acenaphthene	T207	M105	0.1	mg/kg	**42**
3-Nitroaniline	T207	M105	0.1	mg/kg	<1.0(9)
Dibenzofuran	T207	M105	0.1	mg/kg	**18**
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	<1.0(9)
Diethyl phthalate	T207	M105	0.1	mg/kg	<1.0(9)
Fluorene	T207	M105	0.1	mg/kg	**27**
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	<1.0(9)
4-Nitroaniline	T207	M105	0.1	mg/kg	<1.0(9)
Azobenzene	T207	M105	0.1	mg/kg	<1.0(9)
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	<1.0(9)
Hexachlorobenzene	T207	M105	0.1	mg/kg	<1.0(9)
Pentachlorophenol	T207	M105	0.1	mg/kg	<1.0(9)
Phenanthrene	T207	M105	0.1	mg/kg	**100**
Anthracene	T207	M105	0.1	mg/kg	**40**
Carbazole	T207	M105	0.1	mg/kg	**8.1**
Di-n-butylphthalate	T207	M105	0.1	mg/kg	<1.0(9)
Fluoranthene	T207	M105	0.1	mg/kg	**81**
Pyrene	T207	M105	0.1	mg/kg	**72**
Butyl benzylphthalate	T207	M105	0.1	mg/kg	<1.0(9)
4-Nitrophenol	T16	M105	0.1	mg/kg	<1.0(9)
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**39**
Chrysene	T207	M105	0.1	mg/kg	**36**
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	<1.0(9)
Di-n-octylphthalate	T207	M105	0.1	mg/kg	<1.0(9)
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**42**
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	**26**
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	**12**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil

SVOC (USEPA 625) (B and K split)

Concept Reference	**810169 010**
Customer Sample Reference	**CPBH02**
Depth	**0.20**
Bottom Depth	**0.30**
Date Sampled	**12-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	**28**
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	**38**
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	**24**

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil

Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference	**810169 010**
Customer Sample Reference	**CPBH02**
Depth	**0.20**
Bottom Depth	**0.30**
Date Sampled	**12-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Dichlorodifluoromethane	T209	M105	50	µg/kg	<50
Chloromethane	T209	M105	50	µg/kg	<50
Vinyl chloride	T209	M105	50	µg/kg	<50
Bromomethane	T209	M105	50	µg/kg	<50
Chloroethane	T209	M105	50	µg/kg	<50
Trichlorofluoromethane	T209	M105	50	µg/kg	<50
1,1-Dichloroethylene	T209	M105	50	µg/kg	<50
Dichloromethane	T209	M105	50	µg/kg	<50
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	<50
1,1-Dichloroethane	T209	M105	50	µg/kg	<50
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	<50
2,2-Dichloropropane	T209	M105	50	µg/kg	<50
Chloroform	T209	M105	50	µg/kg	<50
Bromochloromethane	T209	M105	50	µg/kg	<50
1,1,1-Trichloroethane	T209	M105	50	µg/kg	<50
1,1-Dichloropropene	T209	M105	50	µg/kg	<50
Carbon tetrachloride	T209	M105	50	µg/kg	<50
1,2-Dichloroethane	T209	M105	50	µg/kg	<50
Benzene	T209	M105	10	µg/kg	<10(13)
1,2-Dichloropropane	T209	M105	50	µg/kg	<50
Trichloroethene	T209	M105	50	µg/kg	<50
Bromodichloromethane	T209	M105	50	µg/kg	<50
Dibromomethane	T209	M105	50	µg/kg	<50
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	<50
Toluene	T209	M105	10	µg/kg	<10
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	<50
1,1,2-Trichloroethane	T209	M105	50	µg/kg	<50
1,3-Dichloropropane	T209	M105	50	µg/kg	<50
Tetrachloroethene	T209	M105	50	µg/kg	<50
Chlorodibromomethane	T209	M105	50	µg/kg	<50
1,2-dibromoethane	T209	M105	50	µg/kg	<50
Chlorobenzene	T209	M105	50	µg/kg	<50
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	<50
EthylBenzene	T209	M105	10	µg/kg	<10
M/P Xylene	T209	M105	10	µg/kg	<10
O Xylene	T209	M105	10	µg/kg	<10
Styrene	T209	M105	50	µg/kg	<50
Bromoform	T209	M105	50	µg/kg	<50
Isopropyl benzene	T209	M105	50	µg/kg	<50
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	<50
1,2,3-Trichloropropane	T209	M105	50	µg/kg	<50
n-Propylbenzene	T209	M105	50	µg/kg	<50
Bromobenzene	T209	M105	50	µg/kg	<50
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	<50
T-Butylbenzene	T209	M105	50	µg/kg	<50
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	<50
S-Butylbenzene	T209	M105	50	µg/kg	<50
p-Isopropyltoluene	T209	M105	50	µg/kg	<50
2-Chlorotoluene	T209	M105	50	µg/kg	<50
4-Chlorotoluene	T209	M105	50	µg/kg	<50
1,3-Dichlorobenzene	T209	M105	50	µg/kg	<50
1,4-Dichlorobenzene	T209	M105	50	µg/kg	<50
1,2-Dichlorobenzene	T209	M105	50	µg/kg	<50

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
PCB EC7

Concept Reference	**810169 010**
Customer Sample Reference	**CPBH02**
Depth	**0.20**
Bottom Depth	**0.30**
Date Sampled	**12-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
PCB BZ#28	T208	M105	0.05	µg/kg	$<10^{(9,63)}$
PCB BZ#52	T208	M105	0.05	µg/kg	$<10^{(63,9)}$
PCB BZ#101	T208	M105	0.05	µg/kg	$<10^{(9,63)}$
PCB BZ#118	T208	M105	0.05	µg/kg	$<10^{(63,9)}$
PCB BZ#153	T208	M105	0.05	µg/kg	$<10^{(63,9)}$
PCB BZ#138	T208	M105	0.05	µg/kg	$<10^{(63,9)}$
PCB BZ#180	T208	M105	0.05	µg/kg	$<10^{(9,63)}$

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
Asbestos ID

Concept Reference					**810169 001**	**810169 002**	**810169 003**	**810169 004**	**810169 005**
Customer Sample Reference					**TP03**	**TP05**	**TP104**	**CPBH01**	**TP01**
Depth					**0.10**	**0.20**	**0.50**	**0.30**	**0.20**
Bottom Depth						**0.30**	**0.60**	**0.35**	**0.25**
Date Sampled					**12-MAR-2019**	**12-MAR-2019**	**12-MAR-2019**	**11-MAR-2019**	**13-MAR-2019**
Matrix Class					**Topsoil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Asbestos ID	T27	A40			N.D.	N.D.	N.D.	N.D.	Amosite Loose Fibres Detected
									Chrysotile Loose Fibres Detected

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
Asbestos ID

Concept Reference					**810169 006**	**810169 007**	**810169 008**	**810169 009**	**810169 010**
Customer Sample Reference					**TP02**	**CPBH03**	**WS02**	**CPBH03A**	**CPBH02**
Depth					**0.20**	**0.10**	**0.20**	**0.50**	**0.20**
Bottom Depth					**0.30**	**0.20**		**0.60**	**0.30**
Date Sampled					**13-MAR-2019**	**13-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**12-MAR-2019**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Asbestos ID	T27	A40			N.D.	N.D.	N.D.	N.D.	N.D.

Concept Reference: 810169
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
Asbestos ID

	Concept Reference	810169 011	810169 012	810169 013	810169 014	810169 015
	Customer Sample Reference	WS104	CPBH04	CPBH05	WS101	WS03
	Depth	2.50	0.50	0.60	0.40	0.60
	Bottom Depth	2.60	0.60	0.70		
	Date Sampled	14-MAR-2019	11-MAR-2019	13-MAR-2019	14-MAR-2019	14-MAR-2019
	Matrix Class	Clay	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method / Test Sample / LOD / Units					
Asbestos ID	T27 / A40	N.D.	N.D.	N.D.	N.D.	N.D.

Index to symbols used in 810169-2

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
A40	Assisted dried < 40C
AR	As Received
N.D.	Not Detected
9	LOD raised due to dilution of sample
13	Results have been blank corrected.
63	LOD was raised because an alternative analytical procedure was used
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos testing was subcontracted to REC Asbestos.

Method Index

Value	Description
T16	GC/MS
T7	Probe
T162	Grav (1 Dec) (105 C)
T208	GC/MS (HR) (MCERTS)
T85	Calc
T2	Grav
T207	GC/MS (MCERTS)
T209	GC/MS (Head Space)(MCERTS)
T27	PLM
T909	GCxGC
T921	Colorimetry (CF) (MCERT)
T6	ICP/OES

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
PCB BZ#28	T208	M105	0.05	µg/kg	M	010
PCB BZ#52	T208	M105	0.05	µg/kg	M	010
PCB BZ#101	T208	M105	0.05	µg/kg	M	010
PCB BZ#118	T208	M105	0.05	µg/kg	M	010
PCB BZ#153	T208	M105	0.05	µg/kg	M	010
PCB BZ#138	T208	M105	0.05	µg/kg	M	010
PCB BZ#180	T208	M105	0.05	µg/kg	M	010
Moisture @105C	T162	AR	0.1	%	N	001-015
Retained on 10mm sieve	T2	M40	0.1	%	N	001-015
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	M	010

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
2-Chlorophenol	T207	M105	0.1	mg/kg	M	010
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	M	010
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	M	010
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	M	010
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	M	010
2-methyl phenol	T207	M105	0.1	mg/kg	M	010
3/4-Methylphenol	T207	M105	0.1	mg/kg	M	010
Hexachloroethane	T207	M105	0.1	mg/kg	U	010
Nitrobenzene	T207	M105	0.1	mg/kg	M	010
Isophorone	T207	M105	0.1	mg/kg	U	010
2-Nitrophenol	T207	M105	0.1	mg/kg	U	010
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	U	010
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	M	010
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	U	010
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	M	010
4-Chloroaniline	T207	M105	0.1	mg/kg	U	010
Hexachlorobutadiene	T207	M105	0.1	mg/kg	M	010
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	M	010
2-Methylnaphthalene	T207	M105	0.1	mg/kg	M	010
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	U	010
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	U	010
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	U	010
2-Chloronaphthalene	T207	M105	0.1	mg/kg	M	010
2-Nitroaniline	T207	M105	0.1	mg/kg	M	010
Dimethyl phthalate	T207	M105	0.1	mg/kg	U	010
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	U	010
3-Nitroaniline	T207	M105	0.1	mg/kg	U	010
Dibenzofuran	T207	M105	0.1	mg/kg	M	010
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	M	010
Diethyl phthalate	T207	M105	0.1	mg/kg	U	010
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	M	010
4-Nitroaniline	T207	M105	0.1	mg/kg	U	010
Azobenzene	T207	M105	0.1	mg/kg	M	010
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	M	010
Hexachlorobenzene	T207	M105	0.1	mg/kg	M	010
Pentachlorophenol	T207	M105	0.1	mg/kg	U	010
Carbazole	T207	M105	0.1	mg/kg	U	010
Di-n-butylphthalate	T207	M105	0.1	mg/kg	M	010
Butyl benzylphthalate	T207	M105	0.1	mg/kg	U	010
4-Nitrophenol	T16	M105	0.1	mg/kg	N	010
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	M	010
Di-n-octylphthalate	T207	M105	0.1	mg/kg	M	010
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	010
Chloromethane	T209	M105	50	µg/kg	U	010
Vinyl chloride	T209	M105	50	µg/kg	M	010
Bromomethane	T209	M105	50	µg/kg	U	010
Chloroethane	T209	M105	50	µg/kg	M	010
Trichlorofluoromethane	T209	M105	50	µg/kg	M	010
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	010
Dichloromethane	T209	M105	50	µg/kg	U	010
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	010
1,1-Dichloroethane	T209	M105	50	µg/kg	M	010
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	010
2,2-Dichloropropane	T209	M105	50	µg/kg	U	010
Chloroform	T209	M105	50	µg/kg	M	010
Bromochloromethane	T209	M105	50	µg/kg	M	010
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	010
1,1-Dichloropropene	T209	M105	50	µg/kg	M	010
Carbon tetrachloride	T209	M105	50	µg/kg	M	010
1,2-Dichloroethane	T209	M105	50	µg/kg	M	010
1,2-Dichloropropane	T209	M105	50	µg/kg	M	010
Trichloroethene	T209	M105	50	µg/kg	M	010
Bromodichloromethane	T209	M105	50	µg/kg	M	010
Dibromomethane	T209	M105	50	µg/kg	M	010
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	010
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	010
1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	010
1,3-Dichloropropane	T209	M105	50	µg/kg	M	010
Tetrachloroethene	T209	M105	50	µg/kg	M	010
Chlorodibromomethane	T209	M105	50	µg/kg	M	010

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
1,2-dibromoethane	T209	M105	50	µg/kg	M	010
Chlorobenzene	T209	M105	50	µg/kg	M	010
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	010
Styrene	T209	M105	50	µg/kg	U	010
Bromoform	T209	M105	50	µg/kg	M	010
Isopropyl benzene	T209	M105	50	µg/kg	M	010
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	010
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	010
n-Propylbenzene	T209	M105	50	µg/kg	M	010
Bromobenzene	T209	M105	50	µg/kg	M	010
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	010
T-Butylbenzene	T209	M105	50	µg/kg	M	010
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	010
S-Butylbenzene	T209	M105	50	µg/kg	M	010
p-Isopropyltoluene	T209	M105	50	µg/kg	M	010
2-Chlorotoluene	T209	M105	50	µg/kg	U	010
4-Chlorotoluene	T209	M105	50	µg/kg	U	010
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	010
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	010
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	010
Arsenic	T6	M40	2	mg/kg	M	001-015
Cadmium	T6	M40	1	mg/kg	M	001-015
Chromium	T6	M40	1	mg/kg	M	001-015
Lead	T6	M40	1	mg/kg	M	001-015
Mercury	T6	M40	1	mg/kg	M	001-015
Selenium	T6	M40	3	mg/kg	M	001-015
Copper	T6	M40	1	mg/kg	M	001-015
Nickel	T6	M40	1	mg/kg	M	001-015
Zinc	T6	M40	1	mg/kg	M	001-015
pH	T7	A40			M	001-015
SO4(Total)	T6	A40	0.01	%	N	001-015
SO4(2:1)	T6	AR	0.1	g/l	N	001-015
Chromium VI	T6	A40	1	mg/kg	N	001-015
Barium	T6	A40	1	mg/kg	U	001-015
Beryllium	T6	A40	2	mg/kg	U	001-015
Boron (water-soluble)	T6	A40	1	mg/kg	N	001-015
Cyanide(Total)	T921	M105	1	mg/kg	M	001-015
Phenols(Mono)	T921	M105	1	mg/kg	M	001-015
Vanadium	T6	M40	1	mg/kg	M	001-015
Naphthalene	T207	M105	0.1	mg/kg	M	001-015
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-015
Acenaphthene	T207	M105	0.1	mg/kg	M	001-015
Fluorene	T207	M105	0.1	mg/kg	M	001-015
Phenanthrene	T207	M105	0.1	mg/kg	M	001-015
Anthracene	T207	M105	0.1	mg/kg	U	001-015
Fluoranthene	T207	M105	0.1	mg/kg	M	001-015
Pyrene	T207	M105	0.1	mg/kg	M	001-015
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-015
Chrysene	T207	M105	0.1	mg/kg	M	001-015
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-015
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-015
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-015
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-015
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-015
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-015
PAH(total)	T207	M105	0.1	mg/kg	U	001-015
Phenol	T207	M105	0.1	mg/kg	M	001-015
Benzene	T209	M105	10	µg/kg	M	001-015
Toluene	T209	M105	10	µg/kg	M	001-015
EthylBenzene	T209	M105	10	µg/kg	M	001-015
M/P Xylene	T209	M105	10	µg/kg	M	001-015
O Xylene	T209	M105	10	µg/kg	M	001-015
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-015
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001-015
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001-015
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001-015
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	M	001-015
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	M	001-015
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	M	001-015
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	M	001-015

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (Aliphatic) total	T85	M105			N	001-015
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	001-015
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001-015
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001-015
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	M	001-015
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	M	001-015
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	M	001-015
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	M	001-015
TPH (Aromatic) total	T85	M105			N	001-015
TPH (Aliphatic+Aromatic) (sum)	T85	M105			N	001-015
Asbestos ID	T27	A40			SU	001-015

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 811227-1

Date of Report: 17-Apr-2019

Customer: Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Salford
M50 2UE

Customer Contact: Mr Martin Lucass

Customer Job Reference: 106841
Customer Purchase Order: 006451
Customer Site Reference: Mayfield
Date Job Received at Concept: 20-Mar-2019
Date Analysis Started: 22-Mar-2019
Date Analysis Completed: 28-Mar-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by :
Chloe Kitto
Customer Service Advisor

Concept Reference: 811227
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**811227 001**
Customer Sample Reference	**CPBH04**
Depth	**0.10**
Date Sampled	**19-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Moisture @105C	T162	AR	0.1	%	**16**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1

Concept Reference: 811227
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil
REC Ltd 002S

Concept Reference	**811227 001**
Customer Sample Reference	**CPBH04**
Depth	**0.10**
Date Sampled	**19-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Arsenic	T6	M40	2	mg/kg	**1100**
Cadmium	T6	M40	1	mg/kg	<1
Chromium	T6	M40	1	mg/kg	**21**
Lead	T6	M40	1	mg/kg	**30**
Mercury	T6	M40	1	mg/kg	<1
Selenium	T6	M40	3	mg/kg	<3
Copper	T6	M40	1	mg/kg	**24**
Nickel	T6	M40	1	mg/kg	**28**
Zinc	T6	M40	1	mg/kg	**55**
pH	T7	A40			**8.1**
SO4(Total)	T6	A40	0.01	%	**0.02**
SO4(2:1)	T6	AR	0.1	g/l	<0.1
Chromium VI	T6	A40	1	mg/kg	<1
Barium	T6	A40	1	mg/kg	**110**
Beryllium	T6	A40	2	mg/kg	<2
Boron (water-soluble)	T6	A40	1	mg/kg	<1
Cyanide(Total)	T921	M105	1	mg/kg	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1
Vanadium	T6	M40	1	mg/kg	**23**

Concept Reference: 811227
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil

PAH US EPA 16 (B and K split) and Phenol

Concept Reference	**811227 001**
Customer Sample Reference	**CPBH04**
Depth	**0.10**
Date Sampled	**19-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T207	M105	0.1	mg/kg	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1
Phenol	T207	M105	0.1	mg/kg	<0.1

Concept Reference: 811227
Project Site: Mayfield
Customer Reference: 106841

Soil Analysed as Soil

TPH UKCWG

Concept Reference	**811227 001**
Customer Sample Reference	**CPBH04**
Depth	**0.10**
Date Sampled	**19-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Benzene	T209	M105	10	µg/kg	<10[13]
Toluene	T209	M105	10	µg/kg	<10
EthylBenzene	T209	M105	10	µg/kg	<10
M/P Xylene	T209	M105	10	µg/kg	<10
O Xylene	T209	M105	10	µg/kg	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1[13]
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	<1[13]
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	**2[13]**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**6[13]**
TPH (Aliphatic) total	T85	M105			**8[13]**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2[13]
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	<1[13]
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	<1[13]
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	<1[13]
TPH (Aromatic) total	T85	M105			N.D.[13]
TPH (Aliphatic+Aromatic) (sum)	T85	M105			**8[13]**

Concept Reference:	811227
Project Site:	Mayfield
Customer Reference:	106841
Soil	Analysed as Soil
Misc	

Concept Reference	**811227 001**
Customer Sample Reference	**CPBH04**
Depth	**0.10**
Date Sampled	**19-MAR-2019**
Matrix Class	**Topsoil**

Determinand	Method	Test Sample	LOD	Units	
Asbestos ID	T27	A40			N.D.

Index to symbols used in 811227-1

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
A40	Assisted dried < 40C
AR	As Received
N.D.	Not Detected
13	Results have been blank corrected.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos was subcontracted to REC Asbestos.

Method Index

Value	Description
T209	GC/MS (Head Space)(MCERTS)
T921	Colorimetry (CF) (MCERT)
T6	ICP/OES
T27	PLM
T909	GCxGC
T85	Calc
T162	Grav (1 Dec) (105 C)
T207	GC/MS (MCERTS)
T7	Probe
T2	Grav

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Moisture @105C	T162	AR	0.1	%	N	001
Retained on 10mm sieve	T2	M40	0.1	%	N	001
Asbestos ID	T27	A40			SU	001
Arsenic	T6	M40	2	mg/kg	M	001
Cadmium	T6	M40	1	mg/kg	M	001
Chromium	T6	M40	1	mg/kg	M	001
Lead	T6	M40	1	mg/kg	M	001
Mercury	T6	M40	1	mg/kg	M	001
Selenium	T6	M40	3	mg/kg	M	001
Copper	T6	M40	1	mg/kg	M	001
Nickel	T6	M40	1	mg/kg	M	001
Zinc	T6	M40	1	mg/kg	M	001
pH	T7	A40			M	001

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
SO4(Total)	T6	A40	0.01	%	N	001
SO4(2:1)	T6	AR	0.1	g/l	N	001
Chromium VI	T6	A40	1	mg/kg	N	001
Barium	T6	A40	1	mg/kg	U	001
Beryllium	T6	A40	2	mg/kg	U	001
Boron (water-soluble)	T6	A40	1	mg/kg	N	001
Cyanide(Total)	T921	M105	1	mg/kg	M	001
Phenols(Mono)	T921	M105	1	mg/kg	M	001
Vanadium	T6	M40	1	mg/kg	M	001
Naphthalene	T207	M105	0.1	mg/kg	M	001
Acenaphthylene	T207	M105	0.1	mg/kg	U	001
Acenaphthene	T207	M105	0.1	mg/kg	M	001
Fluorene	T207	M105	0.1	mg/kg	M	001
Phenanthrene	T207	M105	0.1	mg/kg	M	001
Anthracene	T207	M105	0.1	mg/kg	U	001
Fluoranthene	T207	M105	0.1	mg/kg	M	001
Pyrene	T207	M105	0.1	mg/kg	M	001
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001
Chrysene	T207	M105	0.1	mg/kg	M	001
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001
PAH(total)	T207	M105	0.1	mg/kg	U	001
Phenol	T207	M105	0.1	mg/kg	M	001
Benzene	T209	M105	10	µg/kg	M	001
Toluene	T209	M105	10	µg/kg	M	001
EthylBenzene	T209	M105	10	µg/kg	M	001
M/P Xylene	T209	M105	10	µg/kg	M	001
O Xylene	T209	M105	10	µg/kg	M	001
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	M	001
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	M	001
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	M	001
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	M	001
TPH (Aliphatic) total	T85	M105			N	001
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	001
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	M	001
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	M	001
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	M	001
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	M	001
TPH (Aromatic) total	T85	M105			N	001
TPH (Aliphatic+Aromatic) (sum)	T85	M105			N	001

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 812025-1

Date of Report: 17-Apr-2019

Customer: Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Salford
M50 2UE

Customer Contact: Mr Martin Lucass

Customer Job Reference: 106841
Customer Purchase Order: 006451
Customer Site Reference: O Mayfield Ground Investigation
Date Job Received at Concept: 15-Mar-2019
Date Analysis Started: 27-Mar-2019
Date Analysis Completed: 02-Apr-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by :
Chloe Kitto
Customer Service Advisor

Concept Reference: 812025
Project Site: O Mayfield Ground Investigation
Customer Reference: 106841

Soil Analysed as Soil
pH and Sulphate

				Concept Reference	**812025 001**	**812025 002**	**812025 003**	**812025 004**	**812025 005**
				Customer Sample Reference	**CPBH01**	**CPBH02**	**CPBH04B (811227/003)**	**TP04**	**WSBH01**
				Bottom Depth	**1.70**	**1.80**		**0.80**	**0.70**
				Depth	**1.50**	**1.70**	**0.70**	**0.70**	**0.60**
				Date Sampled	**11-MAR-2019**	**12-MAR-2019**	**19-MAR-2019**	**12-MAR-2019**	**14-MAR-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
pH	T7	A40			**7.9**	**7.4**	**8.2**	**8.6**	**9.8**
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 812025
Project Site: O Mayfield Ground Investigation
Customer Reference: 106841

Soil Analysed as Soil
pH and Sulphate

				Concept Reference	**812025 006**	**812025 007**
				Customer Sample Reference	**WSBH02**	**WSBH04**
				Bottom Depth		**3.30**
				Depth	**0.40**	**3.20**
				Date Sampled	**14-MAR-2019**	**14-MAR-2019**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
pH	T7	A40			**8.7**	**8.3**
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1

Index to symbols used in 812025-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T7	Probe
T6	ICP/OES

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
pH	T7	A40			U	001-007
SO4(2:1)	T6	AR	0.1	g/l	N	001-007

APPENDIX VII
GAS AND GROUNDWATER MONITORING

GAS AND GROUNDWATER MONITORING
APPENDIX VII

Location	Date	CH_4 Max %v/v	CH_4 Steady %v/v	CO_2 Max %v/v	CO_2 Steady %v/v	Low O_2 %v/v	Flow Max (l/hr)	Flow Steady (l/hr)	Response Zone (mbgl)	Depth to Base (mbgl)	Depth to Water (mbgl)
WSBH04	28/03/19	<0.1	<0.1	3.3	3.3	13.8	0.1	0.1	1.00 – 5.00	5.09	3.25
	09/04/19	<0.1	<0.1	3.2	3.2	14.5	0.1	0.1		5.00	3.37
CPBH01	28/03/19	<0.1	<0.1	<0.1	<0.1	19.7	0.1	0.1	5.00 – 20.0	15.60	6.80
	09/04/2019	Not possible to monitor as position is under demolition rubble									
CPBH02	28/03/19	<0.1	<0.1	0.7	<0.1	18.7	0.1	0.1	4.00 – 20.0	18.40	7.30
	09/04/19	<0.1	<0.1	0.6	0.1	18.8	0.1	0.1		18.40	7.60
CPBH03A	28/03/19	<0.1	<0.1	0.1	<0.1	19.6	0.1	0.1	6.00 – 20.0	18.90	5.80
	09/04/19	<0.1	<0.1	<0.1	<0.1	20.2	0.1	0.1		18.90	5.90
CPBH04B	28/03/19	<0.1	<0.1	0.4	0.1	18.7	0.2	0.1	5.00 – 20.0	18.90	5.30
	09/04/19	<0.1	<0.1	0.7	<0.1	19.2	0.1	0.1		18.90	5.40

Flow rate (L/h)	Maximum CH_4 (%)	Maximum CO_2 (%)	CH4 Qhg (l/h)	CO2 Qhg Rate (l/h)	CH_4 Characteristic Situation	CO_2 Characteristic Situation
0.2	<0.1	3.3	0.0002	0.0066	1	1

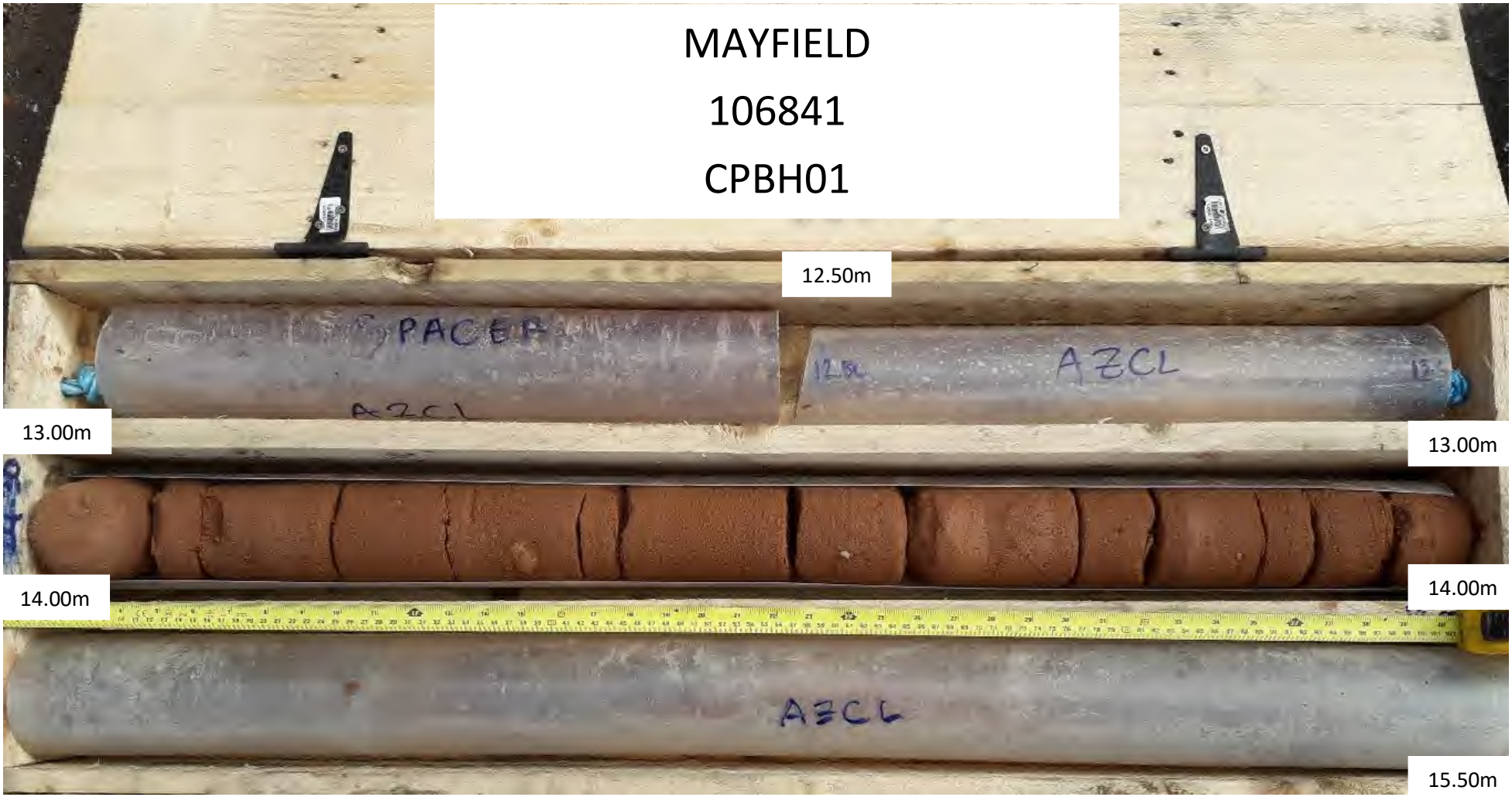
APPENDIX VIII
ROTARY PHOTOS



Core run 1	5.00m – 6.50m
Core run 2	6.50m – 8.00m
Core run 3	8.00m – 9.50m



Core run 4	9.50m – 11.00m
Core run 5	11.00m – 12.50m



Core run 6	12.50m – 14.00m
Core run 7	14.00m – 15.50m

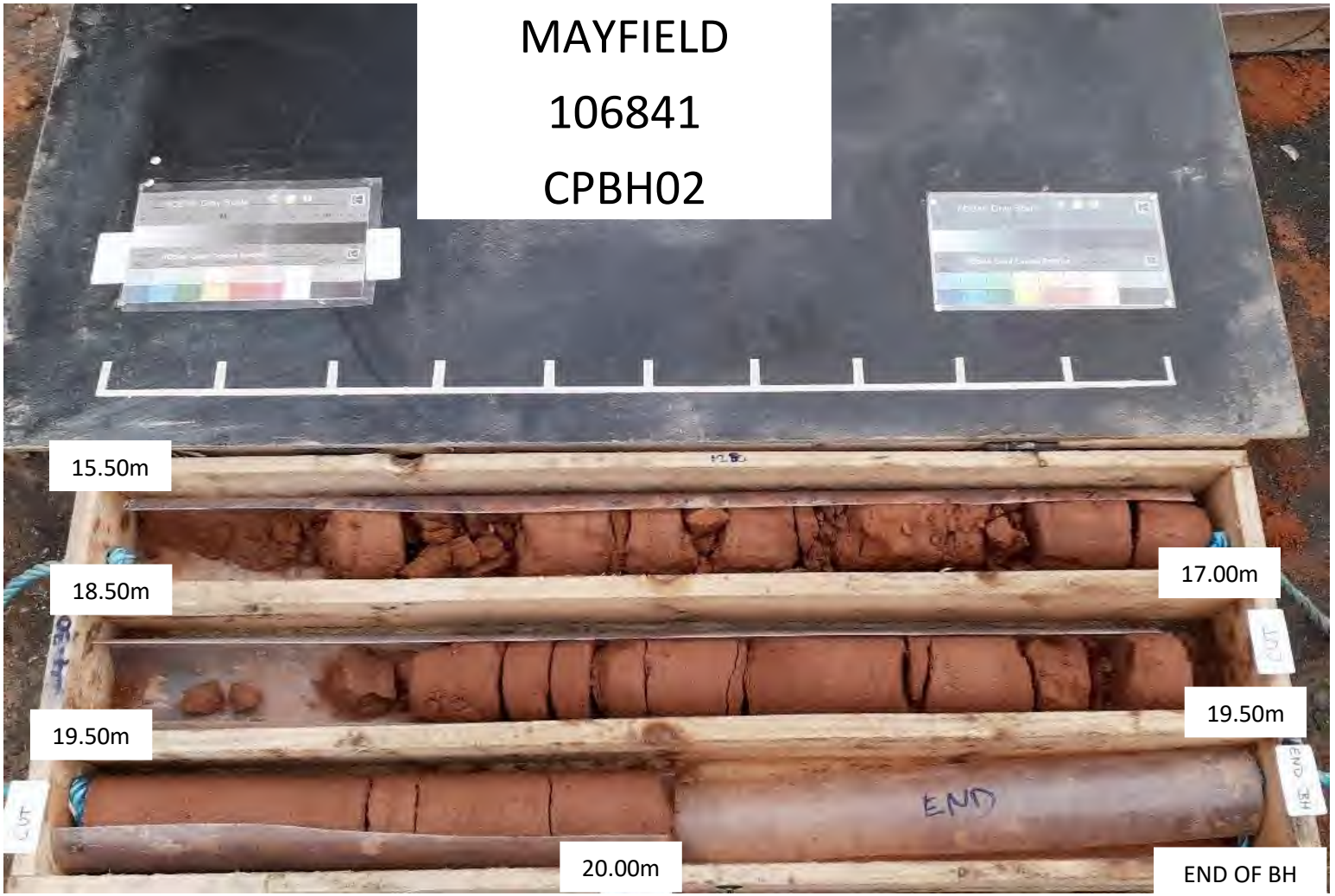


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Core run 8	15.50m – 17.00m
Core run 9	17.00m – 18.50m
Core run 10	18.50m – 20.00m



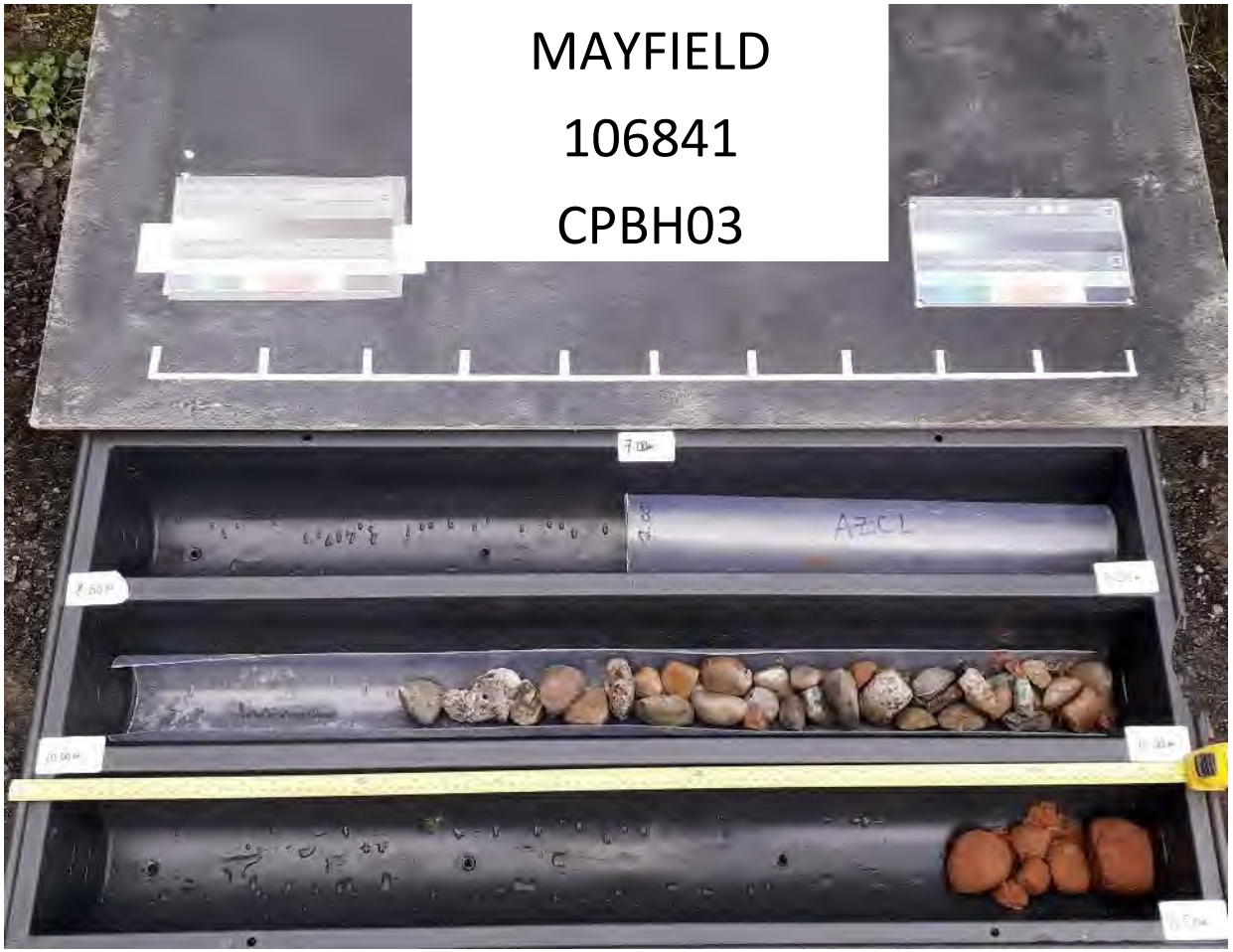
Core run 3	8.00m – 9.50m
Core run 6	12.50m – 14.00m
Core run 7	14.00m – 15.50m



Core run 8	15.50m – 17.00m
Core run 10	18.50m – 20.00m



Core run 1	3.30m – 4.60m
Core run 2	4.60m – 7.00m



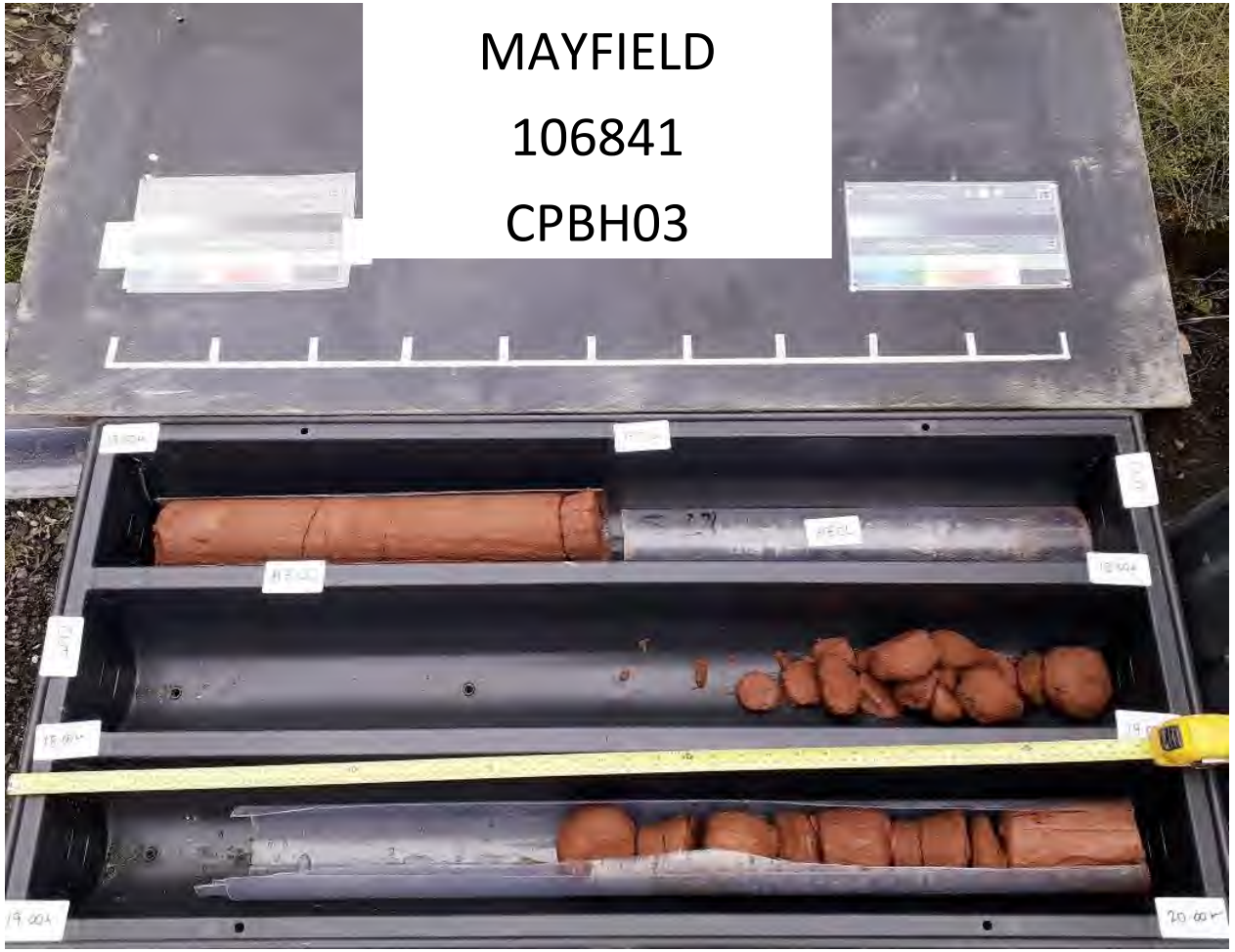
Core run 3	7.00m – 8.50m
Core run 4	8.50m – 10.00m
Core run 5	10.00m – 11.50m



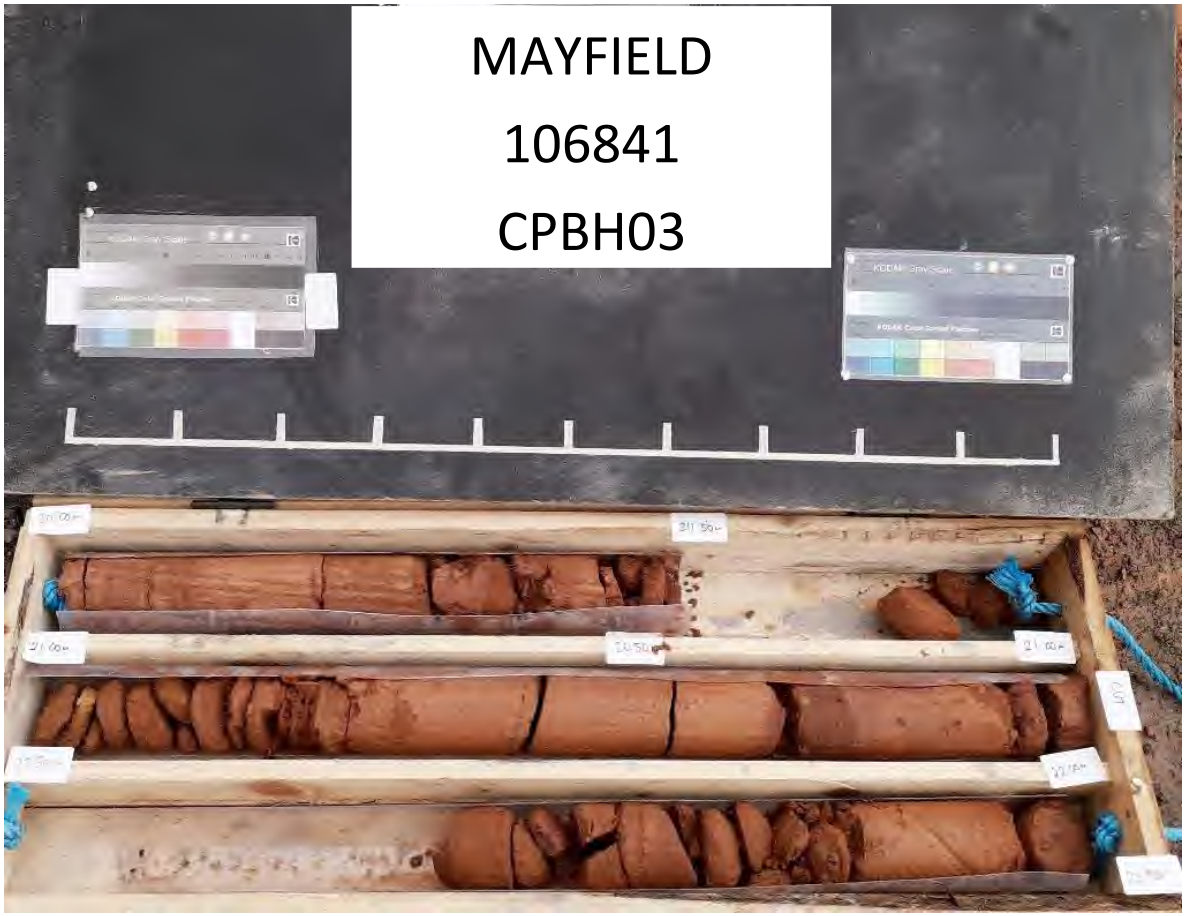
Core run 6	11.50m – 13.00m
Core run 7	13.00m – 14.50m



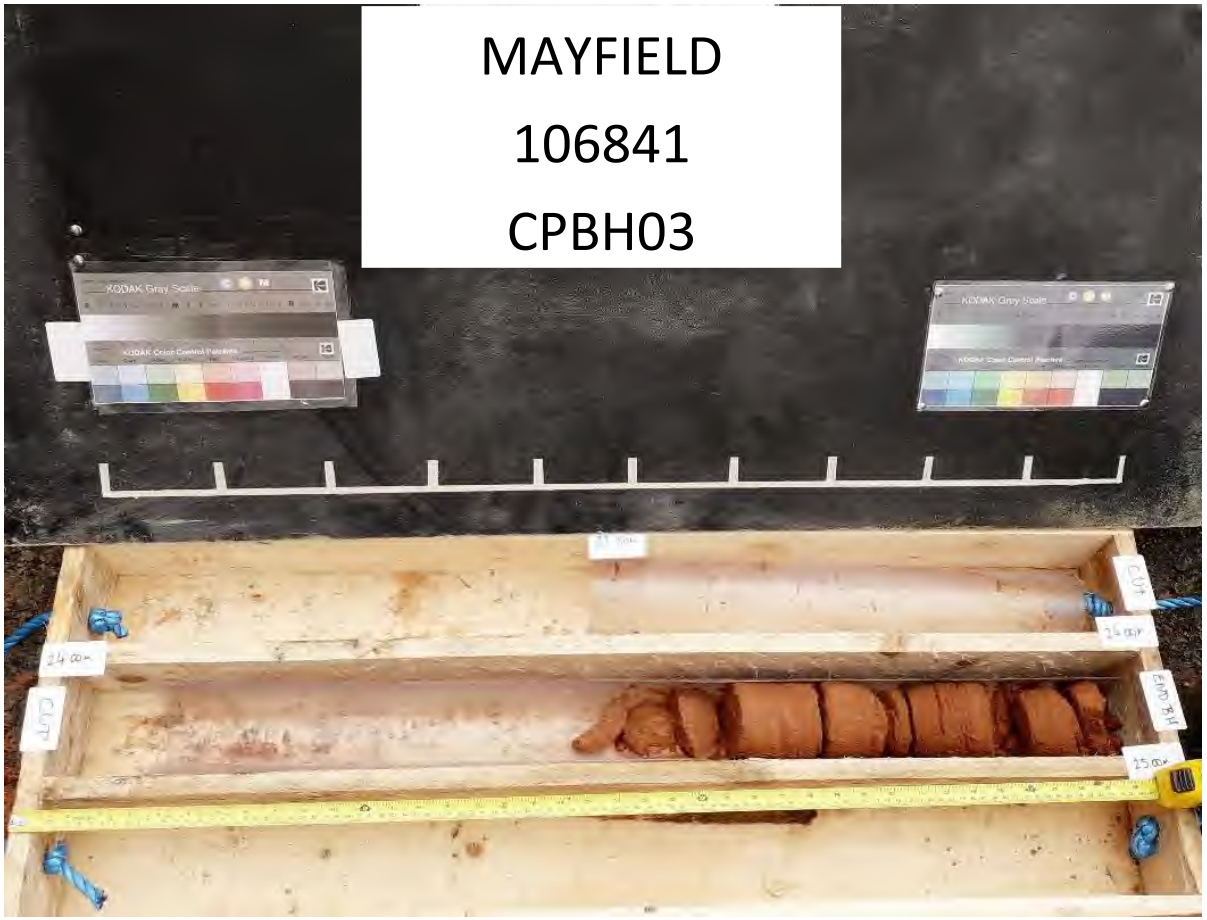
Core run 8	14.50m – 16.00m
Core run 9	16.00m – 17.50m



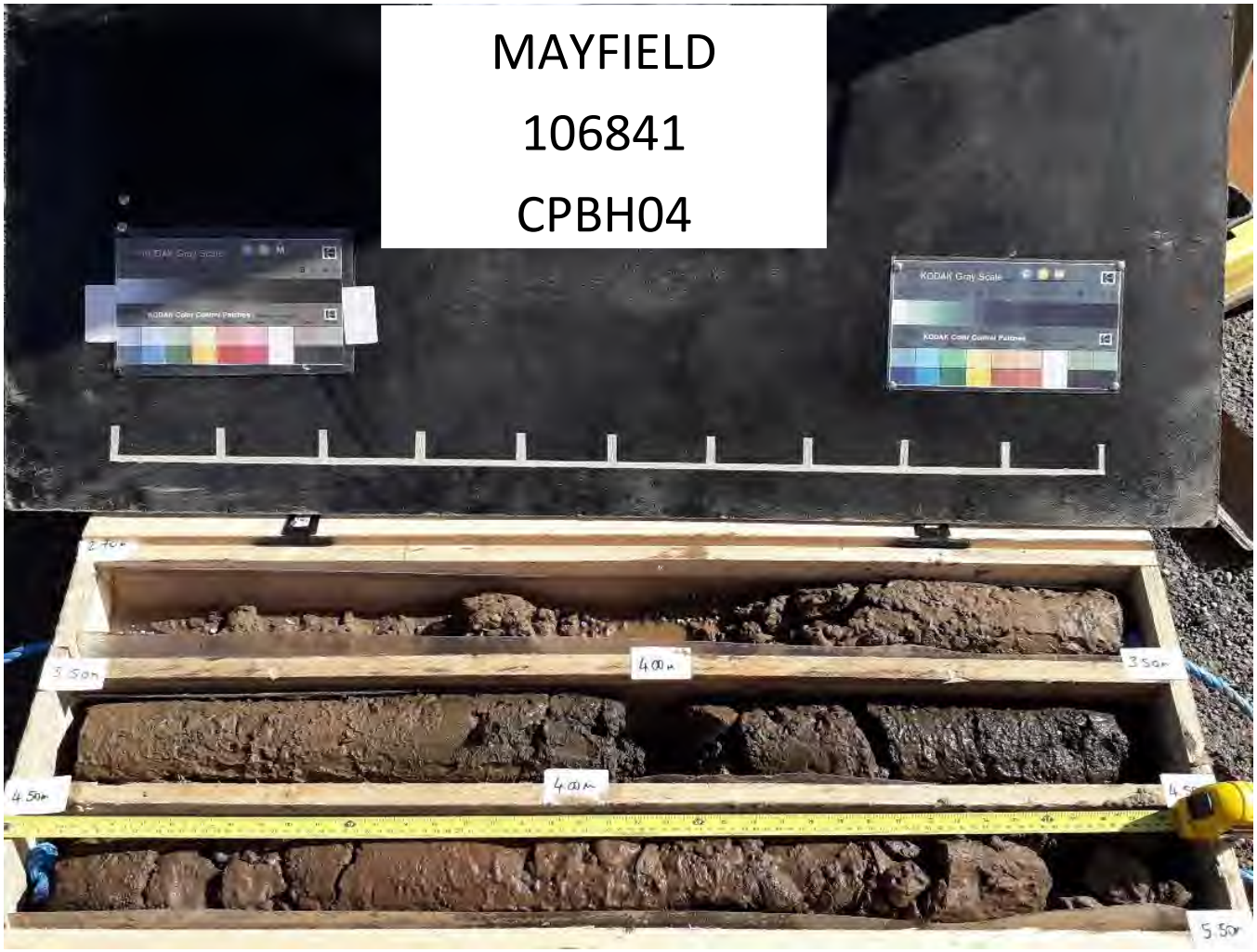
Core run 10	17.50m – 19.00m
Core run 11	19.00m – 20.50m



Core run 12	20.50m – 22.00m
Core run 13	22.00m – 23.50m



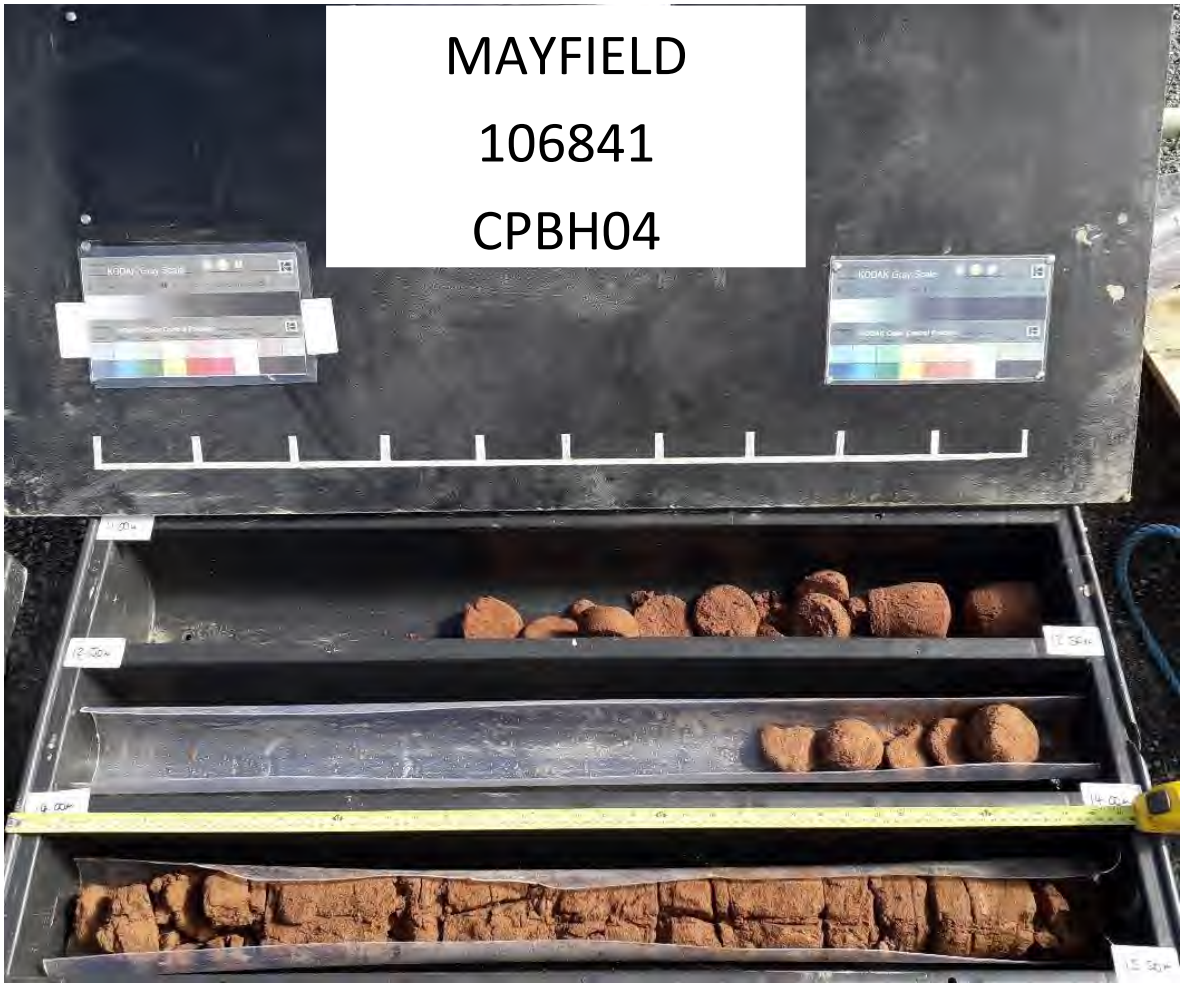
Core run 14	23.50m – 25.00m



Core run 1 + 2	2.70m – 4.00m
Core run 3	4.00m – 5.50m



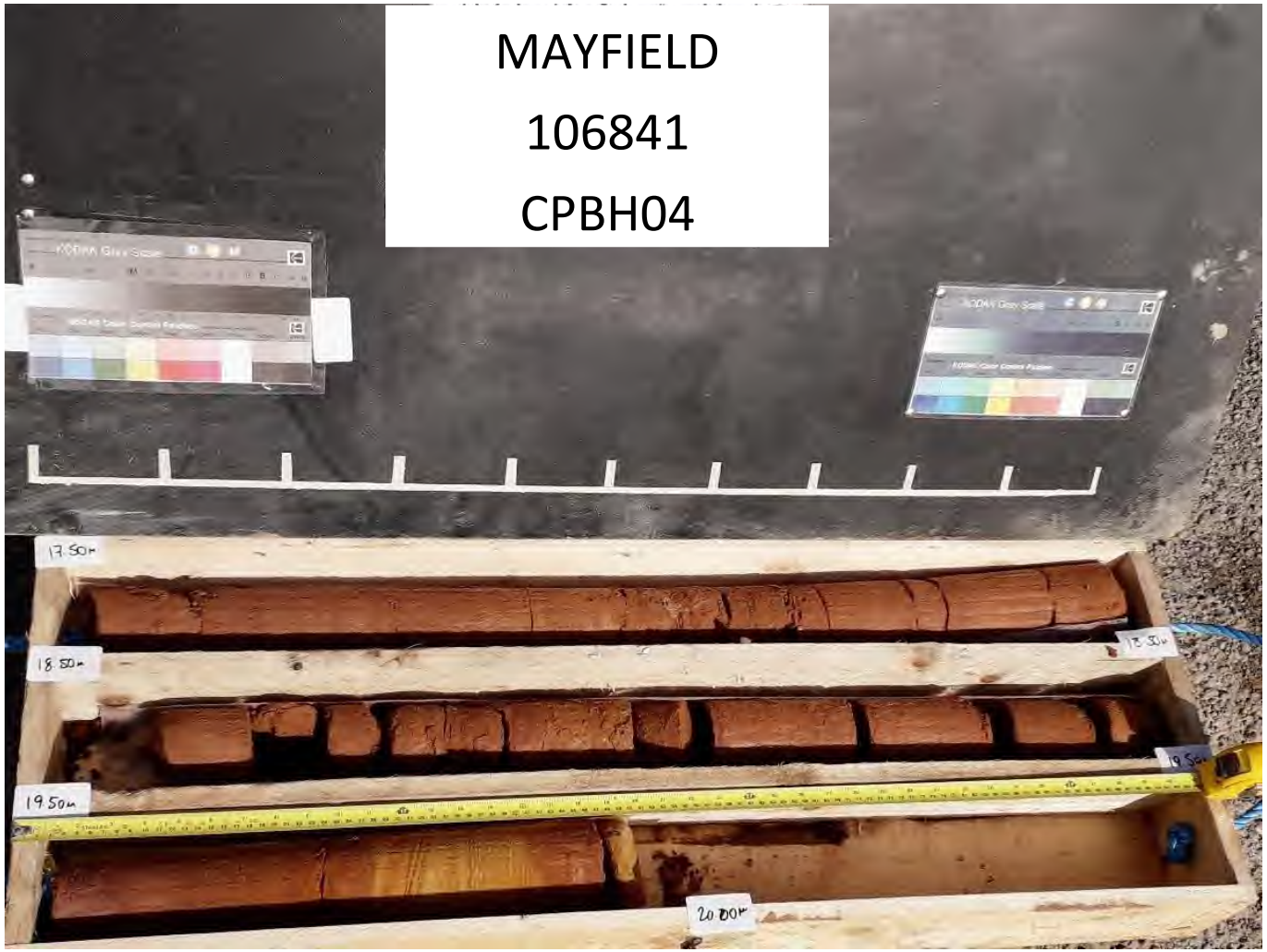
Core run 4	5.50m – 6.60m
Core run 6	8.40m – 9.50m
Core run 7	9.50m – 11.00m



Core run 8	11.00m – 12.50m
Core run 9	12.50m – 14.00m
Core run 10	14.00m – 15.50m



Core run 11	15.50m – 17.00m
Core run 12	17.00m – 18.50m



Core run 12	17.00m – 18.50m
Core run 13	18.50m – 20.00m

Appendix 11.1 Flood Risk Assessment and Drainage Strategy (Site Wide)

BUROHAPPOLD ENGINEERING

Mayfield

Site wide and Phase 1 Flood Risk Assessment

0042912

13 September 2019

Revision 00

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Revision	Description	Issued by	Date	Checked
00	Issue for planning	RG	13/09/19	NV

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author	**Rodoula Gregoriou**
date	**13th September 2019**
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signature	
date	**13th September 2019**

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Glossary

Term	Definition
Annual Exceedance Probability (AEP)	The Probability that a storm event will be exceeded in any given year
Attenuation	A method to reduce a flood peak to prevent flooding, often utilising temporary storage, but increasing the duration of the flow
Design Flood Event	A historic or notional flood event of a given annual flood probability, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed. This is typically the 1% AEP (1 in 100) flood level with appropriate allowance for climate change.
Design Flood Level	The maximum estimate water level during the design flood event
Discharge	The rate of flow of water measured in terms of volume per unit time
Flood Defence	A natural or man-made infrastructure used to prevent certain areas from inundation from flooding, and / or the provision of flood warning systems
Floodplain	Area of land adjacent to a water course which water flows or is stored during a flood event, or would otherwise be flooded in the absence of flood defences
Flood Resilience	Improving flood resistance, e.g. reducing the risk of properties against flooding events
Flood Risk	The level of risk to personal safety and damage to property resulting from flooding due to the frequency or likelihood of flood events
Flood Risk Assessment (FRA)	An assessment of the flood risks to the proposed development over its expected lifetime and the possible flood risks to the surrounding areas, assessing flood flows, flood storage capacity and runoff
Flood Warning Systems (FWS)	A system by which to warm the public of the potential of imminent flooding. This is typically linked to a flood forecasting system
Fluvial Flooding	Related or connected to a watercourse (river or stream)
Freeboard	Allowance made between the finished flood levels of a building or top of flood defence and the Design Flood Level, to accommodate modelling or other uncertainties
Groundwater Flooding	Water occurring below ground in natural formations (typically rocks, gravels and sands)
Impermeable Surface	A surface that does not permit the infiltration of water and, therefore, generates surface water runoff during periods of rainfall
Inundation	Flooding of land with water
Mitigation	Actions taken to reduce either the probability of flooding or the consequences of flooding or a combination of the two
Red line boundary	Boundary drawn to indicate the site area on which the planning application is based
Residual Risk	The risk that remains after risk management and mitigation measures have been implemented
Return Period	The average frequency of a specified condition. An 'n' year event is one that occurs on average over the long term, once every 'n' years
Risk	Risk is the probability that an event will occur and the impact (or consequences) associated with that event
Runoff	Water flow over surfaces to the drainage system. Runoff occurs if the ground is impermeable or if permeable ground is saturated.
Strategic Flood Risk Assessment (SFRA)	An SFRA is the assessment and 'categorisation' of flood risk on an area-wide basis in accordance with PPS25
Surface Water Flooding	Surface water flooding occurs when the volume of water is unable to filtrate through the ground to enter drainage systems, and therefore runs quickly off land and results in localised flooding. This type of flooding is usually associated with intense rainfall.
Sustainable Drainage Systems (SuDS)	SuDS are used as a strategy to manage surface water in a sustainable manner or least damaging solution through management practices and physical structures.

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Abbreviations

Term	Definition
bgl	Below ground level
BGS	British Geological Survey
CC	Climate change
DFE / DFL	Design Flood Event / Level
EA	Environment Agency
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
MCC	Manchester City Council
nr	Number
m AOD	Metres above Ordnance Datum
NPPF	National Planning Policy Framework
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage System

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Executive Summary

This Flood Risk Assessment (FRA) has been prepared by BuroHappold Engineering for the proposed mixed-use development comprising office, Multi-Storey Car Park and amenity open space uses at Mayfield site, Manchester, approximate National Grid coordinates SJ851976.

The purpose of this FRA is to identify and assess the risk from all forms of flooding to and from the development site and to demonstrate how flood risk will be managed throughout the lifetime of the proposed development, taking the effects of climate change into account. The assessment has followed the current National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.

The key findings of this FRA are summarised in the table below.

Subject	Element	Findings
Site Flood Risk	Fluvial	The site is in Flood Zone 1, 2 and 3. Flood Zone 3 covers the centre of the site. Small parts of the site are within Flood Zone 2 and the majority of the site is in Flood Zone 1.
	Ground Water	Low risk.
	Surface Water	Very low to low risk of surface water flooding across the majority of the site. Local depressions at medium and high risk.
	Artificial sources	Low risk.
Mitigation measures	Floodplain compensation	Floodplain compensation has been provided as part of the development (Mayfield Park). Hydraulic modelling has been used to demonstrate that the development does not increase flood risk elsewhere based on the 1 in 100 year flood event + 35% climate change allowance.
	Finished Floor Levels	Residential and office development set at least 600mm above the 1 in 100 year flood event + 35% climate change allowance. Other uses set above the 1 in 1000 year flood event. The building development is located outside Flood Zones 2 and 3.
	Design Flood Event	1 in 100 year event with a 35% allowance for climate change.
	Residual risk	Additional freeboard above flood levels has been allowed to provide resilience against extreme flood events or a combined canal breach and fluvial flood event.
	Emergency planning	Emergency and Maintenance plans for the Mayfield Park should be put in place to ensure the public is at a low risk to any danger due to flooding. Safe access and egress are provided in flood risk areas for pedestrian and vehicular access in the event of flood.
	Riparian access	Easements of at least 5 metres are allowed for maintenance access and repair works.
	Permits	Environmental Permits will be required for works within 8 metres from the river banks.
	Surface water drainage strategy	No flooding for the 1 in 100 year with allowance for climate change. Hierarchy of drainage solutions to be followed, SuDS techniques to be implemented.

The development incorporates the Mayfield Park, a 6 acre green space that can be utilised for flood compensation during an extreme fluvial flood event. Flood risk modelling and general principles of mitigation have been undertaken for the wider SRF site, in line with consultations and recommendations from the EA.

This FRA demonstrates that through the careful design of the proposed development and the incorporation of the above mitigation measures, there is no significant change to the risk of flooding both on-site and off-site. The development is considered safe from flooding for its designed lifetime.

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1 Introduction

1.1 Purpose of the report

BuroHappold Engineering has been commissioned by Mayfield Partnership LP to prepare a site specific Flood Risk Assessment (FRA) for a mixed-use development comprising residential, commercial, park and public realm works at the Mayfield site, adjacent to and south of Manchester Piccadilly railway station. The FRA will be submitted to support a full planning application for the Mayfield Phase 1 development, including two commercial office blocks, a multi-storey car park and creation of a city centre park, in September and October 2019 and will become a reference document for other development within the Mayfield SRF 2018 area.

The purpose of the assessment is to identify current and potential future risks of flooding to the existing site, as well as outline the flood mitigation measures proposed to ensure the development is safe from flooding in line with national legislation. This report is in accordance with the National Planning Policy Framework (NPPF).

Hydraulic flood modelling has been undertaken to support this FRA; a summary and the outcomes of the modelling exercise are discussed herein. The full modelling report is included in Appendix D.

1.2 Existing site

The Site is located south of Piccadilly Station in Manchester. It is bounded by the Mayfield depot on the north, Mancunian Way on the south, Hoyle Street on the east and Baring Street on the west. The approximate National Grid Reference at the centre of the development is SJ851976.



Figure 1-1 - Mayfield site - existing assets. Open watercourse shown in blue.

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The site is predominantly impervious, currently occupied by low rise warehouses and industrial units, interspersed by open land and surface car park. Small areas of the site are vegetated, the majority of which lie adjacent to the River Medlock. The river flows from east to west through the centre of the site. It is generally contained within a rectangular brick walled channel. Parts of the river have been culverted to allow industrial development. Parts of the site are within Flood Zone 3 in accordance with the Environment Agency (EA) flood maps and EA consultations.

A topographic survey for the entire site, excluding the river channel, has been completed by Malcom Hughes in July 2017. From inspection of the topographic data, the levels onsite vary from approximately 34.4m AOD under Units 3+4 rising up to an average level of 37m AOD at the south and 39m AOD at the north. The full topographic survey of the site can be found in Appendix A.

A topographic survey of the in-channel structures was completed in 2008 by Atkins for the purposes of the River Medlock SFRM 1D-2D EA model.

More recently, the industrial units 3, 4, 7, 8 and 9 have been demolished.

1.3 Site visits and observations

Site visits were undertaken (24th November 2016, 28th June 2017 and 4th October 2017) to assess the nature and general condition of the river passing through the site as well as understand the site constraints and flood mechanism through the site. Most parts of River Medlock were inspected within the site, as well as accessible riverside areas upstream and downstream.

The condition of the river varies. At the site location, River Medlock is constrained within brick retaining walls, some of which are in a derelict state. Parts of these have collapsed into the river. In many locations, siltation has built up on one or both sides of the river bank. The silt deposits have enabled the dense growth of vegetation along almost the entire corridor. Japanese Knotweed is present along the riparian corridor within the site, as well as within the upstream section of the river.

In some sections of the channel the retaining walls also provide support to the external walls of buildings built up to the river's edge. Where this occurs, the river retaining walls are generally in a good condition (e.g. Photos D and I below). The river flows through a box culvert within the central part of the site (see Figure 1-1). This was viewed from upstream and downstream, but not accessed (Photos C and D).

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Table 1-1 - Site visit images

	
A. Dense vegetation has caused damage to the river walls (Photograph taken from Baring street bridge facing East, November 2016)	B. Significant vegetation growth within channel over summer months (Photograph taken from top of culvert facing West, June 2017)
	
C. View of culvert outlet (Photograph taken facing north-east, June 2017)	D. View of culvert inlet. Channel formed by external walls of buildings (Photograph taken facing west, October 2017)
	
E. Steel beam footbridge over River Medlock (Photograph taken facing South, October 2017)	F. Access footbridge over River Medlock (Photograph taken facing East, November 2016)

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G. View of scrap yard (Photograph taken facing East, October 2017)



H. Siltation and dense vegetation present at upstream end (view from Fairfield street, November 2016)



I. Clear channel section downstream of the site, parallel to Baring street (Photograph taken facing East, November 2016)



J. Environment Agency river gauging station and downstream weir (view from London Road, November 2016)

At the downstream end of the river, there is a very clear river channel section, well maintained with no siltation building up or presence of vegetation. An Environment Agency (EA) river gauging station (London Road - Medlock) is located here that has been operating since 1969, recording river level and flow measurements.

1.4 Proposed development

1.4.1 The Mayfield Strategic Regeneration Framework (2018)

The proposals for Mayfield were set out in the Strategic Regeneration Framework (SRF) document issued in February 2018 and adopted by Manchester City Council later that year. The vision for Mayfield is to deliver a world class, transformational, distinctive and imaginative commercially-led neighbourhood, anchored by Mayfield Park. The Mayfield Partnership proposes to capitalise on the site's existing assets: the Mayfield Depot; the River Medlock; and its gateway location at the heart of an extensive transport network, to become a destination for work, play and living for all.

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The expansive Mayfield Park is proposed at the centre of the development with the building development located around it. The open space extends the full length of the Mayfield area, from Baring Street in the west to Hoyle Street in the east. The River Medlock that meanders through the centre of the site is proposed to be widened and returned to its natural form, providing opportunities for enhanced biodiversity. In addition to the Mayfield Park, smaller scale pocket parks and open spaces for residents are provided throughout the Masterplan, providing an important local amenity.

The EA has been consulted early on to provide advice on the Mayfield project. The EA has been very supportive of the proposals to naturalise the river Medlock and have set their aims for the project, as listed below (for more details refer to Section 2.4):

- Removal of culvert and daylighting of river to enhance biodiversity;
- Safe development around the site, with development levels raised above the Design Flood Event;
- Provision of flood compensation storage to manage impact of flood risk within and outside the site; and
- Provision of safe access and egress during extreme flood events.

A key consideration in the place making strategy has been to holistically consider the approach to flood management, within the site, but also other planned improvement works that are being progressing further upstream in the wider Medlock catchment.

By removing the old culvert and high-sided river walls and opening up the river, particularly on the north bank, natural river edges with a range of habitats can be created. Integrated flood storage will be provided in the park by allowing some parts of the park to flood during higher order flood events.

The river corridor and floodplain have been carefully re-profiled using the results of the hydraulic modelling work to ensure the proposed development does not increase flood risk elsewhere. The design ensures that there is no increase in flood risk upstream or downstream the site, with finished floor levels for development set at an appropriate margin above design flood levels with an allowance for uncertainty, as recommended by the EA. This will ensure the development is safe, with appropriate pedestrian and vehicular access during extreme flood events and adequate access to the river for maintenance or improvements works.

Safe public pedestrian access will be possible to the river directly from the park by providing features such as riverside walks and boardwalks. The river edges will be softened in places to allow marginal wetland areas to be created not only giving space for water, but space for recreation and wildlife as well. It will be a multi-use space offering significant social and environmental benefits, including increased biodiversity and flood resilience.

New pedestrian bridged links will be created to increase connectivity and accessibility across the park. Opening up the river will allow the floodplain to be clearly defined so that a safe environment for floodwater can be created at times when high river flows are expected.

Maintenance access will also be improved that will allow the river corridor to be managed effectively where necessary, and give access to the riparian owner and the EA for management of the Main River corridor. This access for inspection and maintenance would integrate with a landscape management plan setting out the requirements for maintaining the park and the riverside areas.

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1.4.2 Site-wide development proposals

The principles described above have been followed to deliver the Mayfield site wide proposals illustrated in the figures below.



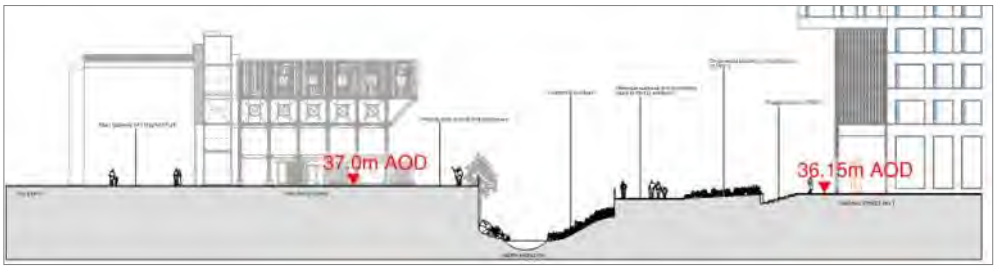
Figure 1-2 - Mayfield proposals and flood risk management principles



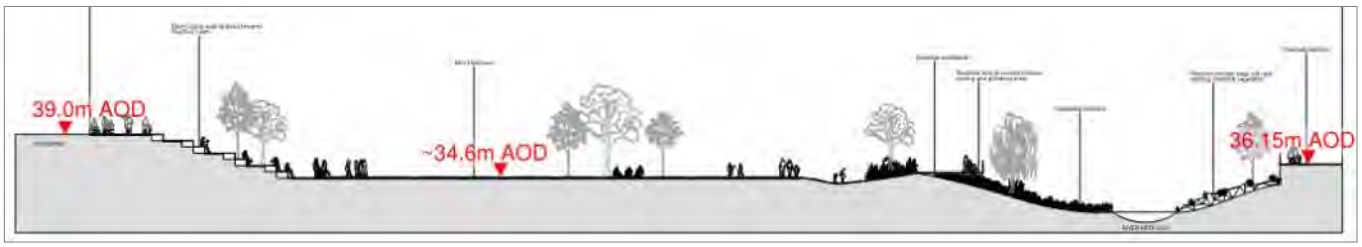
Figure 1-3 - Mayfield sitewide proposals (SEW Draft issue, March 2019)

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Cross section A



Cross section B



Cross section C



Figure 1-4 - Cross sections through Mayfield site (SEW Draft issue, March 2019)

Two new footbridges are proposed across river Medlock to replace the existing derelict footbridges and improve connectivity around the Mayfield site. A 600mm freeboard is normally recommended between the soffit level of a bridge and the design flood levels (DFL). However, in order for the two footbridges to tie in with the adjacent ground level and enable ramped access, the deck levels have been set below the expected DFLs at the locations (DFL: 35.39m AOD).

During consultations with the EA, the inundation of the footbridges by floodwater was discussed. The EA accepted the bridge design concept in principle. It was requested that hydraulic modelling was required to test the impact of the bridges in terms of flood risk. The bridges will be fixed to prevent them from floating off their bearings during a flood.

The impact of both bridges has been assessed through hydraulic modelling. Results are discussed in Section 3.1.2.

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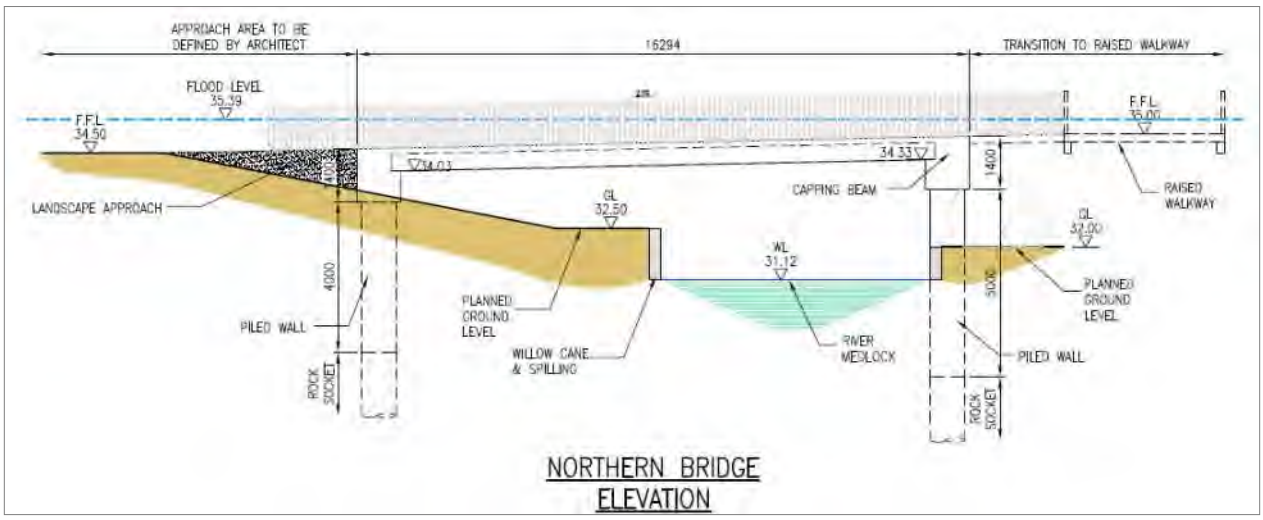


Figure 1-5 - Elevation of Northern footbridge (BuroHappold Engineering Draft issue, September 2019)

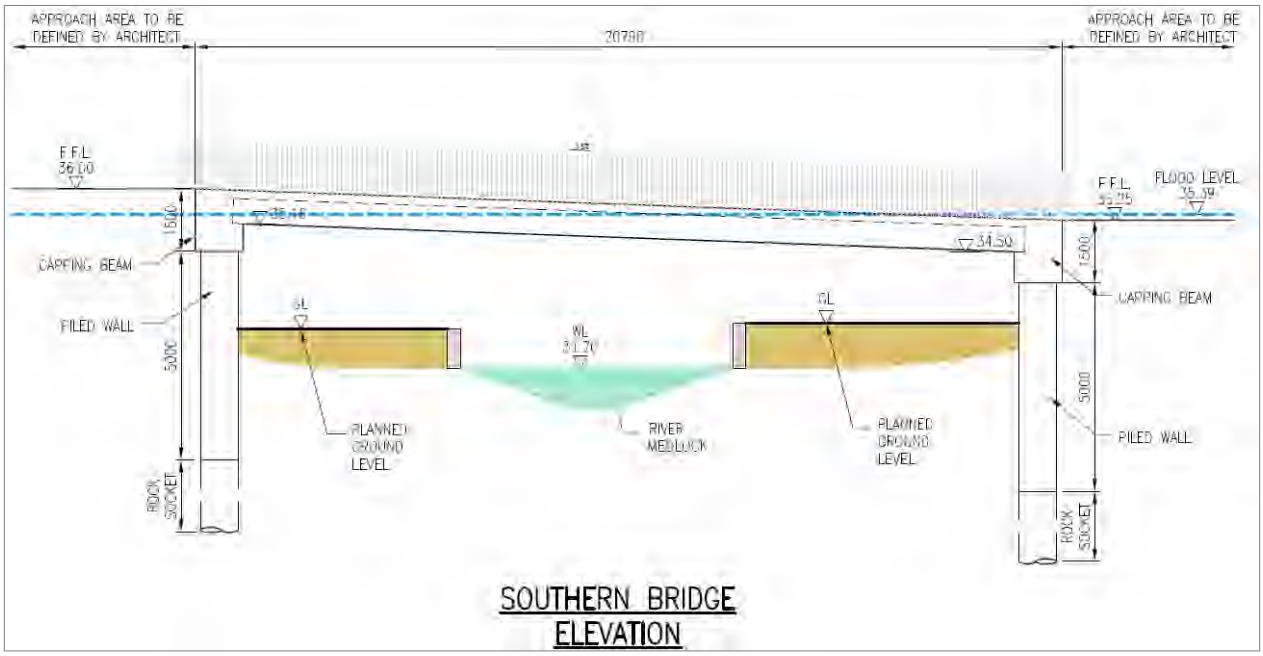


Figure 1-6 - Elevation of Southern footbridge (BuroHappold Engineering Draft issue, September 2019)

1.4.3 Phase 1 planning application (Autumn 2019)

The Phase 1 site is located entirely within the Mayfield SRF area as shown in Figure 1-7 below. Two planning applications will be submitted, including the proposals described below. The proposals are in line with the adopted Mayfield SRF 2018.

Application 1 (September 2019):

- Phased demolition and site clearance, earthworks including re-profiling and construction of retaining walls for the land bounded by the Mancunian Way to the south, Mayfield Depot to the north, Baring Street to the west and Hoyle Street to the east

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- Mayfield Park: provision of circa 6 acres (2.4 ha) of public park, including hard and soft landscaping to be delivered in phases with new bridges across the River Medlock;
- Baring Street Office 1 – Plot O: 8 storey office development including ground, mezzanine and plant level comprising 9,987 sq. m. (GEA) including active ground floor uses (A1, A3, A4 or B1), public realm and riverside walkway;
- Baring Street Multi-Storey Car Park (MSCP) – Plot N: Ground plus 10 storey MSCP for circa 545 car parking spaces; and associated
- Highways and Infrastructure Works: creation of new junction from London Road with required access to the multi-storey car park and works to Baring Street, which will be delivered prior to the MSCP becoming operational.

Application 2 (October 2019):

- Baring Street Office 2 – Plot M: 13 storey office development including ground and mezzanine floors comprising circa 29,046 sq. m. (GIA) with active ground floor uses, highways and associated access and public realm.

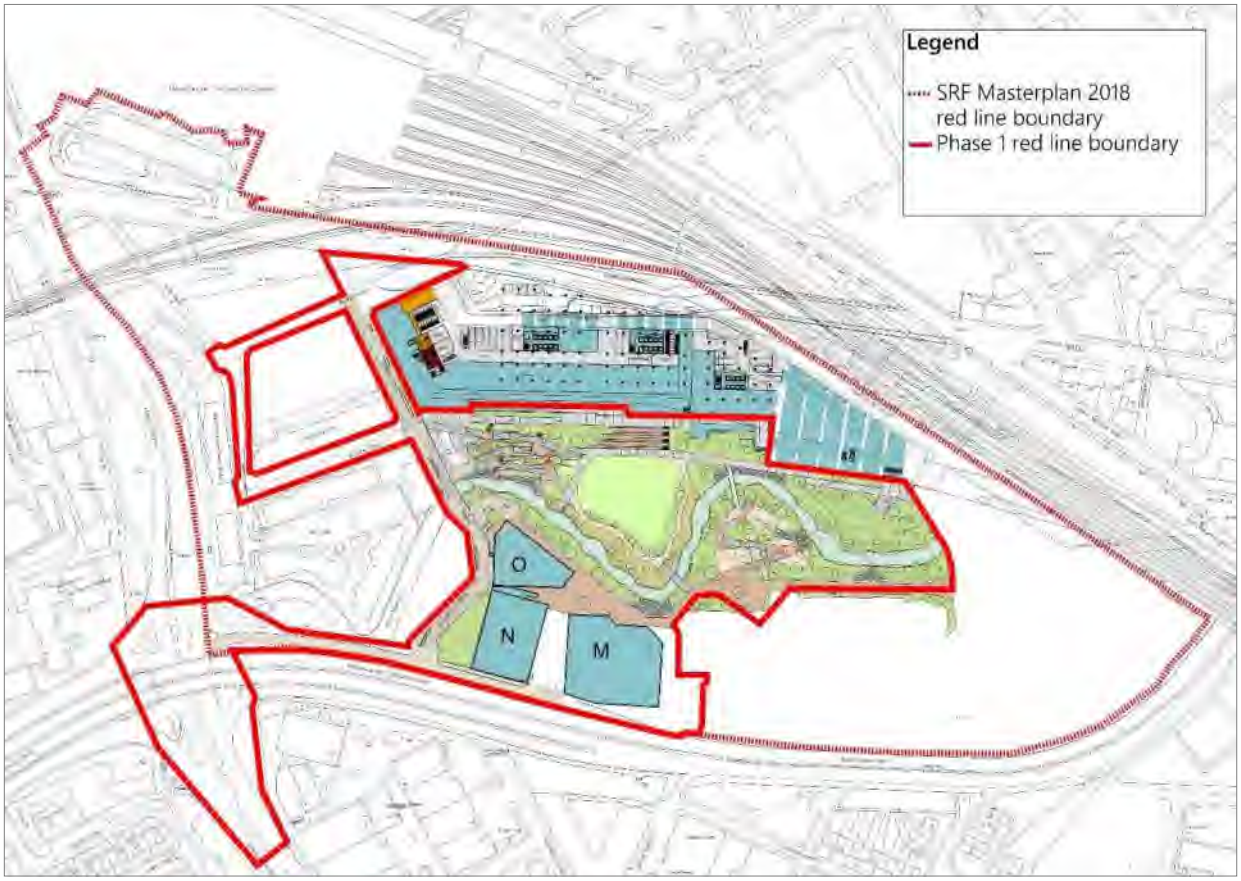


Figure 1-7 - Phase 1 Mayfield masterplan – September 2019

A list of drawings (plans and elevations) that should be reviewed with this FRA can be found in Appendix B.

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2 Planning Context

2.1 Overview

This site-specific FRA has been prepared in accordance with the policies and guidance applicable to the Proposed Development outlined within the following publications:

- National Planning Policy Framework (MHCLG, 2019);
- Planning Practice Guidance; Flood Risk and Coastal Change (2014);
- Flood Risk Assessments: Climate Change Allowances (Environment Agency 2016, updated 2017);
- Manchester City, Salford City and Trafford Councils Level 1 SFRA (2010)
- Manchester City, Salford City and Trafford Councils Level 2 SFRA (2011)

2.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which people and councils can develop local plans and neighbourhood plans, which contribute to the achievement of sustainable development. It defines flood risk and aims to avoid development in areas most vulnerable to flooding. This is attained through the implementation of a Sequential Test, which directs development towards areas with lowest flood risk. Where this is not possible, the NPPF requires that all new developments in flood risk areas are appropriately flood resilient and resistant, include safe access and egress routes where required and that residual risks of flooding are adequately managed.

The Planning Practice Guidance provides a number of tables aiding the identification of the degree of risk of flooding to a development. This includes:

- Table 1: Flood Zones definition for probability of river and sea flooding;
- Table 2: Flood risk vulnerability classification for specific land uses and development types; and
- Table 3: Flood risk vulnerability and flood zone compatibility (signifies when the exception test is required).

2.2.1 Flood zones

The Flood Zones refer to the probability of river and sea flooding without the inclusion of flood defences, as shown in Table 2-1.

Table 2-1 - Flood Zone definition

Flood Zone	Probability	Definition
1	Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding
2	Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding
3a	High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or land having a 1 in 200 or greater annual probability of sea flooding
3b	The Functional Floodplain	This zone comprises of land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency

The Mayfield SRF 2018 and Mayfield Phase 1 developments lie in Flood Zones 1, 2 and 3 (refer to Section 3).

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2.2.2 Flood risk vulnerability

The proposed land uses of the Mayfield Phase 1 development are offices (Baring Street Office 1 and Office 2), Baring Street Multi-storey Car Park (MSCP), amenity open space (Mayfield Park hard and soft landscaping) and highways and infrastructure access works. According to the NPPF Technical Guidance, buildings used for financial, professional and other services are classified as 'Less vulnerable' and amenity open space and recreation as 'Water-compatible' development.

Car parks are not specifically defined within the NPPF vulnerability classification. The flood risk vulnerability of the MSCP is considered low ('Less vulnerable') due to the non-residential nature of the development.

Other uses under the Mayfield SRF 2018 scheme include buildings with residential units. Residential development is considered 'More vulnerable' to the effects of flooding. Any future proposals set out in the Mayfield SRF will be subject to detailed design, testing and separate planning application, taking account the development proposed and any further flood mitigation that has taken place prior to those development proposals coming forward.

2.2.3 Flood zone compatibility

For each Flood Zone and flood risk vulnerability classification, NPPF categorises where development is appropriate and whether the Exception Test is required. The Exception Test is a method used to demonstrate how flood risk to people and property will be manages satisfactorily, while allowing necessary development to proceed when suitable sites with lower risk of flooding are not available. It is required for the proposed development to show that wider sustainability benefits, which outweigh the flood risk, will be provided to the community. It must also be shown that the development will be safe for its lifetime without increasing flood risk elsewhere and, where possible, reduce flood risk overall.

Table 2-2 - Flood risk vulnerability and flood zone 'compatibility'

Flood Zone classification		**More vulnerable - Residential**	**Less vulnerable – Offices and MSCP**	**Water-compatible – Park areas**
Flood Zones	FZ1	Compatible	Compatible	Compatible
	FZ2	Compatible	Compatible	Compatible
	FZ3a	Exception test required	Compatible	Compatible
	FZ3b	Not compatible	Not compatible	Compatible*

*Water compatible uses are permitted within the functional floodplain. They should however be designed to remain operational and safe for users in times of flood, result in no net loss of floodplain storage, not impede water flows and not increase flood risk elsewhere.

Based on the compatibility criteria and the appropriate siting of the proposed uses, the exception test is not required for this planning application.

2.2.4 Climate Change

National Planning Policy requires an allowance is made for the potential impact of climate change to help minimise vulnerability and provide resilience to flooding in the future. This is a critical part of any assessment of flood risk and assessment of design and mitigation measures.

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In February 2016 the Environment Agency published new climate change advice which sets out a range of allowances for peak river flow by river basin district and peak rainfall intensities for the design of surface water drainage. This allowance is a percentage that can be applied to the river flows to predict as accurately possible the increase in flows and levels due to climate change. The EA provides range of allowances; higher climate change allowance provides higher confidence that the real climate change increase will be within the allowance.

Table 2-3 - Peak river flow allowance for North West River Basin, for a development of more than 60 year design life

Confidence	Climate change allowance
Upper end – 90th percentile	70%
Higher Central – 70th percentile	35%
Central – 50th percentile	30%

Under the EA advice, designers should consider higher climate change allowances for sites within higher flood risk zones, and for developments of higher vulnerability. The EA is also advising to consider a range of allowances and understand the impact. For the proposed commercial (less vulnerable) and residential (more vulnerable) development the climate change allowances in Table 2-4 are advised for the developments design life (2070 – 2115).

Table 2-4 - Peak river flow allowance for the proposed uses at Mayfield site

	More vulnerable – Residential	Less vulnerable – Office and MSCP	Water-compatible – Park areas
Flood Zone 1	30%	30%	None
Flood Zone 2	30% - 35%	30%	None
Flood Zone 3a	35% - 70%	30% - 35%	30%

Site specific pre-application advice received by the EA recommends that the 35% and 70% climate change scenarios are taken into consideration for the type of development proposed.

For the design of the surface water drainage strategy, a 20-40% increase in rainfall intensity should be allowed.

2.3 Strategic Flood Risk Assessment

Manchester City Council (MCC) are the Lead Local Flood Authority (LLFA) for Manchester City. Under the Flood and Water Management Act 2010, the LLFA is responsible to lead in the management of flooding from surface water, groundwater and ordinary watercourses.

The Manchester City, Salford City and Trafford Councils commissioned JBA in March 2010 to produce a combined Level 2 Hybrid Strategic Flood Risk Assessments (SFRA) for the three councils. This includes both the Level 1 SFRA (2010) and Level 2 SFRA (2011).

These reports consider flooding from rivers, canals, reservoirs, surface water, groundwater and sewers for the Greater Manchester area; summarises existing and proposed flood risk management; looks at impacts of development on flood risk and can be used to inform a sequential approach to development allocation. The report provides more detailed information on strategic sites identified for development; the Mayfield site has been included in the study and is referred to as Manchester Strategic Employment site – Eastern Gateway (M0001) hatched in Figure 2-1. Findings from the SFRAs have been considered within this assessment.

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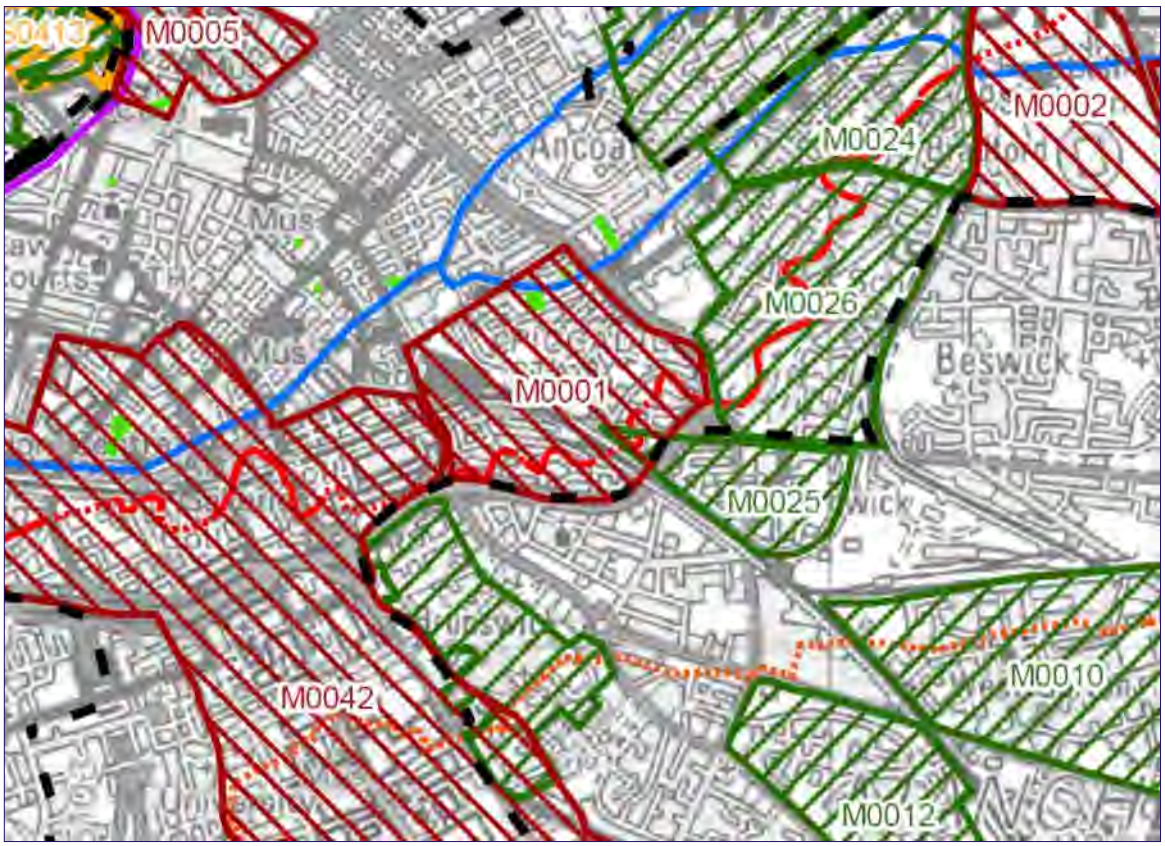


Figure 2-1 - Level 2 Hybrid SFRA: Significant sites (Mayfield site is under the M0001 Strategic Employment Site)

2.4 Consultations

Consultations have been undertaken with the statutory consultees to understand their requirements for the scheme and seek their in-principle agreement to the proposals. These include the EA and MCC as the LLFA.

2.4.1 Consultations with the Environment Agency

BuroHappold submitted a pre-application enquiry to the EA to request Product 4 information as well as preliminary advice on the proposed development in November 2016. Several meetings have been held since between the EA and the design team as part of a wider collaboration under a charged agreement. The EA has provide advice on flood modelling, river works, land contamination, surface water strategy and ecology for the masterplan. A summary of the outcomes relevant to flooding are summarised in Table 2-5.

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Table 2-5 - Consultations with the EA

Subject	Item
Flood Zone	Part of the site lies in Flood Zones 2 & 3 and therefore the sequential test might need to be applied.
Finished Floor Levels – Residential development (SRF)	Climate change allowance should be made in accordance with the latest guidance (Feb 2016). Finished Floor Levels for residential development should be set at least 600mm above the 1 in 100 year flood event with 35% climate change (CC) allowance or at the 1 in 100 year flood event + 70% climate change allowance, whichever is highest. It should be demonstrated that the development is also safe under the 1 in 1000 year flood event. Flood resilient/resistant measures will need to be incorporated if the buildings are at risk.
Finished Floor Levels – Plot 0 levels	The Baring Street Office 1 building proposals are offices, and therefore considered less vulnerable to flooding. The ground floor use on the west side of the building is proposed to be only storage. The EA would not raise objection to floor levels used for cycle/bin storage that did not meet the 1 in 100 year flood event + 35% CC + 600mm requirement. However, it is recommended that the levels are raised as much as feasible and flood resilience measures are considered.
Electric substation	While the floor levels within a substation room can be set at the 1 in 100 year flood level +35% CC, the electric equipment sensitive to flooding should be raised on a plinth above the 1 in 1000 year flood event.
Safe access and egress	Safe access and egress should be provided for extreme flood events (1 in 1000 year flood event). Access routes should preferably be dry during the 1 in 1000 year flood event or if this is not possible be of a low hazard rating.
Compensatory storage	If the site levels are raised, compensatory storage is required. This can be done in the form of floodplain compensation works. The works should ensure risk is not increased elsewhere based on the 1 in 100 year flood event+ 35% CC (Design Flood Event – DFE)
EA hydraulic model	The model should be obtained by the EA. The model should be used to represent proposed levels along the river and re-run to ensure that flood levels are not increased upstream or downstream.
Riparian access	River Medlock is a Main River and EA has powers to curry out repair and maintenance of the bed, banks and any other structures. Access for repairs and maintenance should be considered throughout the masterplan development. Development under, over or within 8m of the top of the bank of the river may require a permit, under the Environmental Permitting Regulations 2010.
Masterplan development	The EA has inspected an early masterplan and provided the following general comments: • Removal of culverts and existing walls and creation of open areas is welcome; • The proposed buildings on the south bank are very close to the bank. Clear easements from both sides of the river for maintenance purposes would be preferred; and • A clear open space to one bank is still an improvement from the existing situation.
River restoration	Recommendations from river habitat, geomorphological and other ecological surveys should be integrated with the flood risk assessment recommendations to create a new improved riparian corridor and ecological network. Consideration should be given to the low flow conditions of the river and the aquatic habitat potential. Development to be set back from the river in both sides to allow pedestrian and maintenance access along the watercourse. Creation of high quality amenity and greenspace zones. River rehabilitation of the canalised River Medlock to enhance banksides through soft or bioengineering techniques.
Discharge to River Medlock	Discharge to river Medlock is acceptable.

Correspondence with the EA can be found in Appendix C.

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2.4.2 Consultations with the LLFA

Manchester City Council (MCC), as the Lead Local Flood Authority (LLFA) is the statutory consultee for surface water flood risk in relation to planning applications. They are the appropriate body to assess the proposed surface water drainage strategy for the development. The LLFA has been approached at an early stage for advice with regard to the site surface water drainage strategy and local flooding (groundwater and surface water).

MCC teams have provided the following information.

Table 2-6 - Consultations with the Lead Local Flood Authority

Subject	MCC response
Flood Risk	
Records of historic flooding on site	A number of historical flooding incidences of the Mancunian Way at entrance to the Railway bridge have affected Temperance Street due to a low spot under the bridge, drainage overwhelmed by rainfall intensity and overland flow routes towards Temperance Street.
Any groundwater issues within or at the vicinity of the site	No records of groundwater flooding or recorded groundwater levels on the site.
Critical drainage area	The site is within the Conurbation Core Critical Drainage Area. We are not aware of any existing drainage issues.
Drainage Strategy	
Discharge to River Medlock	The River Medlock is Main River and any new outfall locations will need to be agreed with the Environment Agency
Discharge rates	The area is situated within the Conurbation Core Critical Drainage Area and in accordance with the Manchester City Council SFRA at least a 50% reduction in surface water runoff should be provided through SUDS as part of any brownfield development with the aim of reducing to the Greenfield runoff rates. Proposed discharge rate is to be restricted to 50% of the existing brownfield runoff rate with 2l/s/ha to be subtracted from this peak 50% discharge rate.
Climate change allowance	Climate change allowance is to be 30%, however, attenuation volumes should also be checked against a 40% allowance.
Discharge volume	As the existing site is brownfield the 1 in 100 year, 6 hour rainfall runoff volume shall be constrained to a maximum of the existing brownfield runoff volume for the same event. Our aspiration is to better this where we can.
Overland flooding	No flooding of buildings occurs in 1 in 100 year rainfall event plus climate change allowance. Plot designers will need to accommodate all the necessary surface water attenuation within the plot demise. The attenuation will need to be designed to accommodate the 1 in 100 year storm events plus climate change allowance based on a 50% brownfield rate with a further reduction of 2l/s/ha for long-term storage. Surface flooding of open spaces is acceptable for short periods in events over 1 in 30 year return period rainfall events Overland flow routes for extreme events are diverted away from buildings.

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3 Appraisal of flood risk

3.1 Flood risk from River Medlock

3.1.1 Baseline flood risk

According to the historic flood maps shared by DEFRA under the Open Government Licence, there are no recorded historic flood extents around the site.

From inspection of the Environment Agency's online flood map for planning (Figure 3-1) the site lies partly within Flood Zones (FZ) 1, 2 and 3, which are defined as having a low, medium and high risk of flooding respectively.

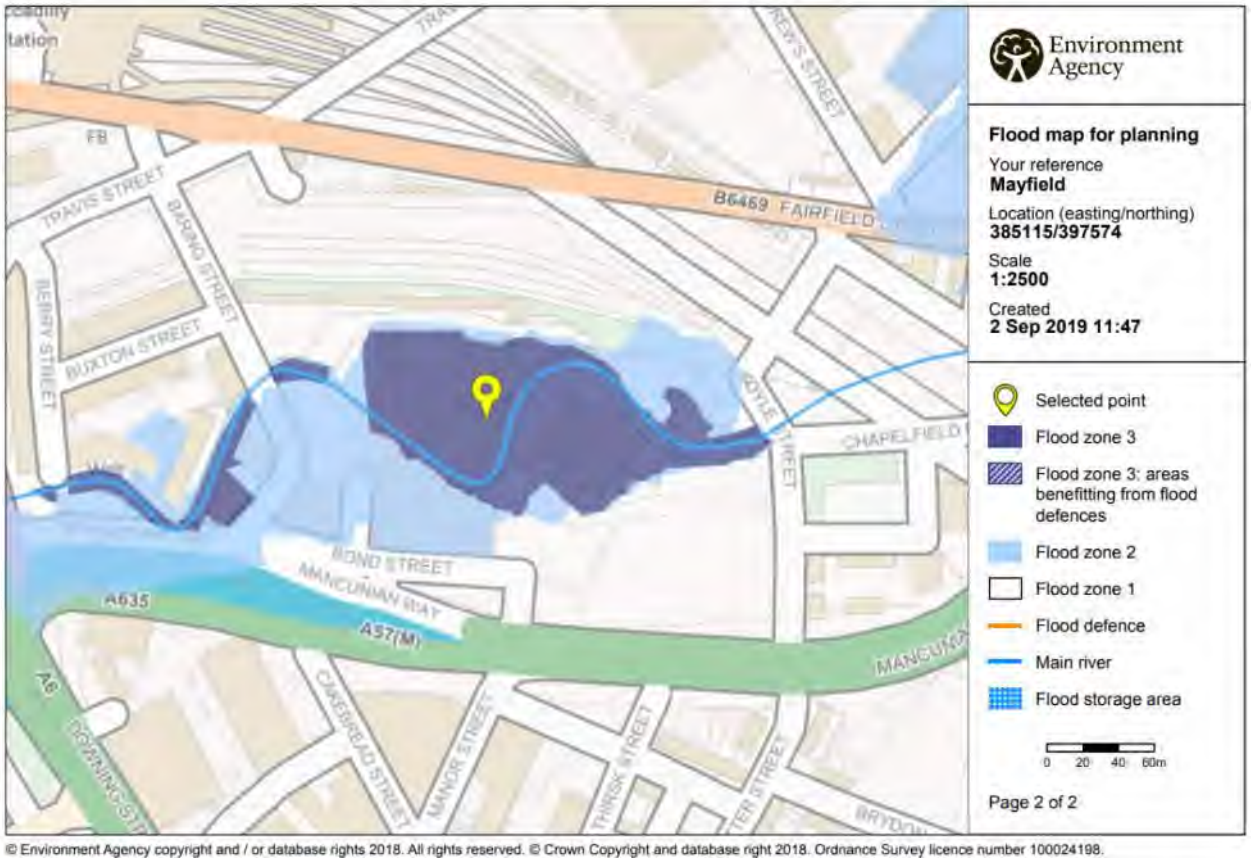


Figure 3-1- Environment Agency Flood Zone map at the site location, accessed 02/09/2019

The flood extents and levels for the River Medlock are based on the River Medlock SFRM 1D-2D (ISIS – TUFLOW) model developed by the EA in 2009 and updated in 2011. BuroHappold has attained the model from the EA, reviewed and updated the model with the current best practice methodologies and hydrology data as per 2019. Additional topographic information within the site boundary was added, as per the topographic survey completed by Malcom Hughes in July 2017. The updated flood model is referred to as the BHE Baseline 2019 model.

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Changes undertaken to create the BHE Baseline 2019 model have been recorded in the Hydraulic Modelling report issued to the EA for review on 15th August 2019. The report demonstrates that the BHE Baseline 2019 model has been adequately updated for use as a flood risk assessment tool for the design of the Mayfield Park development. The Hydraulic Modelling report can be found in Appendix D. Following review of the Hydraulic Modelling report, the EA had minor comments and accepted in principle the negligible impact shown by the proposals compared to the baseline model. The EA response can be found in Appendix C.

The updated flood extents for Flood Zones 1, 2 and 3 can be seen in Figure 3-2.



Figure 3-2- BHE Baseline 2019 flood maps

The equivalent flood levels for different flood events during the baseline scenario (existing flood risk) can be seen in Table 3-1.

Table 3-1 - Flood levels within the site from the BHE Baseline 2019 model

Node	Description	1 in 100 year (m AOD)	1 in 1000 year (m AOD)	1 in 100 year +35%CC (m AOD)	1 in 100 year+70%CC (m AOD)
1	D/S Hoyle Street culvert	35.18	35.94	35.83	36.03
2a	U/S Hoyle Street Industrial estate access footbridge	34.64	36.00	35.84	36.12
2b	D/S Hoyle Street Industrial estate access footbridge	34.63	35.87	35.70	36.00
3	Steel beam footbridge (not represented in model)	34.57	35.79	35.61	35.92
4	D/S Baring street culvert	33.89	35.13	34.96	35.26

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3.1.2 Proposed flood risk

As part of the development of the Mayfield design, the Mayfield proposals were represented in the updated hydraulic model to assess their impact to flood risk compared to the baseline scenario. The impact of the proposals and design of the development compensation areas was based on the Design Flood Event (DFE), the 1 in 100 year flood event with 35% climate change allowance. This is in line with guidance provided by the EA.

For the purposes of the Mayfield 2019 modelling assessment, the areas within the 1 in 100 +35% flood extents have been represented as accurately possible in terms of proposed levels, channel profile and roughness. The building development sites (outlined in orange) have been modelled as raised well above the DFE flood risk levels and above flood zone 2 levels (1 in 1000) to ensure no flood compensation is provided within these areas. The Mayfield 2019 flood extents and levels are presented in Figure 3-3 and Table 3-2.

They Hydraulic Modelling work undertaken demonstrates that the Mayfield development has negligible impact in terms of flood risk from the River Medlock to areas outside the site boundary and a positive impact in decreasing flood risk within the site. Please refer to Appendix D for further details.

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Figure 3-3 - Flood extents due to the Mayfield proposals, Flood Zones 2 and 3 and DFE

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Table 3-2 – Flood levels due to proposals for a range of flood events, Mayfield site

No.	Modelling Node	Description of node location (current assets)	1 in 100 year (m AOD)	1 in 1000 year (m AOD)	1 in 100 year +35%CC (m AOD)	1 in 100 year+70%CC (m AOD)
Upstream the site						
A	MEDL01_2934	U/S Fairfield Street bridge	36.58	37.58	37.38	37.81
B	MEDL01_2855B	D/S Fairfield Street bridge	36.34	37.21	37.02	37.40
On site						
1	MEDL01_2647	D/S Hoyle Street culvert	34.79	35.48	35.38	35.56
2	MEDL01_2492A (data for Mayfield 2019 taken from 2D)	U/S Hoyle Street Industrial estate access footbridge	34.52	35.53	35.40	35.64
3	MEDL01_2429	Steel beam bridge	34.27	35.45	35.26	35.58
4	MEDL01_2315	D/S Baring street culvert	34.04	35.33	35.15	35.46
Downstream the site						
C	MEDL01_2279E	D/S Baring street bridge	33.77	34.61	34.47	34.68
D	MEDL01_2227	Logic site (in channel)	33.56	34.47	34.32	34.56
E	n/a	Logic site (floodplain)	N/A	34.46	34.31	34.54
F	MEDL01_2131	U/S London Road EA station	33.24	34.28	34.13	34.36

It is considered that through the flood compensation works, removal of culvert and raising of plot levels above flood levels, the flood risk to the plots can be reduced to low.

The flood levels estimated by the Mayfield 2019 model are summarised in Table 3-2 are used to set the finished floor levels for the development plots. These are outlined in Section 4.1.

3.2 Groundwater flood risk

Groundwater flooding can occur where the water levels in rock and soil become high enough for the water to appear near to or above the ground surface. This may happen where there are underlying gravels, or porous or fractured rocks, sufficiently permeable to allow water to pass through. It also occurs more slowly than river flooding and tends to be more persistent, typically lasting for weeks or months rather than for hours or days. Groundwater flooding does not normally impose risk to life; however, it can still pose a risk to development and can cause a change in the structural properties of rocks and soils which may cause damage to foundations of structures.

According to the Greater Manchester sub-regional SFRA[1] there are no known reports of groundwater flooding within Manchester City Council area.

[1] Strategic Flood Risk Assessment for Greater Manchester Sub-regional assessment, Scott Wilson, June 2008

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A groundwater flood risk assessment has been performed for Manchester, Trafford and Salford that investigated various mechanisms of groundwater flooding and assessed the likelihood of occurrence. A map has been developed and appended in the Level 2 SFRA. The site is not shown to be at risk of groundwater flooding, nor does it have shallow groundwater or be at risk of groundwater rebound due to decreased groundwater abstraction.

It is therefore considered that the site is at low risk of groundwater flooding.

3.3 Surface water flood risk

Surface water flooding occurs when intense, often short duration rainfall is unable to infiltrate into the ground or enter the stormwater drainage system. Increase in impermeable areas due to development and heavy urbanisation, as observed in Manchester city centre, can cause an increase in surface water runoff rates and volumes and consequently, increase in localised and downstream flood risk due to overloading of drainage infrastructure.

3.3.1 Baseline flood risk

According to the Manchester City Council SFRA, the site is situated with the Conurbation Core Critical Drainage Area. As such at least a 50% reduction in surface water runoff should be provided through SUDS as part of any brownfield development with the aim of reducing to the Greenfield runoff rates.

The MCC have records for a number of historical surface water flooding incidences. According to MCC, flooding of the Mancunian Way at entrance to the Railway bridge have affected Temperance Street due to a low spot under the bridge, drainage overwhelmed by rainfall intensity and overland flow routes towards Temperance Street.

The EA has provided surface water flood risk maps in response to the pre-application information request. The flood map shows that there are areas within the site at very low (less than 1 in 1000 annual probability), low (between 1 in 1000 and 1 in 100 annual probability), medium (between 1 in 100 and 1 in 30 annual probability) and high (more than 1 in 30 annual probability) risk of surface water flooding. The map is shown in Figure 3-4.

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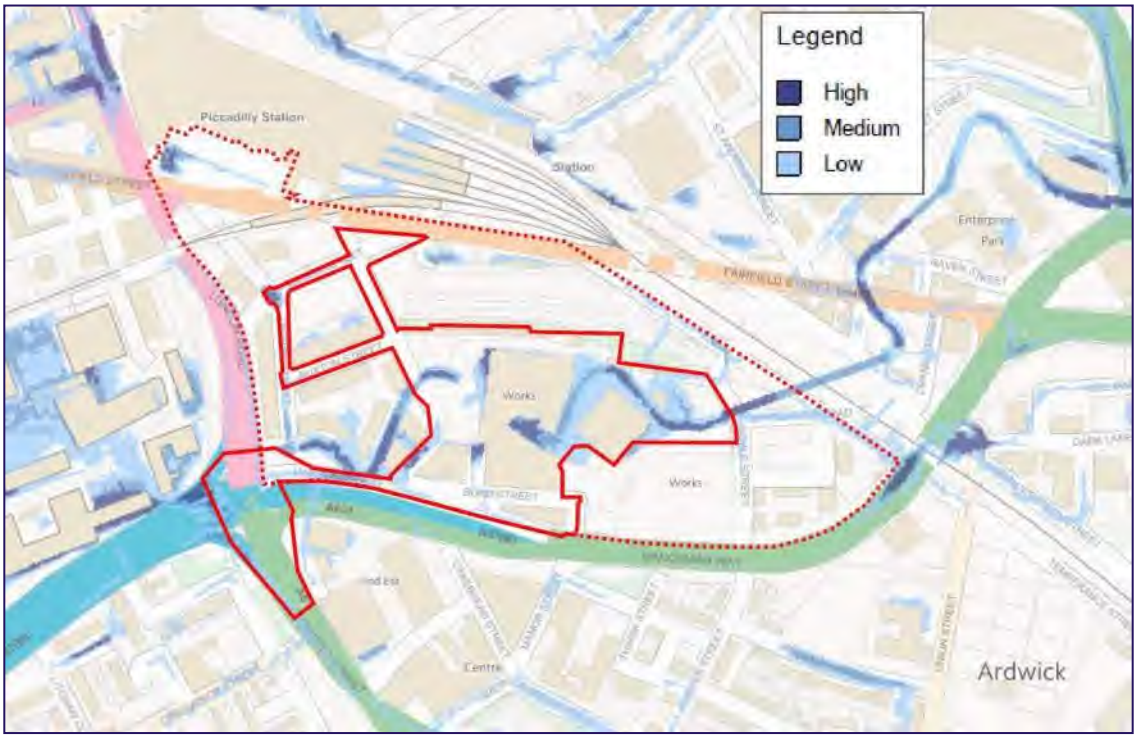


Figure 3-4 - Environment Agency Surface water flood map at the site location, received 11/11/16. (Contains Environment Agency information ©Environment Agency and database right, 2016)

The EA has used the 2-dimensional modelling software JFLOW to route rainfall over a surface elevation map that has been modified to include roads and buildings in order to help define potential flow paths. The three modelled flood scenarios are the 1 in 30 year flood event (high flood risk), 1 in 100 year (medium) and 1 in 1000 year (low).

As expected, the high risk areas are mostly within the River Medlock channel, which is the primary drainage path for the site. Other high risk areas are identified along the west edge of the main buildings at the centre of the site. Those points seem to be localised depressions that allow ponding of surface water behind major obstructions. Similarly, the medium risk zones are shown to be at locations where buildings are obstructing the flow.

From inspection of the site topographic information, the areas at low risk of flooding are lower lying areas around River Medlock, where surface water runoff from the north and south sides of the site could pond before entering the river. The ponding could also be exacerbated due to the presence of informal flood defences such as river walls that would not allow excess surface water into the river system.

A surface water runoff flow path seems to form at Temperance Street during the 1 in 1000 year event, and enter the site from the north (via an underpass and along Hoyle Street).

It is considered that the existing site is mainly at low to very low risk of surface water flooding, with localised areas at medium to high risk.

3.3.2 Proposed flood risk

The areas at surface water flood risk are mainly shown to be at the north of River Medlock or within the extents of the Mayfield Park. The proposals include demolition works and re-profiling the landscape to achieve the desirable compensation storage. As such, the park areas will be graded towards the River Medlock to allow quick drainage of the surface water runoff from the park.

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To the south of the river, the removal of the buildings and the new stormwater drainage system put in place will ensure no flooding of buildings during the 1 in 100 year rainfall event with climate change.

The above measures are anticipated to reduce risk from surface water flooding to low.

3.4 Artificial sources

3.4.1 Reservoir flooding

The EA is currently responsible for leading on flood risk management from reservoirs over 25,000 cubic metres in capacity. The reservoirs under the EA's responsibility will increase to include any reservoirs with capacity larger than 10,000 cubic metres once the Flood & Water Management Act 2010 is fully implemented.

The EA have recently published maps showing areas that could flood in the event of a reservoir failure. Their purpose is not to discourage development but to help authorities and emergency services plan for reservoir flooding. The map shown in Figure 3-5 was obtained from the EA website on long term flood risk (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?map=Reservoirs). According to this map, only very small part of the site might be affected by a sudden reservoir failure. The reservoirs that could affect the site are: Gorton Lower, Gorton Upper and Audenshaw No. 1, 2 and 3. The owner of the reservoirs is United Utilities.

The risk of reservoir failure is extremely unlikely and the impact of such an event to the site is considered low.

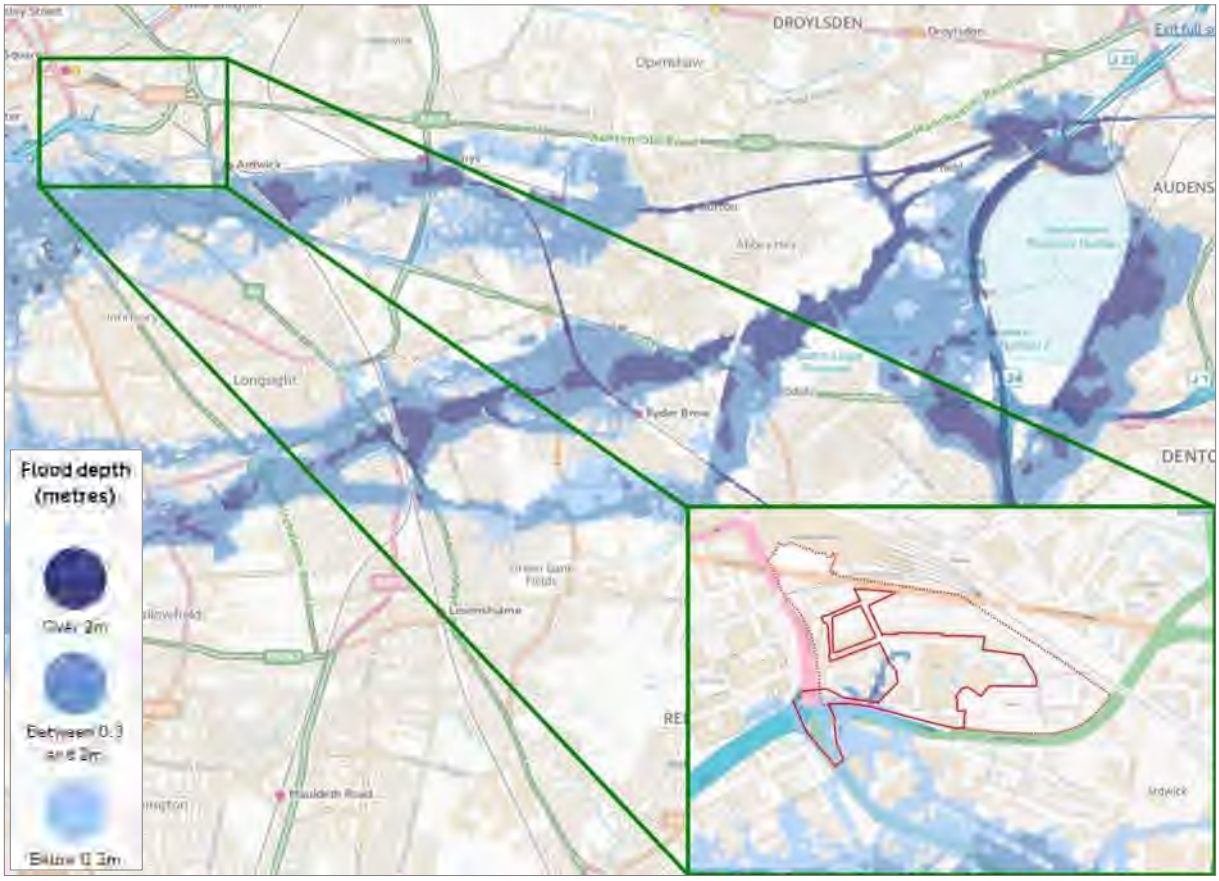


Figure 3-5 - Environment Agency Flood Risk from Reservoir at the site location and surroundings (Contains Environment Agency information ©Environment Agency and database right, 2019)

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3.4.2 Flooding from canals, ponds and small reservoirs

The Lead Local Flood Authority (LLFA) is responsible for leading the management of risk of flooding from ordinary watercourses, canals, ponds and reservoirs smaller than 25,000 cubic metres. Manchester City Council has therefore prepared a Local Flood Risk Management Strategy (LFRMS)[2] to ensure a coordinated way of properly managing local flood risk. The LFRMS has been informed by the Level 2 SFRA prepared in 2011 to produce a map with combined information of the canals breach zones and locations of ponds and small reservoirs, as shown in Figure 3-6.

The Ashton Canal is in closest proximity to the site, passing 500m north of the centre of the development. According to the Level 2 SFRA, the Ashton Canal is at some risk of overtopping due to high inflows exceeding the canal capacity during flood conditions, as well as due to possible blockages of the bywash (an outlet for diverting canal water) at Ancoats upstream of the site. Similarly, the Bridgewater canal is located 2km downstream from the site and could be overtopped as a result of increase flows from River Medlock.

The extents of flooding due to overtopping or breach of these canals are shown in Figure 3-6. None of the canals are shown to impose flood risk to the site.

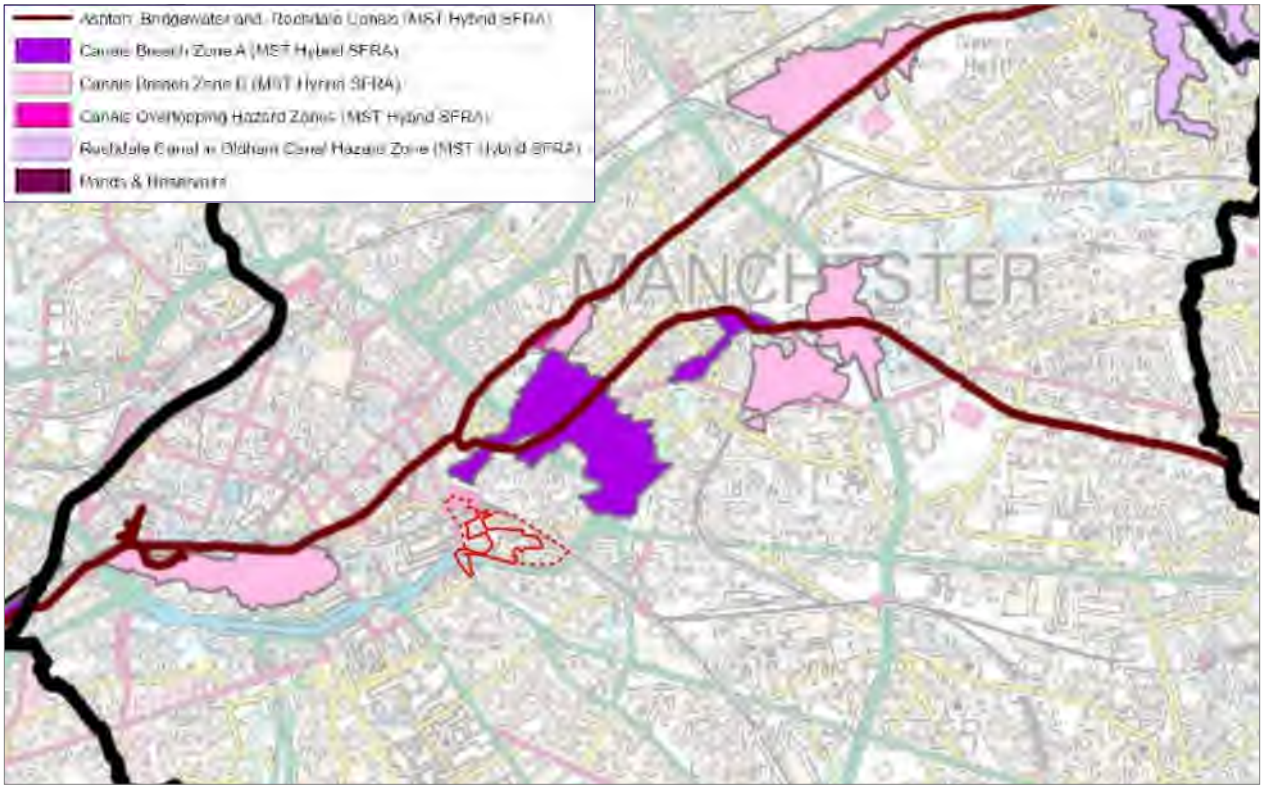


Figure 3-6 –Flood Risk from Canals, Ponds and Reservoirs at the site location and surroundings (Manchester City Council LFRMS, 2014)

[2] Local Flood Risk Management Strategy, Manchester City Council, March 2014

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3.5 Hydraulic interaction (Fluvial and canals)

As part of the Level 2 SFRA, a hydraulic interaction map has been produced that identifies interactions between different sources of flooding, such as canals, ordinary watercourses and open or culverted rivers. The map highlights areas where flooding could be exacerbated by overspill from other sources (please refer to Level 2 SFRA, map H1_5.1).

According to the Level 2 SFRA (Table 7-1 Canal River Interaction), in the event of flood waters overtopping the Ashton canal during a flood event, there is a risk of erosion of embankments and the possibility of this resulting in breach of the canal banks. Should this situation arise, the flow into the River Medlock may result in an increase to flood risk downstream.

Three locations upstream of the site have been identified as areas where breach of the Ashton canal may result in additional flows entering the River Medlock. These are at Philips Park (upstream of the Etihad campus culvert), downstream of the Etihad campus culvert and in the area between Ashton New Road and Temperance Street (immediately upstream of the Mayfield site).

While there is no further information on the potential levels of risk to the site from such an occurrence, flood resilience measures should be considered to reduce and manage the risk to the site.

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4 Managing and reducing flood risk

4.1 Proposed development levels

The EA has stipulated that the finished floor levels (FFL) for residential developments should be set at least 600mm above the 1 in 100 year flood event with 35% allowance for climate change or the 1 in 100 year event with 70% allowance for climate change (with no freeboard), whichever is higher. As the SRF proposals include residential units, the entire podium level south of the river Medlock has been raised to satisfy the above criteria.

Where the proposed development is for uses such as storage refuse areas and car parks, the levels should be set higher than the 1 in 100 year flood event with 35% climate change.

The table below outlines the minimum recommended finished floor levels for the development plots within the Mayfield SRF area. For residential uses, the levels are strictly set above the 1 in 100 +35% CC +600mm, whereas offices can be set above the 1 in 100 +35% CC with some additional freeboard (less vulnerable uses). The recommended freeboard allowance is 600mm as per residential. The energy substation/plant room is set above the 1 in 1000 year flood event to provide resilience during an extreme flood event.

As a general rule, the development levels have also been set above the 1 in 1000 year flood event to remove the development from Flood Zone 2. Please refer to Figure 4-1, Table 3-2 and Table 4-1.

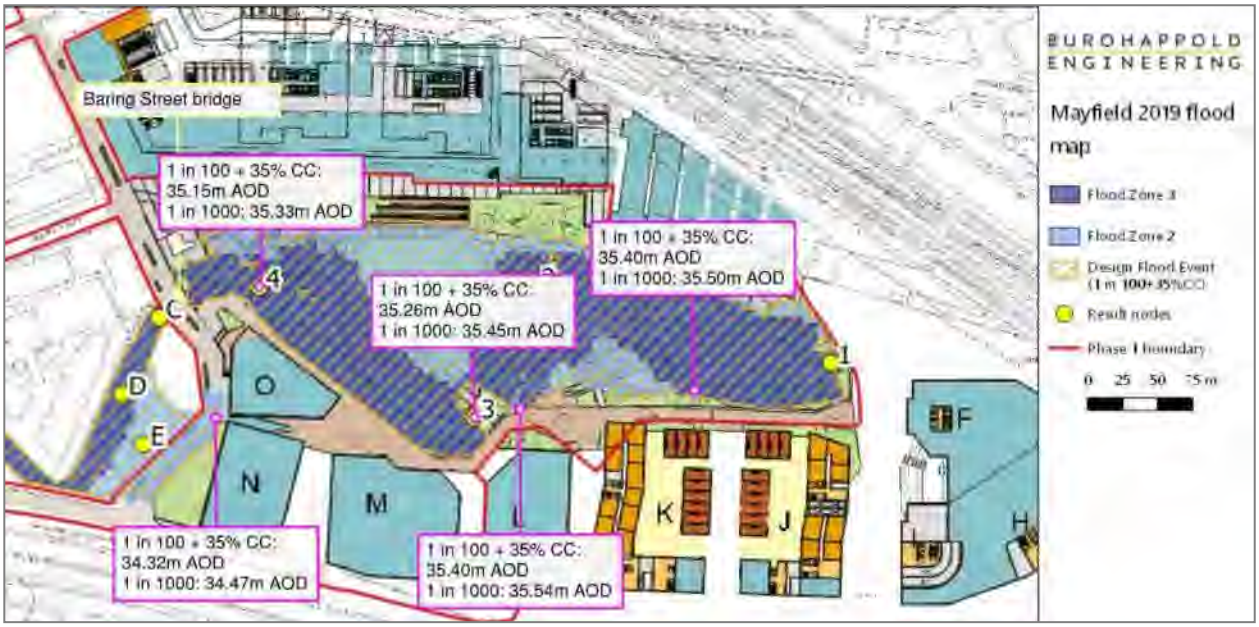


Figure 4-1 – Expected flood levels within the Mayfield site

It is observed that the culvert within the site acts as a throttle to the flows and the restriction causes levels downstream to significantly reduce (see levels for node 4 and E in Figure 4-1). As the levels along the entire length of the River Medlock within the site will be set above the DFL, it is considered that the FFL at the west face of Baring Street Office 1 (Plot O) and the FFL of Baring Street MSCP (Plot N) can be set at lower levels. This will allow tying in with the existing levels at Baring Street (34.5m AOD at the location).

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Therefore, the recommended finished floor levels for the west face of Baring Street Office1 (Plot O) and Baring Street MSCP (Plot N) are based on model node E.

Table 4-1 – Recommended finished floor levels for the Mayfield development plots

Relevant plots	Model node	Proposed uses	Minimum recommended FFL	Event	Proposed FFL	Freeboard allowed above DFE (1 in 100 +35%CC)
Plots F, G, H, I, J, K, L	1	Residential	36.00m AOD (includes 600mm minimum freeboard)	1 in100yr+35%CC with freeboard (600mm minimum)	TBC	TBC
Phase 1 plots						
Plot M	3	Offices	35.86m AOD (includes 600mm minimum freeboard)	1 in100yr+35%CC with freeboard (600mm minimum)	36.15m AOD	890mm
Plot O (east facing)	3	Offices	35.86m AOD (includes 600mm minimum freeboard)	1 in100yr+35%CC with freeboard (600mm minimum)	36.15m AOD	890mm
Plot O (west facing)	E	Refuse storage	34.47m AOD	1 in 1000	34.55m AOD	230mm
Plot O west substation	E	Energy substation/ plant room	34.47m AOD	1 in 1000	35.45m AOD	980mm
Plot N	E	Car park	34.47m AOD	1 in 1000	34.9m AOD	580mm

In order to enable design development for planning, the levels of the Phase 1 plots were initially set based on the EA Medlock hydraulic model levels. The hydraulic modelling exercise undertaken by BuroHappold has demonstrated that by providing the Mayfield Park flood compensation areas, levels within the site are significantly lowered. There is therefore potential for the plot levels to be set lower during detailed design stage, as outlined below:

- Baring Street Office 1 and Office 2 (Plot O (east facing) and Plot M) are recommended to be set above the minimum level of 35.86m AOD (1 in 100 +35%+600mm);
- The energy substation/plant room could be lowered to 34.47m AOD (1 in 1000 year flood level); and
- Similarly, ground floor levels of Baring Street Office 1 (Plot O_ refuse storage and the Baring Street MSCP (Plot N) can be lowered to 34.47m AOD (1 in 1000 year flood level).

If a change in levels is proposed following planning submission, this will be based on the above assumptions and will be discussed with the EA for approval.

4.2 Residual risk – Phase 1

The east face of Baring Street Office 1 (Plot O) and Baring Street Office 2 (Plot M) have been set well above the DFL (+870mm). Baring Street Office 1 (Plot O) west face is set +200mm and Baring Street MSCP (Plot N) +550mm above the DFL. This allowance could reduce the risk of flooding to the properties from the following residual risks:

- Flooding due to flows entering the river during the unlikely event of a breach of Ashton canal (see Section 3.5);
- Higher fluvial flows due to a higher climate change emission scenario;

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- Uncertainties in flood modelling; and
- Exceedance flood events (higher intensity than the DFE).

4.3 Resilience

Key services including electricity and water will need to continue to be provided under flood conditions. As the entire development is proposed above the DFL it is considered to remain safe and operational under a flood scenario. No basement development is proposed for Mayfield Phase 1.

The energy substation/ plant room is located on the ground floor of Baring Street Office 1 (Plot O) are set above the 1 in 1000 year flood event (above 34.50m AOD).

If basements or other development for the future Mayfield phases is proposed under the DFL, the principles described within *'BS 85500: Flood resistant and resilient construction'* will be followed to ensure swift recovery of basement and key services following a flood.

4.4 Emergency planning

4.4.1 Flood hazard

The changes to the levels within the site and the creation of large compensation areas within the site could cause an increase to the exposure of the public to flood hazard. Refer to Figure 4-2 for the maximum flood hazard classification within the site, in accordance with FD2320/TR2 produced by DEFRA/EA). The hazard rating depends on the depth and velocity of floodwater. Danger for some includes children, the elderly and the infirm, danger for most includes the general public and danger for all includes the emergency services.

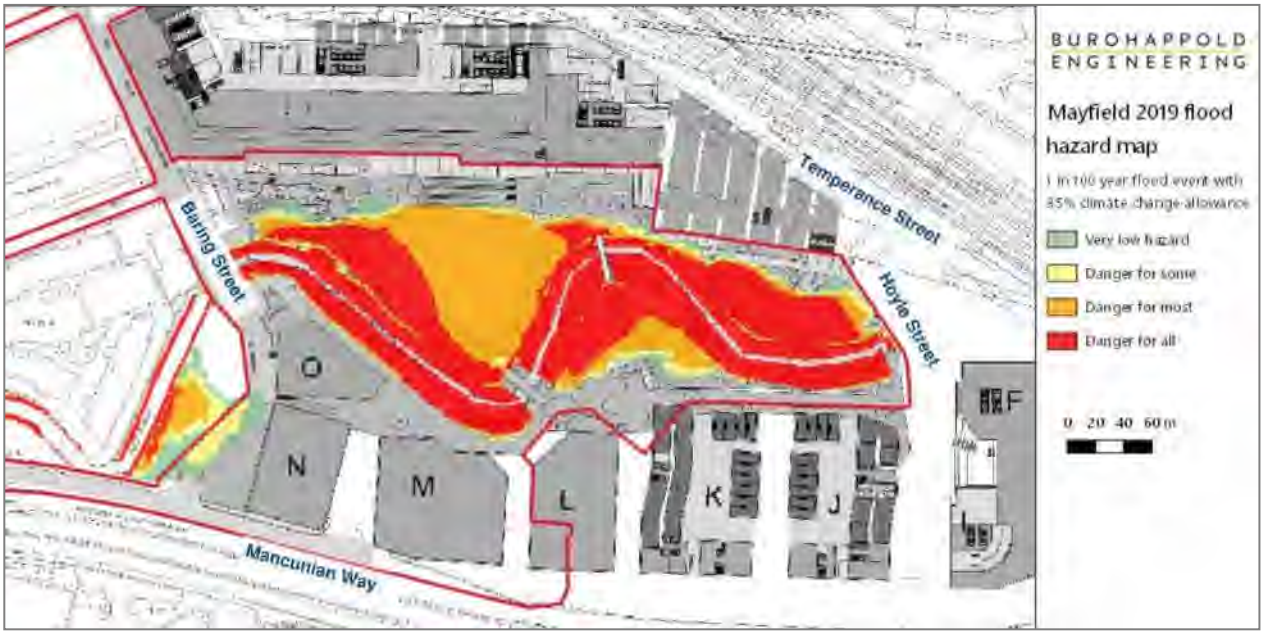


Figure 4-2 - Flood hazard map for the 1 in 100 year event+ 35%CC

As demonstrated in Figure 4-2, the general public should not have access to Mayfield Park during the DFE. In some areas shown in red, the fast and deep flowing water could also prove dangerous to the emergency services.

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An Emergency Plan should be put in place prior to the opening of the Mayfield Park to the public. The plan will outline the responsibilities for the closure of the park to the public during a range of rainfall events, the trigger levels for the closure of different areas, the appropriate measures and signage to be put in place to ensure safe use of the park. A maintenance plan will outline the responsibilities for the maintenance of the park areas during normal operation and following a flood event, to ensure the park can function as a floodplain as designed as well as return to use following a flood event.

4.4.2 Safe access and egress

During the event of flood, safe access and egress to and from the buildings is provided for pedestrians and emergency vehicles from the south boundary of the Mayfield site. The routes shown in blue arrows can be accessed via emergency vehicles.

Parts of Baring Street are shown to be under water during the design flood event. It is not possible to raise Baring Street above the DFL due to the existing levels of surrounding plots. The street can be accessed by all from Fairfield Street and only by emergency vehicles via Mancunian way. Hoyle Street is well above the flood levels; access to Hoyle Street can be achieved via Mancunian Way and Temperance Street.



Figure 4-3 - Access routes for emergency vehicles during a flood event (background: flood hazard map for the DFE)

4.5 Riparian ownership and riverside access

The River Medlock is a designated as a 'Main River' and therefore the EA has powers to carry out maintenance or improvements works to the river and banks. The ultimate responsibility for the repair and maintenance of the bed, banks and any structure rests with the riparian owner.

All buildings have been set back at least 5m from the top of bank to allow clear and unobstructed access for maintenance, as previously discussed and agreed with the EA. The riverside walkway along the south podium will consist of a retaining wall, designed to accommodate loads from emergency vehicles and other potential maintenance equipment. This will provide clear access to most parts of the river from the south bank.

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Figure 4-4 - Access to river for maintenance

Vehicular access (4x4 car) can also be achieved through the ramps along the terraced garden down to the Mayfield Park. The wildscape walk will consist of a narrow boardwalk and therefore vehicular access is restricted to the eastern entrance. Access to the river can also be achieved via Hoyle Street culvert and Baring Street Bridge.

In addition to gaining planning approval for the overall development through the normal planning process, an Environmental Permit will be required from the EA prior to the construction of the proposed works or structures within 8 metres of the top of the bank of the river. This is an entirely separate and additional procedure to the planning process.

4.6 Surface water drainage

According to Planning Policy EN 14 of the Manchester Core Strategy (2012), all new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use of Green Infrastructure. The storm water drainage will be designed in accordance with current best practice to provide adequate capacity so as not to flood for the critical 1 in 30 year storm event, and flood water generated for up to the critical 1 in 100 year plus climate change (30%) storm event shall be contained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services. The pipe network will be designed for no surcharge up to the 1 in 2 year event.

The design of the surface water drainage strategy will follow the hierarchy of drainage solutions, as recommended by the CIRIA C753. Sustainable Drainage Systems (SuDS) will be implemented where possible to enable discharge, volume and water quality control of the surface water runoff and reduce flood risk on site. Not all SuDS systems are appropriate for Mayfield site. Please refer to the drainage strategy in Appendix E.

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The new below ground drainage network shall replace the existing and convey water to outfalls into the River Medlock, as agreed with the EA. It is proposed that all new sewers will drain by gravity, wherever possible however pumping stations may be required to keep the attenuation storage above modelled flood levels. Due to the existing ground conditions, infiltration and other source controls are generally unlikely to be achievable.

The majority of the green space proposed in the landscape masterplan is within the park and therefore lies within the flood plain and is not available to use for storm water attenuation. The strategy therefore proposes to discharge all surface water that falls within the park to the river without first attenuating flows. Surface water may still pass through a variety of SuDS prior to discharge to provide a water quality benefit. These could include filter strips and swales to reduce suspended solids within the surface water runoff.

All surface water which falls on the surrounding buildings and their associated public realm will be attenuated on plot. This surface water will then be discharged via a series of pipes into the River Medlock. Buildings will utilise a range of SuDS systems including green, blue and brown roofs, rainwater harvesting, raingardens and below ground storage. These measures will designed to meet the required surface water discharge rates for the development.

MCC has stipulated that the surface water discharge from the plots will need to be restricted to 50% of the peak brownfield discharge rate (1 in 100 year storm event) minus 2l/s/ha. Brownfield runoff rates for the proposed buildings have been calculated based on the catchment areas of the buildings using the Modified Rational Method. These rates and more detail on the surface water drainage strategy can be found in Appendix E.

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5 Conclusions

This Flood Risk Assessment demonstrates that the development proposals and proposed mitigation measures will reduce the flood risk to the site and surrounding areas for a 1 in 100 year flood event for the design life of the development, taking into account the effects of climate change. The proposed mitigation measures are listed below:

- Development levels: Residential and office development set at least 600mm above the 1 in 100 year flood event + 35% climate change allowance. Other uses set above the 1 in 1000 year flood event. The building development is raised above Flood Zones 2 and 3.
- Floodplain compensation: Floodplain compensation has been provided as part of the development (Mayfield Park). Hydraulic modelling has been used to demonstrate that the development does not increase risk elsewhere based on the 1 in 100 year flood event + 35% climate change allowance.
- Residual risk: Additional freeboard above flood levels has been allowed to provide resilience against extreme flood events or a combined canal breach and fluvial flood event.
- Emergency planning: Emergency and Maintenance plans for the Mayfield Park should be put in place to ensure the public is not exposed to any danger due to flooding. Safe access and egress are provided in flood risk areas for pedestrian and vehicular access in the event of flood.
- Riparian maintenance and ownership: The developer has riparian owner maintenance responsibilities. Environmental Access for maintenance have been allowed on both banks, with at least 5m between the buildings and the top of bank. EA Permits will be required for works within 8 metres from the top of bank.
- Drainage strategy: The drainage strategy will ensure no flooding of buildings for up to the 1 in 100 year event (will allowance for climate change). The hierarchy of SuDS solutions will be followed.

This Flood Risk Assessment demonstrates that through the careful design of the proposed development and the incorporation of the above mitigation measures there is no significant change to the flood risk both on-site and off-site and the development is safe from flooding for its designed lifetime. It is proposed that the above detailed mitigation measures will be submitted to the Local Planning Authority for approval prior to development commencing via the Condition Discharge process subject to achieving planning approval.

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Appendix A Topographic surveys

A.1 Site topographic survey (Malcom Hughes, July 2017)

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Survey Notes

Grid: Local plane metric related to National Grid fixed at Stn SC10

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM02

Notes

Measured Building Survey Legend

ELECTRICAL SERVICES

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- : Cooker connection box
- : Earth point
- : Incoming Electrical point
- : Strobe Warning Light

SECURITY SERVICES

- : CCTV
- : Passive Infra-red detector
- : Security alarm panel
- : Security Door Swipe
- : Integrated CCTV & Intercom
- : Emergency Door Release
- : Door Release
- : Smoke Cloak
- : Alarm Siren
- : Panic button

MISCELLANEOUS INTERNAL FIXTURES

- : Doorswing
- : Urinal
- : Toilet
- : Sink & Drainer
- : Double Sink
- : Sink
- : Hand Basin
- : Hand Dryer
- : Showerhead
- : Shower
- : Bath
- : Bradaline between stairs from floor to floor

WATER SERVICES

- : Incoming water point
- : Stop tap
- : Boiler meter
- : Hot water heater

GAS SERVICES

- : Incoming gas point
- : Gas meter

HEATING / AIR CONDITIONING SERVICES

- : Radiator
- : Central heating boiler
- : Electricity storage heater
- : Hot water tank
- : Cold water tank
- : Air conditioning unit
- : Ventilation duct (ceiling)
- : Air conditioning vent (wall)
- : Central heating thermostat

FIRE PRECAUTION SERVICES

- : Smoke detector
- : Sprinkler
- : Fire alarm
- : Fire alarm push
- : Fire extinguisher (Carbon dioxide)
- : Fire extinguisher (Water)
- : Fire extinguisher (Powder)

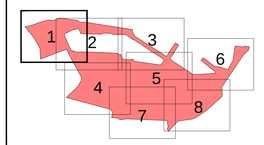
COMMUNICATION SERVICES

- : Telephone outlet
- : Comms outlet
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GENERAL ABBREVIATIONS

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F/S	Floor to Sill Height
F/U	Floor to Underside Height
FL	Floor Level
HT	General Height
BUW	Bricked Up Window
COL	Column
P	Partition
RSJ	Rolled Steel Joist
STAIRS	Stairs/Steps
MH	Manhole
IC	Inspection Chamber
CL	Cover Level
IL	Invert Level
F/BT	Floor to beam top
FFL	Finished floor level
FCL	False ceiling level
SCL	Structural ceiling level
WAL	Window arch level
WSL	Window sill level
WHL	Window head level
WASL	Window arch springing level
SPL	Springing level
AL	Arch level
TWL	Top of wall level
DHL	Door head level
LB	Lamb Box
GB	General Box
BL	Beam level
DHL	Door head level

Sheet Index



Location Plan

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65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS, APAGS, ICES, THE SURVEY ASSOCIATION, FRHS, RICS CPD

Client

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CAMDEN MILL, LOWER BRISTOL ROAD
BATH, BA2 3DQ

Project

MANCHESTER MAYFIELD STATION
FAIRFIELD STREET, MANCHESTER,
M1 2QF.

Drawing Title

TOPOGRAPHICAL SURVEY

Drawn By	JW	25/08/17	Survey Date: August 2017
Checked by	MER	25/08/17	Scale: A0@1:200scale

Drawing No: 19479/1

Revision:

Survey Notes

Grid: Local plane metric related to National Grid fixed at Stn SC10

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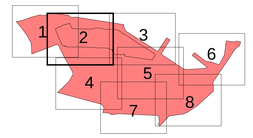
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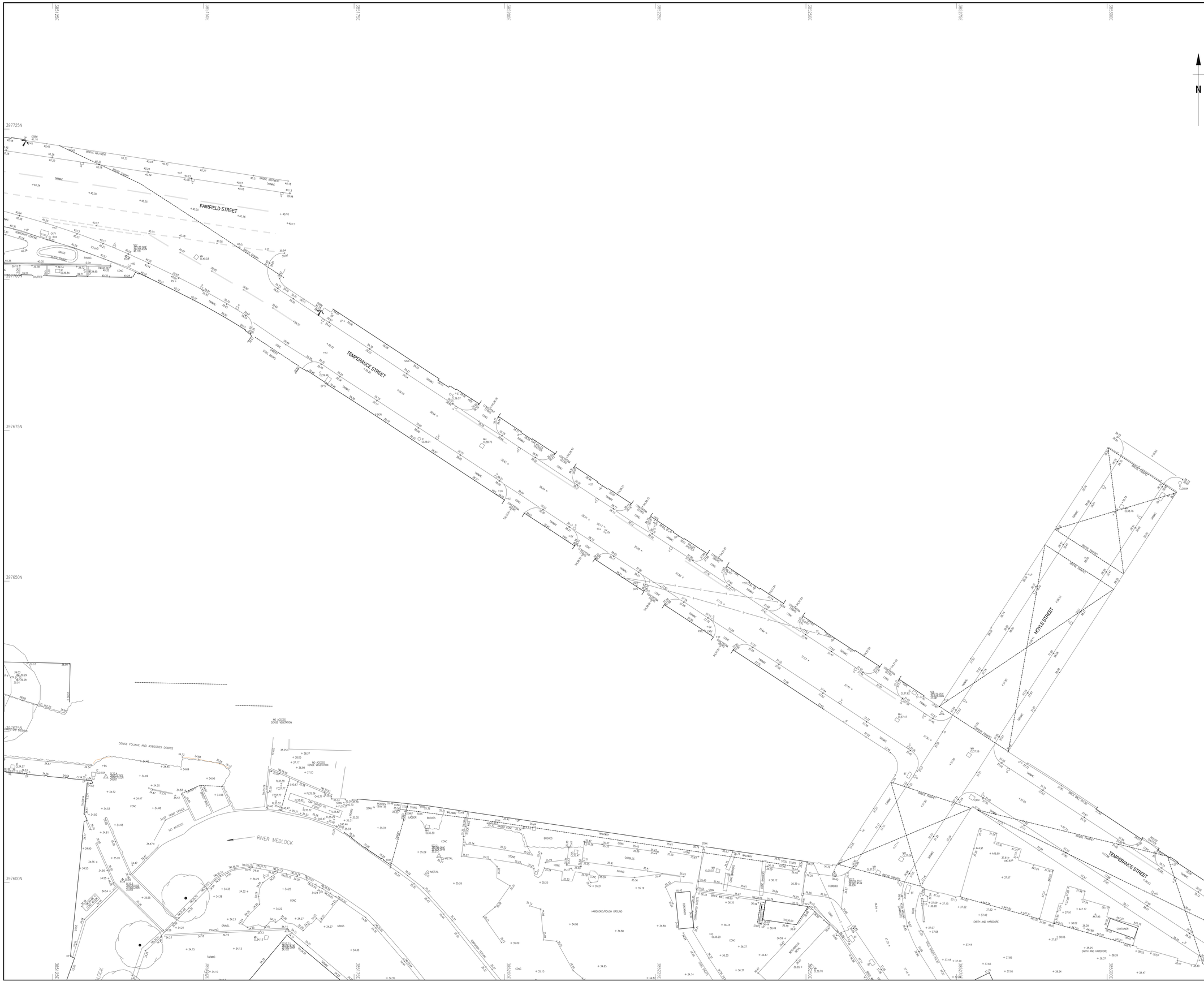
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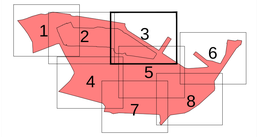
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Drawing No: 19479/3

Revision:



Survey Notes

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WATER SERVICES

- : Incoming water point
- ST : Stop tap
- : Water meter
- HWC : Hot water heater

GAS SERVICES

- : Incoming gas point
- : Gas meter

HEATING / AIR CONDITIONING SERVICES

- : Radiator
- CHB : Central heating boiler
- EWH : Electricity storage heater
- HWT : Hot water tank
- CWT : Cold water tank
- ACU : Air conditioning unit
- : Ventilation duct (ceiling)
- : Air conditioning vent (wall)
- : Central heating thermostat

FIRE PRECAUTION SERVICES

- : Smoke detector
- CHP : Sprinkler
- : Fire alarm
- : Fire alarm push
- : Fire extinguisher (Carbon dioxide)
- : Fire extinguisher (Water)
- : Fire extinguisher (Powder)

COMMUNICATION SERVICES

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- : Comms outlet
- : Intercom
- : Television co-axial outlet
- : Bell push
- : Panic Button
- : Speaker
- : Sensor (general)
- : Lan Box
- : Router
- : Disabled Help Button

SECURITY SERVICES

- : CCTV
- : Passive Infra-red detector
- SAP : Security alarm panel
- : Security Door Swipe
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- : Emergency Door Release
- : Door Release
- : Smoke Cloak
- : Alarm Siren
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MISCELLANEOUS INTERNAL FIXTURES

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- : Hand Dryer
- : Showerhead
- : Shower
- : Bath
- : Breakline between stairs from floor to floor

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F/SP	Floor to Springing Height
F/S	Floor to Sill Height
F/U	Floor to Underside Height
FL	Floor Level
HT	General Height
BUW	Bricked Up Window
COL	Column
P	Partition
RSJ	Rolled Steel Joist
STAN	Stanchions
MH	Manhole
IC	Inspection Chamber
CL	Cover Level
IL	Invert Level
F/BT	Floor to beam top
FFL	Finished floor level
FCL	False ceiling level
SCL	Structural ceiling level
WHL	Window arch level
WSL	Window sill level
WHL	Window head level
WASL	Window arch springing level
SPL	Springing level
AL	Arch level
TWL	Top of wall level
DHL	Door head level
DSL	Door sill level
JB	Junction Box
BL	Beam level
DHL	Door head level

Sheet Index

Location Plan

Rev.	Date	Description

MALCOLM HUGHES
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Chartered Land Surveyors
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M33 7HF. Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS, RICS, The Survey Association, ISO 9001, Cyber Essentials

Client

BURO HAPPOLD LTD
CAMDEN MILL, LOWER BRISTOL ROAD
BATH, BA2 3DQ

Project

MANCHESTER MAYFIELD STATION
FAIRFIELD STREET, MANCHESTER,
M1 2QF.

Drawing Title

TOPOGRAPHICAL SURVEY

Drawn By	JW	25/08/17	Survey Date: August 2017
Checked by	MER	25/08/17	Scale: A0@1:200scale

Drawing No: 19479/4

Revision:

Survey Notes

Grid: Local plane metric related to National Grid fixed at Stn SC10

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM02

Notes

Measured Building Survey Legend

ELECTRICAL SERVICES

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- : Emergency lighting
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- : Strobe Warning Light

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- CWT : Cold water tanks
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- : Air conditioning vent (wall)
- : Central heating thermostat

FIRE PRECAUTION SERVICES

- : Smoke detector
- SPR : Sprinkler
- FB : Fire alarm
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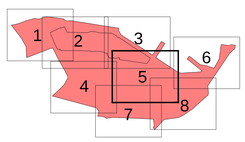
MISCELLANEOUS INTERNAL FIXTURES

- : Doorswing
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F/U	Floor to Underside Height
FL	Floor Level
HT	General Height
BUW	Bricked Up Window
COL	Column
P	Partition
RSJ	Rolled Steel Joist
STAIR	Stairs/Ironwork
MH	Manhole
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IL	Invert Level
F/BT	Floor to beam top
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SCL	Structural ceiling level
WHL	Window arch level
WSL	Window sill level
WHL	Window head level
WASL	Window arch springing level
SPL	Springing level
AL	Arch level
TWL	Top of wall level
DHL	Door head level
DB	Distribution Box
GB	Garage Door
BL	Beam level
DHL	Door head level

Sheet Index



Location Plan

Rev.	Date	Description

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Accreditations: RICS, RICS, The Survey Association, FS 5626, BSI ISO 9001

Client

BURO HAPPOLD LTD
CAMDEN MILL, LOWER BRISTOL ROAD
BATH, BA2 3DQ

Project

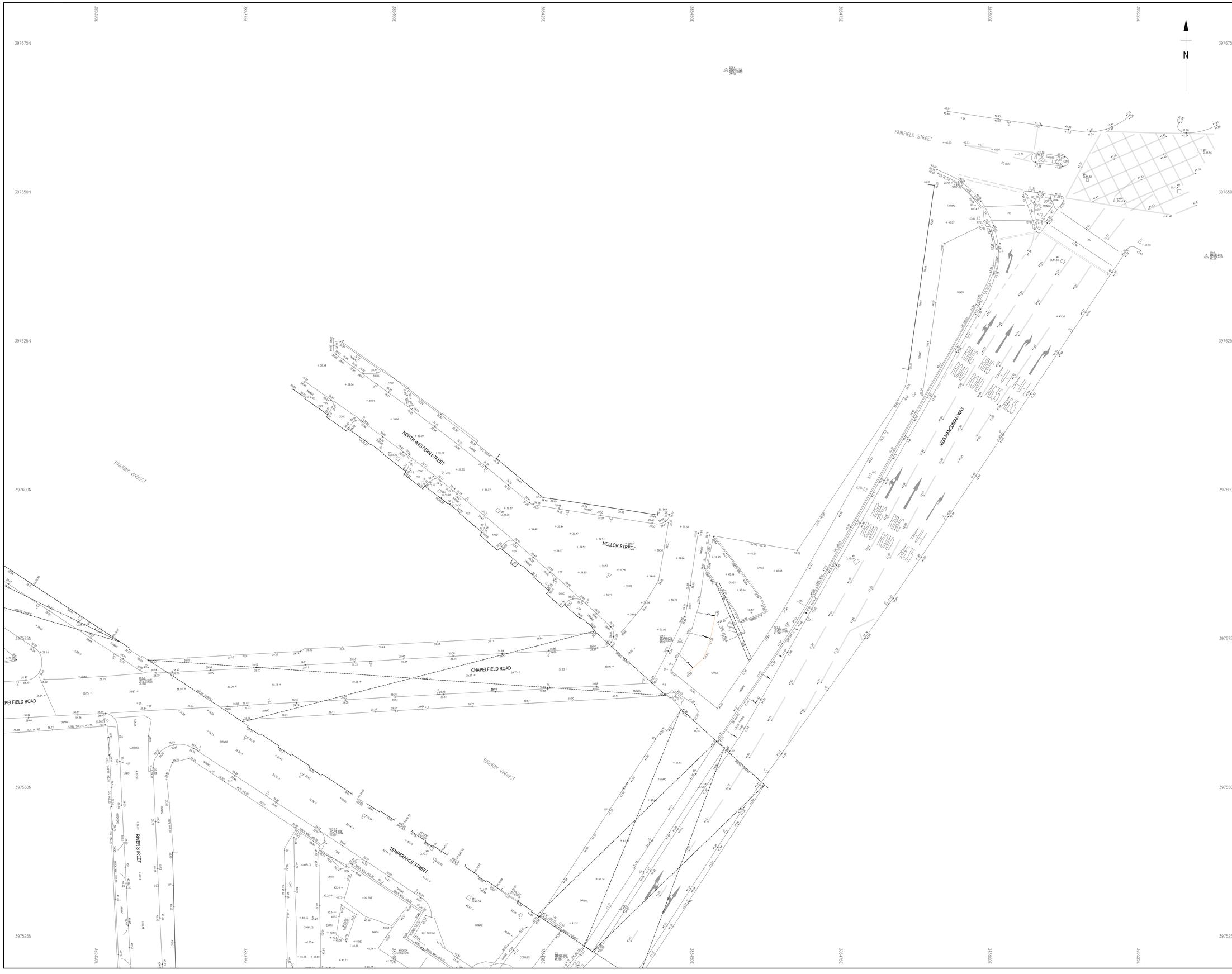
MANCHESTER MAYFIELD STATION
FAIRFIELD STREET, MANCHESTER,
M1 2QF.

Drawing Title

TOPOGRAPHICAL SURVEY

Drawn By	JW	25/08/17	Survey Date: August 2017
Checked by	MER	25/08/17	Scale: A0@1:200scale

Drawing No: 19479/5 — Revision:



Survey Notes

Grid: Local plane metric related to National Grid fixed at Stn SC10

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM02

Notes

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ELECTRICAL SERVICES

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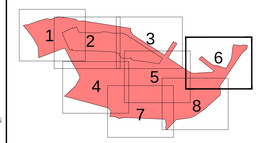
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Accreditations

Client

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CAMDEN MILL, LOWER BRISTOL ROAD
BATH, BA2 3DQ

Project

MANCHESTER MAYFIELD STATION
FAIRFIELD STREET, MANCHESTER,
M1 2QF.

Drawing Title

TOPOGRAPHICAL SURVEY

Drawn By	JW	25/08/17	Survey Date: August 2017
Checked by	MER	25/08/17	Scale: A0@1:200scale

Drawing No: 19479/6

Revision:

Survey Notes

Grid: Local plane metric related to National Grid fixed at Stn SC10

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM02

Notes

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ELECTRICAL SERVICES

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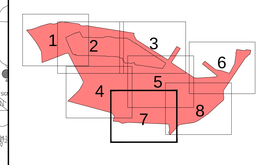
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WASL	Window arch springing level
SPL	Springing level
AL	Arch level
TWL	Top of wall level
DHL	Door head level
CH	Ceiling Height
OB	Overall Beam
BL	Beam level
DHL	Door head level

Sheet Index



Location Plan

Rev.	Date	Description

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CAMDEN MILL, LOWER BRISTOL ROAD
BATH, BA2 3DQ

Project

MANCHESTER MAYFIELD STATION
FAIRFIELD STREET, MANCHESTER,
M1 2QF.

Drawing Title

TOPOGRAPHICAL SURVEY

Drawn By		Survey Date	
JW	25/08/17	August 2017	
Checked by		Scale	
MER	25/08/17	A0@1:200scale	

Drawing No: 19479/7

Revision:

Survey Notes

Grid: Local plane metric related to National Grid fixed at Stn SC10

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM02

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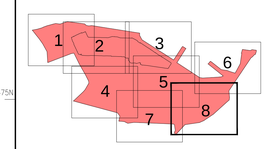
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AL	Arch level
TWL	Top of wall level
DHL	Door head level
DSL	Door sill level
OB	Overhead Beam
SL	Beam level
DHL	Door head level

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Location Plan

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M1 2QF.

Drawing Title

TOPOGRAPHICAL SURVEY

Drawn By	JW 25/08/17	Survey Date	August 2017
Checked by	MER 25/08/17	Scale	A0@1:200scale

Drawing No: 19479/8

Revision:

Appendix B Development proposals

B.1 Mayfield Phase 1 drawings list

SEW – Landscape and park design:

0345-SEW-ZZ-00-DR-L-007101 – Overall GA Context Plan

0344-SEW-ZZ-00-DR-L-001710 – Plot O (Baring Street Office 1) Landscape General Arrangement

0344-SEW-ZZ-ZZ-DR-L-001700 – Plot N (Baring Street MSCP) Landscape General Arrangement

0345-SEW-ZZ-00-DR-L-007200 – Site Sections Location Plan

0345-SEW-ZZ-00-DR-L-007201 – Illustrative Site Sections Section A & B

0345-SEW-ZZ-00-DR-L-007202 – Illustrative Site Sections Section C & D

0345-SEW-ZZ-00-DR-L-007203 – Illustrative Site Sections Section E & F

0345-SEW-ZZ-00-DR-L-007204 – Illustrative Site Sections Section G, H & I

SEW – Baring Street MSCP (Plot N) designers:

0344-SEW-ZZ-00-DR-A-001100 - Ground floor plan

0344-SEW-ZZ-ZZ-DR-A-001304 - West elevation

0344-SEW-ZZ-ZZ-DR-A-001305 - South Elevation

0344-SEW-ZZ-ZZ-DR-A-001306 - East Elevation

0344-SEW-ZZ-ZZ-DR-A-001307 - North Elevation

Bennetts Associates– Baring Street Office 1 (Plot O) designers:

1811-BA-XX-00-DR-A-P-0100 – Ground floor plan

1811-BA-XX-NN-DR-A-P-0310 – North elevation

1811-BA-XX-EE-DR-A-P-0320 – East elevation

1811-BA-XX-SS-DR-A-P-0330 – South elevation

1811-BA-XX-WW-DR-A-P-0340 – West elevation

MORRIS & COMPANY – Basing Street Office 2 (Plot M) designers:

A283-MCO-XX-ZZ-DR-A-01001 – Site location plan

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A283-MCO-XX-00-DR-A-01101 – Ground floor plan

A283-MCO-XX-ZZ-DR-A-01201 – North elevation

A283-MCO-XX-ZZ-DR-A-01202 – East elevation

A283-MCO-XX-ZZ-DR-A-01203 – South elevation

A283-MCO-XX-ZZ-DR-A-01204 – West elevation

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Appendix C Correspondence with stakeholders

C.1 Correspondence with the EA

C.2 Correspondence with the LLFA

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Ms Rodoula Gregoriou
Buro Happold Limited
230 Lower Bristol Road
Bath
Avon
BA2 3DQ

Our ref: SO/2016/116601/01-L01
Your ref: GMMC28626AB

Date: 17 November 2016

Dear Ms Gregoriou

PRE DEVELOPMENT ENQUIRY - THE MIXED DEVELOPMENT WILL CONSIST OF GOVERNMENT OFFICE BUILDINGS TO THE SOUTH OF THE RIVER, NEW RESIDENTIAL BLOCKS TO THE EAST, OPEN SPACE AREAS TO ACT AS FLOODPLAINS AND MAKE SPACE FOR WATER IMMEDIATELY TO THE NORTH OF THE RIVER AND THE RENOVATION OF THE MAYFIELD STATION AND RE-PURPOSE TO FUNCTION AS A MARKET PLACE.
MANCHESTER MAYFIELD

Thank you for submitting the above enquiry which was received on 9th November 2016.

We would like to make the following comments to the proposed development.

Flood Risk

From our flood risk mapping the site is within Flood Zones 2 & 3. Any planning application would need to address the requirements of the National Planning Policy Framework (NPPF) sequential test. Flood zone 3 is shown to affect a portion of the site before the impacts of climate change are considered. The latest climate change guidance (Feb 2016) must be considered as part of any Flood Risk Assessment (FRA).

For a residential development the “upper end” climate change allowances should be considered in the assessment as well as the “higher central” figures.
We would recommend that floor levels (especially residential units) are set at least 600mm above the 1% AEP + 35% flood level and/or at the 1%AEP + 70%cc flood level whichever is the highest whilst also considering 0.1% AEP flood levels. You will also need to show the development is safe under these circumstances.

The development must not increase flood risk elsewhere. If site levels are proposed to be raised to mitigate risks, compensatory storage is likely to be needed. Flood plain compensation works should be based on the 1%AEP + 35%cc defended levels as a minimum to ensure risk is not increased elsewhere as the impacts of climate change occur. We note your comment to create flood plain storage areas and this would be

welcomed together with any proposals to reduce or remove the existing walls that form the river channel.

Modelled flood levels are available for the River Medlock from the EA's customer services team inforequests.gmmc@environment-agency.gov.uk

As you intend to change levels considerably we would advise that you obtain the EA's river model and re-run this with the changes proposed to the river to ensure flood levels are not increased upstream or downstream.

The River Medlock is designated "main river" and the EA has powers to carry out maintenance or improvement works on all "main river". These powers are discretionary and the ultimate responsibility for the repair and maintenance of the bed, banks and any structure thereon rests with the riparian landowner. It is the EA's policy to utilise the Environmental Permitting (England and Wales) Regulations 2010 to control development in order to ensure access is available for future maintenance.

With reference to the submitted masterplan layout, the removal of culverted sections and the creation of open areas adjoining the river would be welcomed. The proposed buildings on the south bank appear very close to the river and creation of clear easements to both banks would be preferable. However, from the viewpoint of accessing the river for maintenance, a clear open space to one bank would be better than what exists currently. Open areas adjoining the river should be kept free of structures and other obstacles that would impede vehicular access along the bank top.

The development may require a permit under the Environmental Permitting (England and Wales) Regulations 2010 from the Environment Agency for any proposed works or structures, in, under, over or within eight metres of the top of the bank of the River Medlock. This was formerly called a Flood Defence Consent. Some activities are also now excluded or exempt. A permit is separate to and in addition to any planning permission granted. Further details and guidance are available on the GOV.UK website: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

With regard to the additional questions in your email of the 15th Nov 2016, the EA river model can be provided with no charge. However, use of it will still need to be licensed and this will be done through our customer services team as noted above.
With regard to surface water drainage, from April 2015 Lead Local Flood Authorities became the statutory consultee for surface water flood risk in relation to planning applications. They are now the appropriate body to assess applicants/developers surface water drainage proposals and the Local Planning Authority should consult the LLFA as necessary during determination of applications.

If new surface water outfalls were required to the river, these may require a flood risk activity permit as noted above. However, the rate of discharge would be agreed through the planning process and the LLFA.

Ecology

The proposed Mayfield development site sits in close proximity to River Medlock waterbody (River Medlock (Lumb Brook to Irwell) GB112069061152), which is currently identified as a watercourse that is heavily modified and failing it's ecological objectives as outlined in statutory North West River Basin Management Plan
(https://www.gov.uk/government/publications/north-west-river-basin-district-river-basin-management-plan)

Cont/d..

The Agency would request based on the proximity of development to the River Medlock WFD waterbody, key green infrastructure asset and ecological receptor, that as part of Environmental Impact Assessment to assess any potential impacts and opportunities on the waterbody and key ecological network, and ensure appropriate mitigation measures to protect and where feasible enhance ecological quality of currently failing WFD waterbody as part of scheme proposals.

We are generally supportive of the Mayfield Strategic Regeneration Framework, which is based around the creation of a new public park and greenspace located along a restored River Medlock corridor, and skylighting sections of existing culverted channel and thereby continue earlier river restoration works on the River Medlock http://www.bbc.co.uk/news/uk-england-manchester-29680074; hopefully creating a new riparian development that sets new design standards in respect to sustainability, and one that will provide an exemplar for future riparian development in the Manchester area and beyond.

We support a development that proposes to rejuvenate the heavily canalised River Medlock here, and would recommend any site based flood risk assessment and ecological survey recommendations i.e. River Habitat Survey, and Geomorphological survey be integrated, enabling the creation of a valuable new riparian corridor and ecological network, that has much improved and safe riverine amenity access, whilst reducing overall flood risk.

Any river restoration scheme should be well designed i.e., be robust in terms of flood risk but also work in dominant low flow conditions, and provides improved riparian and aquatic habitat potential compared to the existing watercourse, that is preferably based on using a mixture of soft and hard revetment options.

We would seek that all new riparian development be set back from both banks of the River Medlock channel, enabling more a more environmentally beneficial channel to be restored, and better integrated in wider development, enable continuous pedestrian and maintenance access along watercourse, and create a more climate change resilient riparian corridor to be designed and constructed. It is sought in areas like the southern development zone that an adequate undeveloped buffer be provided between new build and the restored River Medlock, providing greater ability to create a high quality amenity/greenspace zone as well as improved maintenance access as and when required. The Agency would seek that river rehabilitation of heavily cannalised River Medlock look to enhance both channel, banksides where required, and preferably use soft or bioengineering techniques where feasible to create a valuable ecological network for resident riverine flora and fauna.

We would not support new riparian development that directly abuts the river channel or seeks to build on top of existing culverted sections of river channel.
The Agency would recommend reference to the following river restoration strategy documents, and the River Restoration Centre and European River Restoration websites sites for advice and guidance for urban river restoration projects and how to positively integrate rivers as part of new urban riparian development.
Rivers By Design
(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297315/LIT8146_7024a9.pdf)
http://www.ecrr.org/RiverRestoration/UrbanRiverRestoration/tabid/3177/Default.aspx
http://www.therrc.co.uk/pdf/References/southriver_combined_2up.pdf
http://www.therrc.co.uk/MOT/Final_Versions_%28Secure%29/8.5_Marden.pdf

Cont/d..

We trust you find these comments useful.

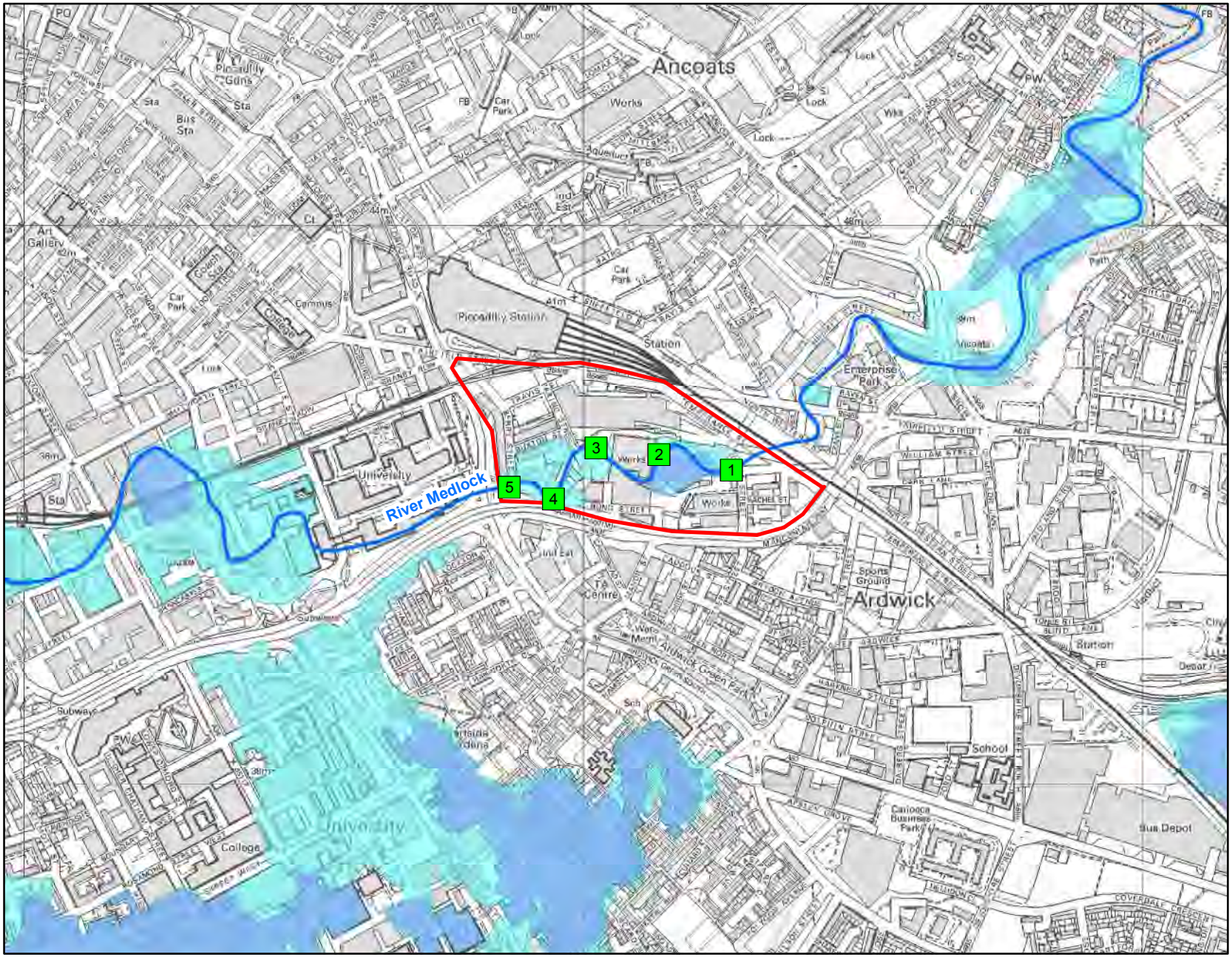
Yours sincerely

Mrs LAILA BERRY
Planning Advisor

Direct dial 02030250761
Direct fax
Direct e-mail laila.smith@environment-agency.gov.uk

End

Detailed Flood Map centred on Mayfield area, Manchester. Created 10/11/2016 [GMMC28626AB]



Environment Agency

1:10,001

N

Legend

- Model_Measurements
- Site_Location
- Main River
- Flood Zone 3
- Flood Zone 2

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

					Undefended			
Map Reference	Model Node Reference	Easting	Northing	Data	1 % AEP (1 in 100 year)	0.1 % AEP (1 in 1000 year)	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow
1	ea013_Model_MEDL01_00044	385265	397561	Modelled Water Level (m aodN)	35.21	36.12	35.64	36.01
				Modelled Flow (cumecs)	60.14	96.43	74.70	87.25
2	ea013_Model_MEDL01_00041	385136	397589	Modelled Water Level (m aodN)	34.65	36.44	35.55	36.03
				Modelled Flow (cumecs)	57.48	62.37	61.40	62.27
3	ea013_Model_MEDL01_00038	385023	397601	Modelled Water Level (m aodN)	33.90	35.67	34.75	35.30
				Modelled Flow (cumecs)	59.71	75.48	72.96	74.93
4	ea013_Model_MEDL01_00035	384947	397510	Modelled Water Level (m aodN)	33.40	35.22	34.42	34.83
				Modelled Flow (cumecs)	59.98	88.19	73.76	85.87
5	ea013_Model_MEDL01_00032	384874	397535	Modelled Water Level (m aodN)	32.45	34.82	34.02	34.41
				Modelled Flow (cumecs)	59.99	93.61	73.74	86.60

Model data taken from Medlock SFRA 2011 Study

Notes:

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

*Climate Change Scenario based on - 35% and 70% increase in flow.

Surface Water Map - GMMC28626AB

Legend

- High
- Medium
- Low



0 100 200 300

Metres

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Buro Happold Ltd
230 Lower
Bristol Road
Bath
Avon
BA2 3DQ

Our ref: SO/2017/117286/01-L01
Your ref: Manchester Mayfield

Date: 13 July 2017

Dear Mr Dannatt

PRELIMINARY OPINION - RIVER CORRIDOR SURVEY.
MANCHESTER MAYFIELD

Thank you for your enquiry regarding the matter of channel survey information which we received on 30th June 2017.

We would like to make the following comments.

Flood Risk

The 2011 Medlock model was based on an earlier version of the EAs River Medlock model. This was built using a survey from various earlier studies. We would have no objections to the use of the model in its existing state as the baseline case. However, we would recommend that you identify any obvious visual changes in the channel that depart from the current sections used in the model. These could be structures that have been removed or changed e.g. weirs, bridges etc.

If there are any changes, we suggest that sufficient information is gathered to represent these in the baseline model with an explanation of the changes provided in the model report.

Biodiversity

We would seek any such survey work adheres to the health and safety measures outlined in River Corridor Survey manual (1992, Section 5). However we would still recommend some form of river corridor survey of the current heavily modified River Medlock corridor to help inform future river rehabilitation proposals and provide a baseline to measure river corridor improvements proposed as part of any new riparian development. As a potential alternative, the survey of the urban channel corridor may be feasible using the River Habitat Survey methodology (http://www.riverhabitatsurvey.org/rhs-doc/the-survey/) to assess current riverine habitat quality, and could be potentially conducted later in season when vegetation has died

back, thereby allowing better and safer views of River Medlock corridor.

We trust you find these comments useful.

We now offer a voluntary charged for service where we can provide more detailed pre-application advice. More information can be found on our website: http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/planning/33580.aspx

Yours sincerely

MRS LAILA BERRY
Planning Advisor

Direct dial 02030250761
Direct e-mail laila.berry@environment-agency.gov.uk

End

Rodoula Gregoriou

From: Telfer, Helen <helen.telfer@environment-agency.gov.uk>
Sent: 16 November 2017 12:07
To: Rodoula Gregoriou
Cc: Andrew Dannatt; 035548 Mayfield Regeneration Development
Subject: RE: Mayfield recommended floor levels

** External E-Mail **

Hi Rodoula

Thanks for the email – the regular catch up sessions are useful for us also.

I can confirm that we agree with your conclusion in relation to the flood resilience/resistance.

In terms of access/egress we suggest reference to the methodology for calculating UK flood hazard rating defined in the EA/ Defra research Flood Risk Assessment Guidance for New Development (FD2320) and the supporting Explanatory Note for FD2320 and FD2321. Access routes should preferably be dry or if this is not possible be of low hazard rating (white cells) in the matrix table.



Thanks

Helen

From: Rodoula Gregoriou [mailto:Rodoula.Gregoriou@BuroHappold.com]
Sent: 16 November 2017 09:40
To: Telfer, Helen <helen.telfer@environment-agency.gov.uk>
Cc: Andrew Dannatt <Andrew.Dannatt@Burohappold.com>; 035548 Mayfield Regeneration Development <035548MayfieldRegenerationDevelopment@BuroHappold.com>
Subject: Mayfield recommended floor levels

Hello Helen,

How are you? Nice to talk to you and Matt a couple of weeks ago.

We are now considering the flood levels in more detail as the design progresses. I thought you might be able to help us on providing clarification on the EA advice with regard to finished floor levels. The following preliminary advice was given early in the design (as per attached document):

"We would recommend that floor levels (especially residential units) are set at least 600mm above the 1% AEP + 35% flood level and/or at the 1%AEP + 70%cc flood level whichever is the highest whilst also considering 0.1% AEP flood levels."

We will be setting the levels as per advice. Could you please clarify whether there is a requirement to raise levels to the 0.1% or what kind of consideration/ approach we should be following for up to those levels? Is the EA seeking for flood resilience/flood resistant approach to be followed between FFL and 0.1%, while ensuring safe access and egress to and from the site?

Kind Regards,
Rodoula

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Meeting Notes

Project:	Mayfield Park and Associated Public Realm		
Subject:	Environment Agency Review Meeting		
Meeting place:	Deloitte Offices, 2 Hardman Street Manchester, M60 2AT	Meeting no:	001
Date and time:	07 February 2019 at 14:30	Minutes by:	Andreas Panourgias
Present:	Lalia Berry (LB) John Ruckledge (JR) Gary Morris (GM) Ian Austin (IA) Rodoula Gregoriou (RG) Max Aughton (MA) Carol Sutton (CS) Andreas Panourgias (AP) Michael Percival (MP) Hannah Graham (HG)	Representing:	Environment Agency (EA) Environment Agency (EA) Environment Agency (EA) BuroHappold (BH) BuroHappold (BH) Studio Egret West (SEW) Faithful+Gould (F+G) Faithful+Gould (F+G) Deloitte (Del) Deloitte (Del)
Apologies:	-	Representing:	-

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
1.	**Introductions and Apologies**	
1.1	Introductions were made.	Note
1.2	EA provided contact sheets of the team involved with Mayfield.	Note
1.3	F+G to provide contact sheets of the project team to the EA.	F+G

Next meeting:	TBA		
Distribution:	All present plus apologies		
Date issued:	15/02/2019	File Ref:	Job Number: 516 1138

NOTE TO RECIPIENTS:
These meeting notes record F+G understanding of the meeting and intended actions arising therefrom.
Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
1.4	It was advised that the appointment documentation and contract has been signed and returned by Mayfield. All invoices should be issued in accordance with the Mayfield invoice procedure and copied to Carol Sutton at F+G for approval.	Note
2.	**Design Update**	
2.1	SEW presented a summary of the current design and BH provided Flood Risk Modelling update.	Note
2.2	Summary of the proposed programme for delivery of the scheme was provided by F+G.	Note
3.	**River Structures**	
3.1	Two new bridges are proposed across the river to replace the two existing, derelict structures. It was explained that the deck of the bridges will need to be below the Design Flood Level (DFL) for accessibility. While the EA normally require a 600mm freeboard above the DFL, the concept was accepted in principle. Hydraulic modelling is required to test the impact of the bridges. To ensure that design is open (i.e railings) as the two bridges are within the flood plain.	Note BH
3.2	The EA have no objection to the Baring Street Square proposals. Encourage the idea of large openings or transparent deck at locations to allow light through to the river.	Note / SEW
3.3	The Flood Modelling presented by BH was accepted by the EA with tolerances at +/- 10mm to 20mm. RG mentioned no change in extends. The development to be tested against the 1 in 100 +35%CC. The Baseline modelling files and hydraulic note have been prepared and will be issued for review w/c 11th of February 2019. This will take 4 weeks to validate.	BH
3.4	With regards to the proposal of stepping stones across the river, EA accepted this concept, but would not prefer installation of weirs. Accumulation of debris behind stones should be considered and to ensure it does not impact flood risk, this needs to be the subject of a management strategy.	SEW / BH
3.5	In terms of breaking the height of Retaining Walls, EA stated that a Bioengineered solution at both levels would be preferred, if it is possible to make it work. Plan showing the current versus the proposed design to be provided to the EA. *Post-meeting note:* To invite the EA team for a site walk to gain better appreciation of the improvements.	BH F+G
3.6	Hard Edge Walls result in high energy flows, which would impede introduction of intertidal planting. To consider smoothening the edges to more natural edges.	SEW / BH
3.7	Any outfalls to the Medlock would be approved by Manchester City Council (MCC) but would need a permit from EA to install.	Note
3.8	EA would like to see more detail about the improvement and ecological aspects with regards to the river corridor.	BH
3.9	Safety around river is the owners responsibility.	Note

ITEM	DESCRIPTION AND ACTION	RESPONSIBLE
3.10	In terms of the access for maintenance, a 5m vehicular access is required. The Design Team to issue marked up access plan for EA. Plan to be provided for further discussion.	Note SEW / BH
3.11	The concept of building on Plot F, over the culvert, would not be the preferred option by the EA, since this might cause issues for stability and maintenance of culvert if new structures are built over. The Project Team is to send a pack of information to explain the above concept further to the EA, including access for maintenance arrangements. The pack is to include the historic building over the culvert. *Post-meeting note:* GM was taken on site on 14/02/2019. GM explained there is no biodiversity benefit from the proposed landscaping at Hoyle Street East compared to opening up the culvert.	Note SEW / BH SEW / BH
3.12	Gabions would not be the preferred option from an EA perspective. This is due to previous failure of baskets and infill.	Note
4.	**Next Meeting**	
4.1	Next meeting to be arranged.	Note

U and I Group Plc
7a Howick Place
London
City of Westminster
SW1P 1DZ

Our ref: SO/2019/119024/03-L01
Your ref: Mayfield

Date: 08 March 2019

Dear Sir/Madam

CHARGED ADVICE MAYFIELD STRATEGIC SITE - COMMENTS TO MEETING NOTES.
BARING STREET, MAYFIELD.

Thank you for accepting our offer to meet with you on 7th February 2019 to discuss the Mayfield development.

We are providing this advice under Agreement No. ENVPAC/1/GMC/00126. Please note we have taken 6 hours to attend the meeting and provision of the following meeting notes.

With regard to flood risk we would make the following comments in relation to the minutes.

3.1 – Where construction of new footbridges is not feasible above design flood level, flood flow routes around the footbridges must be considered. It would be preferable to have the soffit at least 600mm higher than the top of the bank on both sides of the river where possible. The bridges must also be fixed to prevent them floating off their bearings during a flood.

3.2 – We would generally seek the minimum amount of structures crossing the river. However, we would not object to the Baring St square pedestrian crossing subject to soffit being at least 600mm above design flood level (1 % AEP + 35% CC allowance). There will always be an Agency preference to keeping new river crossings to as short as possible to retain as much open channel.

3.6 - Any opportunities to open up River Medlock corridor and remove existing canalisation would be welcome, as this would reduce in channel flow rates and scour risk, and provide greater ability for any new marginal planting to persist.

3.7 – The principles of surface water drainage, discharge rates and provision of SuDS is within the remit of the Lead Local Flood Authority. Construction of outfalls to the river

may require a permit from the EA. These can be included with details of the wider channel proposals that will require a “bespoke” flood risk activity permit.

3.11 – As discussed in the meeting, we would encourage you to avoid proposals that included buildings sited above the existing culverted sections of the river. Whilst you could look to show that flood risk would not be made worse by such proposals we would not consider this to be a sustainable approach to development. It would also seem a departure from the principles of the wider scheme which is seeking to open up the River Medlock and create a new city park. The Agency seeks to avoid construction of buildings or carrying out other development over culverts for a number of good reasons including:

(i) Access for maintenance would be prevented, or further restricted
(ii) Building may block overland flood routes which are important in the event of culvert blockage
(iii) In the event of structural problems, or insufficient hydraulic capacity, re-building of a culvert that has been built over could be impossible or not economically viable
(iv) A building might impose loads on a culvert beneath it, which could lead to collapse of the culvert and flooding of property
(v) Collapse of a culvert could seriously affect the stability of the building over or next to it
(vi) Such a development could be a precedent, leading further riparian development wanting build over existing culverted sections of river.
(vii) Would not be in adherence with SRF objectives for Mayfield

We would also clarify that any development within 8 metres of the River Medlock (including building over the culvert) will require a flood risk activity permit from the Environment Agency.

Gary Morris has met with the scheme ecologist on site to discuss ecological matters, and undertook a brief tour of site on 14th February. It was suggested, based on this visit, instead of revised options of putting plot F over the River Medlock, that there may be opportunity to re-align the current Hoyle Street crossing; which is as Agency understands to be just for occasional emergency vehicle access; closer to existing railway arches – thereby allowing for a continuous and uninterrupted river park area, and relocating the plot F site back to the original left hand bank area (as per SRF), whilst retaining pedestrian access under viaduct via existing Chapelfield Road. Buro Happold said they would also relay this potential option to design team.

We have previously outlined our overall support for the aspirations of the Mayfield development. That view may change if we are asked to agree to proposals that depart from our general principles and given our positive engagements with the project team, we are keen to work with you to find a solution.

I hope the above advice is helpful. If there is any further work you anticipate needing our detailed advice on in relation to this project please let me know so it can be incorporated into this charging agreement.

Yours faithfully

Cont/d..

MRS LAILA BERRY
Planning Advisor

Direct dial 02030250761
Direct e-mail laila.berry@environment-agency.gov.uk

Disclaimer
Our opinion is based on the information available to us at the time of the enquiry. When the formal planning application is submitted, our position may change if there have been changes to environmental risk or evidence, and/or planning policy

End

Buro Happold Limited
230 Lower Bristol Road
Bath
Avon
BA2 3DQ

Our ref: SO/2019/119024/05-L01
Your ref: Mayfield

Date: 17 July 2019

FAO: Rodoula Gregoriou

Dear Ms Gregoriou

ENVPAC/1/GMC/00126 - MAYFIELD STRATEGIC SITE - DOCUMENTATION REVIEW - HYDROLOGY ASSESSMENT. BARING STREET, MAYFIELD.

Thank you for your email of the 26th June 2019 and your hydrology review report dated 25th June 2019.

It has not been possible at the time of writing this letter to confirm the time used under ENVPAC/1/GMC/00126 as part of this review and response however, I will forward details regarding this matter in due course.

Our modelling and forecasting team have reviewed the report and most of the main queries regarding hydrology, raised in the previous baseline model review, have been addressed.

Our hydrology reviewers have commented that Paul Garrad seems to have done a thorough review of the inflows to the modelled reach but they have also made a few comments on the downstream inflows to the modelled reach. Based on our colleagues' comments, it would appear the updated hydrology assessment would be acceptable for use in the hydraulic modelling of the development proposals.

Our reviewers observations are as follows however, please note that the queries raised could be answered within the overall FRA especially in relation to potential risk to the development from sewer exceedance.

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Reviewer Comments

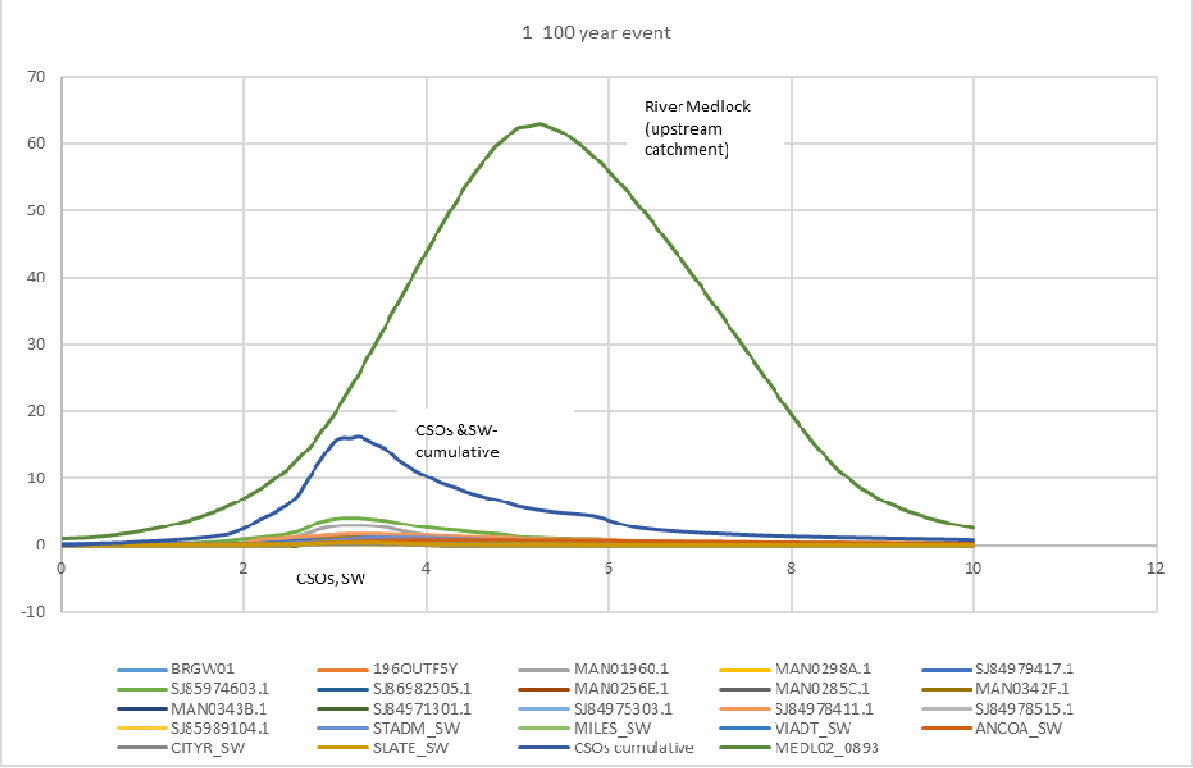
Paul Garrad has provided a thorough review of the estimation of the inflow hydrographs at the upstream end of the modelled reach.
The queries Paul Garrad raised in his review have been addressed in the following attachment.

The upstream catchment is 48 sq km, which is the larger part of the whole Medlock catchment, which has a total area of 58 sq km. Section 4.7.1 of the 2009 report states design flows from the CSO's and surface water sewers were estimated using InfoWorks and the United Utilities models, with design UCWI and rainfall profiles critical to the River Medlock used as inputs.

Flows were not estimated for the downstream limit of the study reach using a lumped catchment approach. This is because the downstream reaches of the catchment are significantly urbanised. It was considered more accurate to estimate the flows from the

urban area using InfoWorks, rather than to scale lateral inflows to match flow estimates at the downstream extent of the model reach. Presumably the flow from the upper catchment dominates the flows in the modelled reach, but it would be useful to know whether these inflows have been generated from the same design rainfall events that have been used to generate the river inflow hydrograph. This would be the logical approach to ensure that the two sets of hydrographs interact in a realistic way.
BuroHappold did not review the Atkins/UU model that derived the combined sewer inflows. Details of the rainfall events used in the analysis is not known, but assumed to correlate with the different return periods. To allow for the latest guidance on climate change, the 1 in 100 year inflows were increased by 35%, similarly to the river inflow hydrograph.

Rainfall profiles might have been developed independently for the Infoworks catchments, although the report says that Atkins provided the rainfall profiles to United Utilities in order to run their model, and so it is likely that they would have provided profiles appropriate to the whole catchment, as implied by the extract above. It may be that the downstream inflows have little impact on the peak flows, as they may have peaked and receded before the upstream peak arrives; it would be good to confirm if this is the case.
Inspection of the river inflow hydrograph indicates that the peak flow occurs at approximately 5 hours after the start of the storm event. The CSOs and stormwater inflows peak at approximately 3 hours as shown in the chart below:



Section 13.14 of the 2009 report, 'Limitations of the model and potential future use', states that *'this model on its own does not adequately represent the total risk of flooding to properties in the area, as it ignores the impact of the sewerage network except in so far as it contributes flow to Corn Brook.'*

The Corn Brook south of the Medlock seems to produce a large area of flooding, and so perhaps the risk from other sources of flooding needs to be considered in the Mayfield Masterplan area, if it isn't being considered already.
This will be considered within the Flood Risk Assessment.

Cont/d..

If much of the catchment is drained by combined sewers, then presumably flows in the river will be lower than might otherwise be expected, as runoff from less intense rainfall will be carried away to the STWs, and the considerable combined sewered areas will only start to make a contribution when the CSOs start to spill? Could this affect the growth curve derived from gauged data?
The growth curve for the river inflow was derived using pooling group from many gauging stations rather than using one station. It is not known how the CSO flows were derived in the UU model. It is assumed that for the Design Flood Event the CSOs drain into the river at full capacity.

When sewer capacity is exceeded, will excess water be able to make its way overland to the river or will built obstructions keep much of it in storage until sewer capacity becomes available? In that is the case then extreme flood peaks in the river might be reduced.
For the Design Flood Event it has been assumed that if the sewers surcharge they will become overland flow and follow the topography. As a result, LiDAR data was used to define the overland runoff area to the upstream river inflow point, and did not include the area served by the sewer system. It is not known whether built obstructions may attenuate overland flood flows.
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Further to above, should you have any queries regarding this response then please do not hesitate to contact me.

Yours faithfully

Mr Andy Davies
Sustainable Places Advisor

Direct dial 02077140640
Direct e-mail andy.davies1@environment-agency.gov.uk

End

Buro Happold Limited
230 Lower Bristol Road
Bath
Avon
BA2 3DQ

Our ref: SO/2019/119024/06-L01
Your ref: Mayfield

Date: 05 September 2019

FAO: Nilani Venn / Rodoula Gregoriou

Dear Nilani / Rodoula

ENVPAC/1/GMC/00126 - MAYFIELD DEVELOPMENT - MASTERPLAN PROPOSAL – REVIEW - HYDRAULIC MODELLING REPORT

BARING STREET, MAYFIELD.

Thank you for forwarding your modelling report (ref: 042912 issue 00) for review. Please be aware that we have used 3.5 hours of charge agreement ENVPAC/1/GMC/00126 in order to review the submitted report and provide this response.

It should also be noted that we have reviewed the content of the report only, based on our most recent review of the detail for the baseline model.

Environment Agency Commentary – Hydraulic Modelling Report

With regard to the modelled return periods, we agree that the design flood event for assessing compensation and floor levels would be the 1% AEP 35%cc event. However, we would strongly recommend that the FRA supporting the development should also consider the impact of the extreme 0.1% AEP event, as advised in our earlier response to you, see letter ref: SO/2016/116601/01-L01 dated 17/11/2016 for details. The FRA must show that development would be safe in these events. We also note from your previous hydrology update report that you have the flows for the extreme event and suggest the model is run for this to also refer to in the FRA.

Tables E.2A and 2B set out the changes made to model files to represent the development. Reference is made to the changes at the “downstream end of the site to enforce constriction at Baring Street bridge”. Some further explanation of what this consists of in relation to the proposals would be useful. Presumably this is to off-set the impact of removing the building culvert within the site and will be covered in more detail within the FRA.

We note the adjustment of the mannings ‘n’ value for banks in the masterplan proposal based on them being well maintained. Without seeing the overall proposals for the new channel this is difficult to comment on but it may be more appropriate to leave it consistent with the baseline model for comparison purposes. Additionally, if the proposals are to reduce the extent of walled channel and introduce more natural planting to the river margins and corridor, reducing the roughness may not be appropriate.

With regard to the modelled changes in flood levels resulting from the development, these appear negligible upstream and downstream of the development site. We therefore would be unlikely to raise objection, subject to seeing full details and the FRA

at the planning application stage.

Should you have any queries regarding this response or wish to discuss the matters raised further, then please do not hesitate to contact me.

Yours faithfully

Mr Andy Davies
Sustainable Places Advisor

Direct dial 02077140640
Direct e-mail andy.davies1@environment-agency.gov.uk

End

Appendix D Hydraulic Modelling Report, BuroHappold 2019

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BUROHAPPOLD ENGINEERING

Mayfield Park, Manchester

Hydraulic modelling report

042912

13 September 2019

Revision 01

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Revision	Description	Issued by	Date	Checked
00	Final for review	RG	15/08/2019	AT
01	Final *(EA comments addressed)*	RG	16/09/2019	AT

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author	**Rodoula Gregoriou**
date	**16th September 2019**
approved	**Alan Travers**
signature	
date	**16th September 2019**

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Glossary/Abbreviations

Term	Definition
BHE Baseline 2019	The up-to-date hydraulic model for River Medlock developed by BuroHappold Engineering in 2019
DFE	Design Flood Event (1 in 100 year flood event with an allowance for climate change)
EA	Environment Agency
EA Medlock 2009 / 2011	The hydraulic model developed by the EA in 2009 and updated in 2011 for the assessment of flood risk from River Medlock.
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
m AOD	Metres Above Ordnance Datum
Mayfield 2019	The hydraulic model used to assess the impact of the Mayfield proposals in term of flood risk. Based on the BHE Baseline 2019 model.
MCC	Manchester City Council
SFRA	Strategic Flood Risk Assessment

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1 Executive Summary

This hydraulic modelling report describes the process followed by BuroHappold Engineering (BuroHappold) to assess the proposals for the redevelopment of the Mayfield area in Central Manchester in terms of flood risk, and to test and inform appropriate mitigation options. The intended use of the models described in this report are for planning purposes for Mayfield site only.

The proposals for Mayfield were set out in the a Strategic Regeneration Framework document issued in February 2018 and adopted by Manchester City Council later that year. At the centre of the area it is proposed to create a new urban park. The River Medlock flows from east to west at the centre of Mayfield and the Park will be created either side of the river. The vision is to regenerate the river by removing a culvert and the high river walls where possible and replacing them with natural banks to create a blue green ecological corridor through Mayfield. The park will also create a remodelled flood plain for the River.

The changes to the river and its floodplain need to be assessed through hydraulic modelling to ensure the development proposals have no adverse impact in terms of flood risk, in and off site.

The model developed for this study has been based on the River Medlock SFRM 1D-2D model developed by the EA in 2009 and updated in 2011 (referred to as the EA Medlock 2011 model). BuroHappold has previously updated the EA Medlock 2011 model with the site topography to create a new baseline for Mayfield site. The EA reviewed this baseline model and provided comments, some relating to the hydrology. This report presents the new updated baseline model (referred to as the BHE Baseline 2019 model), following the recommendations by the EA and a review of the hydrology.

The BHE Baseline 2019 model has incorporated an updated topography for Manchester centre, amendments to hydraulic structures according to the latest guidance and use of latest software and methodologies.

The Mayfield proposals have been represented in the 'with scheme' model, the Mayfield 2019 model. This model is based on the BHE Baseline 2019 model. The proposals have been represented in both 1D (in-channel) and 2D (floodplain) spaces as appropriate.

The impact of the proposals in terms of flood risk to upstream and downstream areas during the Design Flood Event (DFE) was found to be negligible. The peak flood levels are shown to change by <1mm within channel in the upstream extent, and less than 10mm downstream. These changes in flood peak levels in the areas outside the site are attributed to modelling tolerances.

The model demonstrates a general decrease in levels within the Mayfield site by approximately 400mm. This decrease in level is due to the wider river channel and extensive floodplain created within the site. Local increase in levels is observed downstream of the removed culvert due to the changes in the flood mechanism within and at the proximity of the site. Other flood events have also been modelled, demonstrating negligible changes in peak levels outside the site.

The analysis described in this report demonstrates that the Mayfield development has negligible impact in terms of flood risk from River Medlock to areas outside the site boundary and positive impact in decreasing flood risk within the site. Further, it provides significant benefit in terms of a naturalised urban river channel, environmental, ecological and amenity improvements.

Assessment of flood risk from other sources and exceedance events, provision of safe access and egress, and other site specific flood mitigation measures will be discussed in the FRA that will be submitted for planning in September 2019.

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2 Introduction

2.1 Introduction

BuroHappold has been commissioned by Mayfield Development Partnership LP to undertake hydraulic flood modelling to assess the impact of the proposed Mayfield Masterplan with regard to flood risk within the site and elsewhere in Manchester. The proposed development is for a mixed-use scheme including residential and commercial whilst regenerating the site to provide green, open space, integrating the river corridor for public recreational land use.

A Strategic Regeneration Framework was submitted by Mayfield Development Partnership LP to Manchester City Council (MCC) in February 2018. As part of the SRF feasibility study, initial hydraulic modelling work was undertaken by BuroHappold to provide a preliminary assessment of the hydraulic flood impacts of the proposed masterplan by testing various potential mitigation measures. This was based on updating an existing EA hydraulic flood model for the River Medlock (see reports in Appendix A). The principle and strategy was discussed with MCC following their review and with the Environment Agency. The recommendations and strategy as agreed by all parties has been further developed and used to inform the detailed design for the site.

The detailed planning application has now been developed and is scheduled to be submitted to MCC in September 2019. To assist the planning decision process, the EA have agreed to review the hydraulic flood model and the proposed masterplan ahead of the planning submission.

The EA have to date reviewed the baseline hydraulic model and provided comments to BuroHappold. Subsequently, it was suggested that the hydrology was also reviewed and updated. A hydrological analysis was therefore undertaken by BuroHappold and this has also now been reviewed and accepted in principle by the EA. This report summarises both the amendments that were made to the baseline hydraulic model and the hydrological analysis with a description of how the EA comments have been addressed.

This report also describes the proposed masterplan hydraulic model build and comparison of the outputs to the baseline model. The results of the proposed hydraulic model have been used to inform the masterplan design and therefore approval is sought from the EA on the appropriateness of the model build to ensure the masterplan is safe for all users now and in the future.

2.2 Summary of Hydraulic Model Development

To ensure the development proposals were appropriately represented and assessed, the following steps have been undertaken since receiving the EA River Medlock hydraulic flood model:

- Creating an up-to-date baseline hydraulic flood model by:
    - Reviewing the hydrology using the latest recorded data and methodologies, as well as incorporating the latest recommended allowances for impact of future climate change.
    - Obtaining and incorporating the latest topographic data for the site.
    - Reviewing representation of hydraulic structures within the model based on latest best practice.
    - Simulations set up to run using the latest versions of software and most appropriate 2D grid resolution.
- Initial consultation with Mayfield Development Partnership LP to ascertain vision for the site and identify how the site can be developed to maximise flood mitigation options.

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- Consultation with the EA to establish their objectives and concerns with re-development with regard to environmental impacts and flood risk to surrounding area and establish Design Flood Event to inform design levels.
- Creating proposed masterplan hydraulic model by:
    - Using results of the baseline hydraulic flood model to inform the setting of building levels.
    - Amending the topography within the site area to provide appropriate flood compensation areas whilst keeping development safe.
    - Review of the change in flood mechanism to ensure that the proposals do not have an adverse impact on surrounding areas.
    - Sensitivity tests to ascertain model suitability.
- *Final refinement of the masterplan model, following review of the Hydraulic modelling report v00. The comments were received on 05/09/2018. Changes to the model and report as a response to the review are indicated in red italics text. In addition, the spill level of the new bridge at MEDL01_2510H was corrected.*

2.3 Structure of report

This report structure is as follows:

- Section 3 – Hydrological Assessment
- Section 4 – Baseline 2019 model build and results
- Section 5 – Masterplan 2019 model build and results
- Section 6 – Summary and conclusion

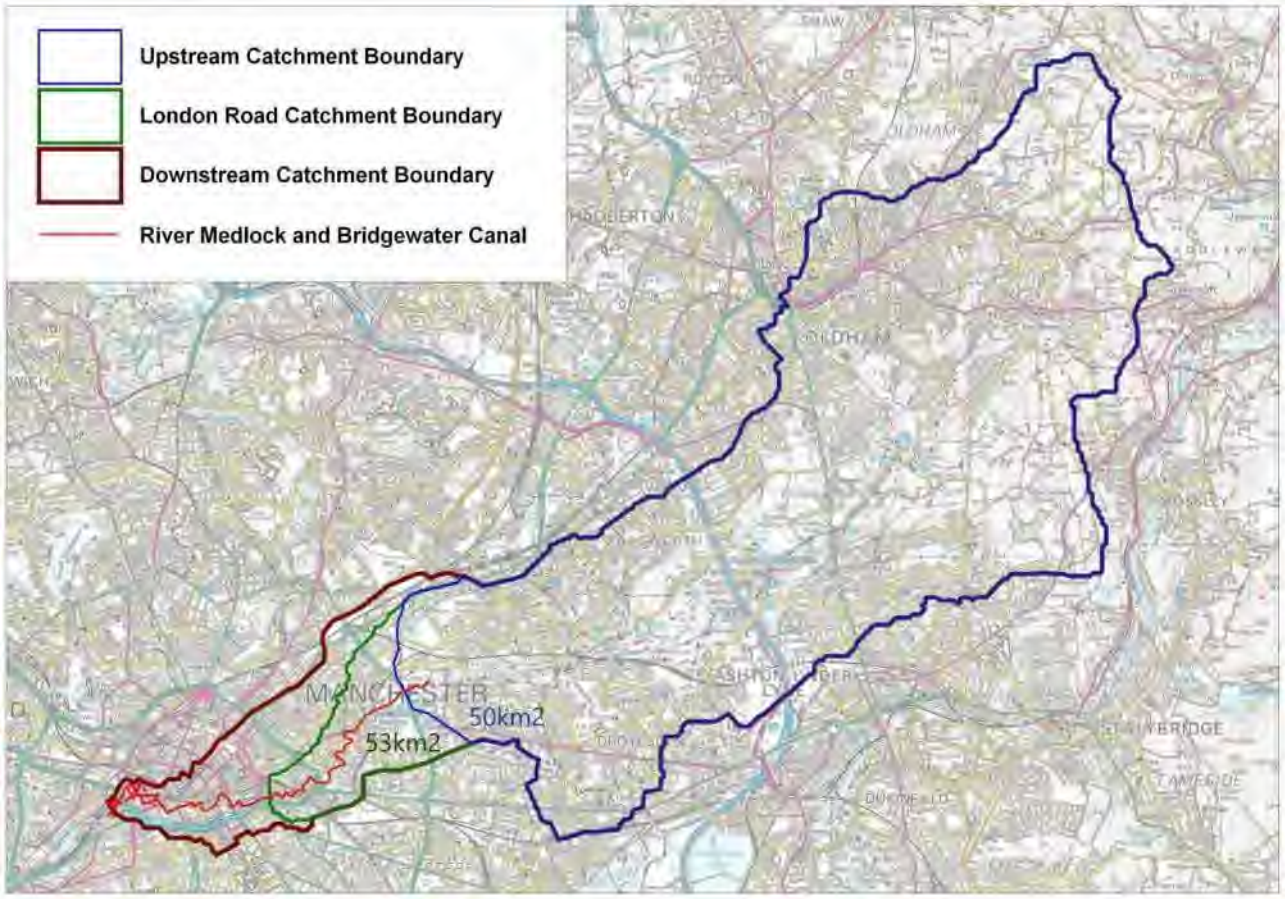
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3 Hydrological Assessment

3.1 EA Medlock Model overview

In 2009 the EA created a 1D hydraulic model as part of the River Medlock Strategic Flood Risk Mapping Study. The hydraulic model was subsequently updated in 2011 to include the 2D domain for the purpose of estimating flood extents from the River Medlock and Corn Brook to inform the Manchester Strategic Flood Risk Assessment (SFRA) (referred to in this report as the EA Medlock 2011 model). The 1D model and the hydrology remained the same between both the 2009 and 2011 models.

The upstream inflow of the model drains a catchment area of approximately 50km^2(see figure below). The catchment drains both rural agricultural areas and some urban areas. An existing gauging station is located in the catchment at London Road.



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Figure 3.1 Hydraulic modelled watercourse and associated catchment extents (source: River Medlock SFRM, 2009)

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The flows from the upstream catchment (blue) are applied as an FEH Inflow Boundary in Flood Modeller (previously ISIS software) at the upstream extent of the River Medlock model. Sewer outfalls to the river are represented as 15 lateral inflows, with 6 additional inflows representing surface water runoff inflows. It is understood that these inflows were estimated from the Unitied Utilities' (UU) InfoWorks model which appears to have been adjusted for each modelled rainfall event.

An artificial baseflow was applied at the upstream end of Bridgewater Canal to enable the model to run. A minimum flow of 0.25 m^3/s was used for all modelled events. The model reports are included in Appendix A.

3.2 Summary of Hydrological Assessment

A hydrological assessment of the methodology and data used by the EA in 2009 was undertaken by BuroHappold in June 2019. The assessment reviewed the estimation of flows from the 50km^2 upstream catchment Details of the hydrological assessment as well as comments made by a third party reviewer and the EA's review can be found in Appendix B. Comments have been provided in the appendix to any queries raised during the reviews.

Analysis of the preferred method outlined for the EA Model 2009 has been undertaken as part of the study. An analysis of the FEH statistical method was carried out for the purposes of comparison using the latest data available, software versions, and methodologies. The assessment included the following:

- Derivation of upstream catchment area based on latest LiDAR topographic data.
- Obtaining FEH catchment characteristics.
- Review of donor site applicability for QMED estimation.
- QMED estimation.
- Derivation of flood frequency growth curve.
- Estimation of Design Flood Event.
- Derivation of inflow hydrograph.

A full description of the hydrological analysis can be found in Appendix B.

3.3 Design Flood Event

To ensure the proposed development is safe for uses now and in the future, the 1 in 100 year return period has been adopted to define the Design Flood Event (DFE).

Based on the EA's latest guidance on climate change, 2016, an increase in flows of 35% has also been made to account for climate change. This is the allowance outlined for the 'Higher Central' category for development with a design life up to 2115. This allowance has been agreed with the EA through early consultation.

3.4 Peak Flow

The hydrological analysis estimated the peak flow at the upstream point of the model to be **85.2m^3/s** for the DFE. The hydrograph used in the EA Medlock 2011 model was scaled to this peak flow. The hydrograph shape was not amended as it had been calibrated as part of the 2009 study and is still considered appropriate.

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4 BHE Baseline 2019 model

4.1 Summary of review and changes

Following receipt of the EA comments in March 2019, the following changes were applied to the EA Medlock 2011 model to improve its quality.

Table 4-1 - Summary of key differences between the EA Medlock 2011 model and the BHE Baseline 2019 model

Model element	EA Medlock 2011	BHE Baseline 2019 model
Model reference	Medlock_SFRA_v0e_MM_002	Medlock_SFRA_v0e_MM_002_BH_305
Software	ISIS 3.3.0.88 TUFLOW 2009-07-AE-iSP	Flood Modeller 4.4.1 TUFLOW 2018-03-AD-iSP
Grid cell size	4m x 4m	3m x 3m - smaller grids (1m or 2m) proved to be problematic due to the quality of the EA LiDAR data outside of the site area
Model timestep	1D timestep: 2s 2D timestep: 1s	1D timestep: 1s 2D timestep: 2s
Model simulation time period	Start time: 0hrs Finish time: 10hrs	Start time: 0hrs Finish time: 10hrs
Modelled return periods	1 in 25, 100, 100+25%, 1000 year flood events	1 in 25, 75, 100, 100+35% year flood events
Digital terrain model	Filtered 1m resolution LiDAR data (unknown date of survey)	Updated 1m resolution LiDAR data provided by the EA in 2019 Mayfield site topographic survey completed by Malcom Hughes, July 2017 (Mayfield survey 2017)
Channel survey	Data not received from EA	No further survey was undertaken due to accessibility issues
Information on hydraulic structures	Survey completed by Atkins consultants Ltd, July 2008 (Atkins, 2008)	No additional data made available

Other recommended minor improvements have been made to the Baseline model, as listed below:

Changes done in 2D space:

- Removal of demolished buildings within and around site
- Amended materials to reflect removal of buildings

Reviews between 1D and 2D spaces:

- Improve bank height consistency between 1D and 2D inherited from 2011 model
- Improve channel width consistency between 1D and 2D inherited from 2011 model

Changes in 1D space:

- Adjust bank heights based on updated topographic data
- Add bank markers to upstream sections
- Apply orifice setting to surcharged bridges

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4.2 Updates in topography

A topographic survey for the site was conducted by Malcom Hughes in July 2017 (referred to hereafter as Mayfield survey 2017) and the elevation information has been provided to BHE in 3D format. The data was processed in earthworks package 12d to create the 2d_zpt_MayfieldSite.12da surface which has been read directly into the BH baseline model to represent the site topography in greater detail. A DEM version has now been produced and shared with the EA to enable external reviews. Please find the topographic survey in Appendix C

Since the EA Medlock 2011 model was issued, some buildings near the site have been demolished. Changes to the materials have been applied to amend the roughness coefficient of the buildings to manmade surfaces.

The levels at the top of bank recorded during the Mayfield survey 2017 were used to adjust the bank levels in the 1D and 2D spaces within the site, as well as the width of the 1D space.

Site walkovers along the channel and within the site have been undertaken during the past 3 year. There were no noticeable changes to the river channel and hydraulic structures within the site since the EA Medlock 2011 model. Therefore the channel data within the 1D domain of the BH Baseline model are mainly maintained as per the existing model. Photographs of the River Medlock within the Mayfield site can be seen below.



A. Siltation and vegetation building up on one side of the river (Photograph taken facing West)



B. Dense vegetation has caused damage to the river walls (Photograph taken facing East)



C. Access footbridge over River Medlock



D. Steel beam footbridge over River Medlock located

Figure 4.1 - Photos from past site visits

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An up to date LiDAR dataset was provided by the EA in March 2019 for hydraulic modelling purposes. The new DEM (New_DTM_Mosaic_for_Manchester.TIF) has been used to replace the surface previously used in the EA Medlock 2011 model (2d_zpt_Medlock_F4m.MID).

4.3 Review of section widths and bank levels

A review of the channel width within the 1D nodes against the 2D inactive space was undertaken for the areas upstream and within the site. These were reviewed against the new Lidar data, the original structures topographic survey completed by Atkins in 2008 and the site-specific topographic survey.

The focus of the review was around the areas where the flood levels overtop the 1D banks and enter the 2D domain. The following areas were found to require amending.

Mayfield site

Following the review of the 1D nodes against the 2D inactive space and using the Mayfield topographic survey, minor adjustments were carried out to the 2D inactive space shape file, as shown in Figure 4.2. These adjustments had negligible impact in terms of flood levels or extents.

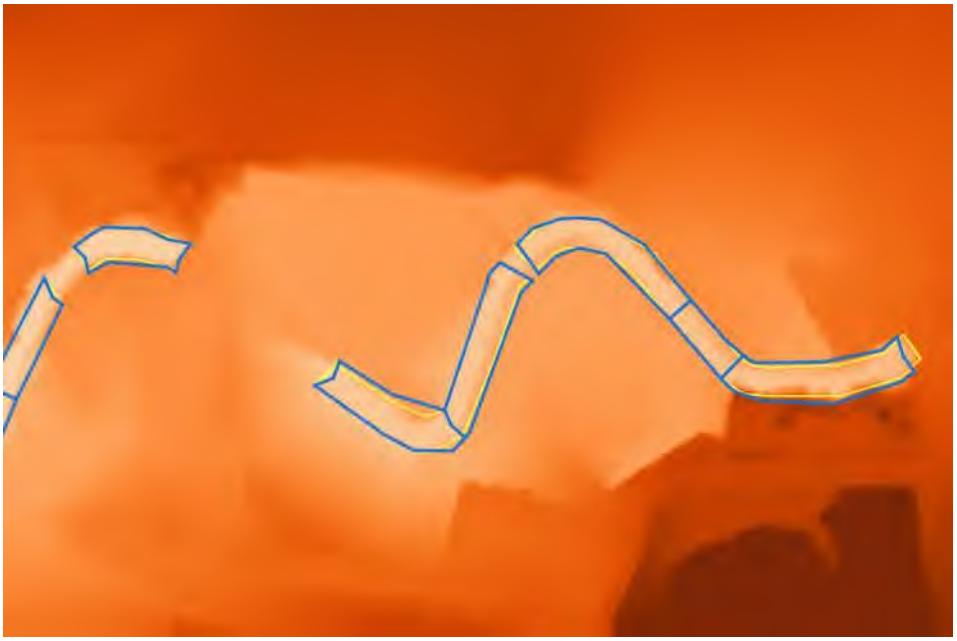


Figure 4.2 - 1D space at Mayfield site (blue – Medlock 2008 model, yellow – BHE Baseline 2019)

Pin Mill Brow to Helmet street culvert:

The stretch of the River Medlock between Pin Mill Brow and Helmet Street Culvert was found to have some inconsistencies between the widths indicated in the 1D space and the areas set as inactive in 2D. Some of the cross sections were found to be wider in 1D (MEDL01_3435 is 85m wide in 1D compared to 48m in 2D) and other areas narrower (MEDL01_3093 is 10m in 1D and 20m in 2D). The following cross sections were corrected by adjusting the 2D inactive space to match the width of the cross sections in 1D:

MEDL01_3435, MEDL01_3301L, MEDL01_3134, MEDL01_3093, MEDL01_3032L.

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Figure 4.3 - 1D space around Pin Mill Brow area (blue – Medlock 2008 model, yellow – BHE Baseline 2019)

The above changes resulted in negligible impact in areas downstream of Pin Mill Brow (less than 5mm). The changes have caused increase in levels within Pin Mill Brow area of approx. 20mm.

MEDL01_3562

The cross section at MEDL01_3562 (within Pin Mill Brow area) was found to be represented as 58m wide in 1D and 74m in 2D. The latest Lidar data provided by the EA in 2019 were referred to when widening the Left Bank of the section in 1D space, as shown below.

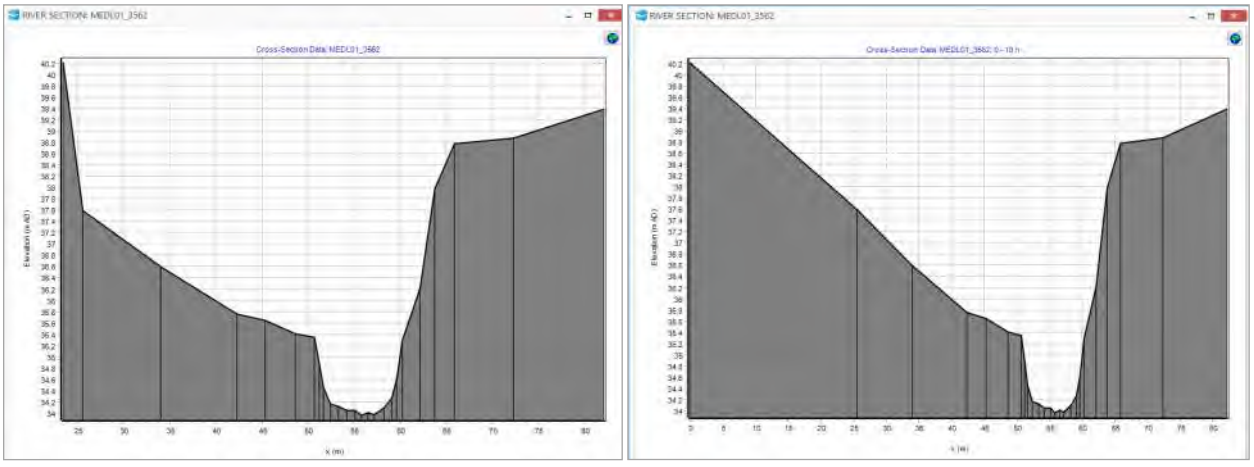


Figure 4.4 - MEDL01_3562 1D cross section (left - Medlock 2008, right - BHE Baseline)

The above change had negligible impact in terms of levels or extents (<5mm increase/decrease).

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4.4 Addition of bank markers

It has been noted that many channel sections did not have bank markers on either side of the channels in the EA Medlock 2008 model. Bank markers can help with stability of the 1D model and it is advised that they should be used if possible.

Bank markers were therefore added to the following sections:

MEDL02_0893, MEDL02_0816J, MEDL02_0059, MEDL01_4746, MEDL01_4689A, MEDL01_4689B, MEDL01_4639, MEDL01_4310, MEDL01_4286, MEDL01_4261, MEDL01_4235, MEDL01_4188, MEDL01_4160, MEDL01_4065, MEDL01_4040, MEDL01_4014, MEDL01_3992, MEDL01_3967A, MEDL01_3967B, MEDL01_3134.

4.5 Review of structures

4.5.1 Unaccounted structures

It is noted that some structures along the River Medlock were not represented in the EA Medlock 2011 model. Specifically, six bridges have been left out of the model, one of which is upstream of the site and one within the site. As the model is being updated for the purposes of the Mayfield site FRA, only these two structures are considered below, as per advice from the EA.

Helmet Street Industrial Park Access Bridge (located 500m upstream Mayfield site):

According to the channel surveys, the access bridge at Helmet Street Industrial park is a steel sloping deck bridge with soffit levels sloping from 39.51m AOD to 39.88m AOD. The flood level for the DFE is at 38.986m AOD.

Therefore, as the peak flood level is below the soffit of the bridge, there is no requirement for the bridge to be added to the model. Please see Figure 4.5.

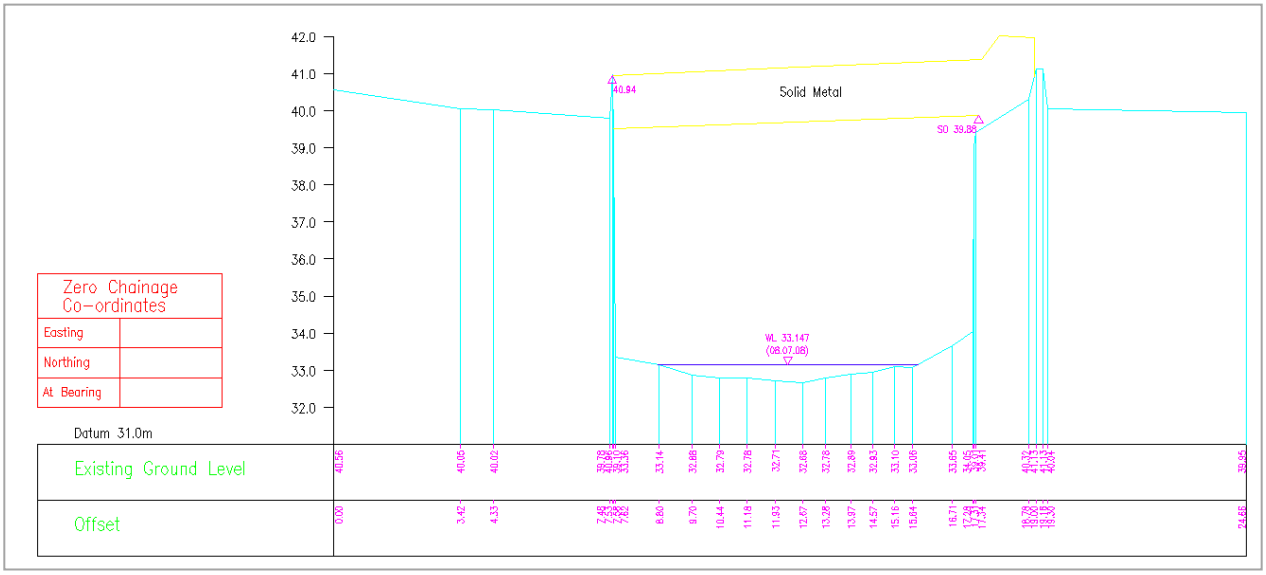


Figure 4.5 - Channel section at Helmet Street Industrial Park access bridge (Atkins, 2008)

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Steel Beam Bridge at Hoyle Street Industrial Estate (within Mayfield site, photo):

The steel access bridge at Hoyle Street Industrial Estate is a portal frame steel bridge, with thin deck (430mm), raised approximately 1-1.5m above the surrounding banks. The soffit level is at 35.28m AOD, with the deck level at 35.70m AOD. The flood level for the DFE is at 35.621m AOD, reaching the bridge soffit. However, as the deck is raised above the surrounding floodplain and the abutments are set back from the channel edge, it was discussed with the EA that adding the bridge to the model was lower priority and could be omitted. Please refer to Figure 4.6.

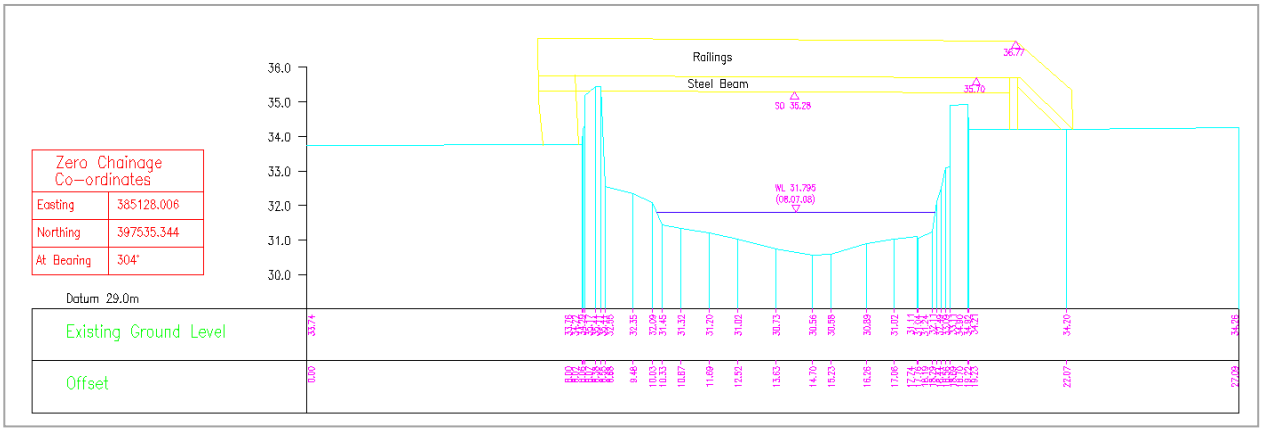


Figure 4.6 - Channel section at Hoyle Street Industrial Estate access bridge (Atkins, 2008)

4.5.2 Invert levels, orifice setting and spills

The bridges upstream and within the site that were represented in the model were reviewed against the structure survey data (Atkins 2008 survey) as well as the flood levels. A check was completed to ensure that the invert levels are correctly represented in the model. All the upstream and on site bridges passed the check.

The USBPR and Arch bridge units are generally regarded appropriate for unsubmerged subcritical flow; applying them to surcharged flow is outside of their calibration range. For this reason in surcharged situations, it is advised that the orifice flow option is often used. The option has the benefit of representing surcharged flow as an orifice, which may be more representative, whilst retaining the bridge afflux calculations when not surcharged.

The EA Medlock 2011 model did not use the orifice flow option for any of the bridge structures. The soffit levels of the upstream and onsite structures was compared with the flood levels for the DFE; in the case that a bridge was found to be surcharged (soffit level ≤ flood level), the orifice flow option was selected. The lower transition level for the orifice was set to 0.5m and the discharge coefficient (used to scale orifice losses) was set to 1. No adjustment of the coefficient is possible as there is no suitable calibration data available.

Finally, a spill bypass around or over the top of structures is required when the structure is likely to be overtopped. A spill can be created either in 1D space as a parallel spill unit to the structure or in 2D as HX lines. Some bridges have been modelled with a 1D spill unit in the EA Medlock 2011 model. Bridges that are now found to be overtopped or surcharged have been modelled with a spill in 2D space. Please see **Table 4-2**. In these instances, and where the deck of a bridge has been removed from the LiDAR survey for Manchester, a shape file (2d_zsh_bridge-deck) was used to add the bridge decks in 2D space.

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Table 4-2 - Bridge checks and changes

Node name	EA Medlock 2011	Represented as per Atkins 2008 survey?	Surcharged or overtopped?	BHE Baseline amendments – 1D	BHE Baseline amendments – 2D
MEDL02_0845D	USBPR bridge unit, no spill	Correctly represented in 1D and 2D	No surcharge for DFE	None	None
MEDL02_0260D	Culvert, modelled using USBPR Bridge because of short length	Correctly represented in 1D and 2D	No surcharge for DFE	None	None
MEDL02_003D	USBPR bridge unit, no spill	Correctly represented in 1D and 2D	No surcharge for DFE	None	HX lines added to allow spill in 2D.
MEDL01_4540J	Arch bridge unit, no spill.	Correctly represented in 1D	Partially surcharged for DFE	Orifice setting on	HX lines added to allow spill in 2D. Deck added in 2D space
MEDL01_4373D	USBPR bridge unit with a spill to model flow over and around structure	Correctly represented in 1D and 2D	Surcharged under DFE	Orifice setting on	None
MEDL01_4213D	USBPR bridge unit, no spill	Correctly represented in 1D	Surcharged under DFE	Orifice setting on	HX lines added to allow spill in 2D. Deck added in 2D space
MEDL01_3941D	USBPR bridge unit, no spill	Correctly represented in 1D	Surcharged and inundated under DFE	Orifice setting on	HX lines added to allow spill in 2D. Deck added in 2D space
MEDL01_2913D	Arch bridge, no spill	Correctly represented in 1D	Surcharged under DFE	Orifice setting on	HX lines added to allow spill in 2D. Deck added in 2D space
MEDL01_2492D	USBPR bridge unit with a spill to model flow over and around structure	Correctly represented in 1D and 2D	Surcharged and inundated under DFE	Orifice setting on	None
MEDL01_2279D	USBPR bridge unit, no spill	Correctly represented in 1D and 2D	Surcharged under DFE	Orifice setting on	None

Similar to the bridge structures, checks were made for the culverts. The width, length, invert and soffit levels modelled in 1D were checked against the Atkins 2008 survey. All upstream and on site culverts were represented correctly in 1D. At the locations where culverts were surcharged, inundated or overtopped, HX lines were added to allow spill of flood water from the 1D domain to the 2D domain. Please refer to **Table 4-3**.

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Table 4-3 – Culvert checks and changes

Node name	EA Medlock 2011	Represented as per Atkins 2008 survey?	Surcharged or overtopped?	BHE Baseline amendments – 1D	BHE Baseline amendments – 2D
MEDL02_0816C / MEDL01_0282C	Orifice unit and sprung arch conduit sections, with a culvert outlet unit, no spill	Correctly represented in 1D	No surcharge for DFE	None	None
MEDL01_3301C / MEDL01_3258C	Culvert inlet unit and sprung arch conduit sections, with a culvert outlet unit, no spill	Correctly represented in 1D	Surcharged under DFE	None	HX lines added to allow spill in 2D. Deck added in 2D space and added z-line for stability.
MEDL01_3032L / MEDL01_2962C	Culvert Inlet unit and sprung arch conduit sections, with a culvert outlet unit, no spill	Correctly represented in 1D	Surcharged under DFE	None	HX lines added to allow spill in 2D.
MEDL01_2829L / MEDL2647C	Culvert Inlet unit and conduit sections, no spill. A weir is used as outlet	Correctly represented in 1D	Partially surcharged under DFE	None	HX lines added to allow spill in 2D.
MEDL01_2380L/ MEDL01_2315C	Culvert Inlet unit and conduit sections, with a culvert outlet unit, no spill	Correctly represented in 1D	Surcharged under DFE	None	HX lines added to allow spill in 2D.
MEDL01_2090L /MEDL01_1554C	Culvert Inlet unit and symmetrical conduit sections, with a culvert outlet unit, no spill	Correctly represented in 1D	Surcharged under DFE	None	HX lines added to allow spill in 2D.

More details on the file modelling changes and the limitations of the model can be found in Appendix D.

4.6 Existing site layout

The Mayfield site currently consists of a number of industrial, storage and distribution units at the centre of the site and the Mayfield train depot along the north of the site. River Medlock meanders through the centre of the site. The 65m Baring street culvert covers parts of the river within the site. Two footbridges currently provide access across the river. As discussed earlier, the Baring Street culvert and access footbridge have been represented in the model; the steel beam bridge has not been included.

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Figure 4.7 - Mayfield site - existing assets. Open watercourse shown in blue.

4.7 Results

The modelling changes described above have resulted in changes in flood extents and flood levels throughout the modelling area. These changes are mainly attributed to the application of the orifice setting to the upstream and onsite bridges. As the purpose of this study is the assessment of the impact the proposals have to the baseline, comparison of the flood levels and extents between the EA Medlock 2011 model and BHE Baseline 2019 model are not included.

The BHE Baseline model flood levels for the DFE can be seen in Figure 4.8.

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Figure 4.8 – BHE Baseline 2019 flood extents for the 1 in 100yr event +35% climate change, modelling area. Site location indicated in red circle.

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The flood extents map of the site can be seen in Figure 4.9.

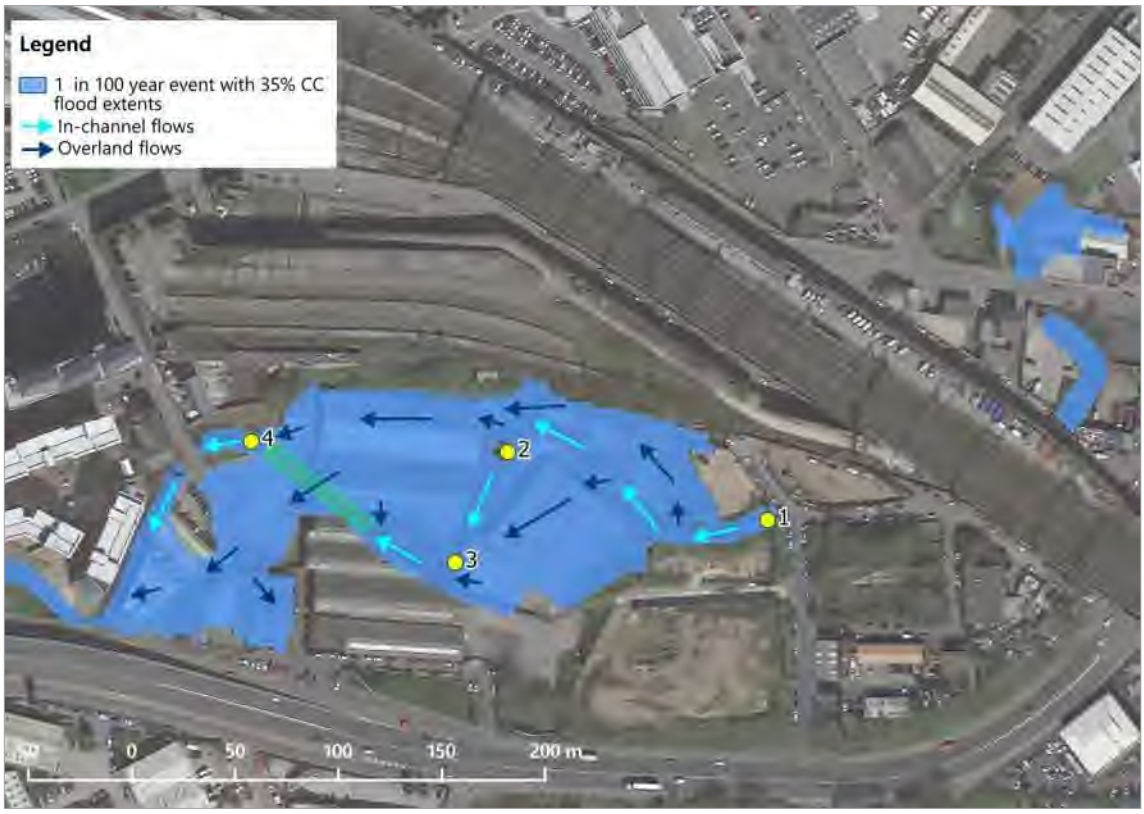


Figure 4.9 – BHE Baseline 2019 flood extents for the 1 in 100yr event + 35%CC, Mayfield site showing direction of flow and location of existing culvert (in green).

Table 4-4 – Flood levels for the DFE (u/s – upstream, d/s – downstream)

Node	Description	BHE Baseline 2019 model Flood levels (m AOD)
1	D/S Hoyle Street culvert	35.83
2 u/s	U/S Hoyle Street Industrial estate access footbridge	35.84
2 d/s	D/S Hoyle Street Industrial estate access footbridge	35.70
3	Steel beam footbridge (not represented in model)	35.61
4	D/S Baring street culvert	34.96

The following observations on the existing flood mechanism within the site are given below (please refer to Figure 4.10 below):

a) Flood water overtops the banks east and west of Unit 5. Most of the overland flows re-enter the channel west of the unit.
b) Flood water overtops the banks upstream of the Hoyle Street access footbridge.
c) The existing 65m length culvert constricts the flow of the river. Overland flow routes generated north of the river flow southwards above the culvert and flow back into the river downstream of the site.
d) The overland flows enter Logic site and re-enter the river channel outside the Mayfield site.

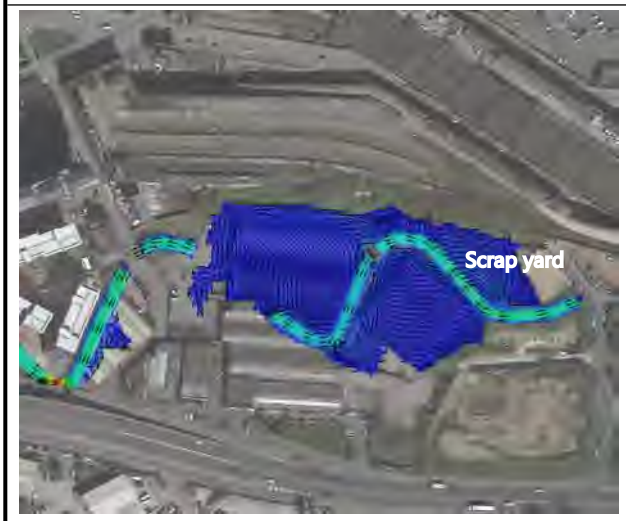
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A) Flood water first overtops the banks east and west of Unit 5 (Time: 04:10)



B) Flood water overtops the banks upstream the access footbridge, entering units 3 + 4. Unit 5 is flooded and overland flows re-enter the river south-west of Unit 5. (Time: 04:50)



C) Flooding overtops the banks to the scrap yard. Units 3+4 are flooded. The culvert is surcharged. (Time: 05:40)



D) Overland flow routes direct flows across to Logic site, before re-entering the river channel. (Time: 06:50)

Figure 4.10 – Flooding mechanism across Mayfield site, existing flow condition at various timesteps following start of storm event. Light blue to red indiates relative increase in flow rate.

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5 Mayfield 2019 model

5.1 The Mayfield Vision

5.1.1 Client objectives

The Mayfield masterplan development is proposing to deliver a series of significant regeneration benefits in order to create a new neighbourhood, generate new jobs and drive wide economic growth within Manchester city centre. The Partnership proposes to capitalise on existing natural assets such as the River Medlock, as well as the creation of new natural capital. They are investing in a new 6.5acre city centre park and additional 6.5acre areas of public realm and the environmental rehabilitation of River Medlock, increasing biodiversity and public access to green space.

The expansive Mayfield Park is proposed at the centre of the development with the building development located around it. The open space extends the full length of the Mayfield area, from Baring Street in the west to Hoyle Street in the east. The River Medlock that meanders through the centre of the site is proposed to be widened and returned to its natural form, providing opportunities for enhanced biodiversity. In addition to the Mayfield Park, smaller scale pocket parks and open spaces for residents are provided throughout the Masterplan, providing an important local amenity.

More information on the vision for Mayfield as well as the approved Mayfield 2018 SRF scheme can be found here: https://secure.manchester.gov.uk/downloads/download/6851/mayfield_strategic_regeneration_framework.

5.1.2 Stakeholder objectives

The EA has been consulted early on to provide advice on the Mayfield project. The EA has been very supportive of the proposals to naturalise the river Medlock and have set their aims for the project, as listed below:

- Removal of culvert and daylighting of river to enhance biodiversity;
- Safe development around the site, with development levels raised above the Design Flood Event;
- Provision of flood compensation storage to manage impact of flood risk within and outside the site;
- Provision of safe access and egress during extreme flood events.

5.1.3 The design response

A key consideration in the place making strategy has been to holistically consider the approach to flood management, within the site, but also other planned improvement works that are being progressing further upstream in the wider Medlock catchment.

By removing the old culvert and high-sided river walls and opening up the river, particularly on the north bank, natural river edges with a range of habitats can be created. Integrated flood storage will be provided in the park by allowing some parts of the park to flood during higher order flood events.

The river corridor and floodplain have been carefully re-profiled using the results of the hydraulic modelling work described here to ensure development does not increase flood risk elsewhere. The design ensures that there is no increase in flood risk upstream or downstream the site, with finished floor levels for development set at an appropriate margin above design flood levels with an allowance for uncertainty, as recommended by the EA. This will ensure the development is safe, with appropriate pedestrian and vehicular access during extreme flood events and adequate access to the river for maintenance or improvements works.

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Safe public pedestrian access will be possible to the river directly from the park by providing features such as riverside walks and boardwalks. The river edges will be softened in places to allow marginal wetland areas to be created not only giving space for water, but space for recreation and wildlife as well. It will be a multi-use space offering significant social and environmental benefits, including increased biodiversity and flood resilience.

New pedestrian bridged links will be created to increase connectivity and accessibility across the park. Opening up the river will allow the floodplain to be clearly defined so that a safe environment for floodwater can be created at times when high river flows are expected.

Maintenance access will also be improved that will allow the river corridor to be managed effectively where necessary, and give access to the Environment Agency to allow them to manage the Main River corridor. This access for inspection and maintenance would integrate with a landscape management plan setting out the requirements for maintaining the park and the riverside areas, reduced through the use of low maintenance planting of the natural features.

5.2 Proposed development

The principles described above are illustrated in Figure 5.1.



Figure 5.1 – Development flood risk management principles

The changes in levels between the baseline and masterplan proposal are illustrated in Figure 5.2.

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Figure 5.2 – Changes in levels across the site due to the Mayfield development proposals (proposal outlines shown above)

5.3 Modelling the Mayfield proposals

5.3.1 Representation of hydraulic structures

The Baring Street culvert as well as the two existing footbridges within the site are proposed to be demolished. The footbridges will be replaced with two new footbridges at similar locations as illustrated in Figure 5.1.

The table below summarises the structures removed and added and their representation within the Mayfield 2019 model.

Table 5-1 - Structures in the Mayfield site and their representation in the Mayfield 2019 model

Structure	Model representation
Removed structures	
Hoyle Street Industrial Estate access footbridge	The footbridge is represented by a series of nodes with the prefix MEDL01_2492 as a USBPR bridge unit with a spill to model flow over and around the structure. The structure has been removed as it will be demolished. The modelling nodes have been removed entirely and not replaced by a river channel, as a new footbridge is added 18m downstream.
Steel beam access footbridge	No model representation (see Section 4.5)
Baring street culvert	The culvert is represented by a series of nodes with the prefix MEDL01_2380 and MEDL01_2315. The conduits, inlet and outlet units have been replaced with river channel sections.

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Added structures	
Footbridge to Mayfield depot (north)	The new structure has been represented by a series of nodes with the prefix MEDL01_2510. The bridge is modelled as a USBPR bridge unit with a spill to model flow over and around the structure.
Footbridge to Mayfield park (south)	The new structure has been represented by a series of nodes with the prefix MEDL01_2429. The bridge is modelled as a USBPR bridge unit with a spill to model flow over and around the structure.

No piers are anticipated to be required to support the two bridges.

5.3.2 Representation of river channel

As part of the rehabilitation of the River Medlock it is proposed that the high hard edges will be broken down to 2 levels were possible. The width of the lower channel is maintained as per existing channel width to maintain the depth of water during daily flows, whereas the higher channel is widened to accommodate flood flows. A typical cross section is shown below.

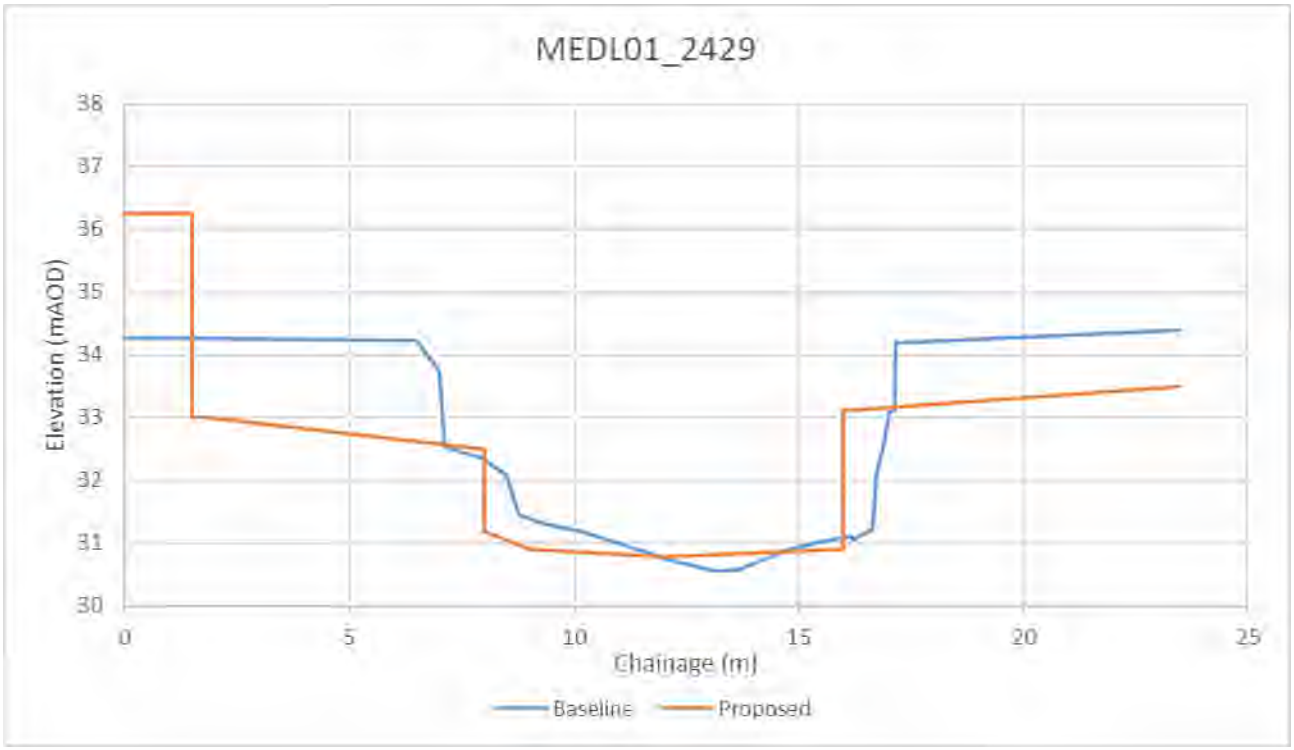


Figure 5.3 – Example cross section illustrating difference in Baseline and with proposals scenario at MEDL01_2429.

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5.3.3 River and floodplain roughness

The different ground types within channel and out of bank can be represented by varying the roughness of the model surface by using the Manning's 'n' value. The roughness can impact on the conveyance of floodwater within the watercourses and over the floodplain, which in turn will have an impact on the flood extent.

The degree of vegetation and sinuosity of the river channel has an impact on in-bank conveyance, whereas the degree of development of adjacent land can impact on floodplain conveyance.

The Manning's values used for the BHE Baseline 2019 model in the 1D domain were based on the EA Medlock 2011 model. The values of 0.04 and 0.06 have been used to represent the roughness along the channel bed and banks respectively. The EA commented in the past that the values are relatively high for an urban centre; however, the EA Medlock model has been calibrated using these values and their use is therefore considered acceptable for the modelling purposes of this assessment. For the Mayfield 2019 model, the banks within the park area have been modelled using a value of 0.05 instead of 0.06 to represent well maintained marginal vegetation.

The Manning's values used within the 2D domain are based on the values shown in Table D.3B in Appendix D. The 2d_mat_Medlock.shp file has been modified for the BHE Baseline model to incorporate demolition of buildings around the site. For the Mayfield 2019 model, the shape file is further amended only within the masterplan area to represent the landscaping proposals.

Buildings are represented in the model by an increased Manning's roughness to slow the movement of water. Although buildings can impede the spread of flood water it is not bet practice to consider them impermeable as water is usually able to enter buildings through openings such as doors and vents. By increasing the roughness of the building footprint the flow through the building will be reduced to better represent the resistance to the spread of water provided by the building.

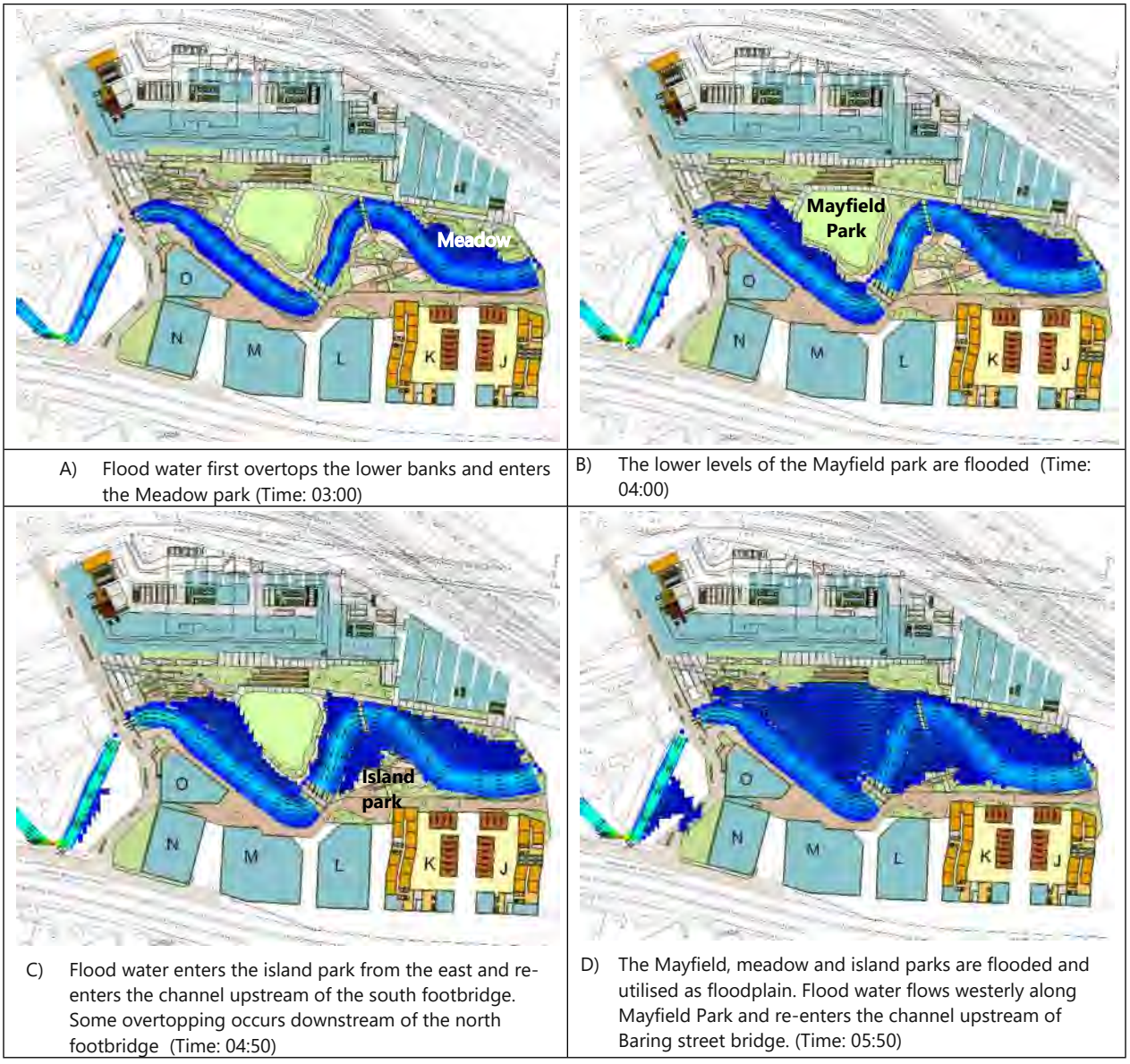
More details on the file modelling changes and manning's coefficients used can be found in Appendix D.

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5.4 Results

5.4.1 Design Flood Event

The Mayfield 2019 model has been simulated for the DFE, the 1 in 100 year flood event, with an allowance for climate change. The flood mechanism is illustrated in Figure 5.4.



A) Flood water first overtops the lower banks and enters the Meadow park (Time: 03:00)

B) The lower levels of the Mayfield park are flooded (Time: 04:00)

C) Flood water enters the island park from the east and re-enters the channel upstream of the south footbridge. Some overtopping occurs downstream of the north footbridge (Time: 04:50)

D) The Mayfield, meadow and island parks are flooded and utilised as floodplain. Flood water flows westerly along Mayfield Park and re-enters the channel upstream of Baring street bridge. (Time: 05:50)

Figure 5.4 – Flooding mechanism across Mayfield site, proposed flow condition at various timesteps following start of storm event. Light blue to red indiates relative increase in flow rate.

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The results have been compared to the BHE Baseline 2019 model to assess the impact the proposals have to areas within the modelling domain and are described below. Areas in red indicate increase in flood extents compared to the BHE Baseline 2019 model whereas areas in blue indicate decrease in flood extents (area no longer at risk of flooding during the DFE). Areas shaded purple indicate no change in extent.

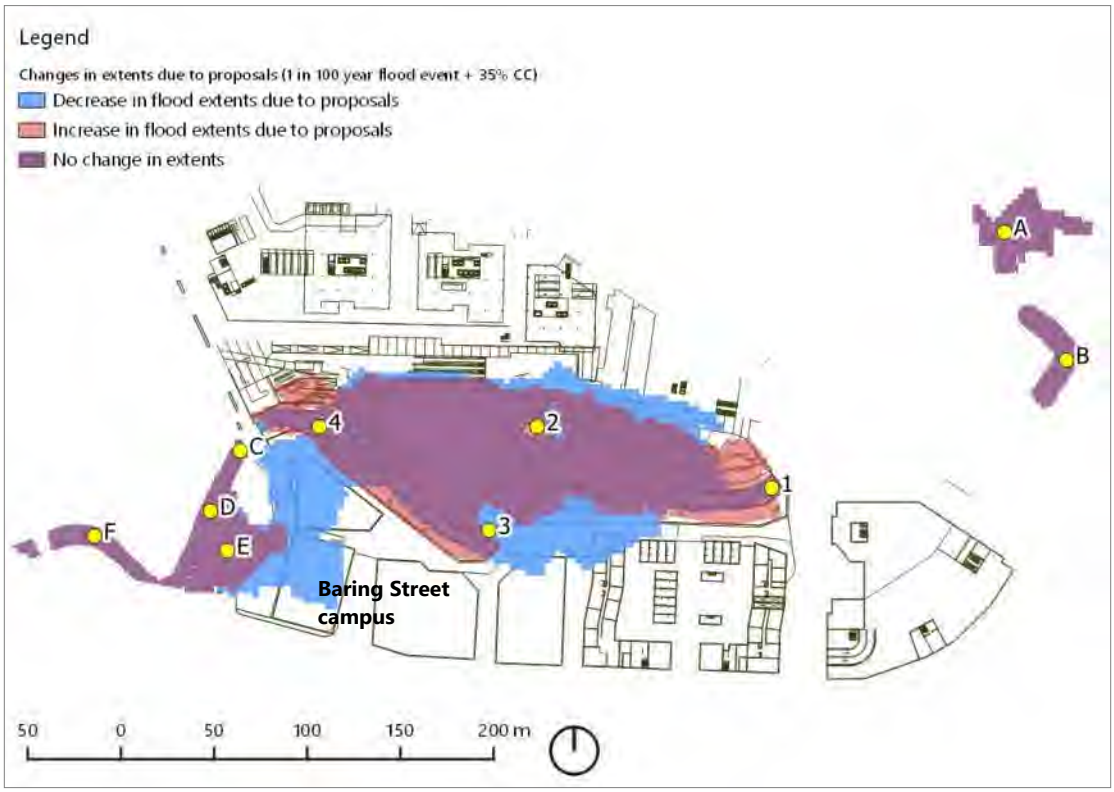


Figure 5.5 - Changes in flood extents due to the Mayfield proposals during the DFE, site surroundings

Table 5-2 – Flood level changes due to proposals for the DFE, Mayfield site *(results based on updated model, following EA review)*

No.	Node	Description of node location (current assets)	BHE Baseline 2019 model (m AOD)	*Mayfield 2019 model (m AOD)*	*Difference in Mayfield 2019 levels compared to BHE Baseline 2019 (mm)*
A	MEDL01_2934	U/S Fairfield Street bridge	37.384	*37.384*	*<1mm*
B	MEDL01_2855B	D/S Fairfield Street bridge	37.023	*37.022*	*-1mm*
1	MEDL01_2647	D/S Hoyle Street culvert	35.830	*35.377*	*-453mm*
2	MEDL01_2492A (data for Mayfield 2019 taken from 2D)	U/S Hoyle Street Industrial estate access footbridge	35.841	*35.401*	*-440mm*
3	MEDL01_2429	Steel beam bridge	35.605	*35.261*	*-344mm*
4	MEDL01_2315	D/S Baring street culvert	34.957	*35.147*	*+190mm*
C	MEDL01_2279E	D/S Baring street bridge	34.503	*34.468*	*-17mm*
D	MEDL01_2227	Logic site (in channel)	34.395	*34.325*	*-70mm*
E	n/a	Logic site (floodplain)	34.373	*34.311*	*-62mm*
F	MEDL01_2131	U/S London Road EA station	34.147	*24.131*	*-16mm*

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The removal of the Baring Street culvert has caused the most noticeable change in the flood mechanism by removing the overland flow path that previously flowed over the culvert is now captured within the channel. Opening of the river channel and the proposed park flood storage areas capture overland flow reducing overall flood levels within the site.

By removing the culvert and increasing ground levels south of the river at Baring Street campus, allows overland flow from the north to drain into the river and reduce the flood extent in this area compared to baseline. Although flood levels within the river increase in this location compared to baseline (No. 4 in Figure 5.2 and Table 5-2), peak flows and levels downstream of the bridge at Baring Street Road decrease (<0.5m^3/s) , reducing any potential flood risk impact elsewhere (see Figure 5.6).

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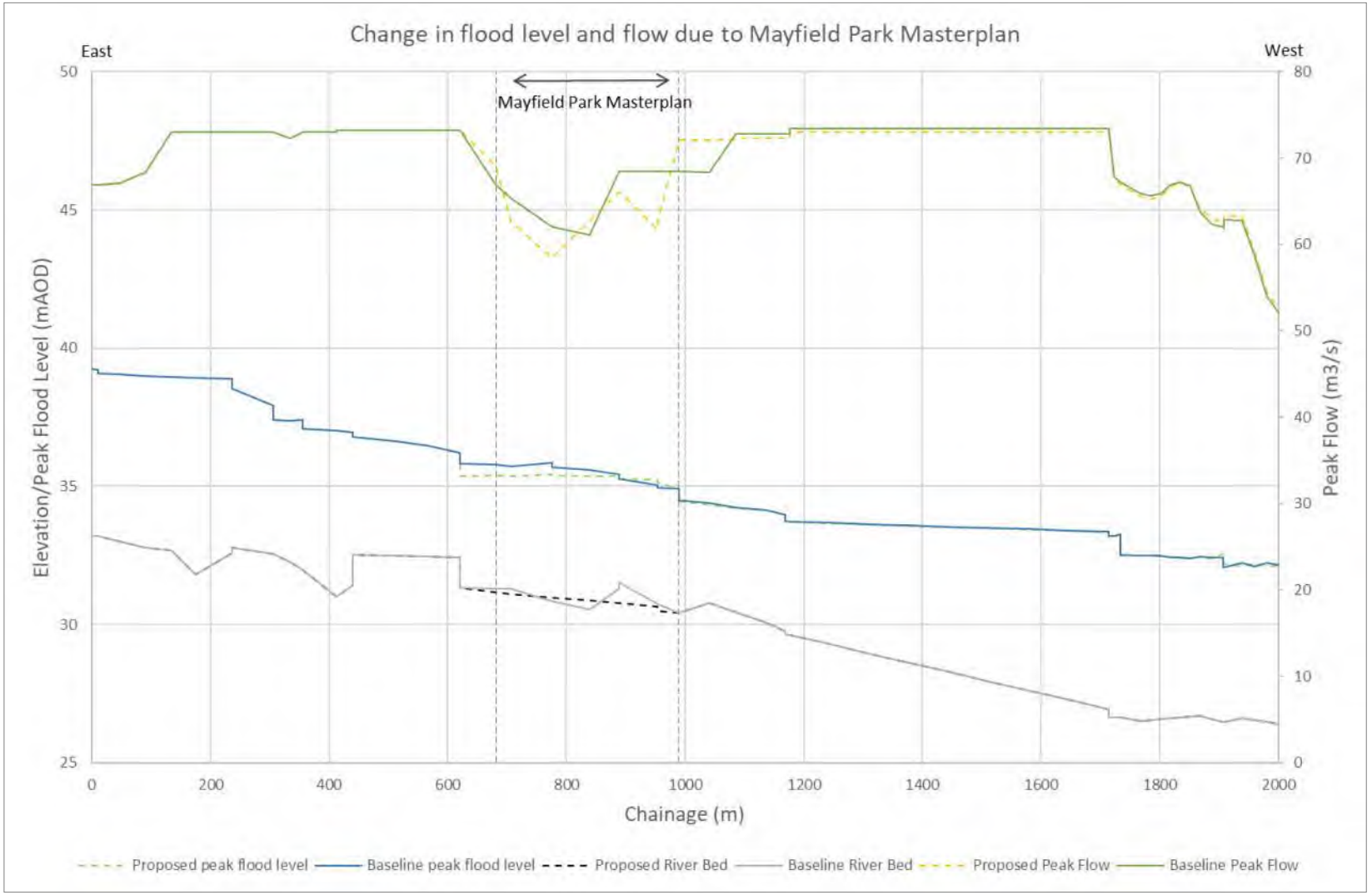


Figure 5.6 - Comparison of change in peak flood level and flow due to proposals shown approximately 1km upstream and downstream of the site (data taken between 1D Nodes MEDL01_3301L to MEDL01_1377A).

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Changes in flood level upstream and downstream of the site were not significant (<1mm decrease upstream and generally less than 10mm change in levels downstream), which is considered within modelling tolerances rather than as a result of impacts of the proposals. No additional properties are at risk of flooding due to the proposals.



Figure 5.7 – Comparison of Mayfield 2019 model to the BHE Baseline 2019 model, flood extent changes for the DFE, upstream of site.

Table 5-3 – Flood level changes due to proposals for the DFE, upstream of the Mayfield site *(results based on updated model, following EA review)*

No.	Node	BHE Baseline 2019 model (m AOD)	*Mayfield 2019 model (m AOD)*	*Difference in Mayfield 2019 levels compared to BHE Baseline 2019 (mm)*
1	MEDL02_0158	41.931	*41.931*	*<1mm*
2	MEDL01_4433	40.705	*40.705*	*<1mm*
3	MEDL01_4065	39.563	*39.563*	*<1mm*
4	MEDL01_3615	39.526	*39.526*	*<1mm*
5	MEDL01_3134	38.951	*38.951*	*<1mm*

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Figure 5.8 - Comparison of Mayfield 2019 model to the BHE Baseline 2019 model, flood extent changes for the DFE downstream of site.

Table 5-4 – Flood level changes due to proposals for the DFE, downstream of the Mayfield site *(results based on updated model, following EA review)*

No.	Node	BHE Baseline 2019 model (m AOD)	*Mayfield 2019 model (m AOD)*	*Difference in levels (mm)*
1	MEDL01_1534A	33.270	*33.258*	*-12mm*
2	MEDL01_1304	32.221	*32.204*	*-17mm*
3	MEDL01_0703	29.656	*29.646*	*-10mm*
4	MEDL01_0170	28.510	*28.501*	*-9mm*
5	BRGW01_0678	25.853	*25.850*	*-3mm*
6	MEDZ01_0107	23.718	*23.717*	*-1mm*

5.4.2 Other flood events

The following additional flood events have been modelled for both the BHE Baseline 2019 model and the Mayfield 2019 model:

- 1 in 25 year event – Model inflow: 49.92m^3/s (70% less than the DFE)
- 1 in 100 year event – Model inflow: 63.09m^3/s (35% less than the DFE)

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A comparison of the peak level model results from the BHE Baseline 2019 and the Mayfield 2019 models for the 1 in 25 year event demonstrates that the proposals have no adverse impact to levels. The levels decrease due to the proposals by up to 12mm. Within the site, the levels decrease on average by 150mm due to the wider, open channel.

A similar comparison of peak levels for the 1 in 100 year event indicates less than 1mm changes in levels at the upstream and downstream ends. This is attributed to modelling tolerances. Within the site, the peak levels decrease by approximately 150mm.

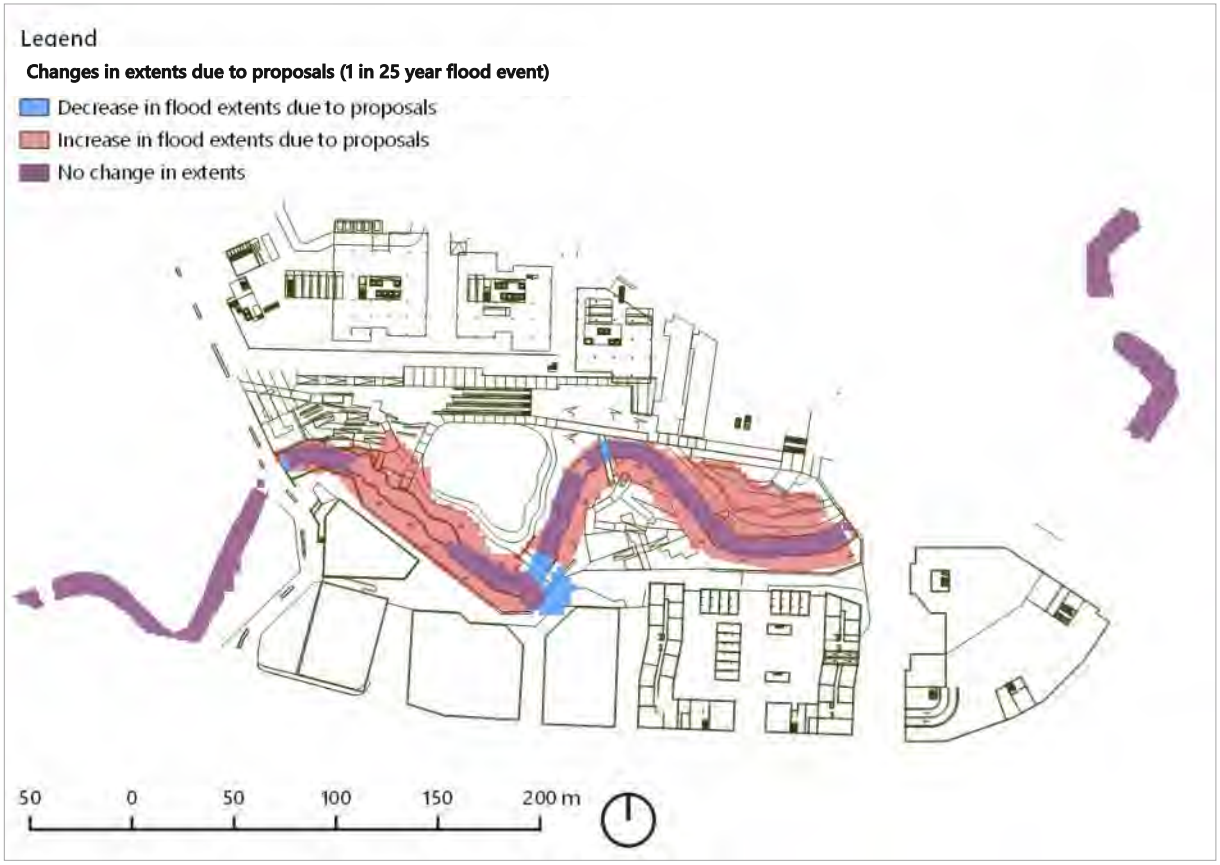


Figure 5.9 - Changes in flood extents due to the Mayfield proposals during the 1 in 25 year event, site surroundings

5.5 Sensitivity Testing

Sensitivity testing on roughness was carried out for the Mayfield 2019 model DFE 100-year event with 35% climate change allowance. Sensitivity to roughness was tested by increasing /decreasing all roughness coefficients by +/-10% in both the 1D and 2D domain of the Medlock model. The decrease in roughness caused model instabilities and model run did not complete.

Increasing Manning's 'n' by 10% generally resulted in increases in stage throughout the model domain between 100-200mm. The largest increase in stage was 219mm upstream of Ashton New Road Bridge, 2km upstream from the site extents. Within the site the levels increased by approximately 115mm.

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Without further recorded data it is not possible to assess whether these changes are more applicable. It is considered that the manning's roughness value used in the original model was at the higher end of the range, and therefore, to be consistent with the set-up of that model, the Manning's values currently used are considered appropriate.

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6 Conclusion

The redevelopment of the Mayfield area in Central Manchester aims to rehabilitate a heavily modified and constrained river into a naturalised channel, surrounded by green open spaces. It is the vision that the rehabilitation of the River Medlock will lead to increased biodiversity around the corridor, allow the creation of an attractive public park and provide opportunities for quality accommodation and workplace.

The above analysis has demonstrated that the BHE Baseline 2019 model has been adequately updated for use as a flood risk assessment tool for the design of the Mayfield Park development. When modelling the proposals, it has been demonstrated that the Mayfield development has negligible impact in terms of flood risk from the River Medlock to areas outside the site boundary and a positive impact in decreasing flood risk within the site.

The EA has reviewed the Hydraulic modelling report v00 and provided comments on 05/09/2019. The comments were addressed and the results in this report have been updated to reflect the latest model. The conclusions of this report have not changed as a result of these changes.

Assessment of flood risk from other sources and exceedance events, provision of safe access and egress, and other site specific flood mitigation measure will be discussed in the FRA that will be submitted for planning in September 2019.

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Appendix A EA Medlock model documentation

A.1 River Medlock SFRM (2009)

A.2 River Medlock ISIS-TUFLOW model (2010)

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Appendix B Hydrology

B.1 Hydrological analysis – BuroHappold 2019

B.2 Review by Paul Garrad and BuroHappold response

B.3 EA review of Hydrological Analysis and BuroHappold response

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Appendix C Site Surveys

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Appendix D Modelling changes

D.1 BHE Baseline 2019 model changes

D.2 Mayfield 2019 model changes

D.3 Manning's values

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D.1 BHE Baseline 2019 model

Modelling files

The BHE Baseline 2019 model is run through the following simulation files:

- Medlock_SFRA_v0e_MM_002_BH_305.ief – 1D
- Medlock_SFRA_v0e_MM_002_BH_305.tcf and – 2D

The following files called in the above simulations have been amended as described in the tables below.

Table D.1A – 1D file changes

New/amended files/nodes	Removed files/ nodes	Reason for change
Medlock_SFRA_v0e_MM_002_BH_305.dat		
Added bank markers to upstream and onsite nodes (see Section 4.4)		Improve model stability
Amended LB of MEDL01_3562 to match LiDAR (see Section 4.3)		Ensure consistency between 1D and 2D models
Applied orifice setting to surcharged bridges (see Section 4.5.2)		Improve modelling representation of surcharged bridges
Medlock_SFRA_v0e_MM_002_BH_305.ied		
Amended peak flows for upstream flows (MEDL02_0893) with the developed BHE Model 2019 hydrology, as per **Error! Reference source not found.**		

Table D.1B – 2D file changes

New/amended files	Removed files	Reason for change
Medlock_ER_3m_BH_303.tgc		
2d_bc_inactive_Medlock_BH_303.shp	2d_bc_inactive_Medlock.MIF	Widened 2D inactive space locally to match 1D space
New_DTM_Mosaic_for_Manchester.asc	2d_zpt_Medlock_F4m.MID	
2d_zpt_MayfieldSite.12da		Site topographic information
2d_zsh_DEM_adjustments_R_002.SHP; 2d_zsh_DEM_adjustments_P_001.SHP	2d_zsh_DEM_adjustments.MIF	Removed adjustments within site,
2d_zpt_mean_building_elevation_074.shp	2d_zpt_mean_building_elevation.MIF	Removal of demolished buildings.
2d_zpt_building_threshold_074.shp	2d_zpt_building_threshold.MIF	Removed the additional threshold for the buildings within site and removal of demolished buildings.
2d_zlr_bank_heights_303_L.shp; 2d_zlr_bank_heights_303_P.shp	2d_zlr_bank_heights.MIF	Adjusted bank heights to match site topographic survey.
2d_zsh_bridge-deck_005.SHP; 2d_zsh_bridge-deck_P_007.SHP		Added the deck levels on surcharged upstream bridges
2d_zln_bridge_L_001.shp		A z-line was added for stability
2d_mat_Medlock_BH_074.shp	2d_mat_Medlock.MIF	Material changes within the Mayfield masterplan due to demolitions of buildings
Medlock_Common_Commands_BH_303.trd		

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1d_isis_nodes_Medlock_BH_072.shp	1d_isis_nodes_Medlock.MIF	Moved nodes MELD01_2647, MEDL01_2492A and MEDL01_2380L to match topographic surveys and 1D space
1d_nwk_Medlock_BH_072.shp	1d_nwk_Medlock.MIF	Amended within site as per above
1d_WLL_Medlock_BH_303.shp	1d_WLL_Medlock.MIF	Amended to match 2d_bc_inactive_Medlock_BH_303.shp
Medlock_BH_303.tbc		
2d_bc_Medlock_HX_BH_303.shp	2d_bc_Medlock_HX.MIF	Amended to allow overspill of structures and match 2d_bc_inactive_Medlock_BH_303.shp
Manchester_Roughness.tmf		No change on material designation

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Limitations

There are some outstanding items that were raised by the EA during their review but could not be addressed in the BHE Baseline 2019 model as shown in the table below.

Item	Comments	Action	BuroHappold response
3.2 Have appropriate distances between sections and/or nodes been used (dx)?	Explain why the spacing between some nodes does not follow the name node convention? (distances between nodes should be reflected in the name of nodes)	Rectify node spacing.	The spacing convention is inherited from the EA Medlock 2019 model. The nodes within the site boundary were checked against the 2018 Mayfield site topographic survey and the distance applied in 1D is correct. Nodes outside the topographic survey boundaries cannot be checked, as the channel survey was not provided and new channel surveys have not been undertaken. This comment is therefore partially actioned.
3.6 Chainage – compared to surveyed sections	No survey provided so cannot be properly checked.	Fix chainage issues.	Same as above. The original channel survey was not provided to BuroHappold and therefore this check cannot be completed.
4.1 What manning's n value(s) have been used for the channel?	Manning n value of 0.04 for the river bed and 0.06 for the banks. This is acceptable for the upper part of the river but for the downstream part (in the city) the river is very urbanised and the manning n value of those sections does not reflect reality.	Change the roughness values to reflect reality.	Information inherited from the EA's Medlock 2011 Model. Calibrations of the EA Medlock 2011 model have been done following sensitivity testing on the Manning's coefficient. The values of 0.04 and 0.06 seem to produce modelled results that match best the actual records. This was explained to the EA during a phone conversation and was accepted. Within the site, the 0.06 value seems to better represent the heavily vegetated banks. This has been replaced by a value of 0.05 in the 'with scheme' scenario to represent natural surfaces that are well maintained. BHE has undertaken sensitivity testing using +10%, as higher values caused model instabilities.
7.4 What grid resolution has been used? Is it suitable to accurately represent flow paths, e.g. between buildings?	4m cell size. This is too coarse for an FRA application. This should be reduce at least to 2m and at best 1m. LiDAR data is available for this area.	Change grid resolution.	A 1m and 2m cell resolution model run was attempted, however, errors in the new Lidar data provided in March 2019 caused errors in the model outputs. A 3m resolution has been used. This has been discussed with the EA during the 3rd April conference call and was accepted.
7.8 How have buildings been represented within the DTM?	Raised by 0.3m and a manning n value of 1.	Explain why an elevation of 0.3m has been chosen. Why this value?	The building values were inherited from EA Medlock 2011 model. This is a value to account for building thresholds normally raised above the surrounding ground levels. Buildings within site have been amended to match topographic survey. The threshold level of buildings outside the site is not known and therefore checks cannot be carried out.

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D.2 Mayfield 2019 model

Modelling files

The Mayfield 2019 model is run through the following simulation files:

- Medlock_SFRA_v0e_MM_002_BH_127.ief – 1D
- Medlock_SFRA_v0e_MM_002_BH_127.tcf and – 2D

The following files called in the above simulations have been amended from the BHE Baseline to create the Mayfield 2019 model as described in the tables below.

Table D.2A – 1D file changes

New/amended files/nodes	Removed files/ nodes	Reason for change
~~**Medlock_SFRA_v0e_MM_002_BH_102.dat**~~ ***Medlock_SFRA_v0e_MM_002_BH_126.dat (to amend manning's n banks value within site and correct spill levels at MEDL01_2510H)***		
	Removed MEDL01_2380L, MEDL01_2380C, MEDL01_2315C	Removed existing culvert
Added MEDL01_2510A, MEDL01_2510D, MEDL01_2510H, MEDL01_2510E, MEDL01_2510B	Removed MEDL01_2492A,MEDL01_2492D, MEDL01_2492H, MEDL01_2492E, MEDL01_2492B	Removed footbridge at MEDL01_2492 and added new footbridge further upstream with spill and orifice setting *(spill level corrected)*
Added MEDL01_2429A, MEDL01_2429D, MEDL01_2429H, MEDL01_2429E, MEDL01_2429B	Removed MEDL01_2429	Removed river section and added new footbridge bridge section with spill and orifice setting
MEDL01_2470		New section between two footbridges for better channel representation
Amended MEDL01_2647, MEDL01_2587, MEDL01_2561, MEDL01_2380, MEDL01_2315		Amended sections within site to represent new masterplan levels. Widened 1D space within site

Table D.2B – 2D file changes

New/amended files	Removed files	Reason for change
~~**Medlock_ER_3m_BH_114.tgc**~~ ***Medlock_ER_3m_BH_127.tgc (removed constriction at Baring Street bridge)***		
2d_bc_inactive_Medlock_BH_102.shp	2d_bc_inactive_Medlock_BH_303.shp	Widened channel corridor and representation in 1D
2d_zpt_mean_building_elevation_080.shp	2d_zpt_mean_building_elevation_074.shp	Removed all building from within the site
2d_zpt_building_threshold_080.shp	2d_zpt_building_threshold_074.shp	Removed all building from within the site
2d_zlr_bank_heights_102_L.shp; 2d_zlr_bank_heights_102_P.shp	2d_zlr_bank_heights_303_L.shp; 2d_zlr_bank_heights_303_P.shp	Adjusted bank heights to match proposals
Optimised Earthworks DES 1m grid_240719.dem		Landscaping proposals across the site
~~2d_zsh_DEM_additional_adjustments_R_003.shp~~ ~~2d_zsh_DEM_additional_adjustments_P_003.shp~~		~~Amendments to the Landscaping DEM at the downstream end of the site to enforce constriction at Baring Street bridge.~~ – *Removed following EA review, as not required*

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2d_mat_Medlock_BH_113.shp	2d_mat_Medlock_BH_074.shp	Material changes within the Mayfield masterplan
Medlock_Common_Commands_BH_102.trd		
1d_isis_nodes_Medlock_BH_098.shp	1d_isis_nodes_Medlock_BH_072.shp	Amended as per .dat file
1d_nwk_Medlock_BH_098.shp	1d_nwk_Medlock_BH_072.shp	Amended within site as per above
1d_WLL_Medlock_BH_098.shp	1d_WLL_Medlock_BH_303.shp	Amended to match 2d_bc_inactive_Medlock_BH_102.shp
Medlock_BH_102.tbc		
2d_bc_Medlock_HX_BH_102.shp	2d_bc_Medlock_HX_BH_303.shp	Amended to suit proposals
Manchester_Roughness.tmf		No change on material designation

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D.3 Manning's values

Table D.3A Material roughness values used in the BHE Baseline model and Mayfield 2019 model in 1D model

Model	Manning's 'n' value bed	Manning's 'n' value banks	Comments
EA Medlock 2011 model	0.040	0.060	Model calibrated using the manning's 'n' value
BHE Baseline 2019 model	0.040	0.060	Inherited from EA model
Mayfield 2019 model	0.040	~~0.050~~ *0.060*	*It was recommended by the EA that the manning's for the banks is kept to 0.06 for consistency with the Baseline model. Furthermore, the walled channel is replaced by rough vegetation, therefore reducing manning's is not appropriate.*

Table D.3B Material roughness values used in the BHE Baseline model and Mayfield 2019 model (inherited from original EA Medlock 2011 model) in 2D model

TUFLOW material code	Manning's 'n' value	Description
1	0.050	General Natural Surfaces
2	1.000	Buildings
3	0.025	Inland Water
4	0.050	General mixed (manmade/natural) surfaces
5	0.025	Roads, tracks, paths & pavements
6	0.100	Railway
7	0.100	Non-coniferous woodland & Scrubland
8	0.075	Rough Grassland
9	0.150	Coniferous Trees
10	0.040	General Manmade Surfaces
11	0.065	Marsh Reeds Or Saltmarsh

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Appendix E Surface water drainage strategy

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BUROHAPPOLD ENGINEERING

Mayfield Phase 1 Foul and Surface Drainage Strategy

0042912

13 September 2019

Revision P02

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Revision	Description	Issued by	Date	Checked
P01	Drainage Strategy	JS	02/09/2019	AG
P02	Drainage Strategy Amendments	JS	13/09/2019	AG

O:\0042912 Mayfield Park Manchester Infrastructure\F8 Civils - Infrastructure\03 Reports\Planning\Drainage\190912 JS 004912 Drainage Strategy P02.docx

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author	**John Scandrett**
date	**13/09/2019**
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signature	
date	**13/09/2019**

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1 Introduction

BuroHappold Engineering has been appointed by U+I Group PLC on behalf of the Mayfield Development Partnership LP to prepare a drainage strategy for Mayfield Phase 1 Development, including two commercial office blocks, a multi-storey car park and creation of a city centre park, in September and October 2019 and will become a reference document for other development within the Mayfield SRF 2018 area. . The Phase 1 site is 7 Ha and is bounded by the Mayfield Depot building to the north, Hoyle Street to the east, the Mancunian Way ring road (A635) to the south and Baring Street (inclusive) to the west. The Site boundary also extends to the London Road junction and access to Baring Street to facilitate road improvements proposed ("the Site").

This report has been prepared to describe the proposed surface water and foul water drainage strategy for the new development, a high-quality urban neighbourhood with residential buildings and public spaces just south of the Manchester Piccadilly Railway Station.



Figure 1-1 Proposed Mayfield Masterplan

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2 Legislation, Policy and Guidelines

2.1 Planning Context

The management of water resources is governed by a range of legislative guidance set out within international, national and regional policies and plans. The stormwater strategy has been prepared with due regard to the plans and policies set out in this section.

2.1.1 Planning Policies and the Guidance

The Drainage Strategy has been developed in accordance with the following policies and guidelines:

- National Planning Policy Framework – March 2012
- Water Resources Act 1991 – December 1991
- Flooding and Water Management Act 2010 – April 2010
- Guide to Development in Manchester Supplementary Planning Document and Planning Guidance Adopted - April 2007
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA User Guide Final – May 2010
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA Level 2 SFRA Final – March 2011
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA Canal Hazard Zones, Drawing Number MM_3.2B, Final – March 2011
- Manchester City, Salford City and Trafford Councils (March 2011) Level 2 Hybrid SFRA Critical Drainage Areas, Drawing Number SS_4.5, Final – March 2011
- Manchester City, Salford City and Trafford Councils (March 2011) Level 2 Hybrid SFRA Flood Risk Management, Drawing Number FL_1.1 F, Final – March 2011
- Manchester City Council SuDS Requirements for New Developments
- Manchester Green and Blue Strategy – July 2015
- Manchester Green and Blue Action Plan – July 2015
- Northwest River Basin Management Plan – February 2015
- Environment Agency (EA) Guidelines

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3 Consultation with Manchester City Council and the Environment Agency

3.1 Manchester City Council (MCC)

Following conversations and meetings with MCC the below parameters were agreed:

- Proposed discharge rate is to be restricted to 50% of the existing brownfield runoff rate with 2l/s/ha to be subtracted from this peak 50% discharge rate.
- Climate change allowance is to be 30%, however, attenuation volumes should also be checked against a 40% allowance.
- No flooding of buildings occurs in 1 in 100 year rainfall event plus climate change allowance. Plot designers will need to accommodate all the necessary surface water attenuation within the plot demise. The attenuation will need to be designed to accommodate the 1 in 100 year storm events plus climate change allowance based on a 50% brownfield rate with a further reduction of 2l/s/ha for long-term storage.
- Surface flooding of open spaces is acceptable for short periods in events over 1 in 30 year return period rainfall events
- Overland flow routes for extreme events are diverted away from buildings
- As the existing site is brownfield the 1 in 100 year, 6 hour rainfall runoff volume shall be constrained to a maximum of the existing brownfield runoff volume for the same event. Our aspiration is to better this where we can
- For surface car parks (>50 spaces) and areas of unusual pollution risk pollution control measures will be provided (likely to be a combination of petrol interceptors and SuDS features where applicable)

3.2 Environment Agency (EA)

After consultation with the EA it was agreed that discharge of surface water into the Medlock River would be acceptable.

3.3 Scoping Opinion Response

A scoping opinion was submitted to MCC in July 2019 the comments returned highlighted two key issues for the drainage strategy to address:

The area is situated within the Conurbation Core Critical Drainage Area and in accordance with the Manchester City Council SFRA at least a 50% reduction in surface water runoff should be provided through SUDS as part of any brownfield development with the aim of reducing to the Greenfield runoff rates.

Surface water should be managed to ensure there is no increased surface water from the proposed development and runoff from extreme events should be retained within the site such that the adjacent third party land is not affected.

And;

The suitability of sustainable drainage systems should be assessed in accordance with paragraphs 051, 079 and 080 of the revised NPPF Planning Practice Guidance for Flood Risk and Coastal Change Sustainable drainage systems should be designed in line with national Non-Statutory Technical Standards for SuDS and local policies EN08, EN14 and EN17 of the Core Strategy.

Hydraulic calculations and drawings to support the design need to be provided along with proposed standards of operation and maintenance in accordance with paragraph 081 of NPPF Planning Practice Guidance.

Both of these points are addressed as part of the proposed surface water strategy.

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4 Existing Site Existing Site

The Mayfield Phase 1 Development Site is a 7ha and is located in Manchester City Centre to the immediate south/southeast of Piccadilly Railway Station, centred at NGR 385006 397717. The River Medlock meanders through the central area of the Site, flowing from east to west within a deep rectangular brick/stone walled channel. It is culverted beneath Hoyle Street.

The Site is currently occupied by existing and historical urban development comprising the former (now abandoned) Mayfield Railway Station and associated railway lines, numerous works/factories, a scrap yard, a depot, Hoyle Street Industrial Estate, derelict land and car parking. The immediate surrounding area comprises urban development including residential (student accommodation/private rental), offices, commercial and industrial facilities.

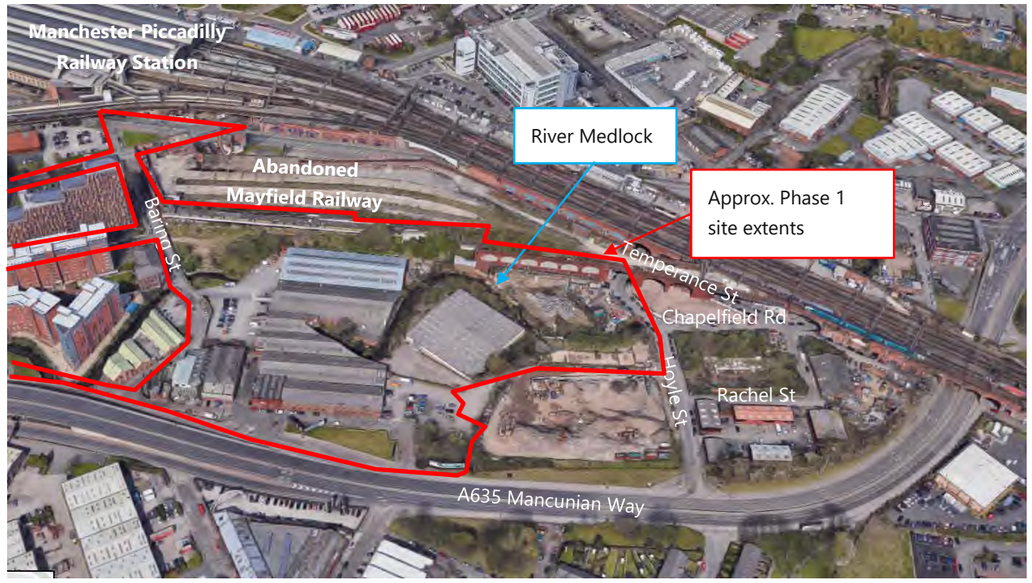


Figure 4-1 Existing Site with the Phase 1 Site Boundary

The condition of the river varies. The river wall is generally in a poor derelict state of repair with parts collapsed into the river. It is assumed that some stormwater is seeping through cracks into the River Medlock. In many locations, siltation has built up on one or both sides of the river bank. The silt deposits have enabled the dense growth of vegetation along almost the entire corridor. Japanese Knotweed is currently present along the riparian corridor within the site.

The site is heavily overgrown in areas and is largely covered in impermeable hardstanding and buildings in various states of condition with hardscaping in areas being cracked and deteriorated.

4.1 Existing Flood Zones

Extract from River Strategy Report and water chapter of Strategic Regeneration Framework dated 12/10/2017:

"The Environment Agency's flood risk mapping shows parts of the existing site to be highly susceptible to flooding with the River Medlock canalised between the high walls and under industrial buildings. Flooding of the site is concentrated around the Medlock in the central area (Flood Zone 3 High risk) with some Flood Zone 2 (Medium risk) on the margins. However, the majority of the site is situated within Flood Zone 1 (Low risk) with a flood risk less than 0.1% (on average one occurrence in 1000 years). Flood risk from ground water, surface water and artificial sources is currently considered low to very low at the site.

The regeneration of Mayfield will allow the river corridor and floodplain to be carefully reprofiled using the results of detailed hydraulic modelling, that will ensure the park can reduce the risk of flooding and mitigate for the effects of climate change. The well-considered design will ensure that there will be no detrimental effects upstream or downstream, with finished floor levels for property set well above design flood levels as recommended by the Environment Agency (EA). This will ensure the development is safe, with appropriate pedestrian and vehicular access, even during the 0.1% AEP event for maintenance or improvements works."

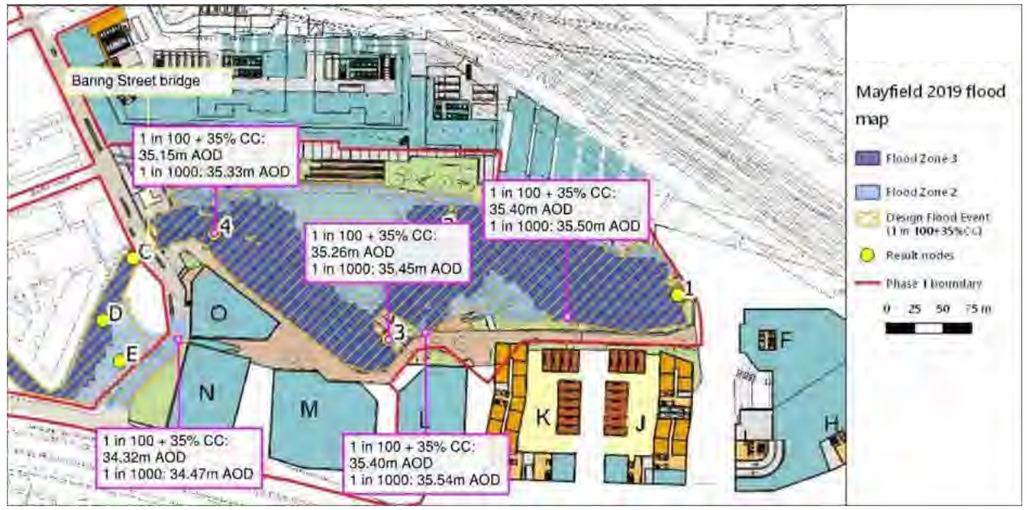


Figure 4-2 Mayfield 2019 Flood Map extract from the Flood Risk Assessment

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5 Existing Surface Water Drainage

5.1 Existing Drainage and Outfalls

It is unclear from public sewer records how the current site is drained however the lack of available information would suggest that the vast majority of the site is served by private drainage networks. It is likely that the buildings are served by individual connections to the United Utilities combined sewers that surround the site.

The site generally slopes towards the River Medlock and it is assumed that it drains into the river. Only one outfall is shown on the topographic survey conducted by Malcolm Hughes. Visual inspection of the river bank on a site visit (conducted 01/10/2017) highlighted one existing drainage outfall to the River Medlock (Figure 5-1). It is assumed that this is a stormwater only outfall however this has not been confirmed at this stage. It is assumed that there are more outfalls along both banks however due to the overgrown and inaccessible nature of the river banks these are not currently observable. Responsibility for managing these systems is assumed split due to the wide array of site situations.



Figure 5-1 Existing Outfall Observed During Site Visit

The existing drainage is assumed to have been designed and installed in accordance with national standards. It is assumed that the existing below ground stormwater drainage system discharges at an uncontrolled rate and no on-site storage exists or is anticipated.

There is a short length of 150mm diameter United Utilities combined sewer just to the south of the southwest end of the abandoned Mayfield train station. The sewer does not appear to drain to an obvious discharge point on the sewer records so this sewer alignment and depth needs to be confirmed via a site-wide utility survey, however, it is assumed to connect to the combined sewer along Amory Street. Other combined sewers within the site and the site's proximity are discussed in section 6 regarding the existing foul water drainage.

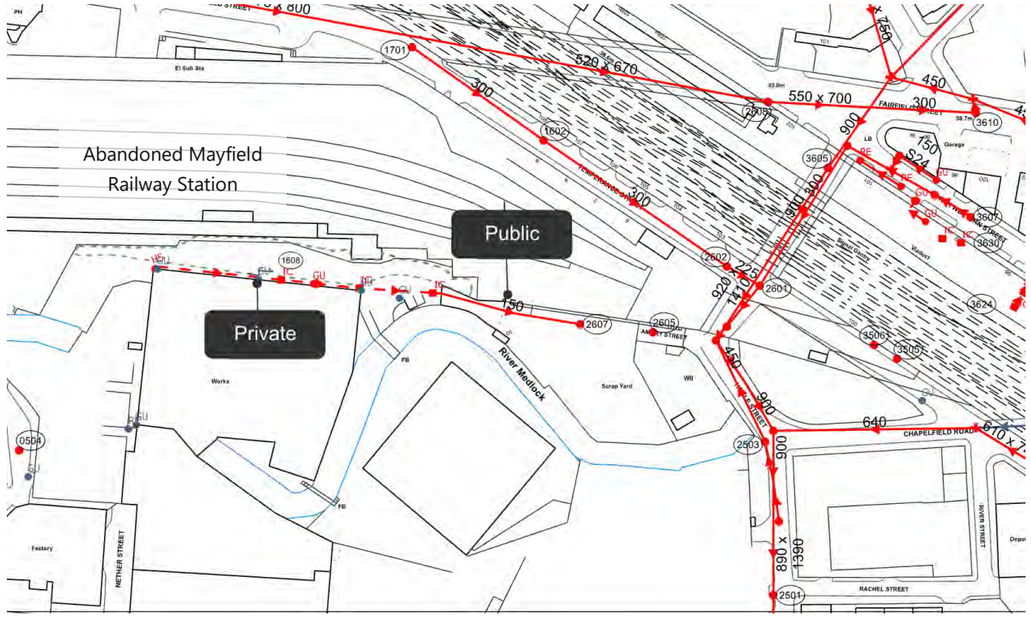


Figure 5-2 Location of the 150mm Combined Sewer on United Utilities Record Drawing (Image courtesy of the United Utilities © United Utilities Water PLC 2017)

Existing topographic surveys show gullies within Hoyle Street, Baring Street, Temperance Street and Chapelfield Road however the condition and exact layout of these stormwater drains are unknown at this stage. It is proposed to retain these drains throughout the resurfacing of these roads and reuse them in the final masterplan.

5.2 Exiting Discharge Rates and Volumes

Table 5—1 Pre-Development Peak Greenfield and Existing Brownfield Discharge Rates

Annual Probability	Greenfield Peak Discharge (l/s)	Existing Brownfield Peak Discharge (l/s)
2	34.8 l/s	61.6 l/s
30	63.5 l/s	139.9 l/s
100	77.75 l/s	188.4 l/s

It should be noted that the values in Table 5—1 have been calculated using the area of the proposed park and Baring Street within the application boundary as this area relates to the area that will be captured and discharged by the storm water system within this application. This area is 3.68 ha.

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6 Existing Foul Water Drainage

Mayfield is served by a network of public combined sewers (conveying both foul and surface water together) situated beneath the principal roads both within the masterplan (Hoyle Street, Baring Street and Chaplefield Road) and immediately beyond its perimeter (Mancunian Way, Fairfield Street and Temperance Street). United Utilities (UU) records show one number site sewer as having been adopted, situated in Amory Street, site of the proposed park.

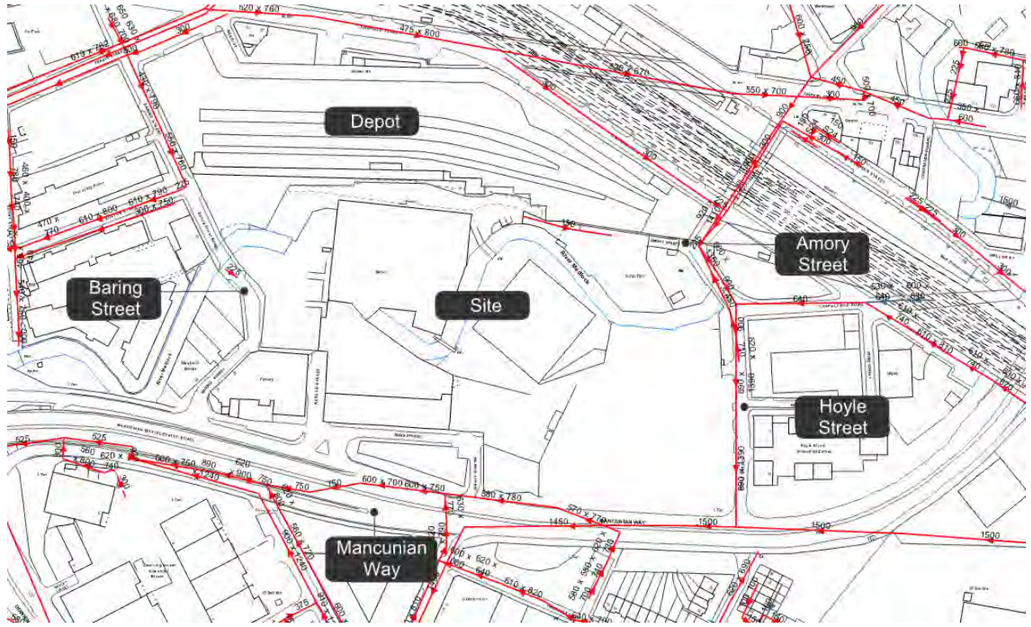


Figure 6-1 United Utilities Sewer Asset Record. (Image courtesy of the United Utilities © United Utilities Water PLC 2017)

UU network pipes sizes vary from 150mm diameter to 1500mm in Mancunian Way. Pipe materials are a mix of vitrified clay and brick and sewer shape varies from circular to egg. Sewer depths appear significant, up to 10m in places, suggesting that they have excavated in rock or possibly constructed within a tunnel heading. UU sewer levels and exact manhole locations are unknown in the majority of cases. A line and level survey at probable points of connection will be required at the next stage.

Information pertaining to the private site foul drainage is limited, and no as-built data is available. UU asset records record a length north of the river serving the Fedex building, does not appear to drain to an obvious discharge point on the sewer records, however, it is assumed to connect to the public sewer in Amory Street. A known private combined sewer is connected to this run.

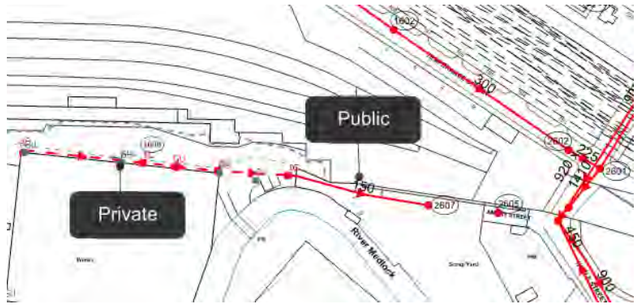


Figure 6-2 Known private site sewerage (Image courtesy of the United Utilities © United Utilities Water PLC 2017)

Localised private sewerage is also known to have been installed as part of the Mayfield Masterplan development, accessed from Baring Street. The new public connection is not shown on the UU record drawings.

The sewers that run underneath Chapelfield Road and Hoyle Street are both assumed to be Victorian era, egg-shaped brick combined sewers of unknown condition and are owned by UU. The sewer that runs beneath Chapelfield Road is buried approximately 2-3m deep based on incomplete UU sewer records and is recorded as a 640mm "diameter". There are two sewers that run down Hoyle Street in opposite directions. There is a 450mm diameter combined sewer draining northwards at approximately 5m depth that runs for roughly a third of the length of the section of Hoyle Street that is within the site boundary. A much larger and deeper 900mm "diameter" combined sewer flows southwards beneath this sewer at a depth of between 8-14m. It is assumed based on limited ground information that this deep sewer is within rock. The other two sewers may be partly within rock but are likely to be buried within the made ground on site. Based on guidance provided by UU no-build easements have been calculated for the existing sewers

UU records show a short length of sewer south of the river within Baring Street. Investigation is recommended to ascertain the extent and suitability of this sewer to receive flows in this area.

This review of existing below ground foul drainage information concludes that a drainage survey is required to confirm the on-site private sewerage network and key points of probable connection to the public UU network beneath the adjacent roads.

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7 Proposed Surface Water Drainage

7.1 Proposed Strategy

The proposed drainage strategy shall be designed:

- To protect against flooding
- To collect and convey surface water away from developed areas in a safe and controlled manner
- To protect surface receiving waters, in both quality and hydraulic terms
- To be sustainable and maintainable; and
- To ensure structural integrity over the duration of the development design life

The new below ground drainage network shall replace the existing and convey water to outfall into the River Medlock. It is proposed that all new sewers will drain by gravity, wherever possible however pumping stations may be required to keep the attenuation storage above modelled flood levels. Due to the existing ground conditions, infiltration and other source controls are generally unlikely to be achievable.

The majority of the green space proposed in the landscape masterplan is within the park and therefore lies within the flood plain and is not available to use for storm water attenuation. The strategy therefore proposes to discharge all surface water that falls within the park to the river without first attenuating flows. Surface water may still pass through a variety of Sustainable Urban Drainage Systems (SuDs) prior to discharge to provide a water quality benefit. These could include filter strips and swales to reduce suspended solids within the surface water runoff.

All surface water which falls on the surrounding buildings will be attenuated on plot. This surface water will then be discharged via a series of pipes into the River Medlock. Buildings will utilise a range of SuDs systems including green, blue and brown roofs, rainwater harvesting, raingardens and below ground storage. These measures will designed to meet the required surface water discharge rates for the development.

7.2 Drainage Design Hierarchy for Sustainable Drainage

Not all SuDS features are appropriate for the Mayfield site. This is mainly due to the restricted site area available in the masterplan outside of the flood plain and the contaminated ground conditions that preclude the use of methods that rely on infiltration. In developing the storm water strategy for the masterplan, the following design hierarchy has been adopted.

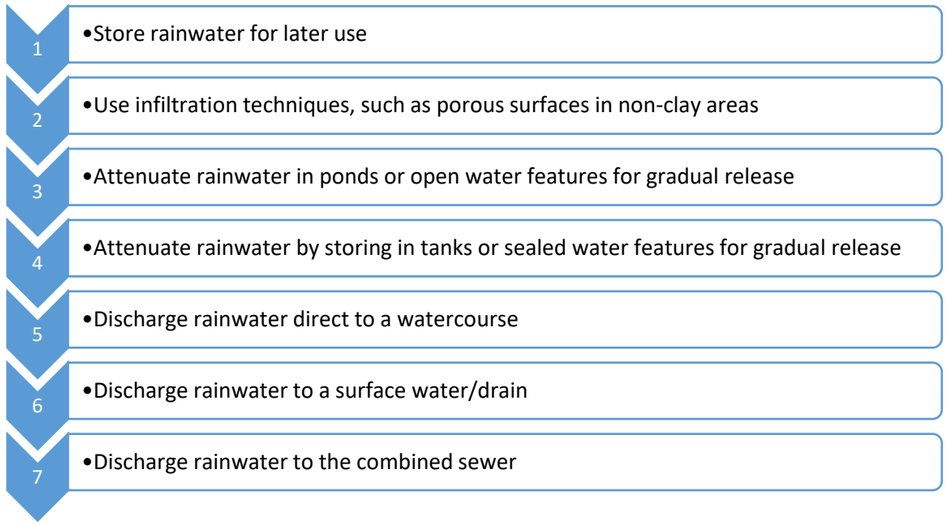


Figure 7-1 SuDS Design Hierarchy

7.2.1 Rainwater Harvesting

Rainwater harvesting could be proposed as part of the on plot water strategy but has not been decided at this stage. This could be developed further by the plot designers at the detailed design stages subject to technical feasibility and cost viability.

7.2.2 Infiltration Techniques

Permeable paving is unlikely to be compatible with proposals for the resurfacing of Hoyle Street, Baring Street and Temperance Street and is unsuitable for use in areas where tight HGV manoeuvring would occur due to wheel loads and tyre scrub. The paving along the footpaths that are within the flood zones are proposed to be permeable.

Areas of the park will use infiltration techniques for storms up to 1 in 30 years plus climate change via swales/infiltration trenches. See section 7.2.3 below.

7.2.3 Rainwater attenuation in open water features for gradual release

There is insufficient space for large open water features such as lakes outside of the flood zone, however, in some areas within the flood zone, swales/infiltration trenches will be introduced to contain 1 in 30 year storm event runoff from neighbouring softscape and footpaths. The remaining runoff from a 1 in 100 year storm event will overflow into the River Medlock. There is no need to generate enough hydraulic head to push the water into the River Medlock during a flood event as these areas will have flooded. Examples of a swale and an infiltration trench are shown below.

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Figure 7-2 Infiltration Trench Example (Left); Swale Example (Right)

7.2.4 Rainwater discharge direct to a watercourse

It has been agreed with the EA to discharge surface water runoff into the River Medlock that runs through the centre of the site. Areas of hardstanding outside of the fluvial flood zone will discharge into the river.

7.2.5 Rainwater attenuation above ground

Buildings will utilise a range of SuDs systems including green, blue and brown roofs, rainwater harvesting and raingardens. These will be designed and determined by the plot designers.

7.2.6 Rainwater attenuation below ground

Rainwater attenuation below ground is not required for areas in the public realm. Plot designers will be required to attenuate their surface water runoff at 50% of the 1 in 100 year storm brownfield runoff rate minus 2l/s/ha as agreed with MCC.

The discharge of the plot designers' attenuation will be discharged into the proposed surface water network that transfers surface water to the River Medlock.

7.2.7 Rainwater discharge to a surface water sewer or drain

There are no public surface water sewers. Currently it is assumed that the majority of the site is connected to a private surface water network that drains into the River Medlock. The intention is to discharge all surface water into the River Medlock as agreed with the EA. This will replicate the existing conditions for the majority of the site.

7.2.8 Rainwater discharge to a combined sewer

Part of the site currently drains into public combined sewers situated around the site. However, to improve the situation with regards to sustainable urban drainage, it is propose to discharge surface water into the River Medlock as agreed with the EA.

7.3 Design Parameters

We propose that all new buried drainage provides the following levels of service:

- No surcharge within the pipe network up to and including a 1:2 year storm event;
- No flooding of the drainage system up to and including a 1:30 year storm event;
- Management of flood water up to the 1:100 year storm event.
- Climate change allowance included in the infrastructure design shall be 30%; and
- Proposed discharge rate for plot attenuation shall be restricted to 50% of the existing peak brownfield runoff rate with 2l/s/ha subtracted from this 50% peak discharge rate (1 in 100 year) as per discussions with MCC and the EA.

7.4 Catchment Areas

Indicative surface water sewer runs were created within the masterplan. Catchment areas were then created based on the sewer runs and the landscaping layout. Catchment areas are shown in Table 7—1. The effective areas for each catchment have been calculated using the runoff coefficients of 0.95 for hardscaping and buildings and 0.3 for softscape landscaped areas. The locations of the catchment areas can be seen in Figure 7-3.

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Table 7—1 Catchment Areas

Catchment Type	Catchment Ref.	Catchment Area (m^2)	Catchment Area (ha)	Hardscape (%)	Softscape (%)	Effective Hardscape Area (ha)	Effective Softscape Area (ha)	Total Effective Area (ha)
Landscape	C1	2439	0.24	60%	40%	0.14	0.03	0.17
Landscape	C2	4200	0.42	65%	35%	0.26	0.04	0.30
Landscape	C3	3108	0.31	10%	90%	0.03	0.08	0.11
Landscape	C4	3619	0.36	68%	32%	0.23	0.03	0.27
Landscape	C5	430	0.04	55%	45%	0.02	0.01	0.03
Landscape	C6	929	0.09	95%	5%	0.08	0.00	0.09
Landscape	C7	598	0.06	70%	30%	0.04	0.01	0.05
Landscape	C8	966	0.10	90%	10%	0.08	0.00	0.09
Landscape	C9	323	0.03	100%	0%	0.03	0.00	0.03
Landscape	C10	1054	0.11	15%	85%	0.02	0.03	0.04
Landscape	C11	670	0.07	97%	3%	0.06	0.00	0.06
Landscape	C12	44	0.00	100%	0%	0.00	0.00	0.00
Building	B1a	1126	0.11	100%	0%	0.11	0.00	0.11
Building	B1b	1784	0.18	100%	0%	0.17	0.00	0.17
Building	B2	2609	0.26	100%	0%	0.25	0.00	0.25



Figure 7-3 Catchment Areas Plan

Catchment area C13 shown in the plan is to be drained by the surface water system that runs along Baring Street and is design by Civic Engineers and therefore has not been included in the surface water sewer design. Catchment area C14 is to be drained via the same method as it currently drains. It's drain paths are to be unaffected.

There is potential for rainwater runoff in catchment area C1 to fall into the planting areas between the hardscaping during low rainfall intensities, however, during higher rainfall return periods, this area will need to be provided with a flow path to the Medlock to avoid localised flooding.

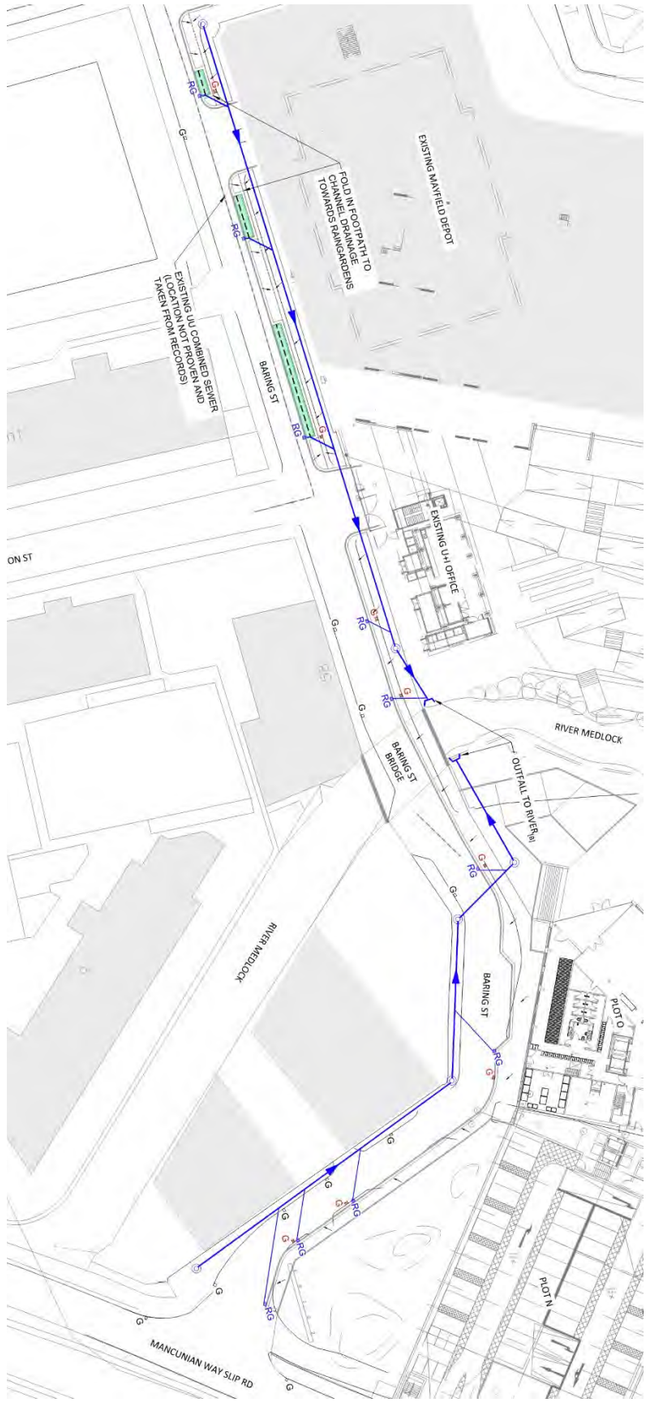


Figure 7-4 Civic Proposed Surface Water Sewer Run

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The existing runoff rates within these catchments have been calculated using the topographical survey. The difference between the existing and proposed effective areas within each catchment can be seen in the table below.

Table 7—2 Existing Catchment Areas

Catchment Ref.	Hardscape (ha)	Softscape (ha)	Effective Hardscape Area (ha)	Effective Softscape Area (ha)	Total Effective Area (ha)
C1	0.05	0.19	0.05	0.06	0.11
C2	0.28	0.14	0.26	0.04	0.31
C3	0.31	0.00	0.29	0.00	0.29
C4	0.34	0.02	0.33	0.01	0.33
C5	0.03	0.01	0.03	0.00	0.03
C6	0.09	0.00	0.09	0.00	0.09
C7	0.06	0.00	0.05	0.00	0.06
C8	0.06	0.03	0.06	0.01	0.07
C9	0.02	0.01	0.02	0.00	0.03
C10	0.11	0.00	0.10	0.00	0.10
C11	0.06	0.01	0.05	0.00	0.06
C12	0.00	0.00	0.00	0.00	0.00
B1a	0.11	0.00	0.11	0.00	0.11
B1b	0.18	0.00	0.17	0.00	0.17
B2	0.22	0.05	0.20	0.01	0.22

7.5 Building Runoff Rates and Discharge Points

The MCC has stipulated that the surface water discharge from the plots will need to be restricted to 50% of the peak brownfield discharge rate (1 in 100 year storm event) minus 2l/s/ha. Brownfield runoff rates for the proposed buildings have been calculated based on the catchment areas of the buildings using the Modified Rational Method. The plot teams have provided flow rates with further reductions for discharging the buildings' surface water into the proposed surface water sewer. These discharge rates have been used in the design of the surface water sewer.

Table 7—3 Brownfield Runoff Rates

Building Catchment Ref.	Effective Area (ha)	1 in 100 year storm event 50% Brownfield Runoff Rate minus 2l/s/ha (l/s)	Discharge Rates from Plot Teams (l/s)
B1a	0.11	10.10	7.50
B1b	0.17	16.00	10.70
B2	0.25	23.40	15.80

The surface water system will also need to take into account future runoff from the proposed buildings around the site. Points of connection to the proposed external surface water system for the on plot attenuation tanks at the required maximum discharge rates are shown in the figure below. See Appendix F for drainage strategies from the plot teams.



Figure 7-5 Surface Water Plot Connection Points into proposed surface water sewer

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7.6 Proposed Outfalls

Due to the high river flood levels during high return-period river flooding events the stormwater outfalls into the River Medlock will become surcharged and thus submerged. This can mean that water is unable to discharge unless there is sufficient hydraulic head in the network to force the water out of the outfall. For most buildings/plot this is unlikely to be a problem as the invert levels of the proposed storage features will be above the high river flood levels and therefore provide enough hydraulic head to discharge into the River Medlock.

However, where invert levels of any attenuation within the proposed buildings are below the 1in 5 year flood levels, it is proposed that these are drained via a pumping or lifting station to provide sufficient hydraulic head.

Where possible, the invert levels of the outfalls have been proposed to be above the 1 in 25 year flood event. However, due to the levels and gradients around the site in some locations it is not possible to achieve this. Instead the average river level has been used as the minimum outfall invert level. There are three outfalls where this occurs, two of which are within the river bank areas of the Phase 1 site. However, it is deemed unlikely that a high intensity fluvial event will coincide with a high intensity rainfall event. If a convergence occurs, there is sufficient hydraulic head within the surface water network to prevent flooding to the buildings/plots if the outfalls are submerged.

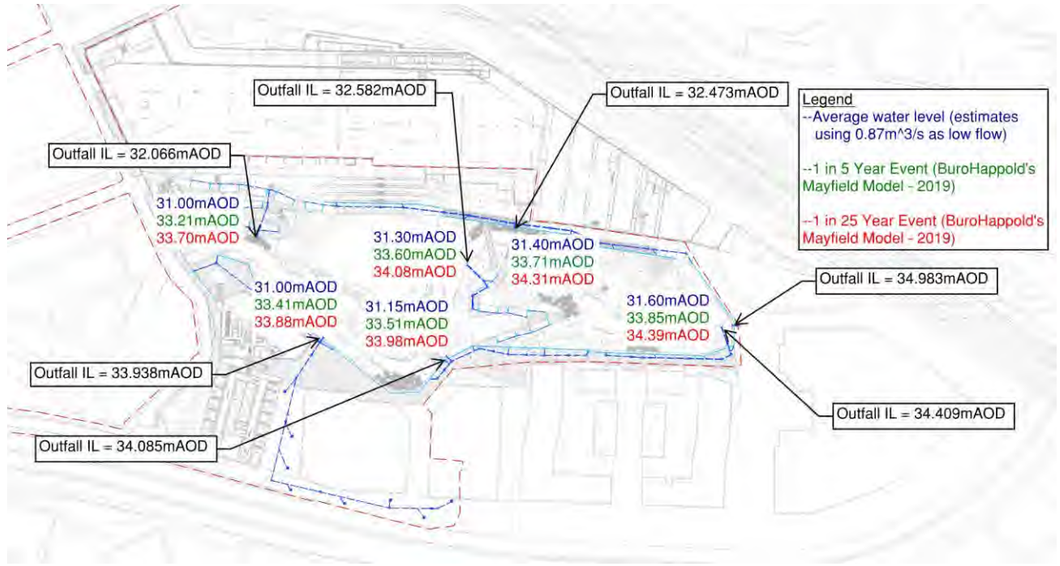


Figure 7-6 1 in 25 Year fluvial flood levels and Average Water Levels near proposed outfalls

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7.7 Proposed Layout

After hydraulic analysis using the catchment areas and brownfield runoff rates of the buildings the layout shown below is proposed. For more detail including pipe sizes and manhole sizes see Appendix D.

Swales/Infiltration trenches have been proposed in some areas of the flood zone to contain 1 in 30 year storm event runoff from neighbouring softscape and hardstanding. The remaining runoff from a 1 in 100 year storm event will overflow into the River Medlock. Footpaths within the river bank areas are proposed to be permeable and include a SuDS system geotextile between its foundations and subgrade that will filter any potential contaminates.

Any flooding from a 1 in 100 year storm that occur within the surface water network will be contained on site and flow towards the River Medlock as the site slopes towards the river.

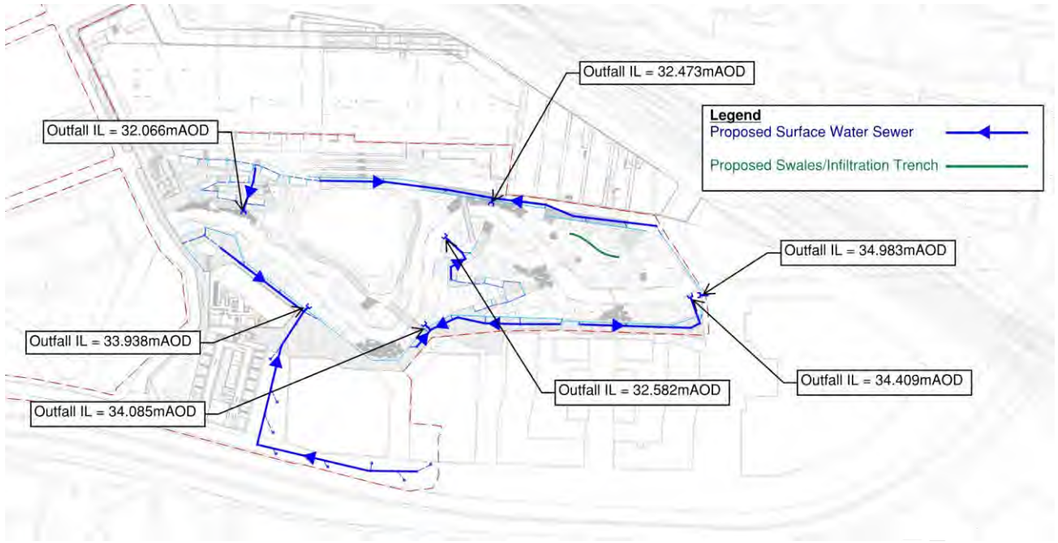


Figure 7-7 Proposed Surface Water Drainage Layout Plan

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8 Proposed Foul Water Drainage

A proposed foul network has been provided to allow plot teams to connect. The proposed network will then connect into the existing UU combined sewer network to the south of the site. Plot connections to the proposed foul water sewer are shown below.

A description of the individual plot drainage strategies and details for plot foul water networks can be found in Appendix F.

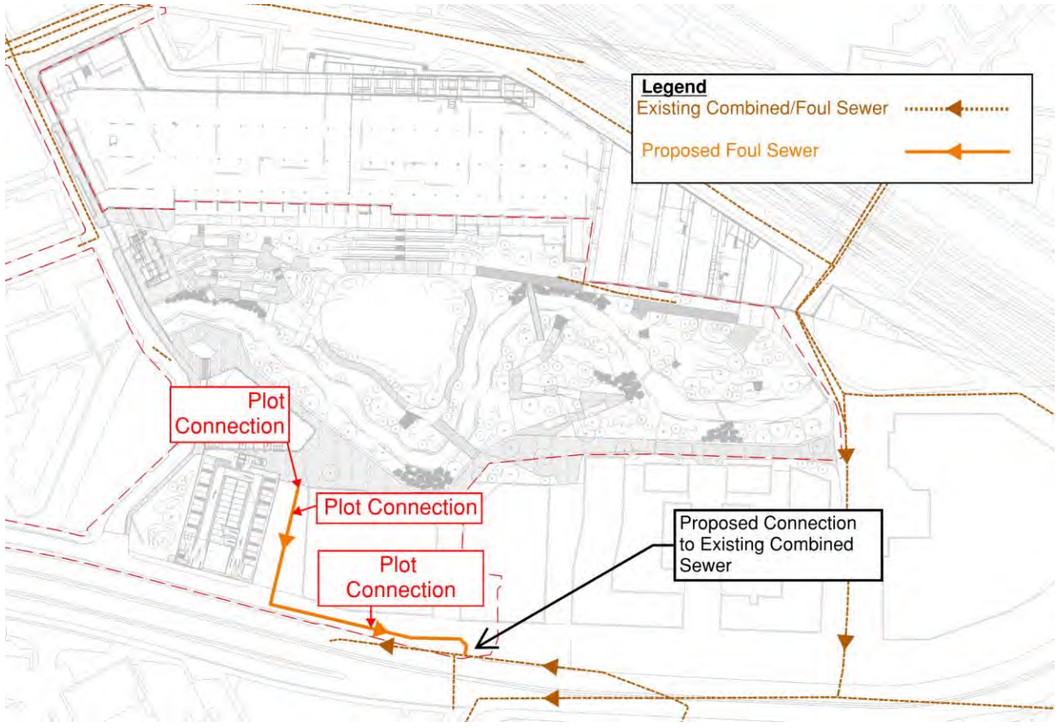


Figure 8-1 Proposed Foul Network

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9 Next Steps

This Foul and Surface Water Drainage Strategy has been prepared to support the planning application for the Mayfield Phase 1 Development.

The strategy has provided calculations of the volume of storage that could be necessary to support the proposed development, using the illustrative masterplan to demonstrate how the proposed approach could be accommodated within the parameters established by the planning application.

Overall, it has demonstrated that as the Proposed Development progresses, the approach to foul and surface water could deliver a sustainable method for managing surface water, which would satisfy both national and local planning policy requirements.

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Appendix A Existing Foul/Combined Sewer Network

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LEGEND

EXISTING

EXISTING COMBINED/FOUL WATER SEWER

APPLICATION BOUNDARY

N

FAIRFIELD STREET

T AN LEW T EET

CORONATION SQUARE

MELLOR ST

FAIRFIELD ROAD

MANCUNIAN WAY

MAN NIAN WAY ELEVATE A

W r M II k

A IN T EET

INVERT LEVEL = 29.63m AOD

900mmØ

300mmØ

OWNERSHIP BEING CONFIRMED WITH UNITED UTILITIES

APPROX DEPTH TO CROWN OF PIPE = 8.0m

IL APPROX 29.63m AOD

900mmØ

IL APPROX 32.08m AOD

450mmØ

APPROX DEPTH TO CROWN OF PIPE = 8.5m

APPROX DEPTH TO CROWN OF PIPE = 2.5m

640mmØ

IL APPROX 35.5m AOD

INVERT LEVEL = 32.08m AOD

900mmØ

610mm x 740mmØ

610mm x 810mmØ

UNITED UTILITIES COMBINED SEWER

930mm x 970mmØ

APPROX DEPTH TO CROWN OF PIPE = 10.0m

900mm x 1350mmØ

890mmØ

APPROX DEPTH TO CROWN OF PIPE = 14.0m

10 5 0 10 20 30 40

1 : 500

SCALE BEFORE REDUCTION

Rev	Description	Date	Drn	Chkd
B	FOR INFORMATION	30.08.19	JS	AG
A	FOR INFORMATION	29.03.19	RH	AG

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Architect SEW

Project MAYFIELD DEVELOPMENT PARTNERSHIP

Drg Title EXISTING SITE
FOUL WATER DRAINAGE AND
PROPSED LAYOUT

Scales@A1 1:500
Drawn by RH
Checked by

Job No. 0042912
Date MARCH 2019
Rev B

Drawing No. 0042912-BHE-XX-XX-DR-C-0201

Job Number:P:\0042912 Mayfield Plot 5\Manchester Office\Revit\WIP\0042912-BHE-XX-XX-DR-C-0201.dwg

Appendix B Proposed Foul Network

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EXISTING

EXISTING COMBINED/FOUL WATER SEWER

PROPOSED DRAINAGE

FOUL WATER SEWER

FOUL WATER MH

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Architect SEW

Project **MAYFIELD DEVELOPMENT PARTNERSHIP**

Drg Title PROPOSED SITE WIDE FOUL WATER PLAN

Scales@A0 1:500
Drawn by JS
Checked by AG

Job No. 0042912
Date AUGUST 2019
Rev B

Drawing No. 0042912-BHE-XX-XX-DR-C-3200

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Appendix C Proposed Catchment Areas

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LEGEND

CATCHMENT AREA

APPLICATION BOUNDARY

N

C13
C1
C2
C3
C10
C7
C8
C11
C12
C6
B1a
B1b
C4
B2
C5
C9
C14

20 10 0 20 40 60 80

1 : 1000

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Architect *SEW*

Project **MAYF E D DE E OPMEN PAR NERSH P**

Drg Title PROPOSED CATCHMENT AREAS

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Drawn by RH
Checked by AG

Job No. 0042912
Date MARCH 2019
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Drawing No. 0042912-BHE-XX-XX-SK-C-0019

John Standiet P:\0042912 Mayfield Park Manchester Infrastructure\06 Civils - Infrastructure\Sheet\Sketches\0042912-BHE-XX-XX-SK-C-0019 - Catchments.dwg

Appendix D Proposed Storm Water Layouts

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LEGEND

EXISTING

EXISTING COMBINED/FOUL WATER SEWER

PROPOSED DRAINAGE

375mmØ SURFACE WATER

SURFACE WATER MH

OUTFALL

GULLEY

SWALE/INFILTRATION TRENCH

ACO MULTIDRAIN LINEAR DRAIN (UNLESS OTHERWISE STATED)

LINEAR DRAIN SUMP

APPLICATION BOUNDARY

Rev	Description	Date	Drn	Chkd
D	FOR INFORMATION	13.09.19	JS	AG
C	FOR INFORMATION	30.08.19	JS	AG
B	SECONDARY DRAINAGE RUNS ADDED	02.04.19	JS	AG
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Architect SEW

Project **MAYFIELD DEVELOPMENT PARTNERSHIP**

Drg Title PROPOSED SITE WIDE SURFACE WATER PLAN

Scales@A0 1:500
Drawn by RJL
Checked by CH

Job No. 0042912
Date MARCH 2019
Rev D

Drawing No. 0042912-BHE-XX-XX-DR-C-3120

Plotted: 13/09/2019 | Mayfield Park Manchester initialsurfacewaterdrainage.dwg | Initialsurfacewaterdrainage | Date: 13/09/2019 09:43 | By: JOHN.SUTHERLAND

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0042912-BHE-XX-XX-DR-C-3122

LEGEND

EXISTING

EXISTING COMBINED/FOUL WATER SEWER

PROPOSED DRAINAGE

375mmØ

SURFACE WATER

SURFACE WATER MH

OUTFALL

GULLEY

SWALE/INFILTRATION TRENCH

ACO MULTIDRAIN LINEAR DRAIN (UNLESS OTHERWISE STATED)

LINEAR DRAIN SUMP

APPLICATION BOUNDARY

Rev	Description	Date	Drn	Ch'd
D	FOR INFORMATION	13.09.19	JS	AG
C	FOR INFORMATION	30.08.19	JS	AG
B	SECONDARY DRAINAGE RUNS ADDED	02.04.19	JS	AG
A	FOR INFORMATION	29.03.19	RH	AG

INFORMATION

Status of drawing

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London
W1T 1PD
UK

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Fax: +44 (0)870 787 4145
Email: 0042912@burohappold.com
Web: www.burohappold.com

Architect *SEW*

Project **MAYF E D DE E OPMEN PAR NERSH P**

Drg Title PROPOSED
SURFACE WATER PLAN
SHEET 1 OF 2

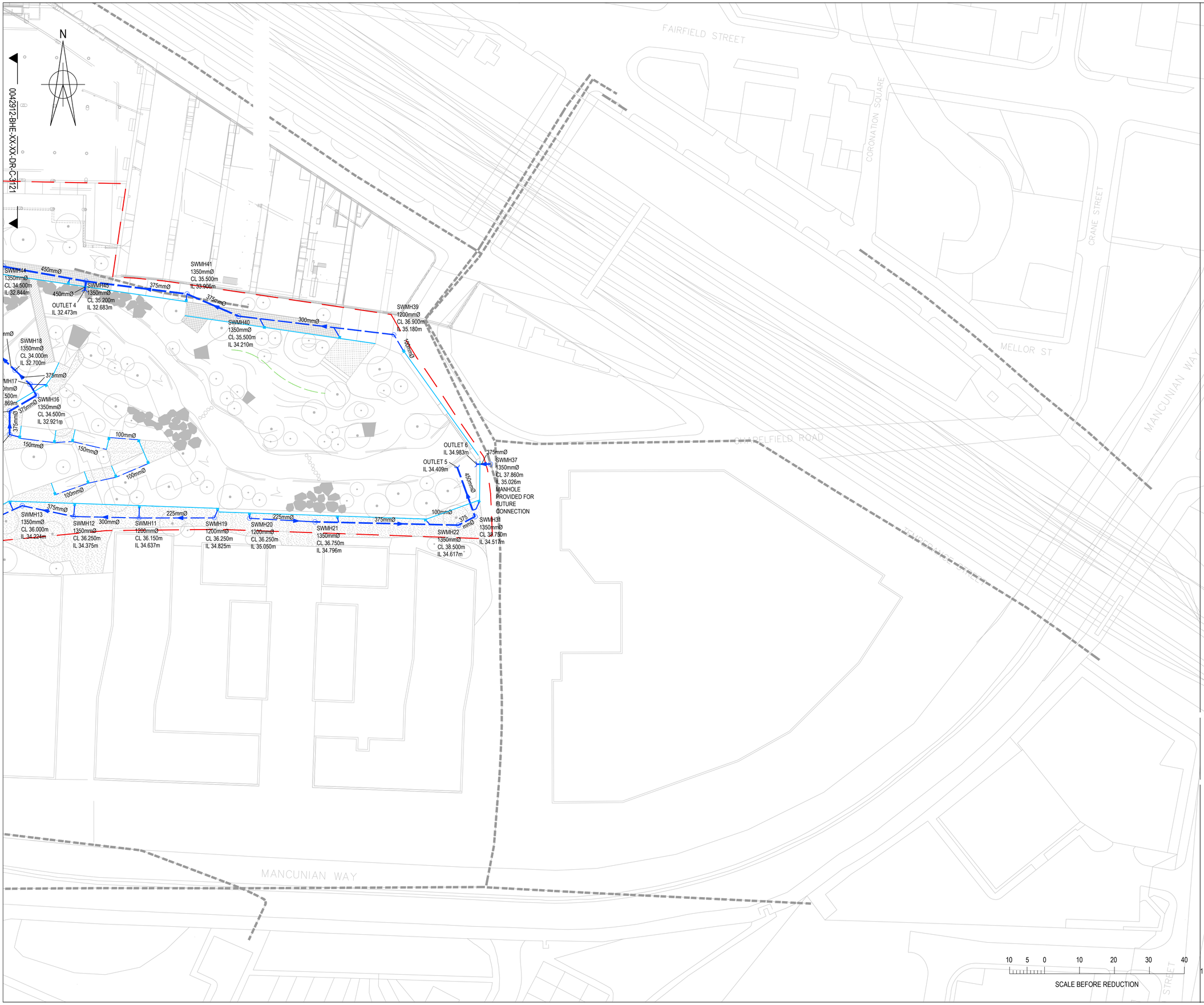
Scales@A1 1:500
Drawn by RH
Checked by AG

Job No. 0042912
Date MARCH 2019
Rev D

Drawing No. 0042912-BHE-XX-XX-DR-C-3121

10 5 0 10 20 30 40
SCALE BEFORE REDUCTION
1 : 500

John Scandrett P:\0042912 Mayfield Park Manchester Infrastructure\Revit\0042912-BHE-XX-XX-DR-C-3121.dwg



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DECOMMISSIONING/DEMOLITION.

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LEGEND

EXISTING

EXISTING COMBINED/FOUL WATER SEWER

PROPOSED DRAINAGE

375mmØ

SURFACE WATER

SURFACE WATER MH

OUTFALL

GULLEY

SWALE/INFILTRATION TRENCH

ACO MULTIDRAIN LINEAR DRAIN (UNLESS OTHERWISE STATED)

LINEAR DRAIN SUMP

APPLICATION BOUNDARY

Rev	Description	Date	Drn	Ch'd
D	FOR INFORMATION	13.09.19	JS	AG
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A	FOR INFORMATION	29.03.19	RH	AG

INFORMATION

Status of drawing

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Architect *SEW*

Project **MAYF E D DE E OPMEN PAR NERSH P**

Drg Title PROPOSED
SURFACE WATER PLAN
SHEET 2 OF 2

Scales@A1 1:500
Drawn by RH
Checked by AG

Job No. 0042912
Date MARCH 2019
Rev D

Drawing No. 0042912-BHE-XX-XX-DR-C-3122

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Appendix E Microdrainage Results

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	11
Number of Online Controls	11	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 392244 401697 SD 92244 01697
C (1km)	-0.026
D1 (1km)	0.364
D2 (1km)	0.417
D3 (1km)	0.292
E (1km)	0.305
F (1km)	2.479
Cv (Summer)	1.000
Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	30, 30, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Summer	2	+30%	30/15 Summer	100/15 Summer		
1.001	2	15 Summer	2	+30%	30/15 Summer	100/15 Summer		
1.002	3	15 Summer	2	+30%	30/15 Summer	100/15 Summer		
1.003	4	15 Summer	2	+30%	30/15 Summer			
1.004	5	15 Summer	2	+30%	30/15 Summer			
5.000	6	15 Summer	2	+30%	30/15 Summer			
5.001	7	15 Summer	2	+30%	30/15 Summer			
1.005	8	15 Summer	2	+30%	30/15 Summer			
6.000	14	15 Summer	2	+30%				
6.001	15	15 Summer	2	+30%	100/15 Summer			
6.002	16	15 Summer	2	+30%	100/15 Summer			
6.003	17	15 Summer	2	+30%				

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	38.644	-0.156	0.000	0.20		16.9	OK	1
1.001	2	37.395	-0.122	0.000	0.42		35.9	OK	3
1.002	3	35.631	-0.106	0.000	0.54		42.9	OK	3
1.003	4	34.779	-0.051	0.000	0.95		49.7	OK	
1.004	5	34.397	-0.190	0.000	0.49		85.1	OK	
5.000	6	34.657	-0.133	0.000	0.34		11.9	OK	
5.001	7	34.473	-0.122	0.000	0.42		18.9	OK	
1.005	8	34.282	-0.074	0.000	0.99		106.2	OK	
6.000	14	33.314	-0.261	0.000	0.20		30.6	OK	
6.001	15	33.172	-0.252	0.000	0.23		32.4	OK	
6.002	16	33.066	-0.231	0.000	0.31		33.6	OK	
6.003	17	32.987	-0.257	0.000	0.22		35.0	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.004	18	15 Summer	2	+30%					32.829
7.000	20	15 Summer	2	+30%	30/15 Summer				35.123
7.001	21	15 Summer	2	+30%	30/15 Summer				34.965
7.002	22	15 Summer	2	+30%	30/15 Summer				34.873
7.003	31	15 Summer	2	+30%	30/15 Summer				34.861
12.005	37	15 Summer	2	+30%	30/15 Summer				35.344
14.000	38	15 Summer	2	+30%					36.147
14.001	39	15 Summer	2	+30%	100/15 Summer				35.423
14.002	40	15 Summer	2	+30%	100/15 Summer				34.373
14.003	41	15 Summer	2	+30%	100/15 Summer				34.082
16.000	42	15 Summer	2	+30%	30/15 Summer				33.595
16.001	43	15 Summer	2	+30%	30/15 Summer				33.206
16.002	44	30 Summer	2	+30%	30/15 Summer				33.058
14.004	45	30 Summer	2	+30%	30/15 Summer				33.007
19.000	46	15 Summer	2	+30%	100/15 Summer				33.562
19.001	47	15 Summer	2	+30%	100/15 Summer				32.945
19.002	48	15 Summer	2	+30%	30/15 Summer				32.303
20.002	9	15 Summer	2	+30%	30/15 Summer				34.680
22.000	19	15 Summer	2	+30%	30/15 Summer				34.908
21.002	11	15 Summer	2	+30%	30/15 Summer				34.783
21.003	12	15 Summer	2	+30%	30/15 Summer				34.534
21.004	13	30 Summer	2	+30%	30/15 Summer				34.423
20.003	10	30 Summer	2	+30%	30/15 Summer				34.389

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.004	18	-0.246	0.000	0.26		35.0	OK	
7.000	20	-0.152	0.000	0.22		7.8	OK	
7.001	21	-0.206	0.000	0.41		49.0	OK	
7.002	22	-0.119	0.000	0.60		51.1	OK	
7.003	31	-0.106	0.000	0.94		172.7	OK	
12.005	37	-0.130	0.000	0.74		99.2	OK	
14.000	38	-0.163	0.000	0.17		12.7	OK	
14.001	39	-0.204	0.000	0.22		32.6	OK	
14.002	40	-0.212	0.000	0.39		83.1	OK	
14.003	41	-0.198	0.000	0.44		93.5	OK	
16.000	42	-0.130	0.000	0.36		15.6	OK	
16.001	43	-0.259	0.000	0.37		73.8	OK	
16.002	44	-0.235	0.000	0.37		80.9	OK	
14.004	45	-0.126	0.000	0.86		223.3	OK	
19.000	46	-0.088	0.000	0.36		14.1	OK	
19.001	47	-0.214	0.000	0.18		37.9	OK	
19.002	48	-0.120	0.000	0.66		40.3	OK	
20.002	9	-0.120	0.000	0.44		24.0	OK	
22.000	19	-0.142	0.000	0.29		9.6	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.002	11	-0.154	0.000	0.47		45.2	OK	
21.003	12	-0.215	0.000	0.37		56.2	OK	
21.004	13	-0.176	0.000	0.47		56.0	OK	
20.003	10	-0.117	0.000	0.81		86.6	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	11
Number of Online Controls	11	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 392244 401697 SD 92244 01697
C (1km)	-0.026
D1 (1km)	0.364
D2 (1km)	0.417
D3 (1km)	0.292
E (1km)	0.305
F (1km)	2.479
Cv (Summer)	1.000
Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	30, 30, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Summer	30	+30%	30/15 Summer	100/15 Summer		
1.001	2	15 Summer	30	+30%	30/15 Summer	100/15 Summer		
1.002	3	15 Summer	30	+30%	30/15 Summer	100/15 Summer		
1.003	4	15 Summer	30	+30%	30/15 Summer			
1.004	5	15 Summer	30	+30%	30/15 Summer			
5.000	6	15 Summer	30	+30%	30/15 Summer			
5.001	7	15 Summer	30	+30%	30/15 Summer			
1.005	8	15 Summer	30	+30%	30/15 Summer			
6.000	14	15 Summer	30	+30%				
6.001	15	15 Summer	30	+30%	100/15 Summer			
6.002	16	15 Summer	30	+30%	100/15 Summer			
6.003	17	15 Summer	30	+30%				

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	38.812	0.012	0.000	0.50		42.4	SURCHARGED	1
1.001	2	38.586	1.069	0.000	0.95		80.9	SURCHARGED	3
1.002	3	36.980	1.242	0.000	1.18		93.1	SURCHARGED	3
1.003	4	35.765	0.934	0.000	2.03		106.6	SURCHARGED	
1.004	5	34.741	0.154	0.000	0.85		149.0	SURCHARGED	
5.000	6	34.957	0.167	0.000	0.80		27.8	SURCHARGED	
5.001	7	34.828	0.233	0.000	1.01		44.8	SURCHARGED	
1.005	8	34.567	0.210	0.000	1.87		200.7	SURCHARGED	
6.000	14	33.389	-0.186	0.000	0.50		76.6	OK	
6.001	15	33.259	-0.164	0.000	0.59		82.8	OK	
6.002	16	33.180	-0.116	0.000	0.80		85.8	OK	
6.003	17	33.071	-0.172	0.000	0.56		90.2	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.004	18	15 Summer	30	+30%					32.925
7.000	20	15 Summer	30	+30%	30/15 Summer				35.363
7.001	21	15 Summer	30	+30%	30/15 Summer				35.326
7.002	22	15 Summer	30	+30%	30/15 Summer				35.231
7.003	31	15 Summer	30	+30%	30/15 Summer				35.202
12.005	37	15 Summer	30	+30%	30/15 Summer				35.696
14.000	38	15 Summer	30	+30%					36.187
14.001	39	15 Summer	30	+30%	100/15 Summer				35.507
14.002	40	15 Summer	30	+30%	100/15 Summer				34.462
14.003	41	15 Summer	30	+30%	100/15 Summer				34.204
16.000	42	15 Summer	30	+30%	30/15 Summer				33.761
16.001	43	15 Summer	30	+30%	30/15 Summer				33.574
16.002	44	15 Summer	30	+30%	30/15 Summer				33.507
14.004	45	15 Summer	30	+30%	30/15 Summer				33.432
19.000	46	15 Summer	30	+30%	100/15 Summer				33.611
19.001	47	15 Summer	30	+30%	100/15 Summer				33.018
19.002	48	15 Summer	30	+30%	30/15 Summer				32.596
20.002	9	15 Summer	30	+30%	30/15 Summer				34.827
22.000	19	15 Summer	30	+30%	30/15 Summer				35.056
21.002	11	15 Summer	30	+30%	30/15 Summer				35.004
21.003	12	15 Summer	30	+30%	30/15 Summer				34.867
21.004	13	15 Summer	30	+30%	30/15 Summer				34.771
20.003	10	15 Summer	30	+30%	30/15 Summer				34.677

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.004	18	-0.150	0.000	0.67		90.5	OK	
7.000	20	0.088	0.000	0.51		17.9	SURCHARGED	
7.001	21	0.155	0.000	0.73		87.6	SURCHARGED	
7.002	22	0.239	0.000	1.07		91.3	SURCHARGED	
7.003	31	0.236	0.000	1.81		334.8	SURCHARGED	
12.005	37	0.222	0.000	1.73		230.4	SURCHARGED	
14.000	38	-0.123	0.000	0.42		31.9	OK	
14.001	39	-0.120	0.000	0.66		98.5	OK	
14.002	40	-0.122	0.000	0.78		168.9	OK	
14.003	41	-0.077	0.000	0.98		206.3	OK	
16.000	42	0.036	0.000	0.88		37.7	SURCHARGED	
16.001	43	0.109	0.000	0.63		125.0	SURCHARGED	
16.002	44	0.213	0.000	0.69		151.4	SURCHARGED	
14.004	45	0.299	0.000	1.57		406.2	SURCHARGED	
19.000	46	-0.039	0.000	0.89		35.3	OK	
19.001	47	-0.141	0.000	0.55		114.3	OK	
19.002	48	0.174	0.000	2.01		123.1	SURCHARGED	
20.002	9	0.027	0.000	0.86		47.0	SURCHARGED	
22.000	19	0.006	0.000	0.70		23.3	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.002	11	0.067	0.000	0.86		82.2	SURCHARGED	
21.003	12	0.118	0.000	0.79		119.7	SURCHARGED	
21.004	13	0.171	0.000	1.01		119.8	SURCHARGED	
20.003	10	0.171	0.000	1.75		187.3	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	11
Number of Online Controls	11	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 392244 401697 SD 92244 01697
C (1km)	-0.026
D1 (1km)	0.364
D2 (1km)	0.417
D3 (1km)	0.292
E (1km)	0.305
F (1km)	2.479
Cv (Summer)	1.000
Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	30, 30, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Summer	100	+30%	30/15 Summer	100/15 Summer		
1.001	2	15 Summer	100	+30%	30/15 Summer	100/15 Summer		
1.002	3	15 Summer	100	+30%	30/15 Summer	100/15 Summer		
1.003	4	15 Summer	100	+30%	30/15 Summer			
1.004	5	15 Summer	100	+30%	30/15 Summer			
5.000	6	15 Summer	100	+30%	30/15 Summer			
5.001	7	15 Summer	100	+30%	30/15 Summer			
1.005	8	15 Summer	100	+30%	30/15 Summer			
6.000	14	15 Summer	100	+30%				
6.001	15	15 Summer	100	+30%	100/15 Summer			
6.002	16	15 Summer	100	+30%	100/15 Summer			
6.003	17	15 Summer	100	+30%				

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	40.000	1.200	0.152	0.69		58.0	FLOOD	1
1.001	2	39.376	1.860	6.389	1.06		90.7	FLOOD	3
1.002	3	37.365	1.627	4.627	1.33		105.4	FLOOD	3
1.003	4	36.292	1.462	0.000	2.28		120.0	SURCHARGED	
1.004	5	34.992	0.405	0.000	1.03		179.3	SURCHARGED	
5.000	6	35.613	0.823	0.000	1.21		42.1	FLOOD RISK	
5.001	7	35.321	0.726	0.000	1.51		67.2	SURCHARGED	
1.005	8	34.741	0.384	0.000	2.40		257.8	SURCHARGED	
6.000	14	33.526	-0.049	0.000	0.74		113.6	OK	
6.001	15	33.438	0.014	0.000	0.89		123.5	SURCHARGED	
6.002	16	33.335	0.038	0.000	1.19		127.8	SURCHARGED	
6.003	17	33.132	-0.112	0.000	0.83		133.6	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.004	18	15 Summer	100	+30%					32.998
7.000	20	15 Summer	100	+30%	30/15 Summer				35.790
7.001	21	15 Summer	100	+30%	30/15 Summer				35.718
7.002	22	15 Summer	100	+30%	30/15 Summer				35.539
7.003	31	15 Summer	100	+30%	30/15 Summer				35.435
12.005	37	15 Summer	100	+30%	30/15 Summer				35.751
14.000	38	15 Summer	100	+30%					36.216
14.001	39	15 Summer	100	+30%	100/15 Summer				35.798
14.002	40	15 Summer	100	+30%	100/15 Summer				34.832
14.003	41	15 Summer	100	+30%	100/15 Summer				34.534
16.000	42	15 Summer	100	+30%	30/15 Summer				34.403
16.001	43	15 Summer	100	+30%	30/15 Summer				33.952
16.002	44	15 Summer	100	+30%	30/15 Summer				33.850
14.004	45	15 Summer	100	+30%	30/15 Summer				33.721
19.000	46	15 Summer	100	+30%	100/15 Summer				34.136
19.001	47	15 Summer	100	+30%	100/15 Summer				33.345
19.002	48	15 Summer	100	+30%	30/15 Summer				32.866
20.002	9	15 Summer	100	+30%	30/15 Summer				35.125
22.000	19	15 Summer	100	+30%	30/15 Summer				35.592
21.002	11	15 Summer	100	+30%	30/15 Summer				35.482
21.003	12	15 Summer	100	+30%	30/15 Summer				35.248
21.004	13	15 Summer	100	+30%	30/15 Summer				35.063
20.003	10	15 Summer	100	+30%	30/15 Summer				34.884

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.004	18	-0.078	0.000	0.98		132.8	OK	
7.000	20	0.515	0.000	0.86		29.9	SURCHARGED	
7.001	21	0.547	0.000	0.98		117.4	SURCHARGED	
7.002	22	0.547	0.000	1.45		124.3	SURCHARGED	
7.003	31	0.468	0.000	2.36		434.8	SURCHARGED	
12.005	37	0.277	0.000	1.86		248.6	SURCHARGED	
14.000	38	-0.094	0.000	0.63		48.3	OK	
14.001	39	0.171	0.000	0.95		141.3	SURCHARGED	
14.002	40	0.247	0.000	0.99		214.6	SURCHARGED	
14.003	41	0.253	0.000	1.26		266.2	SURCHARGED	
16.000	42	0.678	0.000	1.30		55.5	FLOOD RISK	
16.001	43	0.487	0.000	0.77		153.1	SURCHARGED	
16.002	44	0.557	0.000	0.88		192.9	SURCHARGED	
14.004	45	0.588	0.000	1.97		510.2	SURCHARGED	
19.000	46	0.486	0.000	1.32		52.2	SURCHARGED	
19.001	47	0.186	0.000	0.79		163.9	SURCHARGED	
19.002	48	0.444	0.000	2.86		175.5	FLOOD RISK	
20.002	9	0.325	0.000	1.07		58.2	SURCHARGED	
22.000	19	0.542	0.000	1.11		37.2	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
21.002	11	0.546	0.000	1.11		106.9	SURCHARGED	
21.003	12	0.499	0.000	1.08		163.6	SURCHARGED	
21.004	13	0.463	0.000	1.38		164.4	SURCHARGED	
20.003	10	0.378	0.000	2.39		256.4	SURCHARGED	

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Appendix F Drainage Strategy Statements from Plot Teams of Building Plots O, N and M

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1. Introduction

Civic Engineers has been appointed by Mayfield Partnership to provide a Drainage Statement and Strategy for the proposed development of Baring St Office 1, Mayfield.

The purpose of this statement is to:

- Provide information on the existing site's topography and drainage,
- Establish the pre-development peak 1 in 1-year surface water run-off rate,
- Calculate the required attenuation volume; and
- Summarise the proposed drainage strategy (including the feasibility of SUDS features)

This statement is based on currently available information. Proposals contained or forming part of this statement represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project.

2. Existing Site Details

Baring St Office 1 occupies 0.123ha and is located in the south west corner of the Mayfield Development Site, with Baring Street adjacent the west boundary and the proposed Baring St MSCP adjacent the south boundary. The plot is centred around an approximate National Grid Reference of SJ850975.

The proposed area has a history of industrial use during the 18th and 19th century as well as providing areas of terraced workers' housing and a primary community focal point in the form of the Mayfield Bath House. Within the latter half of the 20th century, there was a general reduction in the scale of industrial development of the site and the removal of previous workers' accommodation and the bathhouse. In 1977 a portion of the previous India Rubber building was demolished, leaving an area of open land in the majority of plot.

2.1 Existing Topography

A topographical survey was undertaken by Malcolm Hughes Surveyors in September 2017 and indicates the plot generally grades from the south east, with an approximate level of 35.79m AOD, to the north, with an approximate level of 35.15m AOD. The majority of the plot is currently used as a carpark with a tarmac surface finish, which has localised falls towards a central road gully.

The eastern side of the plot is occupied by a building and there is a small section of grass and trees (31m^2) adjacent the south east plot boundary.

For the purpose of drainage calculations, the plot is considered to be 100% impermeable

2.2 Existing Drainage

No above ground watercourses have been identified within the proposed plot boundary. The River Medlock is generally a culverted watercourse, however an exposed section is present approximately 15m north of Baring St Office 1.

Public Sewer records have been obtained from United Utilities which indicate there are no adopted sewers within the proposed plot boundary.

The following public sewer infrastructure has been identified within the vicinity of the plot:

- A varying large diameter combined water sewer runs within the Mancunian Way approximately 90m south of the proposed plot
- A 225mm diameter combined water sewers runs within Baring St. The sewer is believed to run the length of Baring St, however the United Utilities Asset Map only displays a short section.

The following private sewer infrastructure is believed to be in the vicinity of and within the proposed plot:

- From site observations it is anticipated that a private surface water sewer runs below the existing surface car park and discharges into the River Medlock, north of Baring St Office 1
- A private combined water sewer is anticipated within Nether St

A CCTV Survey has not been undertaken for the proposed plot.

3. Proposed Development

Baring St Office 1 is included within the Phase 1 proposal of the Mayfield Development and comprises an 8 storey office development including ground, mezzanine and plant level comprising 9, 987 sq.m. (GEA) including active ground floor uses (A1, A3, A4 or B1), public realm and riverside walkway.

The Phase 1 Site is located entirely within the Mayfield Strategic Regeneration Framework (SRF) area, which lies to the south of Fairfield Street in Manchester city centre, in close proximity to Piccadilly mainline railway station.

4. Surface Water Calculations

4.1 Catchment/Impermeable Areas

Site Drainage Area	=	1227m^2 / 0.123 ha
Pre-Development Impermeable Area	=	1227m^2 / 0.123 ha (100% Impermeable)
Post-Development Impermeable Area	=	1223m^2 / 0.123 ha (100% impermeable)

4.2 Surface Water Calculation Variables

Data to calculate the pre-development 1 in 1-year surface water run-off rates and attenuation volumes are based on figures from the Flood Studies Report (FSR) data and Wallingford Procedure, which have been sourced from HR Wallingford.

The variables used to calculate the surface water run-off rates and required attenuation volumes are as follows:

M5 – 60 (mm)	=	17.000		
Ratio R	=	0.4		
Cv (Summer)	=	0.750		
Cv (Winter)	=	0.840		
Time of Entry	=	4 minutes		
Climate Change	=	0	-	Pre-Development
	=	30%	-	Post Development

4.3 Pre-Development Peak 1 in 1 Year Surface Water Run-Off

Based on the above variables, and calculations undertaken using a two-pipe simulated network within Micro Drainage computer software, the pre-development surface water run-off rate is as follows:

Pre-Development 1 in 1-Year Rate	=	15.5 l/s	(15-minute critical storm)

4.4 Post Development Restricted Surface Water Run-Off Rate

The Buro Happold Surface Water Design Note requires each plot to discharge at a rate at 50% of the existing runoff rate, minus 2 L/s/ha (per plot boundary) to account for long term storage.

The surface water from the proposed development is to be restricted by a flow control, in this case a vortex flow control devise will be used, to give:

Post Development SW Run-Off Rate	=	7.5 L/s	(50% of 15.5l/s – 2 l/s/ha)

4.5 Surface Water Attenuation Volumes

The surface water attenuation volume has been calculated using the above variables within the Source Control module of Micro Drainage.

1 in 100 Year Event + CC (30%)	=	26.4m^3	(7.5 l/s)

5. Surface Water Drainage Strategy

The site wide drainage strategy, prepared by Buro Happold, proposes that the surface water runoff from each plot be collected within a main sewer run and then outfall to the River Medlock at a restricted rate.

Based on the current proposed layout, runoff collected by the green roof will be conveyed through the building to a traditional below ground system of pipes and manholes which will then convey flows to a underground attenuation tank, before discharging to the proposed Buro Happold Surface Water sewer at a restricted rate of 7.5 L/s.

The proposed drainage strategy is enclosed within Appendix A.

5.1 Potential Sustainable Drainage Systems (SUDS) Features Feasibility

Where possible SuDS are to be incorporated into the post development design to provide attenuation and ensure that runoff from the site does not exceed predevelopment runoff rates.

Varied SuDS methods have been summarised in the table below to assess and establish which are most feasible for the proposed post development site.

SuDS Method	Feasibility, Given Site and Project
Green & Blue Roofs	Green roofs are systems which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insultation. A green roof is currently proposed for the building, however it should be noted that the use of brown/green roofs should be for betterment purposes and not to be counted towards the provision of on-site storage for surface water. This is due to their hydraulic performance during extreme events being similar to a standard roof (CIRIA C697)
Basins and Ponds – Above Ground storage	Basins and ponds increase biodiversity and amenity of the area; provide attenuation; and improve water quality. This method does however occupy large areas of developable land and requires suitable offsets from buildings. Due to the proposed structure occupying the entire site and the urban location, basins and ponds are not a feasible option.
Rain Gardens & Tree Pits	The current layout proposes 100% of the plot be occupied by the residential building and as such there is no area available for a Rain Gardens or Tree Pits
Filter Strips and Swales	Filter strips and swales are generally used adjacent highways to reduce and treat runoff. The current layout proposed for Baring St Office 1 does not involve highways and as such there is no available area for filter strips or swales
Rainwater Harvesting	Storage and use of rainwater for non-potable uses within a building (eg. Toilet flushing). Is should be noted that storage in these types of systems is not usually considered to count towards the provision of on-site storage for surface water balancing because, given the sporadic nature of the use of harvester water, it cannot be guaranteed that the tanks are available to provide sufficient attenuation during storm events.

	Rainwater harvesting is not a viable option due to the rainfall yield on the roof area being significantly less than the water demand for the residential units.
Infiltration Devices	Borehole testing conducted on site identified the presence of made ground and the BGS drift maps indicate the site is underlain by a Secondary Aquifer within the Superficial drift and a Primary Aquifer within the bedrock. The historic use of the site as a tannery, factories and bathhouse also present a high risk to groundwater contamination. For these reasons it is recommended that infiltration not be incorporated into the drainage strategy.
Permeable surfaces	Permeable surfaces allow rainwater to infiltrate through the surface into an underlying storage layer. As the proposed building occupies 100% of the plot there are no surface areas available for this method.
Vortex Control and Tanked Attenuation systems	A vortex flow control device is to be used to restrict the surface water flow from the site to proposed runoff rates. Tanked attenuation systems provide high storage capacity and can be incorporated within road pavements and under structural slabs and landscaping.

6. Foul Water Drainage Strategy

The site wide drainage strategy, prepared by Buro Happold, proposes that the foul water discharge from each plot be collected within a main sewer run and then outfall to the existing public combined water sewer within the Mancunian Way.

Based on the current proposed layout, foul drainage from each residence is be collected via a piped system, before discharging to the proposed Buro Happold Foul Water sewer at an unrestricted rate.

The proposed drainage strategy is enclosed within Appendix A.

Appendix A – Drainage Strategy (1076-01-CE-YY-XX-DR-C-0001)

HEALTH & SAFETY: The works shall be carried out by specialist competent and experienced contractors. All operatives shall have received full and appropriate training with appropriate qualifications for the operations they are required to undertake. All work shall be carried out in accordance with the relevant Health & Safety Regulations.

DRAINAGE NOTES

All discrepancies shall be reported to the engineer for action prior to any new construction

All drainage works shall be carried out in accordance with the requirement of the local authority and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and addendums as appropriate.

All drainage shall comply with the typical drainage construction details and the requirements of BS EN 752.

Access covers and frames shall comply with the loadings specified and to BS EN 124 and kitemarked or if recessed covers are specified then in accordance with FACTA association equivalent. Allow for recess manhole covers to accept landscape architect finishes to all landscaped areas (total 9No. covers)

The proposed building outlines shown on this drawing are for information only. Refer to Architects plans for precise location setting out information and details. For setting out dimensions of SS's, SVP's, RWP's, Floor Gully & other drainage 'pop up' locations, refer to Architects or Mechanical & Electrical Engineers drawings.

All underslab drainage shall be laid at gradients of 1:80 min. for foul pipework and 1:100 min. for surface water unless noted otherwise. All pipework to be: Foul 100mm and Surface Water 150mm unless otherwise stated.

All underslab drainage shall be clear of foundations unless shown otherwise with long radius bends kept to a minimum and used where unavoidable.
All surface water drop down positions shall have a bend set at invert level no greater than 1.3m below finish floor level.

At least one soil pipe at the head of each foul run shall be vented to the atmosphere. All rainwater downpipes shall be accessible above ground for rodding purposes.

All existing drainage levels to which the the proposed drainage is to connect is to be clarified on site. Proposed drainage shown on this drawing subject to change once existing drainage levels are known.

Surface water connections to existing drainage are subject to local planners and statutory organisation approvals.
Existing details shown on this drawing including kerblines, existing drains, chambers, sewers, pipework, stub connections where new connections, diversions or abandonment are shown, invert levels and pipe sizes shall be checked and confirmed to the engineer prior to the commencement of any works. Any discrepancies shall be reported to the engineer for action prior to any new construction.
All drainage works shall be carried out in accordance with the requirements of the local authority and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and addendums as appropriate.

Cover levels shown on this drawing are approximate and shall be adjusted to suit finished pavement levels on site by Contractor. Covers shall be orientated to suit pavement finishes where appropriate.

All private drainage pipework for foul and surface water systems have been designed on the basis of UPVC to BS EN 1401-1, unless noted otherwise.

All drainage pipework shall be laid soffit to soffit unless noted otherwise.

Where new drainage is situated within 5 metres of new or existing trees the pipework shall be encased in concrete to reduce the risk of root ingress.

Concrete encasement of the pipework shall be required where the vertical clearance between two pipes crossing is less than 300mm.

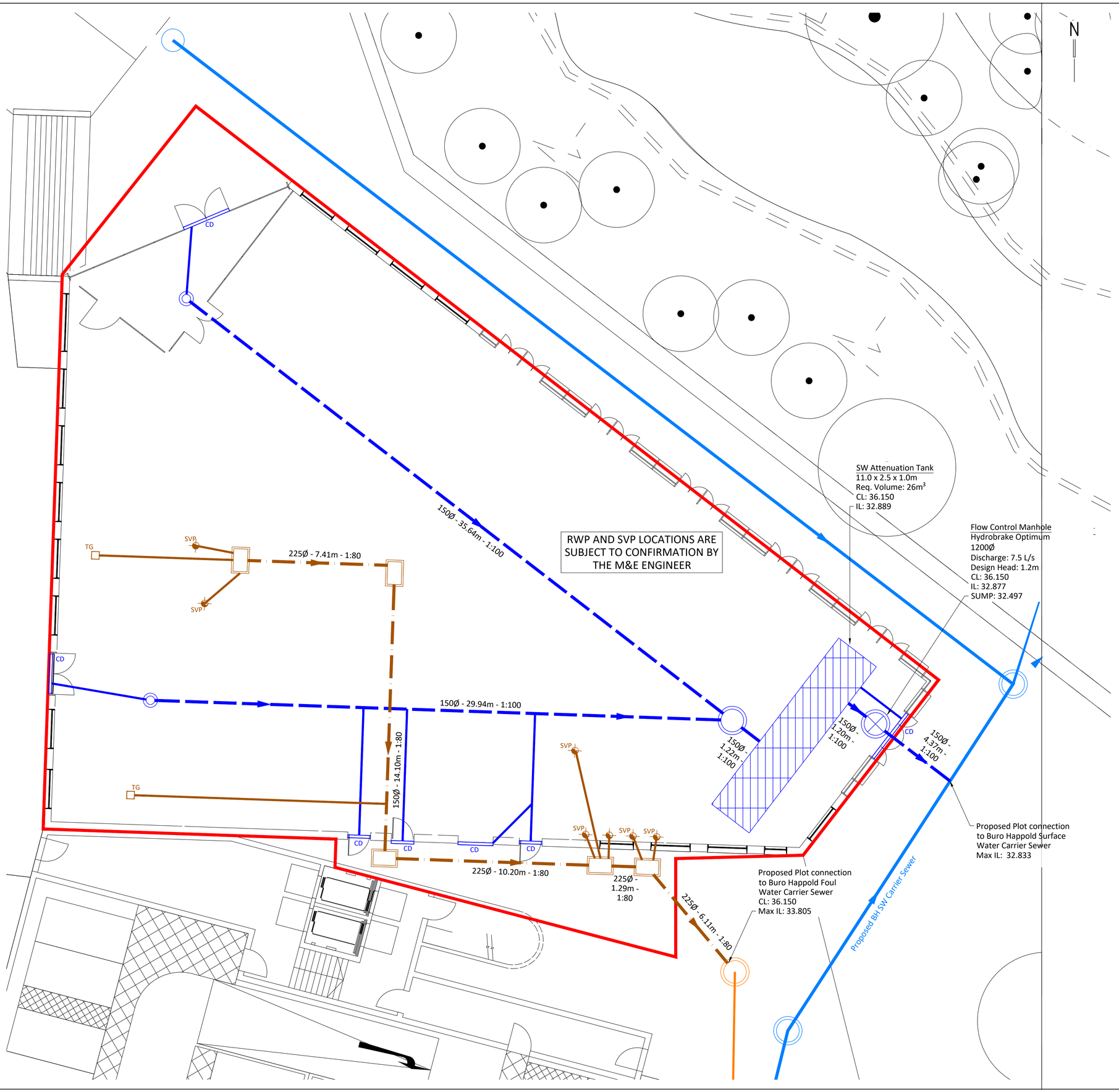
All existing drainage shall be assumed to be 'live' and shall be maintained at all times during the works. Existing drainage shall be reconnected to the new drainage system unless proven to be redundant for abandonment. All existing drainage to be abandoned shall be sealed by appropriate means.

All drainage connecting to the public sewer network shall not commence until receipt of the approval from the drainage authority and shall comply with requirements using vitrified clay pipework to BS EN 295 with plain sleeved or socketed flexible joints subject to their approval.
Where drainage works are carried out in the public highway the relevant necessary approvals and road opening notices shall be obtained from the highway authority and utility companies.

Prior to construction the flow control manufacturer's drawing and hydraulic table shall be provided to the engineer for approval

Prior to construction the attenuation tank manufacturer's drawings shall be provided to the engineer for approval

Upon completion all new drainage installation together with any existing drainage retained shall be jetted and CCTV surveyed upon completion. Contractor to ensure that the drainage system is fully operational, free of excess debris/silt and all identified faults rectified.

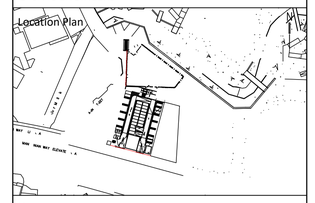


Standard Notes

1. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.
2. This drawing should not be scaled.
3. All dimensions are to be verified by the contractor on site.
4. All discrepancies should be reported to the C.A. prior to the commencement of the works.

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Location Plan



Notes
1. This Drawing has been based on the following;
   - Masterplan layout (0345-SEW-ZZ-00-DR-L-007102) provided by Studio Egret West on 21/08/19
   - Plot Boundaries (0343-SEW-ZZ-ZZ-DR-Z-000050) provided by Studio Egret West on 04/03/19
   - Site Wide Surface Water Drainage Strategy (0042912-BHE-XX -XX-DR-C-3120-A) provided by Buro Happold on 21/03/19
   - Site Wide FW Drainage Strategy (0292-SEW-ZZ-03 -SK1009) provided by Buro Happold on 21/03/19
   - Topographic Survey (170929 Utilities and Topo) provided by Faithful & Gould on 18/08/18

Key

- PLOT BOUNDARY
- PROPOSED BURO HAPPOLD FOUL WATER CARRIER SEWER
- PROPOSED BURO HAPPOLD SURFACE WATER CARRIER SEWER
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED BURO HAPPOLD SURFACE WATER CARRIER MANHOLE
- PROPOSED BURO HAPPOLD FOUL WATER CARRIER MANHOLE
- PROPOSED FOUL WATER INSPECTION CHAMBER (RECTANGULAR)
- PROPOSED SURFACE WATER MANHOLE WITH FLOW RESTRICTION
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED SURFACE WATER INSPECTION CHAMBER (TYPE 2)
- SVP — ASSUMED SOIL VENT PIPE. LOCATION SUBJECT TO CONFIRMATION WITH M&E
- TG — PROPOSED FOUL WATER TRAPPED GULLY
- CD — PROPOSED LINEAR CHANNEL DRAIN
- PROPOSED ATTENUATION TANK
- VP — PROPOSED VENT PIPE

Date	Rev	Description	Drawn	Chkd
05.09.19	P01	ISSUED FOR INFORMATION	EMM	PM

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Project
MAYFIELD DEVELOPMENT
BARING STREET OFFICE 1

Title
DRAINAGE STRATEGY
GENERAL ARRANGEMENT

Status
INFORMATION

Scale @ A1	Date Created	Drawn	Checked
1:100	05/09/19	EMM	PM

Project Number	Originator	Discipline	Drawing Number	Revision
1076-01	CE	C	0001	P01

Appendix B – Micro Drainage Readouts

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	17.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Summer	1	+0%					8.119
1.001	2	15 Summer	1	+0%					8.018

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.031	0.000	0.98		15.5	OK	
1.001	2	-0.032	0.000	0.98		15.5	OK	

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Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 33 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	34.876	0.826	0.0	7.5	7.5	17.3	O K
30 min Summer	35.065	1.015	0.0	7.5	7.5	21.2	O K
60 min Summer	35.093	1.043	0.0	7.5	7.5	21.8	O K
120 min Summer	34.994	0.944	0.0	7.5	7.5	19.7	O K
180 min Summer	34.842	0.792	0.0	7.5	7.5	16.6	O K
240 min Summer	34.677	0.627	0.0	7.5	7.5	13.1	O K
360 min Summer	34.433	0.383	0.0	7.5	7.5	8.0	O K
480 min Summer	34.284	0.234	0.0	7.3	7.3	4.9	O K
600 min Summer	34.200	0.150	0.0	6.9	6.9	3.1	O K
720 min Summer	34.153	0.103	0.0	6.4	6.4	2.2	O K
960 min Summer	34.120	0.070	0.0	5.3	5.3	1.5	O K
1440 min Summer	34.093	0.043	0.0	3.9	3.9	0.9	O K
2160 min Summer	34.076	0.026	0.0	2.9	2.9	0.5	O K
2880 min Summer	34.066	0.016	0.0	2.3	2.3	0.3	O K
4320 min Summer	34.055	0.005	0.0	1.6	1.6	0.1	O K
5760 min Summer	34.050	0.000	0.0	1.3	1.3	0.0	O K
7200 min Summer	34.050	0.000	0.0	1.1	1.1	0.0	O K
8640 min Summer	34.050	0.000	0.0	0.9	0.9	0.0	O K
10080 min Summer	34.050	0.000	0.0	0.8	0.8	0.0	O K
15 min Winter	35.009	0.959	0.0	7.5	7.5	20.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	107.328	0.0	24.7	22
30 min Summer	70.622	0.0	32.5	32
60 min Summer	44.405	0.0	40.9	50
120 min Summer	27.084	0.0	50.0	86
180 min Summer	20.061	0.0	55.5	120
240 min Summer	16.138	0.0	59.5	148
360 min Summer	11.797	0.0	65.3	206
480 min Summer	9.396	0.0	69.3	262
600 min Summer	7.872	0.0	72.6	318
720 min Summer	6.816	0.0	75.4	376
960 min Summer	5.426	0.0	80.1	492
1440 min Summer	3.929	0.0	87.0	734
2160 min Summer	2.841	0.0	94.3	1092
2880 min Summer	2.255	0.0	99.8	1468
4320 min Summer	1.626	0.0	108.0	2184
5760 min Summer	1.288	0.0	114.1	0
7200 min Summer	1.075	0.0	118.9	0
8640 min Summer	0.926	0.0	123.0	0
10080 min Summer	0.817	0.0	126.6	0
15 min Winter	107.328	0.0	27.7	22

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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	35.227	1.177	0.0	7.5	7.5	24.6	O K
60 min Winter	35.396	1.346	0.0	7.5	7.5	25.2	O K
120 min Winter	35.100	1.050	0.0	7.5	7.5	21.9	O K
180 min Winter	34.867	0.817	0.0	7.5	7.5	17.1	O K
240 min Winter	34.601	0.551	0.0	7.5	7.5	11.5	O K
360 min Winter	34.291	0.241	0.0	7.3	7.3	5.0	O K
480 min Winter	34.163	0.113	0.0	6.5	6.5	2.4	O K
600 min Winter	34.127	0.077	0.0	5.7	5.7	1.6	O K
720 min Winter	34.111	0.061	0.0	4.9	4.9	1.3	O K
960 min Winter	34.093	0.043	0.0	3.9	3.9	0.9	O K
1440 min Winter	34.076	0.026	0.0	2.9	2.9	0.5	O K
2160 min Winter	34.063	0.013	0.0	2.1	2.1	0.3	O K
2880 min Winter	34.055	0.005	0.0	1.6	1.6	0.1	O K
4320 min Winter	34.050	0.000	0.0	1.2	1.2	0.0	O K
5760 min Winter	34.050	0.000	0.0	0.9	0.9	0.0	O K
7200 min Winter	34.050	0.000	0.0	0.8	0.8	0.0	O K
8640 min Winter	34.050	0.000	0.0	0.7	0.7	0.0	O K
10080 min Winter	34.050	0.000	0.0	0.6	0.6	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	70.622	0.0	36.5	33
60 min Winter	44.405	0.0	45.9	54
120 min Winter	27.084	0.0	56.0	92
180 min Winter	20.061	0.0	62.2	130
240 min Winter	16.138	0.0	66.7	156
360 min Winter	11.797	0.0	73.1	210
480 min Winter	9.396	0.0	77.7	260
600 min Winter	7.872	0.0	81.3	314
720 min Winter	6.816	0.0	84.5	372
960 min Winter	5.426	0.0	89.7	490
1440 min Winter	3.929	0.0	97.4	728
2160 min Winter	2.841	0.0	105.7	1096
2880 min Winter	2.255	0.0	111.8	1432
4320 min Winter	1.626	0.0	120.9	0
5760 min Winter	1.288	0.0	127.8	0
7200 min Winter	1.075	0.0	133.2	0
8640 min Winter	0.926	0.0	137.8	0
10080 min Winter	0.817	0.0	141.8	0

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Model Details

Storage is Online Cover Level (m) 36.150

Cellular Storage Structure

Invert Level (m) 34.050 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	22.0	0.0	1.201	0.0	0.0
1.200	22.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0122-7500-1400-7500
Design Head (m)	1.400
Design Flow (l/s)	7.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	122
Invert Level (m)	34.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	7.5
Flush-Flo™	0.413	7.5
Kick-Flo®	0.868	6.0
Mean Flow over Head Range	-	6.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.3	1.200	7.0	3.000	10.7	7.000	16.1
0.200	6.9	1.400	7.5	3.500	11.5	7.500	16.6
0.300	7.4	1.600	8.0	4.000	12.3	8.000	17.1
0.400	7.5	1.800	8.4	4.500	13.0	8.500	17.6
0.500	7.4	2.000	8.9	5.000	13.7	9.000	18.1
0.600	7.3	2.200	9.3	5.500	14.3	9.500	18.6
0.800	6.6	2.400	9.7	6.000	14.9		
1.000	6.4	2.600	10.0	6.500	15.5		

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civicengineers.com

1. Introduction

Civic Engineers has been appointed by Mayfield Partnership to provide a Drainage Statement and Strategy for the proposed development of Baring St MSCP, Mayfield.

The purpose of this statement is to:

- Provide information on the existing site's topography and drainage,
- Establish the pre-development peak 1 in 1-year surface water run-off rate,
- Calculate the required attenuation volume; and
- Summaries the proposed drainage strategy (including the feasibility of SUDS features)

This statement is based on currently available information. Proposals contained or forming part of this statement represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project.

2. Existing Site Details

Baring St MSCP occupies 0.176ha and is located in the south west corner of the Mayfield Development Site. It is bounded by Baring Street to the west; the proposed Baring St Office 1 plot to the north; and the Mancunian Way to the south. The plot is centred around an approximate National Grid Reference of SJ850975.

The proposed area has a history of industrial use during the 18th and 19th century as well as providing areas of terraced workers' housing and a primary community focal point in the form of the Mayfield Bath House. Within the latter half of the 20th century, there was a general reduction in the scale of industrial development of the site and the removal of previous workers' accommodation and the bathhouse. Low-level industrial units remained and following the construction of the Mancunian Way to the south in 1986, the site has been consistent with the current day layout

2.1 Existing Topography

A topographical survey was undertaken by Malcolm Hughes Surveyors in September 2017 and shows the majority of the plot is occupied by industrial units. Topographical levels were obtained around the edges of these existing buildings and indicate the plot generally grades from the south east, with an approximate level of 36.75m AOD, to the north, with an approximate level of 35.20m AOD.

Sections of the southern and eastern boundary are occupied by Bond St and Nether St, respectively, and a small section of grass and trees (46m^2) is present, adjacent the northern plot boundary.

For the purpose of drainage calculations, the plot is considered to be 100% impermeable

2.2 Existing Drainage

No above ground watercourses have been identified within the proposed plot boundary. The River Medlock is generally a culverted watercourse, however an exposed section is present approximately 50m north of the proposed plot.

Public Sewer records have been obtained from United Utilities which indicate there are no adopted sewers within the proposed plot boundary.

The following public sewer infrastructure has been identified within the vicinity of the plot:

- A varying large diameter combined water sewer runs within the Mancunian Way approximately 35m south of the proposed plot
- A 225mm diameter combined water sewers runs within Baring St. The sewer is believed to run the length of Baring St, however the United Utilities Asset Map only displays a short section.

The following private sewer infrastructure is believed to be in the vicinity of and within the proposed plot:

- From site observations it is anticipated that a private surface water sewer runs below the existing surface car park within the adjacent plot, Baring St Office 1, and discharges into the River Medlock,
- A private combined water sewer is anticipated within Nether St

A CCTV Survey has not been undertaken for the proposed plot.

3. Proposed Development

Baring St MSCP is included within the Phase 1 proposal of the Mayfield Development and comprises ground plus 10 storey MSCP for circa 545 car parking spaces.

The Phase 1 Site is located entirely within the Mayfield Strategic Regeneration Framework (SRF) area, which lies to the south of Fairfield Street in Manchester city centre, in close proximity to Piccadilly mainline railway station.

4. Surface Water Calculations

4.1 Catchment/Impermeable Areas

Site Drainage Area	=	1756m^2 / 0.176 ha
Pre-Development Impermeable Area	=	1756m^2 / 0.176 ha (100% impermeable)
Post-Development Impermeable Area	=	1756m^2 / 0.176 ha (100% impermeable)

4.2 Surface Water Calculation Variables

Data to calculate the pre-development 1 in 1-year surface water run-off rates and attenuation volumes are based on figures from the Flood Studies Report (FSR) data and Wallingford Procedure, which have been sourced from HR Wallingford.

The variables used to calculate the surface water run-off rates and required attenuation volumes are as follows:

M5 – 60 (mm)	=	17.000		
Ratio R	=	0.4		
Cv (Summer)	=	0.750		
Cv (Winter)	=	0.840		
Time of Entry	=	4 minutes		
Climate Change	=	0	-	Pre-Development
	=	30%	-	Post Development

4.3 Pre-Development Peak 1 in 1 Year Surface Water Run-Off

Based on the above variables, and calculations undertaken using a two-pipe simulated network within Micro Drainage computer software, the pre-development surface water run-off rates are as follows:

Pre-Development 1 in 1-Year Rate	=	22.2 l/s	(15-minute critical storm)

4.4 Post Development Restricted Surface Water Run-Off Rate

The Buro Happold Surface Water Design Note requires each plot to discharge at a rate at 50% of the existing runoff rate, minus 2 L/s/ha (per plot boundary) to account for long term storage.

The surface water from the proposed development is to be restricted by a flow control, in this case a vortex flow control devise will be used, to give:

Post Development SW Run-Off Rate	=	10.7 L/s	(50% of 22.2l/s – 2 l/s/ha)

4.5 Surface Water Attenuation Volumes

The surface water attenuation volumes have been calculated using the above variables within the Source Control module of Micro Drainage.

1 in 100 Year Event + CC (30%)	=	36 m^3	(10.7 l/s)

5. Surface Water Drainage Strategy

The site wide drainage strategy, prepared by Buro Happold, proposes that the surface water runoff from each plot be collected within a main sewer run and then outfall to the River Medlock at a restricted rate.

Based on the current proposed layout, runoff will be collected by rainwater pipes, gullies and channels and conveyed via a traditional below ground system of pipes and manholes before being treated by a Class I Bypass Separator (NSBP003 Kingspan or approved equivalent). Runoff will then flow to a underground attenuation tank, before discharging to the proposed Buro Happold Surface Water sewer at a restricted rate of 10.7 L/s.

Surface water runoff from hard paved areas at risk of contamination should receive water quality treatment. Low traffic access roads and car parking is considered low hazard in terms of contamination, therefore a bypass separator has been recommended.

The proposed drainage strategy is enclosed within Appendix A.

5.1 Potential Sustainable Drainage Systems (SUDS) Features Feasibility

Where possible SuDS are to be incorporated into the post development design to provide attenuation and ensure that runoff from the site does not exceed predevelopment runoff rates.

Varied SuDS methods have been summarised in the table below to assess and establish which are most feasible for the proposed post development site

SuDS Method	Feasibility, Given Site and Project
Green & Blue Roofs	Green roofs are systems which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insultation. As the current layout proposes 100% of the plot be occupied by carparking facilities there is no area available for a Green or Blue roof.
Basins and Ponds – Above Ground storage	Basins and ponds increase biodiversity and amenity of the area; provide attenuation; and improve water quality. This method does however occupy large areas of developable land and requires suitable offsets from buildings. Due to the proposed structure occupying the entire plot and the urban location, basins and ponds are not a feasible option.
Rain Gardens & Tree Pits	The current layout proposes 100% of the plot be occupied by carparking facilities and as such there is no area available for a Rain Gardens or Tree Pits
Filter Strips and Swales	Filter strips and swales are generally used adjacent highways to reduce and treat runoff. The current layout proposed does not involve highways and as such there is no available area for filter strips or swales.
Rainwater Harvesting	Storage and use of rainwater for non-potable uses within a building (eg. Toilet flushing). Is should be noted that storage in these types of systems is not usually considered to count towards the provision of on-site storage for surface water balancing

	because, given the sporadic nature of the use of harvester water, it cannot be guaranteed that the tanks are available to provide sufficient attenuation during storm events. Rainwater harvesting is not a viable option as the current layout is a carparking facility and has no use for non-potable water.
Infiltration Devices	Borehole testing conducted on site identified the presence of made ground and the BGS drift maps indicate the site is underlain by a Secondary Aquifer within the Superficial drift and a Primary Aquifer within the bedrock. The historic use of the site as a tannery, factories and bathhouse also present a high risk to groundwater contamination. For these reasons it is recommended that infiltration not be incorporated into the drainage strategy.
Permeable surfaces	Permeable surfaces allow rainwater to infiltrate through the surface into an underlying storage layer. There are no external landscape areas associated with the carpark and whilst the top storey of the carpark will be open to the elements, the structural slab will form the surface of the carpark. As such there is no opportunity for permeable surfacing within the plot.
Vortex Control and Tanked Attenuation systems	A vortex flow control device is to be used to restrict the surface water flow from the site to proposed runoff rates. Tanked attenuation systems provide high storage capacity and can be incorporated within road pavements and under structural slabs and landscaping.

Appendix A – Drainage Strategy (1076-02-CE-YY-XX-DR-C-0001)

HEALTH & SAFETY: The works shall be carried out by specialist competent and experienced contractors. All operatives shall have received full and appropriate training with appropriate qualifications for the operations they are required to undertake. All work shall be carried out in accordance with the relevant Health & Safety Regulations.

DRAINAGE NOTES

All discrepancies shall be reported to the engineer for action prior to any new construction

All drainage works shall be carried out in accordance with the requirement of the local authority and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and addendums as appropriate.

All drainage shall comply with the typical drainage construction details and the requirements of BS EN 752.

Access covers and frames shall comply with the loadings specified and to BS EN 124 and kitemarked or if recessed covers are specified then in accordance with FACTA association equivalent. Allow for recess manhole covers to accept landscape architect finishes to all landscaped areas (total 9No. covers)

The proposed building outlines shown on this drawing are for information only. Refer to Architects plans for precise location setting out information and details. For setting out dimensions of SS's, SVP's, RWP's, Floor Gully & other drainage 'pop up' locations, refer to Architects or Mechanical & Electrical Engineers drawings.

All underslab drainage shall be laid at gradients of 1:80 min. for foul pipework and 1:100 min. for surface water unless noted otherwise. All pipework to be: Foul 100mm and Surface Water 150mm unless otherwise stated.

All underslab drainage shall be clear of foundations unless shown otherwise with long radius bends kept to a minimum and used where unavoidable.
All surface water drop down positions shall have a bend set at invert level no greater than 1.3m below finish floor level.

At least one soil pipe at the head of each foul run shall be vented to the atmosphere. All rainwater downpipes shall be accessible above ground for rodding purposes.

All existing drainage levels to which the the proposed drainage is to connect is to be clarified on site. Proposed drainage shown on this drawing subject to change once existing drainage levels are known.

Surface water connections to existing drainage are subject to local planners and statutory organisation approvals.
Existing details shown on this drawing including kerblines, existing drains, chambers, sewers, pipework, stub connections where new connections, diversions or abandonment are shown, invert levels and pipe sizes shall be checked and confirmed to the engineer prior to the commencement of any works. Any discrepancies shall be reported to the engineer for action prior to any new construction.
All drainage works shall be carried out in accordance with the requirements of the local authority and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and addendums as appropriate.

Cover levels shown on this drawing are approximate and shall be adjusted to suit finished pavement levels on site by Contractor. Covers shall be orientated to suit pavement finishes where appropriate.

All private drainage pipework for foul and surface water systems have been designed on the basis of UPVC to BS EN 1401-1, unless noted otherwise.

All drainage pipework shall be laid soffit to soffit unless noted otherwise.

Where new drainage is situated within 5 metres of new or existing trees the pipework shall be encased in concrete to reduce the risk of root ingress.

Concrete encasement of the pipework shall be required where the vertical clearance between two pipes crossing is less than 300mm.

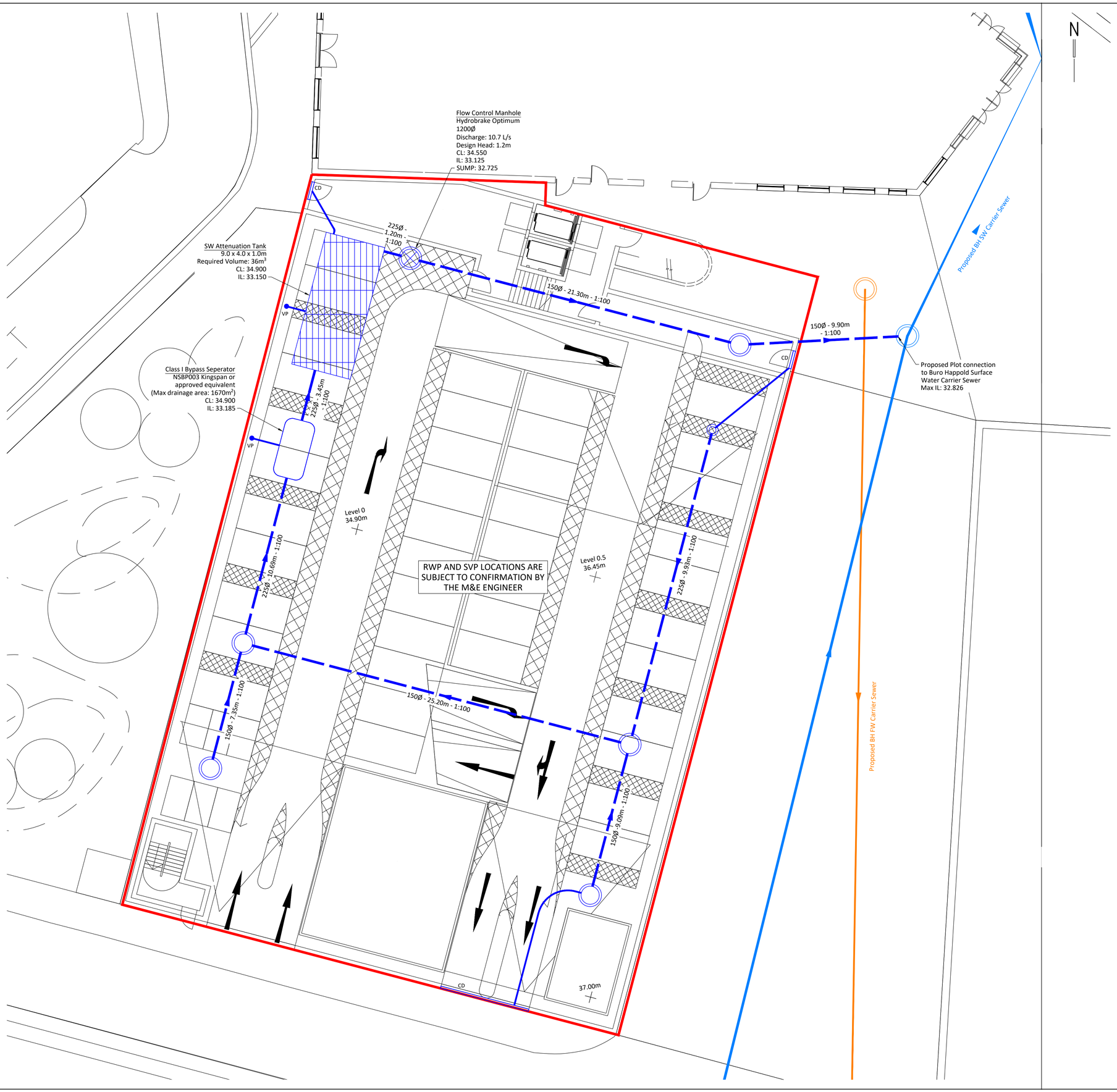
All existing drainage shall be assumed to be 'live' and shall be maintained at all times during the works. Existing drainage shall be reconnected to the new drainage system unless proven to be redundant for abandonment. All existing drainage to be abandoned shall be sealed by appropriate means.

All drainage connecting to the public sewer network shall not commence until receipt of the approval from the drainage authority and shall comply with requirements using vitrified clay pipework to BS EN 295 with plain sleeved or socketed flexible joints subject to their approval.
Where drainage works are carried out in the public highway the relevant necessary approvals and road opening notices shall be obtained from the highway authority and utility companies.

Prior to construction the flow control manufacturer's drawing and hydraulic table shall be provided to the engineer for approval

Prior to construction the attenuation tank manufacturer's drawings shall be provided to the engineer for approval

Upon completion all new drainage installation together with any existing drainage retained shall be jetted and CCTV surveyed upon completion. Contractor to ensure that the drainage system is fully operational, free of excess debris/silt and all identified faults rectified.

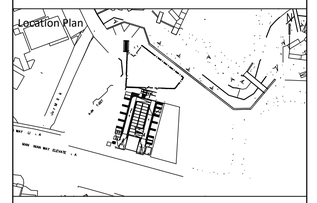


Standard Notes

1. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.
2. This drawing should not be scaled.
3. All dimensions are to be verified by the contractor on site.
4. All discrepancies should be reported to the C.A. prior to the commencement of the works.

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Location Plan



Notes
1. This Drawing has been based on the following;
   - Masterplan layout (0345-SEW-ZZ-00-DR-L-007102) provided by Studio Egret West on 21/08/19
   - Plot Boundaries (0343-SEW-ZZ-ZZ-DR-Z-000050) provided by Studio Egret West on 04/03/19
   - Site Wide Surface Water Drainage Strategy (0042912-BHE-XX -XX-DR-C-3120-A) provided by Buro Happold on 21/03/19
   - Site Wide FW Drainage Strategy (0292-SEW-ZZ-03 -SK1009) provided by Buro Happold on 21/03/19
   - Topographic Survey (170929 Utilities and Topo) provided by Faithful & Gould on 18/08/18

Key

- PLOT BOUNDARY
- PROPOSED BURO HAPPOLD FOUL WATER CARRIER SEWER
- PROPOSED BURO HAPPOLD SURFACE WATER CARRIER SEWER
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED BURO HAPPOLD SURFACE WATER CARRIER MANHOLE
- PROPOSED BURO HAPPOLD FOUL WATER CARRIER MANHOLE
- PROPOSED SURFACE WATER MANHOLE WITH FLOW RESTRICTION
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED SURFACE WATER INSPECTION CHAMBER (TYPE 2)
- CD — PROPOSED LINEAR CHANNEL DRAIN
- PROPOSED ATTENUATION TANK
- VP — PROPOSED VENT PIPE

Date	Rev	Description	Drawn	Chkd
05.09.19	P01	ISSUED FOR INFORMATION	EMM	PM

MANCHESTER Carver's Warehouse, 77 Dale Street, Manchester, M1 2HG. Tel: 0161 228 6757
LONDON Reeds Wharf, 33 Mill Street, London SE1 2AX. Tel: 020 7253 2977
LEEDS Tower Works, Unit D2-01, Globe Road, Leeds, LS11 5QG. Tel: 07174 3159 138
GLASGOW Grinham Chambers, 45 West Nile St, Glasgow, G1 2PT. Tel: 0141 370 1829
www.civicengineers.com

Project
MAYFIELD DEVELOPMENT
BARING STREET MSCP

Title
DRAINAGE STRATEGY
GENERAL ARRANGEMENT

Status
INFORMATION

Scale @ A1	Date Created	Drawn	Checked
1:125	05/09/19	EMM	PM

Project Number	Originator	Discipline	Drawing Number	Revision
1076-02	CE	C	0001	P01

Appendix B – Micro Drainage Readouts

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	17.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Summer	1	+0%					8.119
1.001	2	15 Summer	1	+0%					8.018

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.031	0.000	0.98		15.5	OK	
1.001	2	-0.032	0.000	0.98		15.5	OK	

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Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 33 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	34.876	0.826	0.0	7.5	7.5	17.3	O K
30 min Summer	35.065	1.015	0.0	7.5	7.5	21.2	O K
60 min Summer	35.093	1.043	0.0	7.5	7.5	21.8	O K
120 min Summer	34.994	0.944	0.0	7.5	7.5	19.7	O K
180 min Summer	34.842	0.792	0.0	7.5	7.5	16.6	O K
240 min Summer	34.677	0.627	0.0	7.5	7.5	13.1	O K
360 min Summer	34.433	0.383	0.0	7.5	7.5	8.0	O K
480 min Summer	34.284	0.234	0.0	7.3	7.3	4.9	O K
600 min Summer	34.200	0.150	0.0	6.9	6.9	3.1	O K
720 min Summer	34.153	0.103	0.0	6.4	6.4	2.2	O K
960 min Summer	34.120	0.070	0.0	5.3	5.3	1.5	O K
1440 min Summer	34.093	0.043	0.0	3.9	3.9	0.9	O K
2160 min Summer	34.076	0.026	0.0	2.9	2.9	0.5	O K
2880 min Summer	34.066	0.016	0.0	2.3	2.3	0.3	O K
4320 min Summer	34.055	0.005	0.0	1.6	1.6	0.1	O K
5760 min Summer	34.050	0.000	0.0	1.3	1.3	0.0	O K
7200 min Summer	34.050	0.000	0.0	1.1	1.1	0.0	O K
8640 min Summer	34.050	0.000	0.0	0.9	0.9	0.0	O K
10080 min Summer	34.050	0.000	0.0	0.8	0.8	0.0	O K
15 min Winter	35.009	0.959	0.0	7.5	7.5	20.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	107.328	0.0	24.7	22
30 min Summer	70.622	0.0	32.5	32
60 min Summer	44.405	0.0	40.9	50
120 min Summer	27.084	0.0	50.0	86
180 min Summer	20.061	0.0	55.5	120
240 min Summer	16.138	0.0	59.5	148
360 min Summer	11.797	0.0	65.3	206
480 min Summer	9.396	0.0	69.3	262
600 min Summer	7.872	0.0	72.6	318
720 min Summer	6.816	0.0	75.4	376
960 min Summer	5.426	0.0	80.1	492
1440 min Summer	3.929	0.0	87.0	734
2160 min Summer	2.841	0.0	94.3	1092
2880 min Summer	2.255	0.0	99.8	1468
4320 min Summer	1.626	0.0	108.0	2184
5760 min Summer	1.288	0.0	114.1	0
7200 min Summer	1.075	0.0	118.9	0
8640 min Summer	0.926	0.0	123.0	0
10080 min Summer	0.817	0.0	126.6	0
15 min Winter	107.328	0.0	27.7	22

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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	35.227	1.177	0.0	7.5	7.5	24.6	O K
60 min Winter	35.396	1.346	0.0	7.5	7.5	25.2	O K
120 min Winter	35.100	1.050	0.0	7.5	7.5	21.9	O K
180 min Winter	34.867	0.817	0.0	7.5	7.5	17.1	O K
240 min Winter	34.601	0.551	0.0	7.5	7.5	11.5	O K
360 min Winter	34.291	0.241	0.0	7.3	7.3	5.0	O K
480 min Winter	34.163	0.113	0.0	6.5	6.5	2.4	O K
600 min Winter	34.127	0.077	0.0	5.7	5.7	1.6	O K
720 min Winter	34.111	0.061	0.0	4.9	4.9	1.3	O K
960 min Winter	34.093	0.043	0.0	3.9	3.9	0.9	O K
1440 min Winter	34.076	0.026	0.0	2.9	2.9	0.5	O K
2160 min Winter	34.063	0.013	0.0	2.1	2.1	0.3	O K
2880 min Winter	34.055	0.005	0.0	1.6	1.6	0.1	O K
4320 min Winter	34.050	0.000	0.0	1.2	1.2	0.0	O K
5760 min Winter	34.050	0.000	0.0	0.9	0.9	0.0	O K
7200 min Winter	34.050	0.000	0.0	0.8	0.8	0.0	O K
8640 min Winter	34.050	0.000	0.0	0.7	0.7	0.0	O K
10080 min Winter	34.050	0.000	0.0	0.6	0.6	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	70.622	0.0	36.5	33
60 min Winter	44.405	0.0	45.9	54
120 min Winter	27.084	0.0	56.0	92
180 min Winter	20.061	0.0	62.2	130
240 min Winter	16.138	0.0	66.7	156
360 min Winter	11.797	0.0	73.1	210
480 min Winter	9.396	0.0	77.7	260
600 min Winter	7.872	0.0	81.3	314
720 min Winter	6.816	0.0	84.5	372
960 min Winter	5.426	0.0	89.7	490
1440 min Winter	3.929	0.0	97.4	728
2160 min Winter	2.841	0.0	105.7	1096
2880 min Winter	2.255	0.0	111.8	1432
4320 min Winter	1.626	0.0	120.9	0
5760 min Winter	1.288	0.0	127.8	0
7200 min Winter	1.075	0.0	133.2	0
8640 min Winter	0.926	0.0	137.8	0
10080 min Winter	0.817	0.0	141.8	0

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Model Details

Storage is Online Cover Level (m) 36.150

Cellular Storage Structure

Invert Level (m) 34.050 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	22.0	0.0	1.201	0.0	0.0
1.200	22.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0122-7500-1400-7500
Design Head (m)	1.400
Design Flow (l/s)	7.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	122
Invert Level (m)	34.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	7.5
Flush-Flo™	0.413	7.5
Kick-Flo®	0.868	6.0
Mean Flow over Head Range	-	6.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.3	1.200	7.0	3.000	10.7	7.000	16.1
0.200	6.9	1.400	7.5	3.500	11.5	7.500	16.6
0.300	7.4	1.600	8.0	4.000	12.3	8.000	17.1
0.400	7.5	1.800	8.4	4.500	13.0	8.500	17.6
0.500	7.4	2.000	8.9	5.000	13.7	9.000	18.1
0.600	7.3	2.200	9.3	5.500	14.3	9.500	18.6
0.800	6.6	2.400	9.7	6.000	14.9		
1.000	6.4	2.600	10.0	6.500	15.5		

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Mayfield Baring Street No.2
Design Note

Drainage Strategy Supplementary Note

The proposed B1 Office development site referenced as Baring Street No.2 (Plot M) sits within the Mayfield Strategic Regeneration Framework (SRF) Phase 1 Boundary. The site comprises the building footprint only and excludes all adjoining external areas.

This Drainage Strategy Supplementary Note represents a plot implementation within the Buro Happold Mayfield Drainage Strategy Design Note dated 11.03.2019 ref:0042912. It does not compromise the requirements of the Drainage Strategy Design Note or fully implement the intended drainage strategy for the Mayfield SRF.

Investigation of the existing site drainage was undertaken during demolition and site clearance and whilst not being able to positively prove the connectivity of the whole existing drainage system, it gives an indication that the existing buildings, yards roads were positively drained to either sewer or to the nearby watercourse (River Medlock).

National and local planning guidance sets out the National Planning Policy Framework (NPPF), Planning Policy Guidance (PPG) and the Non-Statutory Technical Standards for Sustainable Drainage aim to protect and control the risk of flooding downstream of development sites by recommending the management of surface water as close to source.

From the CIRIA SuDS Manual C753 guidance in the form of hierarchy of drainage is indicated below;

Runoff Destinations

See the Planning Practice Guidance

This states:

"Generally the aim should be discharge surface runoff as high up the following hierarchy of drainage options as reasonably practicable:

1. **Into the ground (infiltration)**
2. **To a surface water body;**
3. **To a surface water sewer, highway drain or another drainage system;**
4. **To a combined sewer."**

1. As the drainage strategy for this site is on a plot only basis, it is not practical to provide infiltraion to ground beneath the building footprint. Also, the indicative ground conditions of made ground overlaying fluvial deposits together with the sites previous use for industrial purposes; would increase the risk of mobilising potential ground contamination which is unacceptable.

2. The Mayfield SRF is providing new separate foul and surface water infracture drainage for the development area, with surface water discharging to the nearby River Medlock and the foul water to nearby United Utilties public sewerage network.

This is considered to be the most practical solution for draining the foul and surface water runoff generated from this site.

Drainage Strategy & Design Criteria

The drainage strategy for this site is to;

1. Discharge the foul water unrestricted by gravity to the adjoining new foul water infrastructure being provided, which will discharge to the public sewerage system.
2. Discharge the surface water at a minimum 50% reduced discharge rate from the existing by gravity to the adjoining new surface water infrastructure being provided, which discharges to the the nearby River Medlock.The design criteria being;
   - No Surcharge for a 1 in 1 year return period storm
   - No Flooding for a 1 in 30 year return period storm
   - Flood check and management for a 1 in 100 year return period storm + 40% rainfall allowance for climate chainge.

Foul Water

Foul water to drain unrestricted to nearest appropriate foul water infrastructure drain provided, prior to discharging to public sewerage system.

Based on the current Architects floor plans and utilising the Unit Discharge Unit Method from BS EN12056-2 System III Table 2 with a Typical Frequency of K – 0.5 'Intermittent Use' from Table 3 an estimated design discharge rate of 11.3 litres per second can be expected, requiring a 150dia connection at a minimum gradient of 1 in 125.

Localised sump pumping is required to the plant room basement area, restricted to a maximum of 10 litres per second to the above ground drainage at off-peak times to reduce the risk of overloading the drainage system.

Grease treatment is not considered a requirement due to the 'Office use' of the building. However, should grease treatment be required to any food or bar areas, this will be provided locally at source above ground.

Surface Water

The surface water drainage takes into account the requirements of the Buro Happold Mayfield Drainage Strategy Design Note dated 11.03.2019 ref:0042912. However, due to the age and condition of the existing site drainage, insufficient information was obtained and as such, it is not practical to model the existing site drainage.

In order to set a peak discharge rate for the site, It is proposed to use a flat rainfall rate of 50mm/hr to set the peak Q100 runoff rate from the existing site. Due to age of the site and drainage, it is a reasonable assumption for the original design of the sewers. This approach has been accepted by United Utilities Plc and Manchester City Council as Lead Local Flood Authority on similar urban re-development sites in Manchester. This approximately equates to a 15min duration 30yr RP storm.

- From a review of the current drawings, the site's drained plan area is estimated to be 2,610m² (0.261ha) made up of;
  - 2,185m² Hardstanding (Roof/Yards and Roads)
  - 425m² soft landscaping
- Taking the runoff from the hardstanding areas at 100% and 20% equivalent area from the soft landscaping a catchment area of 2,770m² (0.227ha) is derived
- Thus, the peak flow rate (existing) = 2.78 x 0.227 x 50 = 31.6 l/s (for a 15min 30yr RP event)
- To comply with the Drainage Strategy Design Note and National/Local Planning Guidance, a 50% reduction is applied which reduces peak discharge rate of Q = 31.6 x 0.5 = 15.8 l/s
- This is equivalent to the existing run off from a 25mm/hr flat rainfall rate which equates to less than a 15min 1yr RP Storm
- Micro Drainage Quick storage estimate, subject to design and based on the above for the 100yr+40% climate change allowance is in the order of 80m³, without allowance for the effects of a surcharged outlet
- Utilising MicroDrainage Network and simulating the surface water design for a development area of 2,610m² (0.261ha) as indicated on RoC drawing 3986-DR-201 for the 1yr, 30yr and 100yr +40% free discharge and again the 30yr and 100yr +40% against a 1m surcharged outfall, the required attenuation volume has been adjusted to 120.2m³ net storage resulting in no surface flooding to the building and the peak discharge rate of 15.8 l/s is not exceeded.
- As noted on RoC drawing 3986-DR-201 the attenuation is to be provided by means of a geocellular tank 50.05m long x 4.55m wide x 0.55m deep fully tanked with a fully welded waterproof membrane beneath the building footprint. The discharge rate is to be controlled in a downstream manhole chamber by a vortex flow control rated at 15.8 l/s at a design head of 1.2m

Applying a limit of 15.8 l/s to the Q100+40%CC event will inherently give a greater than 50% reduction in run-off because the limiting flow rate is similar to the existing run off rate for a 1yr RP storm of 15-30mim duration. As such it is not consider that there is a need to provide the further reduction in run-off rate of 2 l/s/ha stipulated in the Buro Happold Drainage Strategy Design Note or to carry out a flood check on the long term storage volume.

The above surface water drainage strategy meets the requirements outlined in the Buro Happold Mayfield Drainage Strategy Design Note dated 11.03.2019 ref:0042912, subject to confirmation from Buro Happold and further development from this RIBA Stage 2 design.

NOTE:
SERVICES INFORMATION TAKEN FROM MALCOLM HUGHES DRAWING 19749_UG01 AND BASED ON A DESKTOP REVIEW OF UTILITY RECORDS AND SHOULD NOTE BE CONSIDERED TO REPRESENT ACTUAL ALIGNMENTS ON SITE.
BUILDING FOOTPRINTS & RETAINING WALL LOCATIONS TAKEN FROM MORRIS & COMPANY DRAWING 190708 MASTERPLAN STAGE 1.
FLOOD RISK ZONES TAKEN FROM MORRIS & COMPANY DRAWING A283MMPM-00-A1-200
PROPOSED DRAINAGE/POWER/ COMMUNICATIONS LAYOUT FROM BUROHAPPOLD ENGINEERING DRAWINGS 0042912-3120, 5100 & 6100

KEY TO SERVICES

- A — Abandoned
- AD — Acid drain
- BT — British telecom
- TV — Cable TV
- CM — Communication cables
- C — Sewer combined
- S — Sewer surface water
- F — Sewer foul
- DU — Ducting
- E — Electric cables
- EF — Effluent pipes
- FU — Fuel line
- GA — Fuel gauge line
- V — Fuel vent line
- G — Gas pipes
- H — Heating pipes
- TL — Traffic light cables
- VR — Vapour recovery pipes
- W — Water pipes
- U — Unidentified GPR or electro location trace
- Rising main
- Scar trace
- AC — Alarm cables
- CC — CCTV cables
- CH — Chemical pipes
- CA — Compressed air pipes
- CU — Culvert
- CO — Sewer combined overflow
- HV — Electric HV cables
- P — Electric pilot cables
- EA — Earth cables
- FO — Fibre optic cables
- LG — LPG pipes
- OP — Oil pipes
- SM — Sludge main
- T — Telemetry cables
- VD — Vehicle detection pad
- W W — Wash water pipes
- End of trace
- E — Group of services representation
- E — Taken from records (Not proven on site)
- Assumed route
- Services survey boundary

KEY TO CONSTRAINTS

- RIVER MEDLOCK (ASSUMED LINE OF CULVERT)
- RIVER MEDLOCK (OPEN CHANNEL)
- HIGHWAYS
- ADJACENT BUILDING FOOTPRINT
- PLOT M BUILDING FOOTPRINT
- RETAINING WALL
- 35.55 / 36.85 — EXISTING TOPOGHRAPHY
- PROPOSED TOPOGHRAPHY
- FLOOD RISK ZONE 2
- FLOOD RISK ZONE 3

FLOOD RISK BASED ON EXISTING TOPOGRAPHY

Park retaining wall form TBC, possible interface with foundations

Presumed line of existing basement subject to survey. Assumed to be removed by part of park earthworks.

Existing advertisement signs

225mmØ

RIVER MEDLOCK

MANCUNIAN WAY SLIP ROAD

BOND STREET

NETHER STREET

MANOR STREET

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NOTES

PROPOSED SERVICES

- SURFACE WATER
- SURFACE WATER MH
- OUTFALL
- GULLEY
- SWALE/INFILTRATION TRENCH
- ACO MULTIDRAIN M100D0.0
- LINEAR DRAIN (UNLESS STATED OTHERWISE)
- LINEAR DRAIN SUMP
- LOW VOLTAGE DUCTS
- LOW VOLTAGE PITS
- COMMUNICATIONS DUCTS
- COMMUNICATIONS PITS

REV.	DATE	DETAILS	DRN.	CHK.
P02	30-08-19	PLOT M BOUNDARY UPDATED	DAE	MJN
P01	09.07.19	FIRST ISSUE	JB	MJN

DRAWING STATUS: STAGE 2

DRAWN: JB	DATE: 09/07/2019	SCALES: 1:250
CHECKED: MN	DATE: 09/07/2019	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE. --DO NOT SCALE--
APPRVD.: MN	DATE: 09/07/2019	EMAIL FOR DRAWINGS: info@rocconsulting.com

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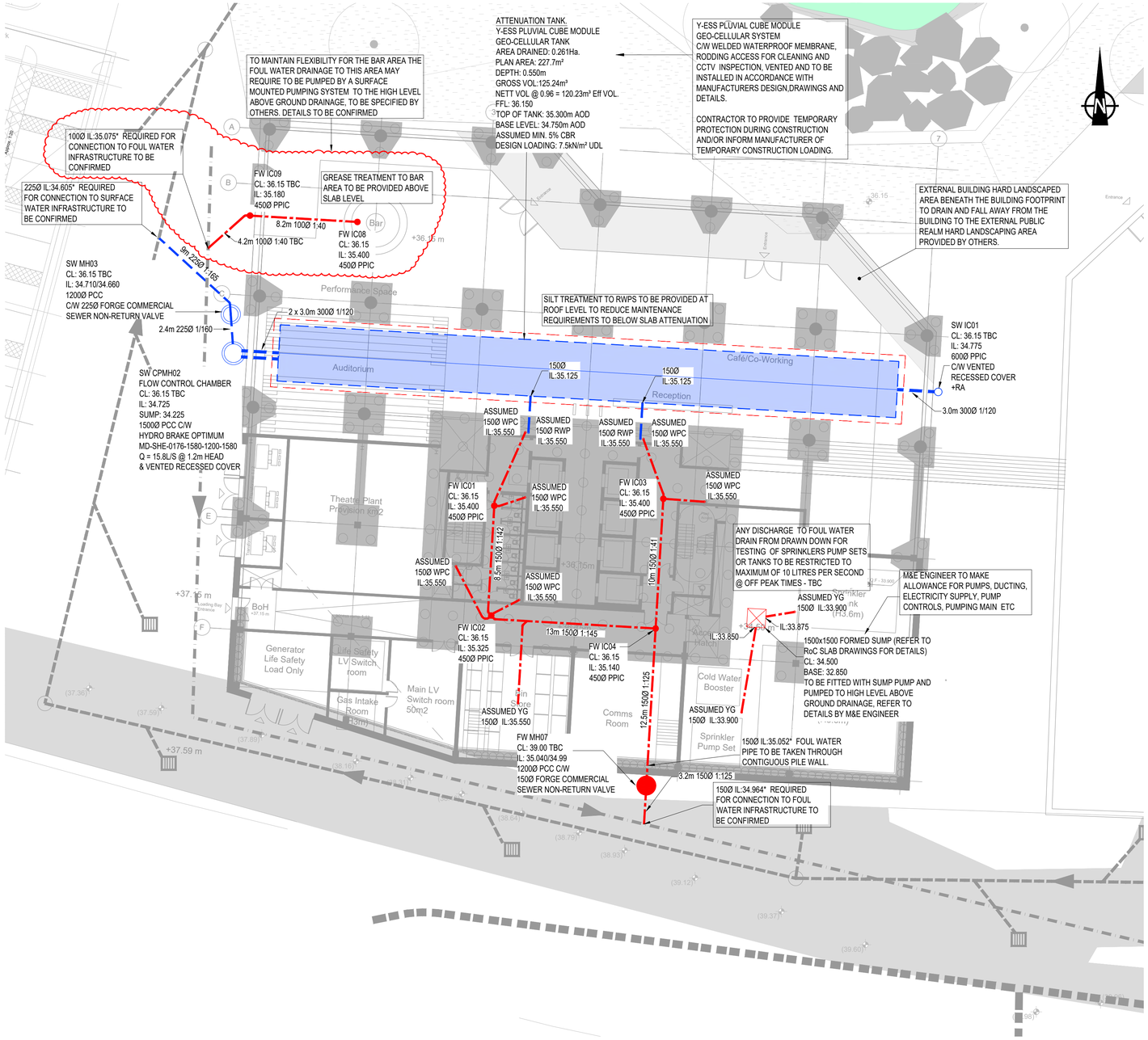
PROJECT TITLE: MAYFIELD PLOTS L & M

DRAWING TITLE: SITE CONSTRAINTS (WITH PROPOSED BUILDING FOOTPRINTS)

PROJECT No.	DRAWING No.	REV.
3986	CON-1	P02

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ACADFILE PLOTDATE



RISKS:

1. ALL FOUL AND SURFACE WATER CONNECTION SIZES (150Ø) AND LOCATIONS HAVE BEEN ASSUMED WITH ABOVE GROUND RODDING ACCESS PROVIDED AND REQUIRE COORDINATION WITH THE ARCHITECTS AND M&E ENGINEERS INFORMATION.
2. THE CURRENT SURFACE WATER DRAINAGE SCHEME IS BASED ON THE CURRENT INTERNAL GROUND FLOOR AND CENTRAL CORE LAYOUT AND FLOOR LEVELS AND ARE SUBJECT TO CONFIRMATION AND COORDINATION WITH THE ARCHITECTS FINAL INFORMATION.
3. ALL INTERNAL DRAINAGE RUNS NEED TO BE COORDINATED WITH THE FINAL STRUCTURAL ENGINEERS FOUNDATION DESIGN INFORMATION AND DETAILS.
4. ATTENUATION VOLUMES HAVE BEEN BASED ON THE CURRENT HARD ROOF AREA AND IS SUBJECT TO CONFIRMATION.
5. FOUL AND SURFACE WATER DRAINAGE PROPOSALS ARE SUBJECT TO THE APPROVAL OF THE LOCAL TO PLANNING AUTHORITY AND LEAD LOCAL FLOOD AUTHORITY.
6. ALL FOUL AND SURFACE WATER DRAINAGE IS TO OUTFALL SEPARATELY TO THE NEW INFRASTRUCTURE DRAINAGE TO BE PROVIDED AND IS SUBJECT TO CONFIRMATION.

DRAINAGE STRATEGY & ASSUMPTIONS:

SURFACE WATER

1. THE DRAINAGE STRATEGY ASSUMES THAT THE DRAINAGE FROM PLOT M WILL BE BY GRAVITY AND BE PRIVATELY OWNED AND MAINTAINED.
2. PLOT M DISCHARGE IS TO BE RESTRICTED TO A MAXIMUM PASS ON FLOW RATE OF 15.8 LITRES PER SECOND, OUTFALLING TO THE NEW SURFACE WATER INFRASTRUCTURE BEING PROVIDED. DETAILS TO BE CONFIRMED
3. ATTENUATION IS PROVIDED ON PLOT TO PROTECT THE BUILDING FROM FLOODING. NO FLOODING FOR A 1 IN 30YR RP STORM OF CRITICAL DURATION AND A FLOOD CHECK FOR A 1 IN 100YR RP STORM OF CRITICAL DURATION WITH A +40% RAINFALL ALLOWANCE FOR CLIMATE CHANGE AGAINST A 1m SURCHARGED OUTFALL.
4. A NON RETURN VALVE WILL BE PROVIDED IN THE LAST MANHOLE ON THE SURFACE WATER SYSTEM PRIOR TO CONNECTION TO THE SURFACE WATER INFRASTRUCTURE DRAINAGE TO PROTECT THE PLOT DRAINAGE FROM BACKFLOW AND POTENTIAL FLOODING FROM THE SURFACE WATER INFRASTRUCTURE DRAINAGE SYSTEM.

FOUL WATER

1. THE DRAINAGE STRATEGY ASSUMES THAT THE DRAINAGE FROM PLOT WILL BE BY GRAVITY AND BE PRIVATELY OWNED AND MAINTAINED.
2. THE PLOT WILL BE DRAINED AND DISCHARGE AT AN UN-RESTRICTED RATE VIA A NEW 150Ø CONNECTION AT A GRADIENT OF 1 IN 125 AND, SUBJECT TO CONFIRMATION A 100Ø AT 1IN 40 FOR THE BAR AREA TO THE NEW FOUL WATER INFRASTRUCTURE BEING PROVIDED. DETAILS TO BE CONFIRMED.
3. THE PUMPED DISCHARGE FROM THE PLANT ROOM BASEMENT TO THE SUSPENDED DRAINAGE WILL BE RESTRICTED TO A MAXIMUM RATE OF 10 LITRES PER SECOND AT OFF-PEAK TIMES TO PREVENT OVERLOADING THE ABOVE AND BELOW GROUND FOUL WATER DRAINAGE.
4. A SEWERAGE NON RETURN VALVE WILL PROVIDED IN THE LAST MANHOLE ON THE FOUL WATER SYSTEM PRIOR TO CONNECTION TO THE FOUL WATER INFRASTRUCTURE DRAINAGE TO PROTECT THE BUILDING FOUL WATER SYSTEM AND BASEMENT FROM BACKFLOW AND POTENTIAL FLOODING FROM THE FOUL WATER INFRASTRUCTURE DRAINAGE SYSTEM.

EXISTING DRAINAGE:

1. EXISTING PUBLIC SEWER INFORMATION IS BASED ON SEWER RECORD MAPS.
2. PRELIMINARY FOUL AND SURFACE WATER INFRASTRUCTURE DRAINAGE HAS BEEN PROVIDED BY BURO HAPPOLD

LEGEND

- SURFACE WATER ATTENUATION TANK + WORKING ZONE
- PROPOSED SURFACE WATER
- PROPOSED SURFACE WATER CHAMBER
- RWP — RAINWATER PIPE (ASSUMED 150Ø)
- PROPOSED FOUL WATER
- PROPOSED FOUL WATER CHAMBER
- WPC — WASTE PIPE CONNECTION (ASSUMED 150Ø)
- YG — YARD GULLY CONNECTION (ASSUMED 150Ø + RISER PIECE + SILT BUCKET)
- PROPOSED SURFACE WATER INFRASTRUCTURE DRAINAGE BY BURO HAPPOLD - TBC
- PROPOSED FOUL WATER INFRASTRUCTURE DRAINAGE BY BURO HAPPOLD - TBC
- EXISTING COMBINED PUBLIC SEWERS

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2. DO NOT SCALE OFF THIS DRAWING. USE DOCUMENTED DIMENSIONS ONLY. IF IN DOUBT SEEK CONFIRMATION FROM THE ENGINEER.
3. ALL LEVELS ARE IN METERS ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE.
4. CURRENT GROUND FLOOR AND EXTERNAL LAYOUT DETAILS ARE BASED ON ARCHITECTS' CURRENT LAYOUTS RECEIVED ON 06.08.2019

W.I.P NOTE

THE FOUL AND SURFACE WATER DRAINAGE DESIGN IS SUBJECT TO DESIGN DEVELOPMENT AND COORDINATION WITH THE LATEST INFORMATION FROM THE ARCHITECT, M&E ENGINEER, STRUCTURAL ENGINEER AND LANDSCAPE ARCHITECT.

REV.	DATE	DETAILS	DRN.	CHK.
P01	30-08-19	INITIAL ISSUE	DAE	MJN

DRAWING STATUS
FOR INFORMATION

RIBA STAGE
STAGE 2

DRAWN DAE	DATE AUG 19	SCALES 1:200
CHECKED DAE	DATE AUG 19	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE --DO NOT SCALE--
APPRVD. MN	DATE AUG 19	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
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PROJECT TITLE
MAYFIELD PLOT M

DRAWING TITLE
DRAINAGE LAYOUT PLAN

PROJECT No.	DRAWING No.	REV.
3986	DR-201	P01

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Appendix 11.2 Drainage Strategy Office 1

Appendix 11.3 Drainage Strategy MSCP

Appendix Appendix 14.1: Townscape and Visual Impact ZVI



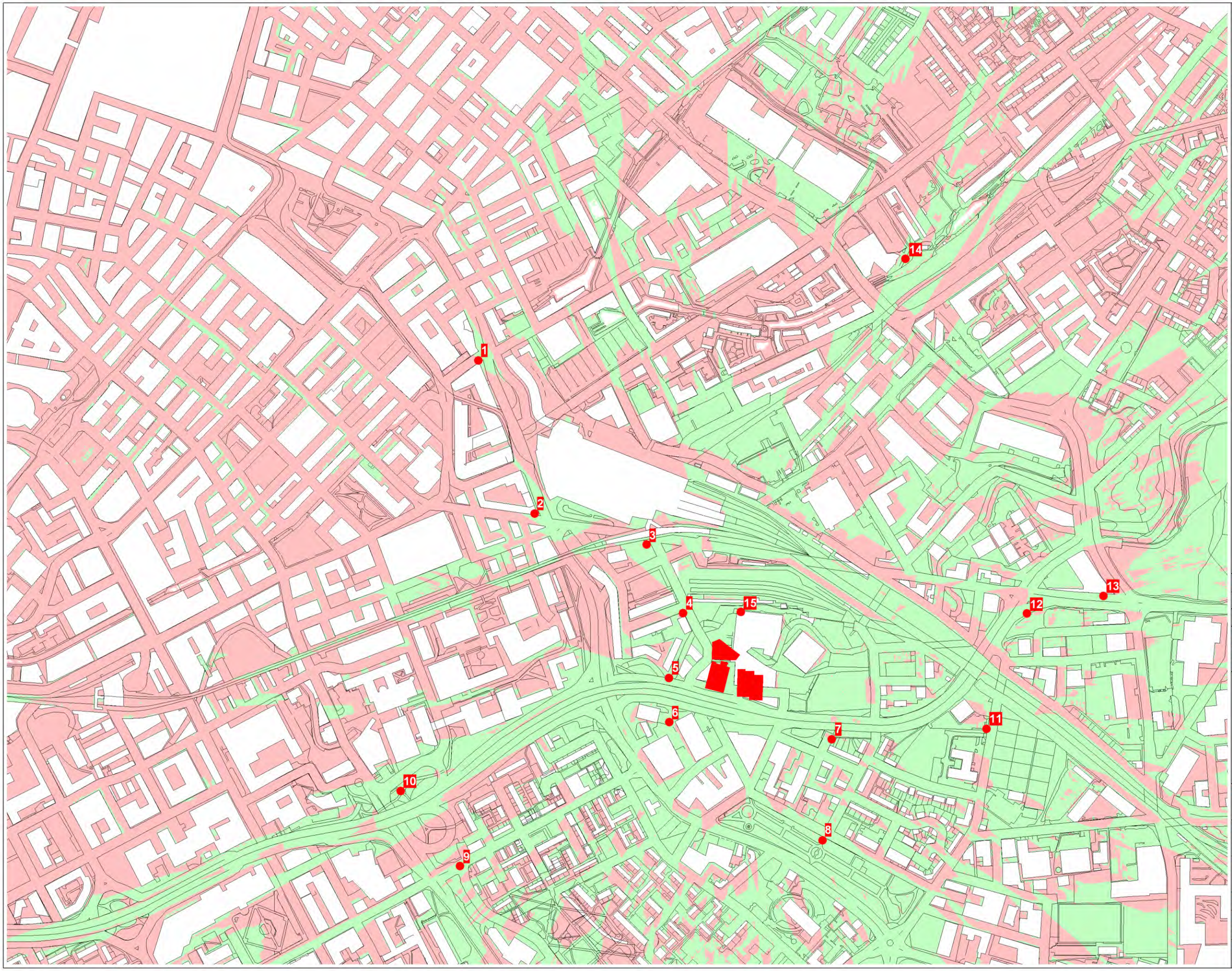
MAYFIELD

Townscape and Visual Impact Assessment: MAPS

APPENDIX 14.1

Chris Burnett Associates

26 09 19



Key

- building footprint
- townscape viewpoint
- building(s) visible
- building(S) not visible
- OS Local Vector building footprints and/or DSM no data values

(NB Viewshed analysis is calculated from the top of the building to locations 1.6m above the DSM data taking into account a normal earth surface curvature correction.)

0.0 60.0 120.0
metres

Date	Details	Revision
24/07/19	Revised viewpoint locations. Inclusion of Plot M location.	-01
06/08/19	Revised viewpoint locations.	-02

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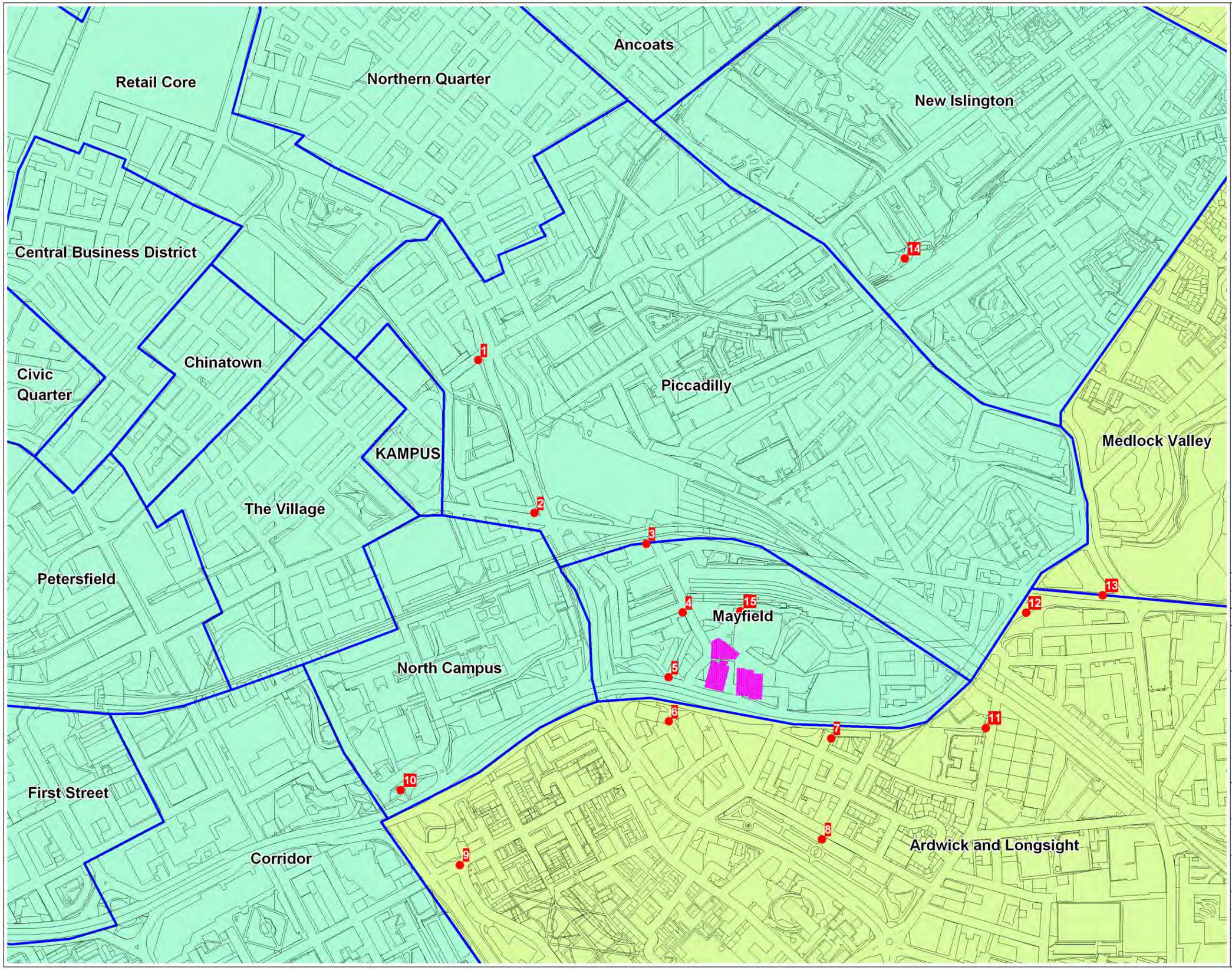
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Client	**Mayfield Development Partnership**
Project	**Mayfield, Manchester**
Title	**Vewshed Analysis and View-point Locations: Plots M-O**
Scale	**1:6,000 @ A3**

Date	Drawn	Checked
06/08/19	JHD	CB

Reference	Revision
MMTVIA19.02	**-02**

N



Key

- building footprints
- Residential Neighbourhood Area
- Townscape Character Area
- townscape viewpoint

0.0 60.0 120.0 metres

Date	Details	Revision
29/07/19	Revised viewpoint locations. Inclusion of Plot M location.	-01
06/08/19	Revised viewpoint locations.	-02

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CHRIS BURNETT

Client: **Mayfield Development Partnership**

Project: **Mayfield, Manchester**

Title: **City Neighbourhood Areas and Viewpoint Locations: Plots M-0**

Scale: **1:6,000 @ A3**

Date	Drawn	Checked
06/08/19	JHD	CB

Reference: **MMTVIA19.03** Revision: **-02**

N

Appendix 14.2: Townscape Views



MAYFIELD

Townscape and Visual Impact Assessment: VIEWPOINT PHOTOS

APPENDIX 14.2

Chris Burnett Associates

4 10 19



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.273mm

VIEWPOINT 1
London Road
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.273mm

VIEWPOINT 1
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.254mm



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.254mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 2
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.292mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 3
Fairfield Street
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.292mm

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MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 3
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.276mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 4
Baring Street
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.276mm

VIEWPOINT 4
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.276mm



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.276mm

VIEWPOINT 5
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.262mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 6
Braley Street
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.262mm

VIEWPOINT 6
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.281mm



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.281mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 7
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.269mm

VIEWPOINT 8
Ardwick Green North
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.269mm

VIEWPOINT 8
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.238mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 9
Kincardin St/ Grosvenor St Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.238mm

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MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 9
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.298mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 10
Footway
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.298mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 10
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.345mm



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.345mm



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.225mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 12
Ashton Old Rd
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.225mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 12
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.225mm

VIEWPOINT 12
Cumulative



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.266mm

VIEWPOINT 13
Ashton Old Rd
Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.266mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 13
Proposed



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.266mm

VIEWPOINT 13
Cumulative



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.259mm

CHRIS BURNETT ASSOCIATES 26 9 19

MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 14
Ashton Canal Tow Path Baseline



PHOTOGRAPH INFORMATION:

Ht above ground : 1.7 m Camera and lens : Sony A7rII; Lens focal length : 24.259mm

CHRIS BURNETT ASSOCIATES 26 9 19

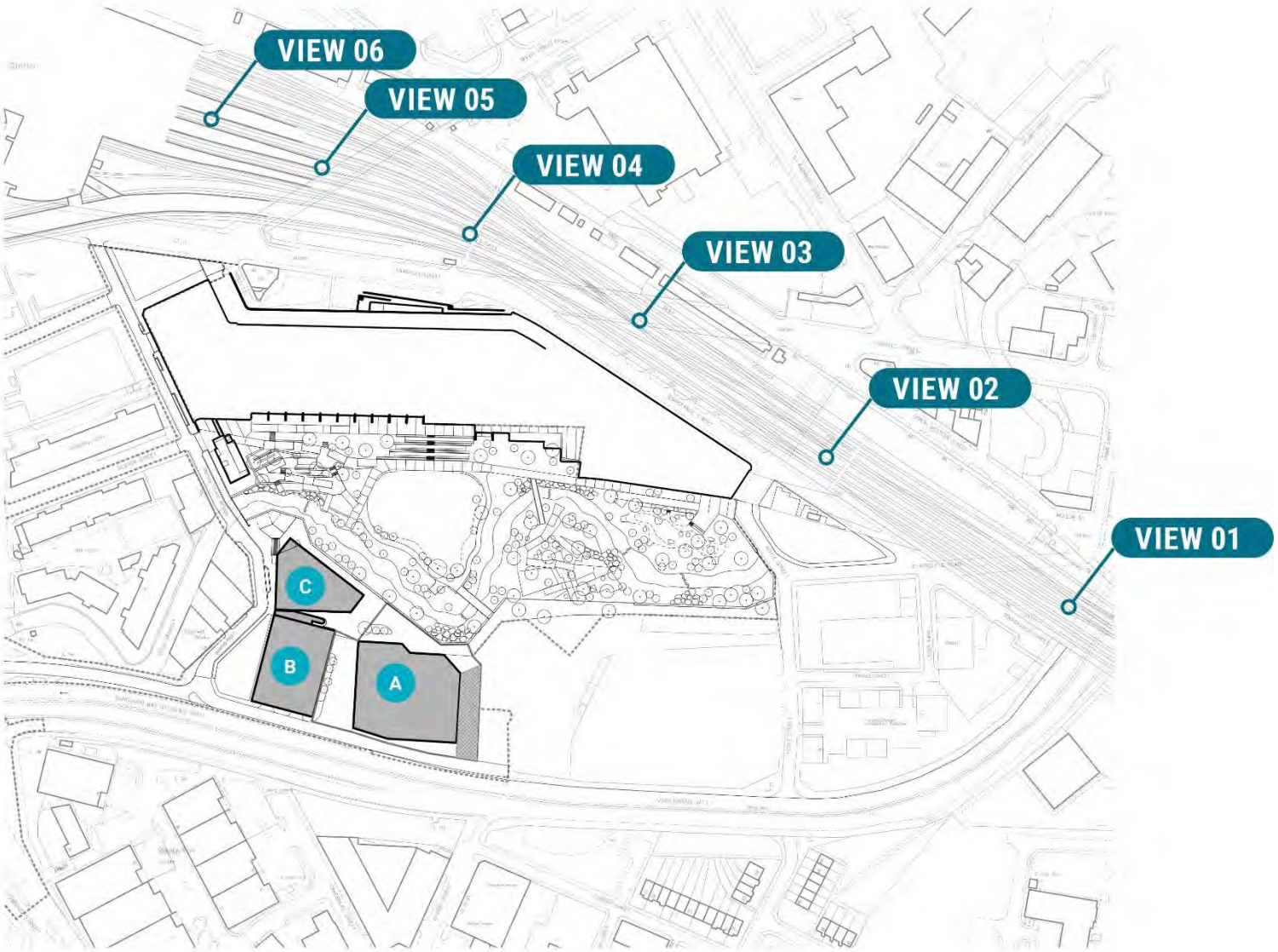
MAYFIELD Townscape and Visual Impact Assessment

VIEWPOINT 14
Proposed

KINETIC VIEWS

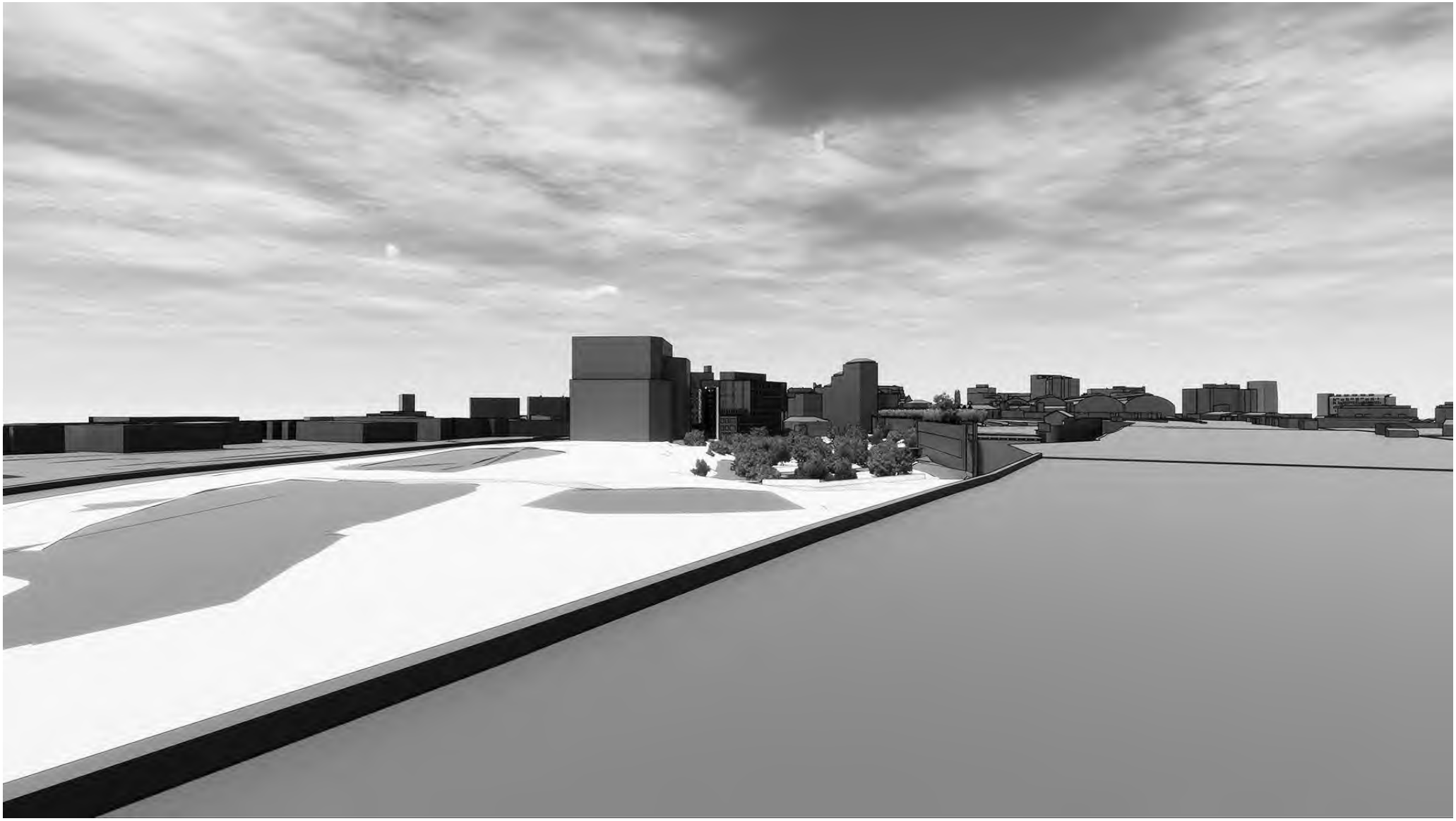
These kinetic views have been produced to provide an impression of the buildings in their approximate location from positions that are only accessible from the tracks and therefore not survey-able.

These views are indicative only and provide a guide to the possible views. These are not Verified Views. The locations shown opposite are approximate.

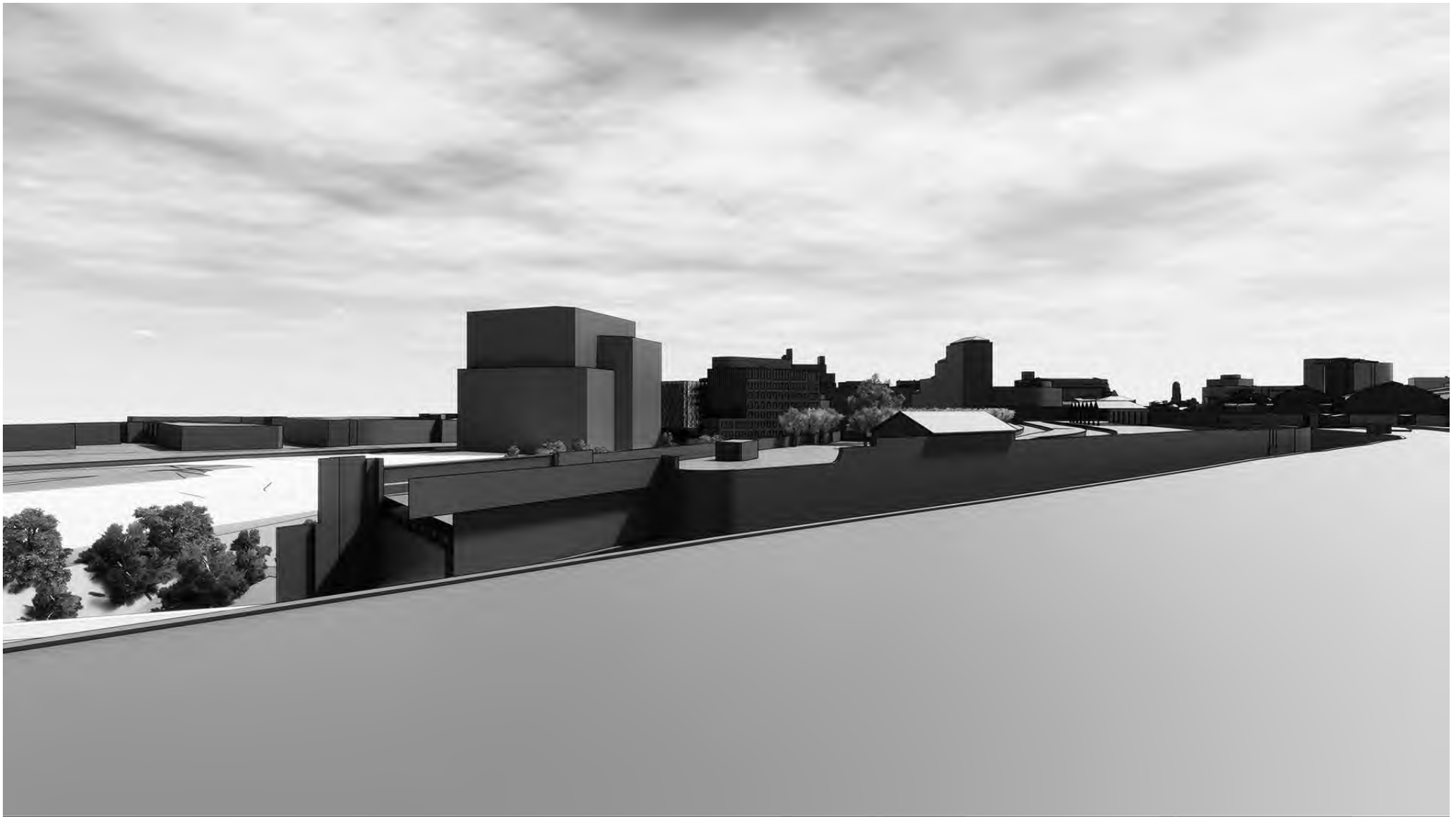


VIEW 06 Approximate View Location

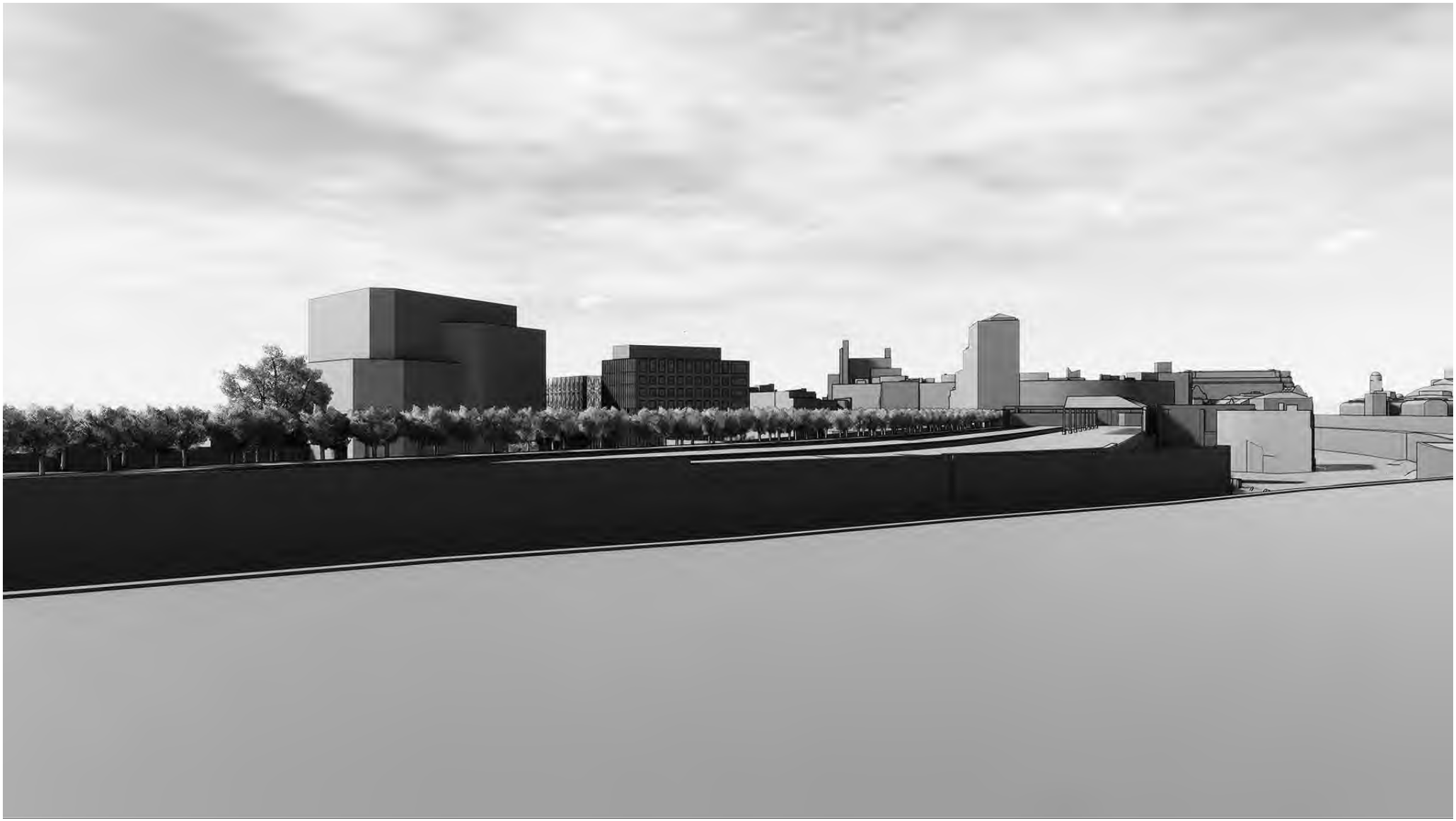
B Building Identifier



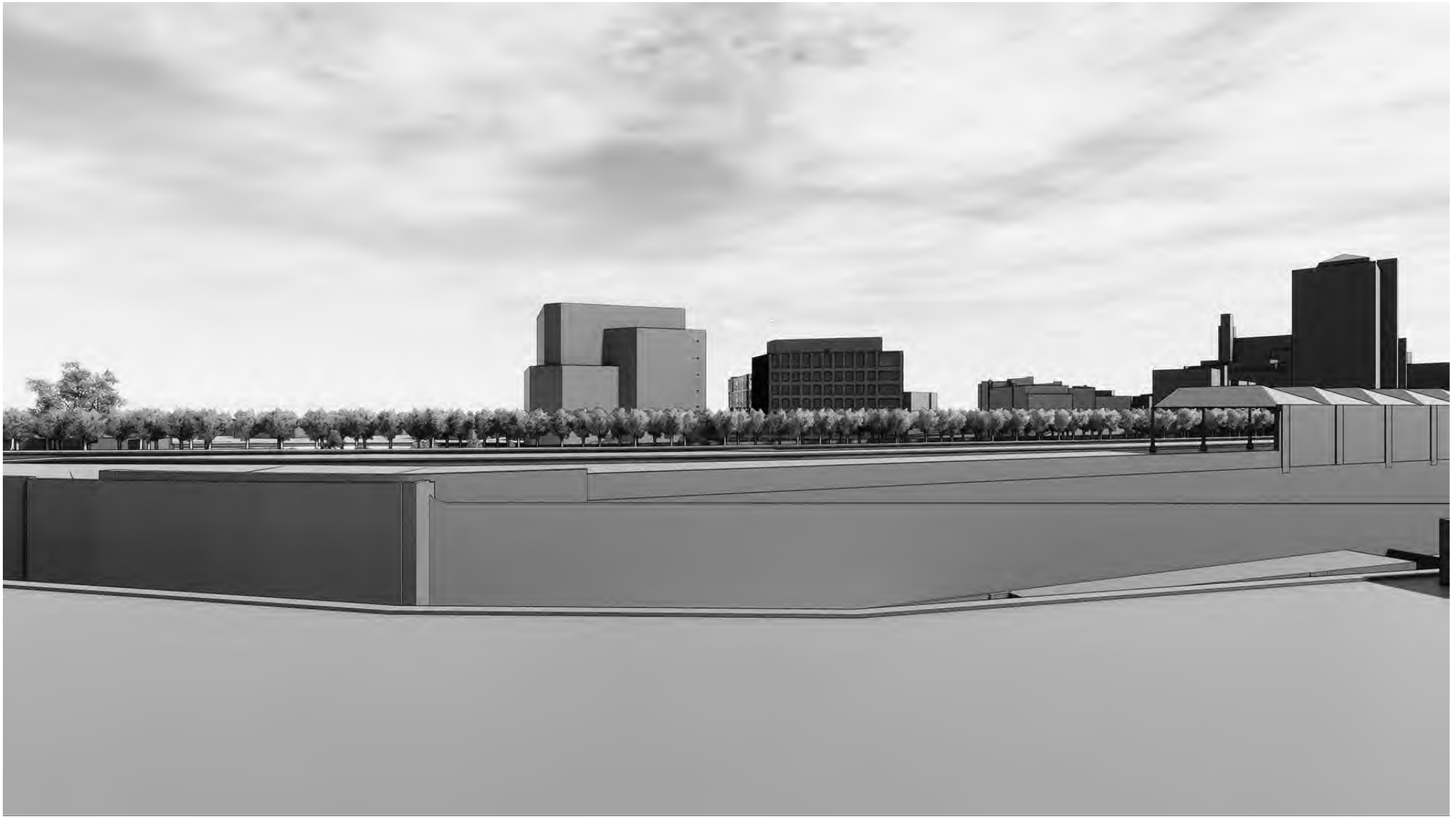
VIEW 1



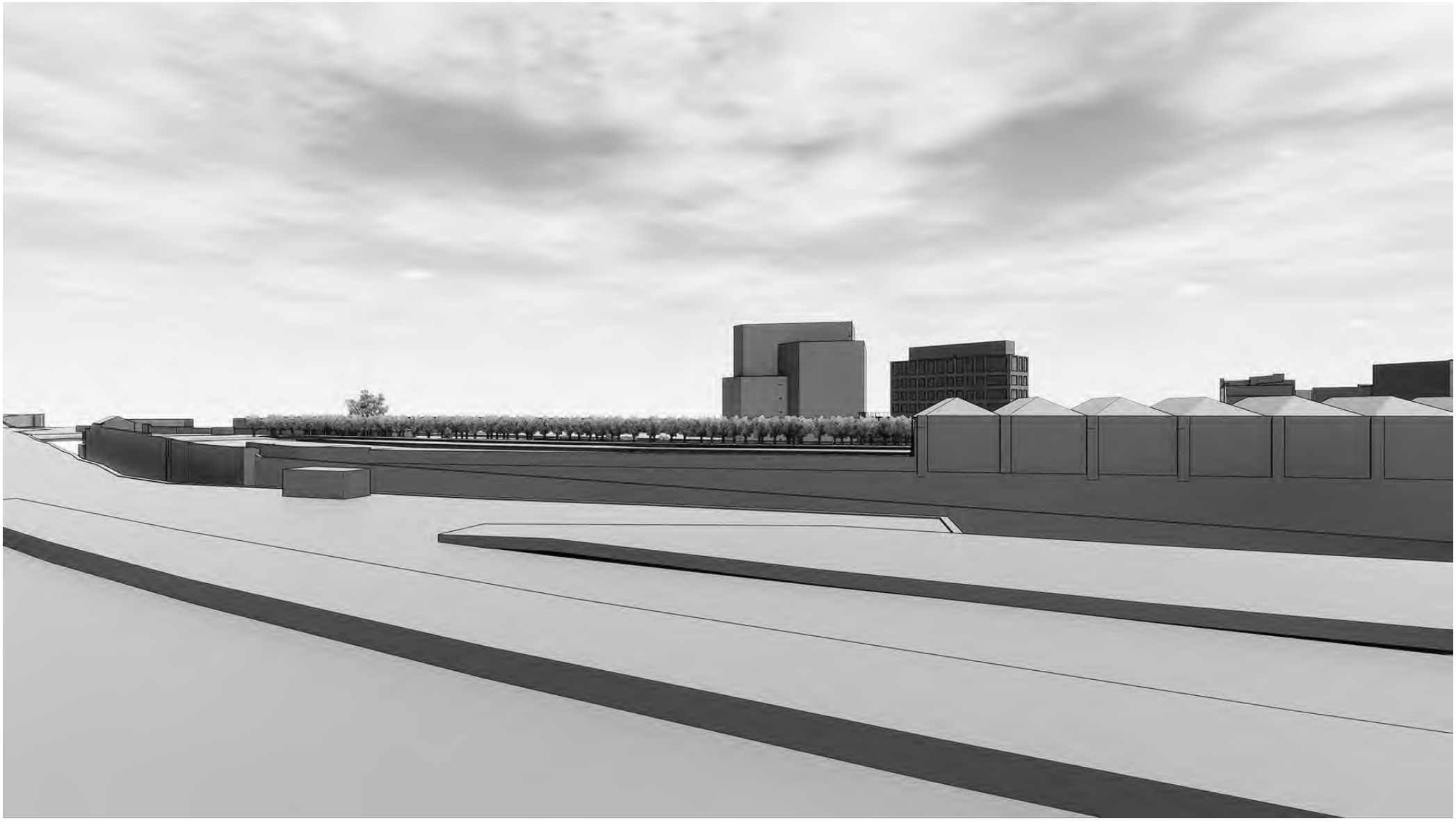
VIEW 2



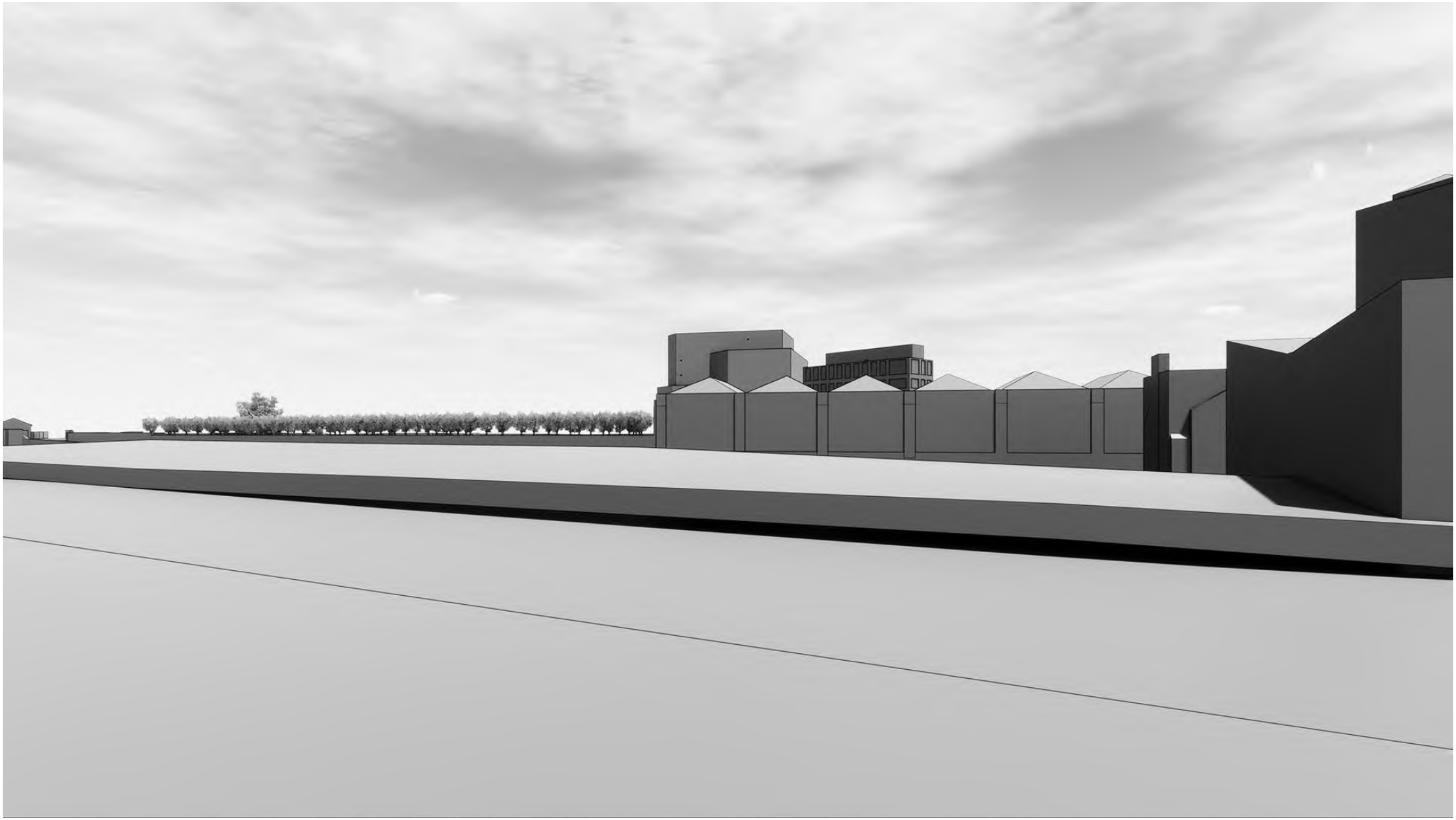
VIEW 3



VIEW 4



VIEW 5



VIEW 6

Appendix 15.1: Socio-Economic Data Tables

Table 15.1: Total Population[1] (2017)

	Total Population	Male (count)	Male (%)	Female (count)	Female (%)
Assessment Area	85,091	44,889	52.8%	40,202	47.2%
Manchester	545,501	276,213	50.6%	269,288	49.4%
Greater Manchester	2,798,799	1,389,674	49.7%	1,409,125	50.3%

Table 15.2: Population Change[2] (2011 and 2017)

	2011	2017	% Change
Assessment Area	69,012	85,091	23.3%
Manchester	502,902	545,501	8.5%
Greater Manchester	2,685,386	2,798,799	4.2%
England	53,107,169	55,619,430	4.7%

Table 15.3: Age Structure of the Population[3] (2017)

	Assessment Area		Manchester		Greater Manchester	
0-15	11,979	14.1%	110,138	20.2%	571,672	20.4%
16-24	24,002	28.2%	98,349	18.0%	326,724	11.7%
25-34	24,596	28.9%	115,511	21.2%	419,986	15.0%
35-49	12,819	15.1%	100,784	18.5%	547,007	19.5%
50-64	7,080	8.3%	70,105	12.9%	492,444	17.6%
65+	4,615	5.4%	50,614	9.3%	440,966	15.8%
Total	**85,091**		**545,501**		**2,798,799**	

Table 15.4: Ethnicity[4] (2011)

Ethnicity	Assessment Area		Manchester		Greater Manchester	
All usual residents	69,036		503,127		2,682,528	
White	43,686	63.3%	335,109	66.6%	2,248,123	83.8%
White: English/Welsh/Scottish /Northern Irish/British	37,370	54.1%	298,237	59.3%	2,141,687	79.8%
White: Irish	1,379	2.0%	11,843	2.4%	34,499	1.3%
White: Gypsy or Irish Traveller	81	0.1%	509	0.1%	1,523	0.1%
White: Other White	4,856	7.0%	24,520	4.9%	70,414	2.6%
Mixed/multiple ethnic groups	3,168	4.6%	23,161	4.6%	60,710	2.3%
Mixed/multiple ethnic groups: White and Black Caribbean	1,189	1.7%	8,877	1.8%	23,131	0.9%
Mixed/multiple ethnic groups: White and Black African	636	0.9%	4,397	0.9%	9,997	0.4%
Mixed/multiple ethnic groups: White and Asian	610	0.9%	4,791	1.0%	15,657	0.6%
Mixed/multiple ethnic groups: Other Mixed	733	1.1%	5,096	1.0%	11,925	0.4%
Asian/Asian British	11,907	17.2%	85,986	17.1%	272,173	10.1%
Asian/Asian British: Indian	1,943	2.8%	11,417	2.3%	53,461	2.0%

[1] ONS Population estimates
[2] ONS Population estimates
[3] ONS Population estimates by single year of age
[4] ONS Census

Asian/Asian British: Pakistani	2,127	3.1%	42,904	8.5%	130,012	4.8%
Asian/Asian British: Bangladeshi	597	0.9%	6,437	1.3%	34,186	1.3%
Asian/Asian British: Chinese	5,341	7.7%	13,539	2.7%	26,079	1.0%
Asian/Asian British: Other Asian	1,899	2.8%	11,689	2.3%	28,435	1.1%
Black/African/Caribbean/Black British	7,787	11.3%	43,484	8.6%	74,097	2.8%
Black/African/Caribbean/Black British: African	5,294	7.7%	25,718	5.1%	44,691	1.7%
Black/African/Caribbean/Black British: Caribbean	1,179	1.7%	9,642	1.9%	17,767	0.7%
Black/African/Caribbean/Black British: Other Black	1,314	1.9%	8,124	1.6%	11,639	0.4%
Other ethnic group	2,488	3.6%	15,387	3.1%	27,425	1.0%
Other ethnic group: Arab	1,607	2.3%	9,503	1.9%	15,026	0.6%
Other ethnic group: Any other ethnic group	881	1.3%	5,884	1.2%	12,399	0.5%

Table 15.5: Tenure[5] (2011)

	Assessment Area		Manchester		Greater Manchester	
All households	29,368		204,969		1,128,066	
Owned	6,622	22.5%	77,395	37.8%	678,367	60.1%
Shared ownership (part owned and part rented)	249	0.8%	1,481	0.7%	5,730	0.5%
Social rented	9,551	32.5%	64,682	31.6%	247,540	21.9%
Private rented	12,432	42.3%	58,170	28.4%	181,095	16.1%
Living rent free	514	1.8%	3,241	1.6%	15,334	1.4%

Table 15.6: Employment[6] (2017)

	Total Employment	Full time %	Part time %	FTE
Assessment Area	224,500	73.8%	26.2%	192,000
Manchester	392,500	71.4%	28.8%	331,000
Greater Manchester	1,331,000	68.7%	31.3%	1,099,250

Table 15.7: Employment by Sector[7] (2017)

	Assessment Area		Manchester		Greater Manchester	
Prof., scientific and technical activities	36,500	16.3%	48,500	12.4%	123,000	9.2%
Admin and support services	33,525	14.9%	48,000	12.2%	131,500	9.9%
Wholesale and retail trade	27,625	12.3%	50,500	12.9%	217,000	16.3%
Accommodation and food services	19,750	8.8%	30,500	7.8%	77,000	5.8%
Education	19,575	8.7%	39,000	9.9%	116,500	8.8%
Human health and social work	17,775	7.9%	47,000	12.0%	170,000	12.8%
Finance and insurance	17,630	7.9%	19,500	5.0%	44,500	3.3%
Public admin and defence	11,625	5.2%	16,500	4.2%	54,000	4.1%
Arts, entertainment, recreation & other services	8,625	3.8%	14,500	3.7%	55,000	4.1%
Transportation and storage	8,425	3.8%	29,000	7.4%	75,500	5.7%
Information and communication	8,195	3.7%	16,500	4.2%	48,500	3.6%
Real estate	6,055	2.7%	10,500	2.7%	31,000	2.3%
Manufacturing	4,850	2.2%	13,500	3.4%	108,500	8.2%
Construction	3,725	1.7%	9,000	2.3%	60,000	4.5%
Agriculture, mining, quarrying & utilities	760	0.3%	1,170	0.3%	18,300	1.4%

[5] ONS Census
[6] Business Register and Employment Survey (BRES), 2017
[7] BRES, 2017

Total	224,500		392,500		1,331,000	

Table 15.8: Claimant Count (June 2019)

		Assessment Area	Manchester	Greater Manchester	England
June 2013	Count	2,405	19,040	79,395	1,173,090
	% 16-64 year olds	4.2	5.2	4.5	3.4
June 2014	Count	1,600	13,270	54,680	818,840
	% 16-64 year olds	2.7	3.6	3.1	2.4
June 2015	Count	1,205	10,205	43,930	618,860
	% 16-64 year olds	2.0	2.7	2.5	1.8
June 2016	Count	1,305	10,510	45,980	610,745
	% 16-64 year olds	2.0	2.7	2.6	1.8
June 2017	Count	1,215	10,010	46,150	648,715
	% 16-64 year olds	1.8	2.6	2.6	1.9
June 2018	Count	1,620	12,045	51,975	727,930
	% 16-64 year olds	2.4	3.1	2.9	2.1
June 2019	Count	2,000	16,285	67,120	948,800
	% 16-64 year olds	2.9	4.2	3.7	2.7

Table 15.9: Skill Levels of the Working Age Population[8] (2018)

	Level 4 + (%)	Level 3 + (%)	Trade Apprentice-ships (%)	Level 2 + (%)	Level 1 + (%)	Other qualifications (%)	No qualifications (%)
Manchester	44.1	60.4	1.4	72.7	81.9	7.6	10.5
Greater Manchester	39.0	57.7	3.1	75.0	85.6	6.8	7.6
England	35.6	54.9	2.8	72.7	83.5	6.7	9.8

Table 15.10: Apprenticeship Starts[9] (2014/15 – 2017/18)

	2014/15	2015/16	2016/17	2017/18	2014/15 - 2017/18 % change
Manchester	4,830	4,730	4,350	3,720	-23%
England	499,890	509,360	494,880	375,760	-25%

Table 15.11: Resident Occupation of those in employment[10] (2018/19)

[8] Annual Population Survey
[9] Department for Education Apprenticeship and traineeships data
[10] Annual Population Survey

	Manchester	Greater Manchester	England
Professional occupations	24.7%	21.0%	20.3%
Elementary occupations	13.2%	10.2%	11.5%
Associate prof & tech occupations	11.9%	15.0%	13.9%
Caring, leisure & other service occupations	10.1%	8.9%	9.1%
Sales & customer service occupations	9.5%	7.3%	8.6%
Administrative & secretarial occupations	9.3%	10.0%	10.3%
Managers, directors & senior officials	8.7%	11.2%	9.8%
Process, plant & machine operatives	6.1%	6.2%	7.4%
Skilled trades occupations	5.8%	9.9%	8.7%

Table 15.12: Tenure[11] (2011)

	Assessment Area		Manchester		Greater Manchester	
	29,368		204,969		1,128,066	
Owned	6,622	22.5%	77,395	37.8%	678,367	60.1%
Shared ownership (part owned and part rented)	249	0.8%	1,481	0.7%	5,730	0.5%
Social rented	9,551	32.5%	64,682	31.6%	247,540	21.9%
Private rented	12,432	42.3%	58,170	28.4%	181,095	16.1%
Living rent free	514	1.8%	3,241	1.6%	15,334	1.4%

Table 15.13: Average Household Local Expenditure[12] (2018)

	Average weekly expenditure	Average annual expenditure
Recreation and culture	£74.60	£3,879.20
Food and non-alcoholic drinks	£60.60	£3,151.20
Restaurants and hotels	£29.60	£1,539.20
Clothing and footwear	£24.30	£1,263.60
Personal care	£12.50	£650.00
Alcoholic drinks	£8.70	£452.40
Good and services for routine household maintenance	£6.70	£348.40
Personal effects	£4.00	£208.00
Total	**£221.00**	**£11,492.00**

Table 15.14: Doctors Surgeries within 1 mile of the Site[13]

Surgery	Distance	Number of Registered Patients	Accepting New NHS Patients?
The Vallance Centre	0.4 miles	9,444	Yes
The Docs	0.4 miles	7,766	Yes
Ancoats Urban Village Medical Practice	0.5 miles	10,692	Yes
New Islington Medical Centre	0.7 miles	6,439	Yes
Cornbrook Medical Practice – Boundary Surgery	0.7 miles	13,091	Yes
City Health Centre	0.8 miles	13,283	Yes

[11] ONS Census
[12] Based on the ONS Family Spending Survey: https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/bulletins/familyspendingintheuk/financialyearending2018 for the goods and services expected to be bought locally.
[13] http://www.nhs.uk/Service-Search

Trinity Medical Centre	0.9 miles	9,741	Yes
The Arch Medical Practice	1 miles	18,900	Yes

Table 15.15: Dental Practices within 2 miles of the Site[14]

Dental Practice	Distance	Accepting New Adult NHS Patients?	Accepting New Children Patients?
The Vallance Dental Centre	0.4 miles	No	Yes
Manchester PCTDS	0.4 miles	Information not available	Information not available
mydentist, Stevenson Square	0.6 miles	No	No
Manchester Dental Practice	0.7 miles	Yes	Yes
Revive Dental Care Limited	0.7 miles	Information not available	Information not available
The Dental Practice	0.7 miles	Information not available	Information not available
New Cross Dental Surgery	0.7 miles	Information not available	Information not available
Ocean Dental Implant and Aesthetic Clinic	0.8 miles	No	No
Oasis Dental Care Ltd	0.8 miles	Information not available	Information not available
Bupa Dental Care	0.8 miles	Yes	Yes
207 Dental Care	0.9 miles	No	No
City Centre Dental Practice – Mr Moss	0.9 miles	No	No
Petrie Tucker & Partners Ltd	0.9	Information not available	Information not available
Manchester PCTDS	1.2 miles	Information not available	Information not available
Archway Dental Practice	1.4 miles	No	No
Rusholme Dental Practice	1.4 miles	No	No
Revive Dental Care	1.4 miles	Information not available	Information not available
Parsonage Dental Practice	1.5 miles	No	No
Kathcare Ltd	1.5 miles	Information not available	Information not available
Manchester PCTDS Longsight	1.6 miles	Information not available	Information not available
M S Umar Dental Practice	1.7 miles	No	No
Dr I Saleem	1.7 miles	Yes	Yes
Family Dental Practice	1.7 miles	Information not available	Information not available
Brooks Bar Dental	1.7 miles	No	No
Birchfields Family Dental Care	1.8 miles	No	No
Queens Road Dental & Cosmetic Centre	1.9 miles	Information not available	Information not available
Salford Community Health	2.0 miles	Information not available	Information not available
Deane Dental Practice	2.0 miles	Yes	Yes
Longsight Dental Practice	2.0 miles	Yes	Yes
mydentist, Platt Lane, Fallowfield	2.0 miles	No	No
East Road Care Limited	2.0 miles	Information not available	Information not available
Tasmia Khan & Associates	2.0 miles	No	No

Table 15.16: Nurseries within 1.2 miles of the Site[15]

Day Nursery	Distance	Available Places	Number of vacancies
Little Learning Ladder Nursery	0.45 miles	Yes	81
Paint Pots Manchester Day Nursery	0.53 miles	Yes	Information not available
Tiddlywinks – Ancoats	0.67 miles	Yes	72
Bright Horizons Manchester	0.71 miles	Yes	Information not available
Early Explorers Day Nursery	0.75 miles	Yes	Information not available

[14] http://www.nhs.uk/Service-Search
[15] https://hsm.manchester.gov.uk/kb5/manchester/directory/results.page?directorychannel=1-2-7&qt=&term=M1+2QF&sorttype=distance and https://www.mapdevelopers.com/distance_finder.php

Dryden Street Nursery	0.75 miles	Information not available	Information not available
First Steps Day Nursery (St Mary's Hospital)	0.93 miles	Yes	5
Happy Kids Heybury Close	0.99 miles	Yes	Limited vacancies available
Bright Eyes Day Nursery	1.00 miles	Yes	Information not available
Winstanley Day Nursery	1.06 miles	Yes	Information not available
Twinkle Star Pre-School Beswick	1.12 miles	Information not available	Information not available
Ciara's Tots	1.16 miles	Yes	Information not available

Table 15.17: Primary Schools within 1.2 miles of the Site[16]

School	Distance	No. Pupils	Capacity	Available Capacity
Medlock Primary School	0.39 miles	407	420	13
New Islington Free School	0.50 miles	253	420	167
St Annes RC Primary School	0.57 miles	189	210	21
St Philip's C of E Primary School	0.87 miles	191	210	19
Ashbury Meadow Primary School	0.90 miles	385	420	35
Trinity Church of England High School	0.89 miles	1,351	1,500	149
Dean Trust Ardwick	1.15 miles	646	1,200	554
Manchester Academy	1.23 miles	1,051	1,200	149
The East Manchester Academy	1.27 miles	936	900	-36
Eden Boy's Leadership Academy	1.73 miles	121	800	679
Eden Girls' Leadership Academy	1.75 miles	122	800	678
St Peter's RC High School	1.83 miles	968	1,000	32
Manchester Communication Academy	1.95 miles	1,128	1,200	72
William Hulme's Grammar School	2.2 miles	1,330	1,520	190
Manchester Enterprise Academy (MEA) Central	2.30 miles	213	1,050	837
Oasis Academy MediaCityUK	2.35 miles	521	900	379
Whalley Range 11-18 High School	2.4 miles	1,562	1,650	88
Seymour Road Academy	2.4 miles	415	420	5
The Albion Academy	2.5 miles	700	925	225
Cedar Mount Academy	2.7 miles	806	900	94
King David High School	2.9 miles	805	800	-5
Streford High School	3.0 miles	852	973	121
Secondary Total				**4,252**[17]

Table 15.18: Reported Crimes within 1 mile radius of the Site (June 2019)[18]

Crime Type	Count	%
Violence or sexual offences	485	19.3%
Anti-social behaviour	406	16.1%
Theft from the person	393	15.6%
Other theft	289	11.5%
Public order	210	8.3%
Vehicle Crime	192	7.6%
Shoplifting	149	5.9%

[16] https://secure.manchester.gov.uk/directory/84/school_finder and https://www.mapdevelopers.com/distance_finder.php and Department for education (DfE), School Capacity underlying data for 2017/18
[17] In schools where capacity is available
[18] https://www.police.uk/greater-manchester/AC28/crime/+47Smv8/ crimes in June 2019 accessed 06/08/19

Criminal Damage & Arson	85	3.4%
Drugs	83	3.3%
Bicycle theft	68	2.7%
Burglary	67	2.7%
Robbery	55	2.2%
Possessions of weapons	22	0.9%
Other Crime	15	0.6%
Total	2,519	

Table 15.19: Value of Local Greenspace[19]

Name	Area (hectares)	Welfare per annum	Welfare per Hectare
Sand Street	3.3	£41,385	£12,541
Hulme Park	4.9	£150,552	£30,851
Philips Park	15.7	£727,556	£46,341
Gartside Gardens	2.3	£111,948	£48,462
Ardwick Green Park	2.3	£115,630	£51,391
St Michael's Flags	1.8	£145,440	£80,800
Bradford Park	1.6	£176,667	£113,248
Ancoats Green	1.7	£213,994	£126,624
All Saints Park	0.8	£118,977	£158,636
Roman Gardens	0.8	£135,181	£168,976
Piccadilly Gardens	0.5	£97,161	£194,322
St Catherine's	1.8	£364,821	£202,678
Victoria Mill Park	2.2	£593,541	£269,791
Cutting Room Square	0.4	£107,949	£269,873
Sackville Gardens	0.5	£566,222	£1,132,444

[19] University of Exeter ORVal Tool https://www.leep.exeter.ac.uk/orval/

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