Deloitte.



Mayfield, Phase 1

EIA Volume 1

September 2019

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1 Introduction

Introduction

1.1 This Environmental Statement ("ES") has been prepared in respect of land within the Mayfield Strategic Regeneration Framework (SRF) area for the erection of a commercial led mixed-use development comprising two office buildings (Baring Street Office 1 and 2), a multi-storey car park (Baring Street MSCP) and a new 2.4 hectare city park. The applications to which this ES relates are submitted by Mayfield Development Partnership LP 'the applicant'.

1.2 The Site to which this ES relates is 5.01 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").

1.3 The Proposed Development, as outlined above and in detail at Chapter 3 of this Environmental Statement and summarised in Table 1.1 below, is hereafter referred to as the "Proposed Development". This ES sets out the findings of an Environmental Impact Assessment ("EIA") carried out in respect of the development of the Site.

1.4 The proposed overall quantum of development is set out below:

Table 1.1 - Proposed Uses and Floorspace

Use	Proposed Development
Site Area	5.01ha
Office Buildings	Baring Street Office 1 (Application 1): 9,350 sq. m. GIA / 9,987 sq. m. GEA Baring Street Office 2 (Application 2): 30,046 sq. m. GIA / 30,100 sq. m. GEA
Baring Street Multi-Storey Car Park (MSCP)	543 spaces / 16,258 sq. m. (Application 1)
Mayfield Park	2.4 ha of hard and soft landscaping, centred around the River Medlock and delivered in two phases, with relevant enabling and site remediation works associated with the delivery of each phase (Application 1).
Other	Junction improvements to London Road, improvements to Baring Street and immediate surrounds, Traffic Regulation Orders and Stopping Up of Bond Street and Nether Street (Application 1).

EIA Process

1.5 The EIA process is the mechanism by which development proposals are appraised in terms of their likely environmental effects, in addition to engineering and technical considerations. The purpose of the EIA is to establish the nature of the Proposed Development and the environment in which it is likely to take place, during both construction and operational phases, so as to identify the likely significant effects on the environment.

1.6 The assessment compares the existing situation at the start of the work (baseline) with the situation during demolition and construction, and when the Proposed Development is operational. A full and comprehensive explanation of the scenarios tested is set out in Chapter

2 of this ES (EIA Methodology). Any variance to these scenarios will be set out in each chapters, based on the information and data used and the agreement to this method through discussion with Statutory Consultees.

1.7 A newly amended EIA Directive (2014/52/EU) entered into force on 15 May 2014 and was transposed into statutory legislation within the United Kingdom on 17 May 2017. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the "EIA Regulations") require that any Proposed Development falling within the description of a 'Schedule 2 development' (as defined within the meaning of the Regulations), will be subject to an Environmental Impact Assessment where such development is likely to have 'significant' effects on the environment by virtue of such factors as its nature, size or location (Regulation 2(b)).

1.8 A development proposal is considered likely to fall under the category of "urban development projects" (Schedule 2, 10, (b)) where:

- The development includes more than 1 hectare of urban development which is not dwelling house development; or
- The development includes more than 150 dwellings; or
- The overall area of the development exceeds 5 hectares.

1.9 On this basis, the Proposed Development and Site exceeds the indicative applicable EIA Screening thresholds set out in the EIA Regulations and an EIA was therefore considered appropriate to test the likely significant effects of the Proposed Development.

1.10 A formal EIA Scoping Request was submitted to Manchester City Council on 10 January 2019, requesting confirmation as to the proposed scope of the EIA required in respect of the Proposed Development. This Scoping Request was then updated to respond to the amended first phase proposals.

1.11 A response was received from the LPA on 16 August 2019 and full details of this co-ordinated response is set out in Chapter 2 and associated appendices. The technical chapters are therefore based on a scope of assessment that has been agreed with the relevant statutory consultees where possible.

1.12 In accordance with the EIA Regulations, this ES sets out the following information:

- A description of the Proposed Development comprising information on the site, design, size and other relevant features of the development (Chapter 3);
- A description of the reasonable alternatives studied by the developer, which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment (Chapter 4);
- A description of the likely significant effects of the Proposed Development on the environment (Chapters 6-15);
- A description of any features of the Proposed Development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment (Chapters 6-15);
- A non-technical summary of the information, of the information specified above (Stand-alone EIA Non-Technical Summary); and,
- Any additional information specified in Schedule 4 of the EIA Regulations relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

1.13 This ES considers two separate applications (Application 1 and Application 2) for Full Planning Permission which together form Phase 1 of the Mayfield development, referred to as the Proposed Development. The Applications are described in detail in Chapter 3 and will be submitted approximately a month apart.

1.14 These Applications will form the overall Phase 1 boundary for the Environment Statement (as set out in Chapter 3 – the Site) and will in turn be supported by Phasing Plans that will set out the stages of delivery associated with each plot and the masterplan overall. These delivery scenarios will be tested as part of this EIA and are set out in detail within Chapter 3 (EIA Methodology) and Chapter 5 (Construction Management and Phasing).

1.15 The first application, hereafter referred to as "Application 1", includes the following scope of works:

- 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 1 (Plot O): 9 storey office development including ground, mezzanine and plant level comprising 9,987 sq. m. (GEA) including active ground floor uses (A1, A2, A3, A4 or B1), public realm and riverside walkway;
- Baring Street Multi-Storey Car Park (MSCP): 10 storey MSCP including ground for 543 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.

1.16 The second application, referred to as Application 2 throughout this Statement, relates to a 13 storey office development including ground and mezzanine floors comprising 30,046 sq. m. (GIA) (circa 31,000 sq. m. (GEA)) with active ground floor uses, highways and associated access and public realm. This is referred to throughout this ES and supporting submission documentation as Baring Street Office 2.

1.17 As mentioned, the Applications will be brought forward separately. However both applications have been considered as part of this ES to ensure that any interrelated environmental impacts are identified and appropriately assessed, including a qualitative assessment of the wider SRF area. This approach has been agreed with Manchester City Council (MCC) through the EIA Screening and Scoping process detailed below.

1.18 The first submission will comprise Plot O (referred to hereafter as 'Baring Street Office 1'), Plot N (referred hereafter as 'Baring Street MSCP') and the phased delivery of the park with any required highways and enabling works. Due to programme and testing periods, the submission and ES uses the maximum quantum for testing for Plot M (hereafter referred to as 'Baring Street Office 2') for the first planning submission and associated ES in September 2019.

1.19 The ES and associated technical reports contain a clear statement at the beginning explaining the quantum used for testing and referencing the final application quantum and explaining the impact, if any, this has on the validity of the results and associated mitigation. Mitigation should be clearly split by phase to allow distinct planning conditions to be associated with each phase of development.

1.20 This ES for Application 1, having tested maximum parameters, will be resubmitted and supported by a suite of stand-alone Baring Street Office 1 specific non-EIA technical reports.

Application 2 will be made in October 2019, which will be supported by a series of stand-alone technical reports.

1.21 Full details of the EIA Methodology are contained within Chapter 2 of this ES and a description of both proposals are set out in detail within the Chapter 3 of the ES, supporting Planning Statement and Design and Access Statement.

Project Team

1.22 The EIA has been managed and the ES prepared by competent experts in accordance with Regulation 18 (5). The project team is experienced in the preparation of EIAs and specialise in their respective disciplines. Team members are appropriately trained and the work has been overseen by staff highly experienced and qualified in their field and in the production of EIA work.

1.23 Deloitte Real Estate has significant experience and expertise in managing the EIA process, and hold the IEMA EIA Quality Mark. Deloitte Real Estate has managed the EIA process and the production of the ES for Mayfield Manchester, and has received technical input from a range of suitably qualified and experienced technical consultees.

1.24 Details of the EIA Technical Team and qualifications are set out in Table 1.2 below.

Table 1.2 - ES Project Team

Organisation	Expertise / Role	Qualifications
Mayfield Development Partnership LP	Land Owner and Developer	n/a
Deloitte Real Estate	Town Planning, EIA Co-ordination	Extensive experience in preparation, co-ordination and submission of Environmental Impact Assessments and accredited firm for organisations including RTPI, RICS and IEMA (including EIA Quality Mark).
F&G	Construction, Management and Logistics	Specialists in project and programme management.
Buro Happold	Noise and Vibration Transport Air Quality Ecology and Biodiversity Ground Conditions Water Resources and Flood Risk Wind Daylight, Sunlight, Overshadowing and Solar Glare	BuroHappold Engineering is an international, integrated engineering consultancy operating in 23 locations worldwide. They work as a multi-disciplinary team providing the full range of environmental services required on projects, drawing on our experience across the globe to provide expert advice and design, from concept through to project completion. Their team are experienced in providing comprehensive Environmental Impact Assessments (EIA), including coordination and preparation of Environmental Statements (ES) covering the full range of technical services from desktop studies to site investigations, to complex modelling in order to meet legislative requirements.
Chris Burnett Associates	Townscape and Visual Impact	Specialists in Landscape and Visual Impact Assessments and registered with the Landscape Institute.

Organisation	Expertise / Role	Qualifications
Ekosgen	Socio-Economic Impact	Economic, Social and Regeneration Specialists.

Table 1.2 - Non-EIA Technical Team

Organisation	Expertise / Role
Studio Egret West	Architects (Baring Street MSCP and Park)
Bennetts Associates	Architects (Baring Street Campus - Office 1)
Morris & Co	Architects (Baring Street Campus – Office 2)
F&G	Project Management, Construction Management Plan
u+i	Regeneration Specialists, Operational Management
Buro Happold	Servicing and Waste, Topography, Arboriculture, Structural and Civil engineering
Salford Archaeology	Archaeology
Greater Manchester Police	Crime impact and security
Transport Work Orders	Buro Happold
Hoare Lea	Ventilation, Energy, Environmental Standards to Baring Street Office 1 and MSCP.
WSP	Ventilation, Energy, Environmental Standards to Baring Street Office 2
Civic Engineers	Baring Street highway works and landscaping, Oil Interception to MSCP, Civil and Structural engineering
G-Tech Surveys	TV Reception
HillBreak	Sustainability Consultant (Site Wide)

Organisation of the Environmental Statement

1.25 This ES comprises 17 chapters and is supported by figures (located at the back of each chapter within Volume 1) and technical appendices (within a separate Volume 2). A Non-Technical Summary (NTS) of the full ES is provided as a separate standalone document.

1.26 Figures have been referenced using the chapter number as a prefix followed by the number of the figure within a given chapter. Appendices have been referenced in the same way in Volume 2.

1.27 Table 1.2 sets out the structure of the ES:

Table 1.2 - Environmental Statement Structure

Chapter No.	Chapter Title	Description
VOLUME 1		
1	Introduction	Introduction to the ES, EIA requirements, details of the project team, ES organisation and availability.
2	EIA Methodology	Methods used to prepare each chapter, description of ES structure and content, generic significance criteria, scoping and consultation.
3	Site and Development Description	Site description and details of the Proposed Development.
4	Consideration of Alternatives	Outlines of the main alternatives considered by the Applicant.
5	Construction Management and Phasing	Details of anticipated programme for development and construction methodology are also included, with a high level summary of plant and equipment to be used during the construction programme.
6	Noise and Vibration	Assessment of likely effects of construction and operational phases on existing sensitive receptors, and the suitability of the Site for the Proposed Development.
7	Traffic and Transport	Assessment of impact to the local highway network in terms of vehicle trip generation, including waste and servicing requirements, and how this will be mitigated to support use of sustainable transport options, walking and cycling.
8	Air Quality	Assessment of Phase 1 and the wider development of the SRF to provide the impact of both Phase 1 and a future development year scenario.
9	Ecology	Assessment of the impact on existing ecological receptors and new ecological habitats as a result of the Proposed Development.
10	Ground Conditions	Assessment of ground contamination impacts and effects associated with construction of the development as well as potential operational impacts and effects.
11	Water Resources and Flood Risk	Assess the impact of re-profiling works and on site attenuation on the River Medlock.
12	Wind Microclimate	An assessment of the impact that the proposals will have on the local wind environment.
13	Daylight, Sunlight, Overshadowing and Solar Glare	An assessment into Sunlight and Daylight impacts on nearby sensitive receptors as a result of the Proposed Development.
14	Townscape and Visual Impact	Assessment of the likely significant effects of the Proposed Development with respect to Townscape and Visual Impact.
15	Socio-Economic Impact	Assess the likely significant effects of the Proposed Development with respect to the socio-economic environment, including direct and indirect construction phase (temporary) and operational phase (permanent) effects on the local and regional environment.

Chapter No.	Chapter Title	Description
16	Type 1 Cumulative Impact Assessment	Summary of Type 1 cumulative effects, the combined effects arising from the development on a set of defined sensitive receptors.
17	Summary of Residual Effects	Summary of the effects that remain after mitigation.
VOLUME 2	Technical Appendices	Technical data and reports to support the chapters in Volume 1.
VOLUME 3	Non-Technical Summary	Summary of the ES in non-technical language.

Other Documents

1.28 A number of other documents have been submitted to Manchester City Council in support of the planning applications in addition to Volume 1 of the ES. These include:

- ES Volume 2:
- Appendix 2.1: EIA Scoping Report
- Appendix 2.2: EIA Scoping Opinion
- Appendix 5.1: Construction Management Plan Park and Highways
- Appendix 5.2: Construction Management Plan Office and MSCP
- Appendix 6.1: Acoustic Glossary
- Appendix 6.2: Legislation and Policy Summary
- Appendix 6.3: Environmental Noise Survey Results
- Appendix 6.4: Traffic Data
- Appendix 6.5: Construction Noise Data Calculations
- Appendix 7.1: Transport Assessment
- Appendix 7.2: Framework Travel Plan
- Appendix 8.1: Construction Assessment Methodology
- Appendix 8.2: Construction Mitigation Measures
- Appendix 9.1: Ecology Glossary
- Appendix 9.2: Ecological Assessment Report, August 2019
- Appendix 9.3: Bat Survey Report, September 2019
- Appendix 9.4: Breeding Bird Survey Report, November 2017
- Appendix 9.5: River Survey Report, November 2017
- Appendix 9.6: Ecology Strategy with Biodiversity Net Gain Calculations
- Appendix 9.7: Arboricultural Impact Assessment and Arboricultural Method Statement
- Appendix 10.1: Ground Engineering Desk Study Report – Mayfield Regeneration
- Appendix 10.2: Phase II Geo-Environmental and Geotechnical Assessment, Plots N + O Mayfield, Baring Street, Manchester
- Appendix 11.1: Flood Risk Assessment and Drainage Strategy (Site Wide)
- Appendix 11.2: Drainage Strategy Office 1
- Appendix 11.3: Drainage Strategy MSCP

  - Appendix 12.1 – Wind Impact Assessment
  - Appendix 14.1: Townscape and Visual Impact ZVI
  - Appendix 14.2: Townscape Views
  - Appendix 15.1: Socio-Economic Data Tables

- Non Environmental Statement Documents (Site wide for both applications):
  - Mayfield Masterplan Design and Access Statement;
  - Topographical Survey;
  - UXO Desktop Study;
  - Site Wide Crime Impact Statement; and
  - Archaeological Desk Based Assessment.
  - Non Environmental Statement Documents (Baring Street Office 1, Baring Street MSCP and Park):
  - Supporting Plans, Elevations and Sections;
  - Planning Statement;
  - Statement of Consultation;
  - Design and Access Statements;
  - Crime Impact Statements;
  - Waste Management and Servicing Strategy;
  - TV Reception Survey;
  - Ventilation Strategies; and
  - Energy Statements.
- Non Environmental Statement Documents (Baring Street Office 2) to be submitted with Application 2:
  - Supporting Plans, Elevations and Sections;
  - Design and Access Statement;
  - Planning Statement;
  - Statement of Consultation;
  - Operational Management Strategy;
  - Crime Impact Statement;
  - Ventilation Strategy;
  - Waste Management and Servicing Strategy;
  - Energy Statement; and
  - Environmental Standards Statement.

1.29 For Application 2, this EIA will be / has been resubmitted in order to provide the full suite of EIA documentation, in addition to the stand-alone technical reports prepared specifically for Baring Street Office 2. Considering the EIA will test maximum parameters for Application 2, no perceptible change is anticipated.

1.30 Full details of the EIA methodology and multi-stage approach to the assessment in order to cover Applications 1 and 2 in sequence are provided in Chapter 2 of this ES (EIA Methodology).

Environmental Statement Availability

1.31 The ES is available for public viewing on Manchester City Council's Public Access website at the following address: http://pa.manchester.gov.uk/online-applications/ once the application has been submitted and validated.

1.32 The ES may be purchased in volumes, the costs for which are set out below

- Volume 1: ES Main Text and Figures - £150
- Volume 2: ES Appendices - £150
- Non-Technical Summary (NTS) - £15
- Full Copy (Volumes 1, 2 and NTS) of the ES on CD - £15

1.33 For copies of any of the above, please contact the Manchester Planning Team at Deloitte Real Estate.

Mayfield Project Team – Planning and EIA
Deloitte Real Estate
2 Hardman Street
Manchester
M3 3HF

2 EIA Methodology

Introduction

2.1 This chapter explains the methodology used to prepare each assessment and technical chapter in this ES and describes its structure and content. In particular, it sets out the process of identifying and assessing the likely significant effects of the Proposed Development on the environment (as defined in Chapter 1 and described in detail in Chapter 3 of this ES). It also seeks to provide detailed clarification of the multi-stage nature of the EIA required in order to cover subsequent and intrinsically linked Planning Applications.

Legislation and Guidance

2.2 The ES has been prepared to comply with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, which implement European Council Directive No. 85/337/EEC as amended by Directives 2011/92/EU and 2014/52/EU. Reference has also been made to currently available good practice guidance in EIA, including:

- National Planning Practice Guidance – Department for Communities and Local Government;
- Impact Assessment Guidelines and ES Review Criteria, Institute of Environmental Management and Assessment (IEMA), 2004;
- Guidance on EIA, EIS Review, European Commission, June 2001;
- Guidance on EIA Scoping, European Commission, June 2001;
- Guidance on Transport Assessment, DCLG and DfT, March 2007;
- Shaping Quality Development, IEMA, November 2015;
- Health in Environmental Impact Assessment, A Primer for a Proportionate Approach, IEMA, 2017; and
- Biodiversity Net Gain, Good Practice Principles for Development, IEMA, 2016.

Scoping and Consultation

2.3 The Proposed Development has been the subject of a scoping exercise to identify the likely significant effects on the environment that might arise, which has in turn informed the scope of the assessment.

2.4 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 LP (the 'Partnership').

2.5 It was agreed with the Local Planning Authority that, due to the inclusion of an additional office (Baring Street Office 2) and omission of other areas from the forthcoming Phase 1 application, an addendum to the Scoping Report should be prepared to confirm the scope of the EIA.

2.6 This Addendum reviewed 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. The Addendum and the original Scoping Report are contained within Appendix 2.1 to this ES.

2.7 In response, Manchester City Council issued their Scoping Opinion 16 August 2019 (Appendix 2.2). The Author of each Chapter has sought the opinion from relevant officers at Manchester

City Council, and statutory and non-statutory consultees as necessary. Compliance with the scope is detailed within the 'Assessment Methodology and Significance Criteria' section of each Technical Chapter.

2.8 The above demonstrates that a robust approach has been taken to both the formal and informal aspects of scoping that have influenced the EIA process and the production of this ES. Statutory bodies were consulted during the formal scoping process, and include:

- 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

2.9 A number of non-statutory consultees were also contacted about the proposals during the planning process, including engagement with local resident and groups. A number of public exhibitions were held between 6 May and 22 August and the responses received are provided in the Statement of Consultation submitted with each respective application. This detailed design consultation in relation to each building follows on from extensive consultation associated with the masterplan and Strategic Regeneration Framework.

2.10 Further details relating to stakeholder engagement and public consultation are included within the Statement of Consultation (SoC) submitted in support of the planning application.

2.11 The scoping and consultation undertaken has focused the scope of the EIA on those areas where significant environmental effects might be likely to occur. The scope of the technical assessment is set out in Table 2.1 below, and reflected in the structure of this ES.

Table 2.1 - Scope of EIA

Topic
Noise and Vibration
Traffic and Transport
Air Quality
Ecology
Ground Conditions
Water Resources and Flood Risk
Wind Microclimate

Topic
Daylight, Sunlight and Overshadowing
Townscape and Visual Impact
Socio-Economic Impact

2.12 The technical assessments set out above have been informed by details of the indicative construction methodology and programme, which is included within Chapter 5 of the ES and in Appendix 5.1 and 5.2 of Volume 2.

2.13 An assessment of inter-project (Type 2) cumulative effects has also been included within each technical chapter (6-15) where relevant. Chapter 16 contains a standalone assessment of intra-project (Type 1) cumulative effects.

Non-Significant Issues

2.14 The following disciplines were identified as not being likely to have significant effects on the environment and are therefore not included in the ES. An explanation for each scoped-out discipline is provided in the EIA Scoping Report and EIA Scoping Addendum at Appendix 2.1.

- Agricultural Circumstances;
- Aviation;
- Climate Change;
- Archaeology;
- Built Heritage;
- Waste;
- Electronic Interference; and
- Human Health.

Structure of Technical Chapters

2.15 Each technical chapter (6-15) of the ES is set out in a consistent structure, as set out within Table 2.2.

2.16 Chapter 3 (Site and Development Description) and Chapter 5 (Construction Methodology and Programme) provide information to allow the technical ES chapters to undertake a robust assessment and technical assessment findings are set out in Chapters 6-15 in detail and summarised in Chapters 16 and 17.

Table 2.2 - Structure of ES Technical Chapters

Section	Overview of Section Content
Introduction	Each of the technical chapters begins with an introduction providing context to the EIA completed.
Legislative and Policy Context	This section includes a summary of legislation and national, regional and local policies of relevance to the environmental discipline and explains its purpose in the context of the Proposed Development and the ES.
Assessment Methodology and	This section describes the method or approach employed in the assessment of impacts, the criteria against which the significance of effects has been evaluated, the sources of information used and any technical difficulties encountered. Relevant legislation is also

Section	Overview of Section Content
Significance Criteria	identified.
Baseline Conditions	This section describes and evaluates the baseline environmental conditions i.e. the current situation and anticipated changes over time assuming the Site remains unchanged. This is a critical part of the EIA process as it provides a measure against which potential environmental effects can be assessed.
Identification and Evaluation of Likely Significant Effects	This section identifies the likely significant effects on the environment resulting from the Proposed Development. A description of the likely effects of the Proposed Development and an assessment of their predicted significance is provided. The assessment of effect significance has been undertaken using appropriate national and international quality standards. Where no such standards exist, the judgments that underpin the attribution of significance are described. The guidelines, methods and techniques used in the process of determining significance of effects are contained within each of the technical chapters presented.
Mitigation Measures	One of the main aims of the EIA process is to develop suitable mitigation measures to avoid, reduce or compensate for any significant adverse effects of a project. This section of each technical chapter describes the measures which would be implemented to mitigate against potential adverse effects. Where possible, enhancement measures have also been proposed. The mitigation measures described in each technical chapter (6-15) are also summarised within Chapter 17, Summary of Residual Effects.
Cumulative Effects	This section considers the cumulative effects of the Proposed Development identified within the vicinity of the Site. Any likely significant effects on the environment arising in this respect are set out in this section. There are two distinct types of cumulative effects: Type 1 - Cumulative effects are the interactions between effects of the Proposed Development on a single receptor. Note these effects are assessed in Chapter 16. Type 2 - Cumulative effects are those that arise from incremental changes caused by other consented or reasonably foreseeable activities ('committed developments') together with the Proposed Development. These effects are considered within the individual technical ES chapters (6-15).
Residual Effects	The residual effects, i.e. the remaining effects of the Proposed Development assuming implementation of the proposed mitigation measures, have been estimated and presented. The methods used to make these estimates are described and proposed methods of treatment for any residual effects have been identified and quantified where possible.
Summary	Each technical chapter concludes with a brief summary outlining the potential residual effects of the Proposed Development.

2.17 The EIA technical studies, contained in Volume 2 of this ES, have been undertaken in accordance with current best practice. Specific guidance used is referenced within each of the respective assessment chapters. The majority of assessments involved consultations with statutory and non-statutory bodies, desk-based research, site inspections and surveys, impact prediction and mitigation.

2.18 The objective of the ES is to present an informed, transparent and reasoned description of the likely significant effects of the Proposed Development on the environment. The full range and

type of effects are considered within each assessment, including beneficial/adverse, direct/indirect, short/medium/long term and cumulative.

Baseline Conditions

2.19 The technical studies, including a variety of surveys and assessments, were undertaken during 2018 and 2019. Some of these surveys are reliant on research and analysis undertaken over an extended period. Baseline data has been obtained from a variety of sources, including published documents, maps, historical information, site survey data and information provided by Statutory Consultees.

2.20 Each technical chapter (6-15) includes a section which describes and evaluates the baseline environmental conditions (i.e. the current situation and anticipated changes over time assuming the Site remains unchanged, also commonly referred to as the 'Future Baseline'). Each technical chapter includes a clear description of what is assumed as the baseline against which the assessment is being made.

2.21 The findings of the baseline environmental studies have played an important role in the evolution of the Proposed Development by defining the environmental sensitivities, constraints and opportunities associated with the Site. All of the assessments are primarily undertaken against the existing baseline.

2.22 The method used to obtain baseline information is in line with the Scoping request and Scoping Opinion and, where relevant and possible, has been agreed in advance with statutory consultees and is clearly identified within each technical chapter.

Significance Criteria

Magnitude

2.23 The methodology for determining the scale, or magnitude of change, of an effect on the baseline is set out in Table 2.4 below.

Table 2.4 - Methodology for Assessing Magnitude of Change

Magnitude of Change	Criteria for Assessing Effect
Major	Total loss or major / substantial alteration to key elements/features of the baseline (pre-development) 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.

Sensitivity

2.24 The sensitivity of the receptor is based on the relative importance of the receptor, using the scale in Table 2.5 below.

Table 2.5 - Methodology for Assessing 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.
Medium	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.

Significance

2.25 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the effects can be positive or negative. Table 2.6 below shows how magnitude and sensitivity interact to derive effect significance.

Table 2.6 - Methodology for Assessing Significance

Magnitude	Sensitivity		
	High	**Medium**	**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

2.26 The above magnitude and significance criteria have been provided as a guide for specialists to assess effect significance and to provide consistency on this aspect for each discipline included in the EIA. Where discipline specific methodology has been applied that differs from the generic criteria above, this has been clearly explained within the relevant technical chapter under the heading of 'Assessment Methodology and Significance Criteria'.

2.27 For the purposes of this ES, an effect will be considered to be 'significant' if it is classed as either 'moderate' or 'major'.

2.28 In addition to the above, some assessments utilise a different approach to determining significance based on guidance and professional judgement, also referred to as a qualitative assessment. Where this is the case, it has been clearly set out within the methodology of the relevant ES chapter.

Mitigation

2.29 Any adverse environmental effects have been considered for mitigation at the design stage and, where practicable, specific measures have been put forward. Measures have been considered based on the following hierarchy of mitigation[1]:

- Avoidance;
- Minimisation
- Compensation;
- Remediation; and
- Enhancement.

2.30 Where the effectiveness of the mitigation proposed has been considered uncertain, or where it depends upon assumptions of operating procedures, data and/or professional judgement has been introduced to support these assumptions.

2.31 Mitigation measures and residual effects are detailed, where necessary, within the technical chapters (6-15) and summarised within a schedule in Chapter 17 (Mitigation Measures and Residual Effects). Mitigation measures are set out as relevant to each phase of development within each Application (Applications 1 and 2).

Cumulative Effects

2.32 Formal consultation on the list of committed developments and reasonably foreseeable schemes ('cumulative schemes') considered relevant to the EIA has also occurred through the formal scoping process, as described earlier in this chapter.

2.33 The cumulative schemes are those pertinent to the cumulative impact assessment. The list of cumulative schemes was compiled by the project team initially reviewing the planning register and other information sources, and was then agreed with Manchester City Council via the scoping process.

2.34 The cumulative schemes that have been considered in the context of the EIA are set out in Table 2.7. Further information on the committed developments and a map showing their location is set out in Appendix 2.1.

2.35 In the absence of the Proposed Development, it is expected that the Site under a future baseline scenario would include the 'Baseline' developments as set out below and the site would remain as existing.

2.36 The schemes included in this future baseline comprise those developments that are currently under construction on site, so will be delivered prior to the Proposed Development becoming operational. Where relevant and applicable to the specific technical disciplines, consideration is given to the future baseline scenarios within the technical chapters of the ES (6-15).

Table 2.7: Committed Developments

Application Reference	Proposal Description of Development
Future 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

[1] United Nations Environment Programme (UNEP), EIA Training Resource Manual (Second Edition, 2002).

Application Reference	Proposal Description of Development
	(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)
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.
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.
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 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.
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)
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.
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.
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

Application Reference	Proposal Description of Development
	Isaac Way along with associated hard and soft landscaping, car parking, boundary treatment and other associated works
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
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.
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 landscaping and other associated works including servicing access and 9 offsite 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.
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.
116401/FO/2017	Erection of 6 storey building (plus plant level) above basement level to create office accommodation Class B1 at 1st to 5th floors and ground floor and basement (A1 (Shop), A3 (Restaurant and Cafe) and A4 (Drinking Establishment) Use) with repair up to second floor and reinstatement from 2nd floor to roof of former central feature above former entrance block, removal of brick and stone wall to Bunsen Street elevation, remains of existing chimney to gable wall of 25 Dale Street and existing stair and lift core from basement, ground and 1st floor.

Application Reference	Proposal Description of Development
113713/FO/2016	Erection of 3, 5, 7 and 8 and 11 storey building to comprise 38 residential apartments (Class C3) (12 no 1 bedroom units , 25 no 2 bedroom units and 1 no. 3 bedroom unit) above ground floor commercial space (Use Class A1 (Shop), A2 (Financial and Professional Services), A3 (Restaurant and Cafe) and B1 (Office)) with retention and restoration of facade to no. 2 Union Street following demolition of the rear of the building and provision of associated cycle parking, landscaping and ancillary works
115401/FO/2017	Conversion of building to 31 x apartments (1 x 1 bed, 24 x 2 bed, 6 x 3 bed) with 19 x parking spaces and 31 cycle parking spaces and elevational alterations to include creation of private garden and courtyard spaces with associated hard and soft landscaping, addition of mesh enclosures to service risers at roof level, erection of external staircase to gable end, insertion of roof lights, redirection of existing bridge., removal of non-original timber infills and insertion of new slimline steel windows, height reduction to existing masonry wall.
Cumulative	
120149/FO/2018	Erection of 7 to 8 storey residential building (Class C3) to provide 41 apartments (7 x 1-bedroom 1-person apartments, 6 x 1-bedroom 2-person apartments, 6 x 2-bedroom 3-person apartments, 22 x 2-bedroom 4-person apartments) with associated landscaping and other works
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, Echo Street, Cobourg Street and Back Acton Street
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
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
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.
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.

2.37 The likely effects of the cumulative schemes in combination with the Proposed Development (Type 2 cumulative effects) are discussed further within the individual technical chapters (6-15). Each cumulative scheme is not necessarily relevant to each technical topic, and so the ES chapters identify and explain within the text where committed developments are not considered to be relevant to that assessment.

2.38 Intra-project impacts of the Proposed Development on local receptors (Type 1 cumulative effects) are considered in Chapter 16.

Residual Effects

2.39 The likely significant effects on the environment, assuming the successful implementation of mitigation measures proposed, have been estimated within each chapter. These are termed 'residual effects'.

Assumptions and Limitations

2.40 The principal assumptions that have been made and any limitations that have been identified in preparing the ES are set out below.

- All of the principal land uses adjoining and surrounding the Site remain, except where redevelopment proposals have been granted planning consent. In such cases, it is assumed that permissions will have be implemented;
- Baseline conditions have been established in 2019 from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions may change during the Proposed Development;
- Information received from third parties is complete and up to date;
- The various stages of the Proposed Development will satisfy minimum environmental standards, consistent with contemporary legislation, practice and knowledge;
- Construction and demolition methods and phasing will follow the indicative timetable and methods set out in Chapter 5 (Construction Methodology and Programme);
- Conditions will be attached to the planning permission as relevant to each phase that will control disturbance during construction of the Proposed Development; and
- Necessary off-site services infrastructure for the Proposed Development will be provided by statutory undertakers.

2.41 Where necessary, an explanation of further assumptions/limitations relevant to specific disciplines has been made in the respective technical chapters.

Objectivity

2.42 The technical studies within this ES have been undertaken by suitably experienced professionals, on the basis of consistent information and have been progressed in a transparent, impartial and unbiased way with equal weight attached, as appropriate, to beneficial and adverse effects. Where possible, this has been based upon quantitative and accepted criteria together with the use of value judgements and expert interpretations.

2.43 The assessment has been explicit in recognising areas of limitation within the ES and any difficulties that have been encountered, including assumptions upon which the assessments are based. Where appropriate, the assessment of significance has been given confidence levels.

3 Site, Surroundings and Description of Proposals

Introduction

3.1 This chapter of the ES describes the Site and the Proposed Development which have been introduced in Chapter 1, comprising Application 1 and Application 2. It summarises the key features of the Proposed Development for the purposes of the EIA as proposed in both Applications.

3.2 Please refer to both the Masterplan and application-specific Design and Access Statements (DAS) and plans submitted in support of the Application 1 for further details of design features associated with the Baring Street Campus (Baring Street Office 1 and MSCP) and phased delivery of the park. Application 2 includes further details in relation to design features specifically associated with Baring Street Office 2 within the Baring Street Campus and associated public realm.

3.3 Consideration of likely significant effects on the environment that may arise as a result of the Proposed Development, and any necessary mitigation measures, are covered in Chapters 6 to 15 of this ES with a summary provided in Chapters 16 and 17.

Site Description

3.4 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 redevelopment of the Site is supported by the SRF, which was formally endorsed by Manchester City Council's Executive Committee in May 2018. The 2018 SRF for Mayfield supersedes the 2010 Mayfield SRF and the 2014 Mayfield SRF.

3.5 The Mayfield Partnership, comprising LCR, Manchester City Council and Transport for Greater Manchester appointed u+i in December 2016 as its development partner for the Mayfield SRF area. u+i have since been working as part of the Mayfield Partnership to deliver the ambitious vision for the site set out in the Mayfield SRF (2018).

3.6 The 2018 SRF guides the delivery of a new commercially-led mixed-use area that is both socially and physically accessible and has a distinctive sense of place generated by the existing assets on site and meanwhile activation. It is considered that the Proposed Development is fully in accordance with the principles of the endorsed SRF (2018) and will facilitate the implementation of the vision of the SRF.

3.7 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 wider SRF regeneration site extends to approximately 12.14ha / 30 acres overall, of which 8.5ha / 21 acres is to be subject to either permanent or temporary redevelopment, enabling or highways works as set out in the SRF.

3.8 A large element of the northern part 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 currently in temporary use as multi-purpose events venue, due to continue until 2024, which is included within the list of Cumulative Developments set out in Appendix 2.1 and Chapter 2 (Table 2.7).

3.9 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. The south eastern portion of the Mayfield SRF area comprises low rise warehouses and industrial units interspersed by open land and surface car parking.

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

3.11 The individual site descriptions for the two applications that comprise the Proposed Development, provided in as Figures at the end of this Chapter, are as follows:

- Application 1: land bounded by the Mancunian Way to the south, Mayfield Depot to the north, Baring Street and MacDonald Hotel to the west and Hoyle Street to the east, occupied by highways, surface car parking, hardstanding and the River Medlock.
- Application 2: land bounded by Bond Street to the south, River Medlock to the north and Nether Street to the west.

3.12 The applications set out above will form the overall Phase 1 boundary for the Environmental Statement and these two applications are supported by Phasing Plans (Figure 3.2) that will identify the stages of delivery associated with each plot or phase of development and the masterplan overall.

Site Surroundings

3.13 The Site is located at the heart of Manchester City Centre, roughly 140m from Manchester's principal transport node, Manchester Piccadilly Station and Piccadilly Metrolink stop. It is extremely accessible to and from the rail and tram infrastructure provided at Piccadilly Station and is adjacent to the Inner Ring Road, providing vehicular access.

3.14 Roughly 40m to the west of the Site is student accommodation operated by Unite as well as an area of surface car parking and an electricity substation. To the south of the Unite complex, beyond Buxton Street, is a further student accommodation (Liberty Point). Further west, beyond the student accommodation, is the MacDonald Piccadilly Hotel fronting London Road. To the north of the Site, the Star and Garter public house (Grade II listed) is located on Fairfield Street, adjacent to the platform ramp and ticket hall.

3.15 The Baring Industrial Estate was located to the south beyond the Gatehouse and GRUB but is now demolished (planning ref 121901/DEM/2018) in order to ready the Site for the Proposed Development and to allow for temporary activation of the site approved by 123728/FO/2019.

3.16 A full description of the strategic and economic context of Mayfield is contained in both Chapter 15 (Socio-Economic) and Appendix 15.1 (Volume 2) of this ES and also contained in the Supporting Planning Statements submitted with Applications 1 and 2.

Accessibility

3.17 The Site is considered to be located in a highly accessible location that can be accessed by a choice of transport options:

- **Pedestrian** – given the city centre location of the Site, pedestrian accessibility to the surrounding area is very good. Manchester Piccadilly Station is in close proximity and pedestrian infrastructure in the vicinity of the Site is good with pedestrian crossings on Fairfield Street, providing access to Piccadilly Station, where the majority of visitors will travel to and from. The primary roots to the centre of Manchester are proposed to be strengthened by this application.

- **Cycle –** Cycling is an increasingly popular mode of transport and is an effective mode for short trips. The online cycle map of Greater Manchester indicates that there are a number of designated cycle routes in close proximity to the Site, including a route along Fairfield Street.
- **Metroshuttle** – all three Metroshuttle services commence and end their journey at Piccadilly Rail Station, which is situated approximately 0.3 miles from the Site. Metroshuttle buses provide convenient access to major activity centres in the City. They run on a 15 minute frequency and are free.
- **Train** – Piccadilly train station is a 4 minute walk from the site and provides access to local, regional and national destinations on a frequent basis.
- **Metrolink** – the existing Metrolink services currently cover a broad area of Manchester and its outlying residential districts. Piccadilly is the closest Metrolink stop to the Site and is accessible within a 4 minute walk. Metrolink services provide frequent services until midnight Sunday to Thursday and until 1:00am on Friday and Saturday.
- **Bus** – significant bus services are available within a short walk of the site. Notably, there are a number of services (Routes 147, 219, 221) that operate along Fairfield Street. All other regional bus routes run to and from Piccadilly Station and Piccadilly Gardens.

3.18 Full details of the existing baseline in relation to traffic and transport options are set out within Section Chapter 7 of this ES (and Appendix 7.1 – Transport Statement) and provides a full detailed understanding of how the Proposed Development seeks to capitalise and improve on these important assets.

Environmental Designations

3.19 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, with some areas further away from the River Medlock classified as Flood Zone 2. Full details in relation to flood mapping is contained in Chapter 12 of this ES and supporting technical appendices (Appendix 12.1).

3.20 With regard to environmental qualities of the Site, the River Medlock runs through it via a culvert. The Site also contains protected species such as common pipistrelle (bat). 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. A full description of the ecological baseline is contained with Chapter 9 of this ES and considered in the context of the Proposed Development.

3.21 The Site is not located within a conservation area, nor does it contain any listed buildings, with the nearest comprising the Grade II Listed Star and Garter, 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 Phase 1 site boundary.

3.22 Full details of the Site's historic context is contained within the supporting Design and Access Statements, Planning Statement and Archaeological Desk Based Assessment.

The Proposed Development

3.23 This section sets out the key design features and principles of the Proposed Development, including the proposed uses and quantum. Please refer to the Design and Access Statements, and plans submitted in support of the planning applications for further design details.

Proposed Uses

3.24 A full application description is provided in the Planning Statement and supporting Design and Access Statements submitted with the Applications. In summary, the Proposed Development

for Phase 1 is to be submitted within two separate applications for planning permission and includes the following scope of works:

Application 1:

3.25 The Description of Development for Application 1 is as follows:

"Application for Full Planning Permission for two buildings comprising: 9 storey mixed use building (including ground and mezzanine) comprising office space (Use Class B1), with retail uses at ground and mezzanine levels (Use Class A1/A2/A3/A4 and / or D2) and rooftop amenity spaces and terrace levels, internal ancillary storage spaces for waste, cycles, rooftop plant and back of house functions; a 10 storey car park (including ground) comprising 543 car parking spaces (Use Class Sui Generis); and a Park; along with public realm, highways works and other associated works."

3.26 In line with the description of development set out above, Application 1 proposals can be summarised as follows:

- Phased demolition and site clearance, earthworks including re-profiling, 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 2.4 ha (6 acres) of public park, including hard and soft landscaping to be delivered in phases with new bridge across the River Medlock;
- Baring Street Campus Office 1: 9 storey office development including ground and mezzanine comprising 9,987 sq. m. (GEA) including active ground floor uses (A1, A2, A3, A4 or B1), rooftop plant, public realm and riverside walkway;
- Baring Street Campus MSCP: 10 storey MSCP (including ground) for 543 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, works to Baring Street and other associated highways works.

Application 2:

3.27 The proposed Description of Development for Application 2 (Baring Street Office 2) is as follows:

"Application for Full Planning Permission for mixed use building comprising ground and mezzanine floor flexible commercial floorspace (Use Class A1/A2/A3/A4 and / or D2) with floors 1-13 comprising office space (Use Class B1), together with rooftop amenity spaces and terrace levels, internal ancillary storage spaces for waste, cycles, plant and back of house functions, hard and soft landscaping, provision of external seating areas, access and other associated works."

3.28 The proposals comprise a 13 storey office development including ground and mezzanine floors comprising 30,046 sq. m. (GIA) including active ground floor uses, with associated access and public realm.

Table 3.1 – Quantum of Development

Land Use	Phase 1 Quantum	Application No.
B1 Office (Baring Street Office 1) and ground floor commercial and associated public realm	9,350 sq. m. GIA / 9,987 sq. m. GEA	Application 1
Sui Generis Multi storey car park (Baring Street MSCP)	543 spaces	Application 1

Land Use	Phase 1 Quantum	Application No.
Mayfield Park	2.4 ha	Application 1
Highways improvements	N/A	Application 1
B1 Office (Baring Street Office 2) and ground floor commercial / ancillary space.	29,046 sq. m. GIA / 31,000 sq. m. GEA	Application 2

3.29 Full details of the design of each plot and public realm can be found within the Design and Access Statements submitted with each application. The details of each application assessed against the relevant material considerations and development plan documents are provided within the Planning Statement, submitted with each application.

Construction Programme

3.30 The construction programme for Phase 1 (Applications 1 and 2) would span approximately 4 years, and is expected to commence in 2020, becoming operational in 2024 as follows:

- Start construction of development: Q1 2020
- Delivery of Phase 1a (phased re-profiling works, highways works to Baring Street/London Road, delivery of office (Baring Street Office 1) and MSCP and first park of the Park): Q1 2020-Q1 2023
- Delivery of Phase 1b (completion of remaining areas of park, temporary landscaping, delivery of Baring Street Office 2): Q3 2020-Q4 2024
- Anticipated full delivery of the Strategic Regeneration Framework: 2030

3.31 Further detail on the anticipated construction phasing is set out in Chapter 5 and supporting technical appendices (Appendix 5.1 / 5.2 – Construction Methodology).

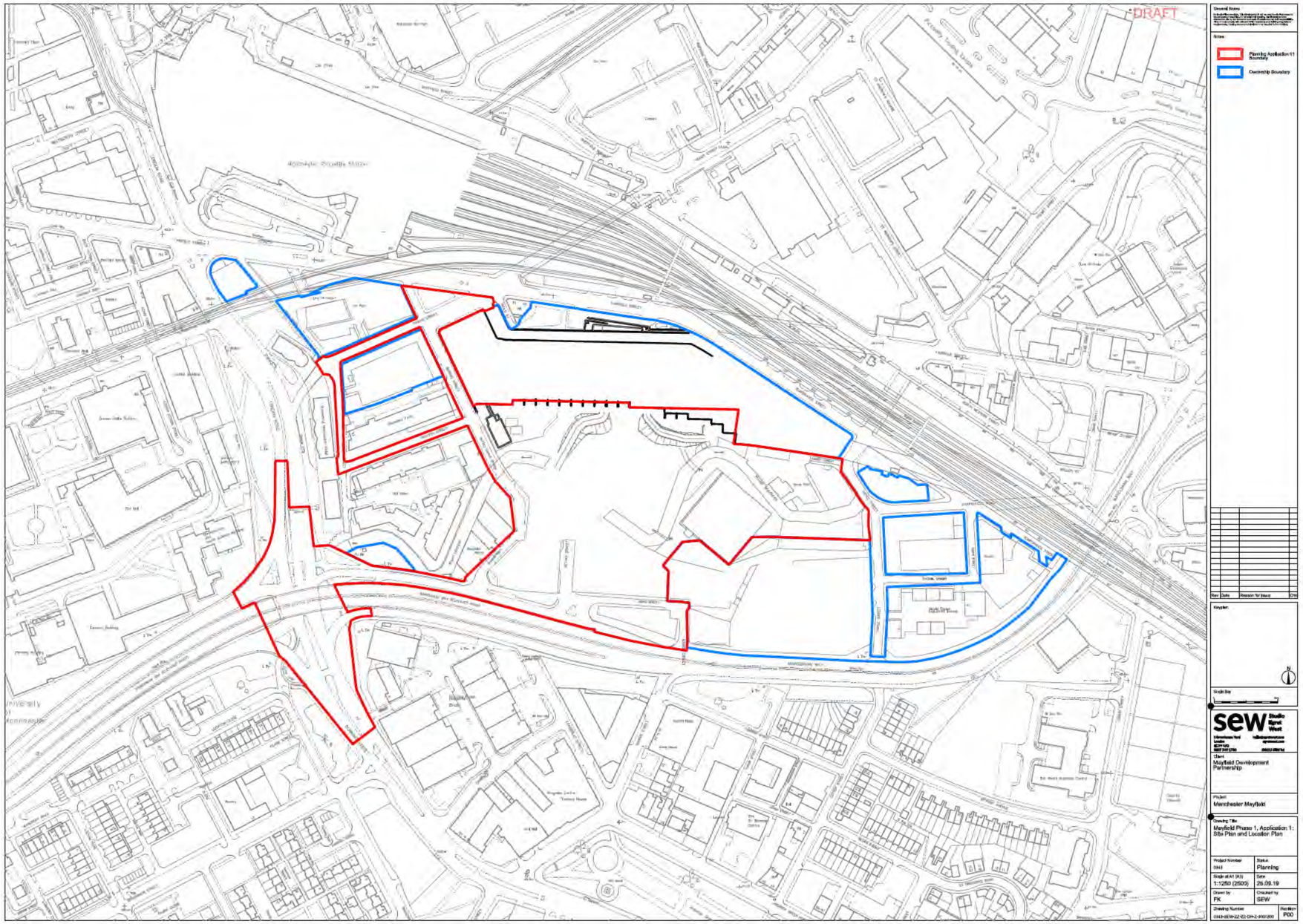


Figure:	**3.1**			
Title:	**Existing Site Plan**			
Project:	**Mayfield Phase 1**			
Date:	**27/09/19**	**Scale:**	**1:1250 (at A1)**	



	Figure:	**3.2**		
	Title:	**Proposed Masterplan**		
	Project:	**Mayfield Phase 1**		
	Date:	**27/09/19**	**Scale:**	**-**

4 Consideration of Alternatives

Introduction

4.1 This chapter explains how the design of the Masterplan as shown in the SRF and Proposed Development (Applications 1 and 2) has evolved, and outlines the alternative options considered by the Applicant during the design process. It explains the main reasons for the choices made, taking into account the environmental effects.

4.2 The EIA Regulations require, as part of the information for inclusion in Environmental Statements, that a description of the reasonable alternatives considered by the developer is given which are relevant to the proposal and its specific characteristics, including the main reasons for the option chosen with reference to the environment.

4.3 The Proposed Development is the result of an iterative design process which has been informed by high level appraisals undertaken by the technical design team and consultation with key stakeholders including Manchester City Council and Places Matter! Design Review Panel, which has been used to inform incremental design changes to address a range of design considerations.

4.4 The main alternatives considered through the design development are outlined below and, where choices made were influenced by environmental reasons, then these are indicated.

4.5 This chapter considers the following four options in the context of the existing development brief:

- The 'do nothing' alternative where the Proposed Development is not progressed.
- Alternative locations for the Proposed Development.
- Alternative uses for the Site.
- Alternative design/layout for the Proposed Development in the context of the design evolution.

Development Brief

4.6 The vision for Mayfield is to deliver a world class, transformational, distinctive and imaginative commercially led neighbourhood, anchored by Mayfield Park, which will become a powerhouse of socio-economic productivity. 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.

4.7 The phase 1 delivery is focussed around the delivery of two office buildings comprising circa 40,000 sq. m. (GEA), a multi-storey car park, 2.4 ha park, highways improvement works and associated enabling and remediation of the Site. The delivery and definition of Phase 1 has been considered through a lengthy detailed design process and each plot being brought forward as part of Phase 1 has also been through multiple iterations as a result of the consultation undertaken and technical studies.

4.8 This iterative design process associated with the Proposed Development and wider masterplan is set out in detail within this Chapter.

The 'Do Nothing' Alternative

4.9 The "do nothing" scenario refers to the option of leaving the Site in its current state; occupied by one storey industrial units, associated storage and surface car parking and some temporary leisure uses.

4.10 It is considered that the proposals represent a considerable improvement in the existing situation. The current use of the Site does not represent an efficient use of space within Manchester City Centre and a higher density use will allow the Site to be used more productively.

4.11 Without forming part of a wider scheme it is unlikely that the Site will be developed and the significant quantum of development brought forward as a result of the proposals will enable this to happen, including the extensive site remediation works required to enable the site for redevelopment and the delivery of a new publically accessible park area.

4.12 The character of the Site is currently poor and the lack of activity, particularly in the southern areas of the site, make it uninviting and encourages anti-social behaviour. The proposals will improve this by increasing natural surveillance over this space and build on the positive change induced by the temporary uses, including the Depot, GRUB and Dirt Bike.

4.13 Overall, it is considered that the 'do nothing' alternate option will be inferior to the Proposed Development that will bring further and more regular activity to the Site and boost economic activity in the area, supporting significant environmental and social improvements on site and up to a regional scale. Full details of the socio-economic impact are set out in Chapter 15 (Socio-Economic Impact) of this ES.

Consideration of Alternative Locations

4.14 The Proposed Development will be located at the heart of a new commercially-led mixed use neighbourhood in the city centre as defined in the development brief and the SRF. To this effect, the Site has been supported for redevelopment by various strategy documents since 2010 and most recently endorsed by Manchester City Council in 2018.

4.15 The Site and the masterplan proposals are a significant scale at 8.5 ha and the SRF specifies the delivery of a new, high quality public park occupying over 2.4 ha of this SRF area. Without significant intervention to another city centre site, the delivery of the new park proposed would not be possible. It can primarily come forward due to the land ownership and clear under-utilisation of the area combined with a Partnership that has been formed in order to support its delivery.

4.16 In addition to this clear policy support and availability of land in the City Centre, the Site is also well located for the proposed commercial use as it is within walking distance of key transport nodes and complementary uses.

4.17 It can be inferred that there were very few – or no – readily available alternative sites that could have been proceeded with instead. On balance it is considered that, due to the use, land ownership, policy support for development in this area and the availability of a significant amounts of land to deliver this unique project in Manchester City Centre, alternative locations are not possible for this particular development.

Consideration of Alternative Uses for the Site

4.18 It is considered that the only feasible alternative uses for the Site in relation to the Proposed Development are residential, retail and leisure and logistics. These uses have been considered in turn under each sub-heading.

Residential

4.19 The Site's city centre location means that, in principle, residential uses could be considered appropriate on the Site. This is line with the growth aspirations of the city and an identified need for residential accommodation.

4.20 To this effect, the SRF identified part of the site adjacent to Hoyle Street for residential development, which will be brought forward as a later phase. The SRF seeks to deliver a commercially-led neighbourhood, so a decision has been made to bring this type of development forward as a first phase.

4.21 Baring Street is seen as a critical phase of development given its location and the development-ready nature of the site with relatively good existing access and connectivity through available infrastructure.

4.22 On this basis, redevelopment of the Site as part of the Proposed Development will not include residential development and this will instead be brought forward as a later phase of development.

Retail

4.23 A retail use is not considered appropriate for the site given its location outside the Central Retail District. Supporting commercial retail uses will however be brought forward as part of the proposed office developments where market demand allows for the right type of occupier to support the principles of the SRF.

Logistics

4.24 The Site most recently hosted warehouse and distribution uses.

4.25 Given the city centre location and low levels of demand for the current and previously existing warehouse, it is clear that the Site has limited capacity for either a continued or intensified logistical use. In addition, the land intensity and trip generation associated with such development is wholly incompatible with the delivery of a significant city centre publically accessible park.

4.26 Overall, it is considered that for the reasons above the most appropriate use for the Site is as proposed.

Consideration of Alternate Designs

4.27 The overall Masterplan, based on the SRF designs, and the design of each building plot located within Phase 1 has been rigorously tested. Having defined a number of key design objectives drawn from a site analysis, the client brief, and the broad principles of the SRF, an exhaustive options appraisal has been completed to define the optimum solution for the Site, which are set out in detail below.

Strategic Regeneration Framework Layout and Park Design

4.28 The SRF transport strategy has evolved to reduce the environmental impact of the car parking strategy and supports the future evolutions in the transport agenda. The SRF masterplan spread the car parking spaces across the entire masterplan area, allocating them within the podium of residential an office buildings.

4.29 The adopted approach instead collects parking spaces in one multi-storey car park reducing the need for basement parking area. This solution unlocks space in some development areas allowing for a more flexible design and avoids expensive and unsustainable earthworks.

4.30 Moreover, considering the lifespan of the building, it guarantees a more efficient long term view strategy. In the future, when the transport approach will change, the MSCP has the potential to be reinvented and become an electric vehicle charging hub.

4.31 The sequencing of delivery of the masterplan has been reconsidered to provide immediate regenerative effects and supports future delivery phases. A coordinated approach, prioritising the delivery of public uses, has been promoted to create a sense of destination and act as catalyst to the regeneration of the entire site.

4.32 The first phase of the new strategy proposes to deliver the MSCP alongside adjacent office buildings, highways works and improvements to the public realm along Baring Street and, the first part of the park. In the early phase of works, the MSCP will ensure on-site public parking for employees, shoppers and commuters while, during subsequent phases, the building will provide parking opportunities for further residential and commercial developments, including also users of the new park facilities.

4.33 The new office uses will help to animate the area while improvements to the public realm and the opening of the new park will invite people into the site and provide amenities for all. This combined asset of services and amenities will create a thriving and attractive environment since the early stage of masterplan delivery.

4.34 The different approach to the car parking strategy generated an impact on the design of other development areas (Hoyle Street East and Baring Street Campus). Further tests have been carried out to maximise the benefits of changed podium strategy and replace office space previously located on MSCP plot. The evolved design has also focused on improving the building footprint efficiency and optimising the sustainability in term of building orientation and massing.

4.35 In November 2018 further engagement was held to inform the design process and in particular the design of May-field park and public realm. The key topics, including people aspirations, desires and concerns about the design of the public space, were discussed with a selection of community figures, professionals and experts in the fields of landscape, accessibility, ecology, environment, play, exercise and social work. The information gained during the workshop guided the evolution of the design for the public spaces and help to shape the place together with the local community.

4.36 The masterplan design has also evolved to address the recommendations identified in the Crime Impact Assessment in order to reduce the opportunities for crime and fear of crime. The SRF proposal delivered a layout that positively contributes to the reduction of the crime, not only in the masterplan area, but spreading its effects also to the surrounding context.

4.37 Nevertheless, further considerations have been made to discourage antisocial behaviours and minimise the growth of crimes. Improvements relate mostly to the landscape and public realm strategy and are directed to enhance natural surveillance and general sense of safety across the Site.

4.38 Detailed design areas have also been refined in order to support the successful delivery of a first phase. For example, the seating steps have been re-positioned further west to improve the access to the park from Baring Street and define a clear direct route down into the main lawn space. In the new arrangement, the seats overlook the largest area of the park where events can take place and benefit also of a better sunlight exposure. The new position also strengthen the connection between the Depot ground floor and the park.

4.39 Similarly, a small scale bridge, located in a more central area of the park, has been preferred to the SRF bridge option. The new arrangement allows to open the views up across the park and highlights the presence of Baring Street Office 1. The new bridge position will be framed

by the retained brick arches defining a special feature of the park. A new public space, the Gatehouse square, has been proposed highlight the entrance to the park from Baring Street.

4.40 Full details of the key moves associated with the Masterplan are provided illustratively to this Chapter (see Figure 4.1) and are provided in full within the supporting Masterplan Design and Access Statement submitted with this Application.

Development Plots

4.41 The scale and massing of the Proposed Development is informed by site constraints and opportunities that have resulted in some minor changes in the massing and heights of the buildings from the SRF stage.

4.42 For the Baring Street Multi Storey Car Park, a more compact massing with a small increase in height has been adopted to make better use of the space available and preserves the daylight provided into key areas of the park.

4.43 A simplified massing for Baring Street Office 1 presents a larger footprint at the first levels and a smaller, taller element to the south associated with the rooftop plant equipment. Similar to the MSCP, the building scale has been modelled to ensure that it is possible to achieve appropriate levels of daylight into the park and to respect the SRF massing profile and range of storeys.

4.44 The materiality influence for the buildings and Mayfield Park as described in this Statement and comprising the Proposed Development, as well as the additional buildings due to come forward over the next 10-15 years, have been informed by a number of studies undertaken at the SRF and masterplanning stage.

4.45 The SRF area contains several designated and non-designated historic buildings including the Star and Garter Pub (Grade II), Mayfield Depot Train Station and associated railway viaduct. The retention of these historic structures has been a key ingredient of the framework strategy and has contributed to preserve the place history and character. The features and qualities of the existing structures have been at the base of design considerations and have influenced the architectural response in both building and park design.

Summary

4.46 The Proposed Development has been influenced by a variety of stakeholders, including planning officers at MCC, independent design review, statutory consultees and local communities, as part of an iterative design process which has led to the final design.

4.47 The wider project team have also played an important part in influencing the design of the Proposed Development to ensure that likely significant environmental effects are avoided or mitigated.

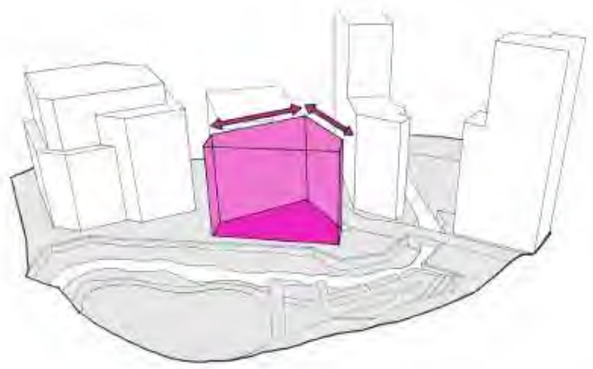
4.48 The key alternatives which were considered during the design process have been described within this chapter, along with the main reasons for selecting the chosen option. The primary environmental drivers for design choices have been a combination of ensuring project feasibility, minimising visual impacts, and responding to reviews from members of the public, statutory consultees and key stakeholders generated by extensive pre-application consultation.



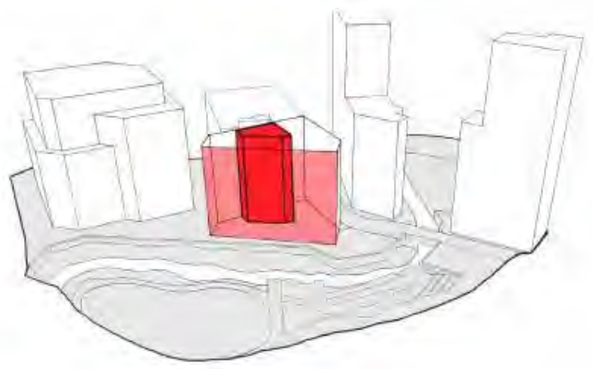
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	Title:	**Original SRF Masterplan**		
	Project:	**Mayfield Phase 1**		
	Date:	**27/09/19**	**Scale:**	**-**



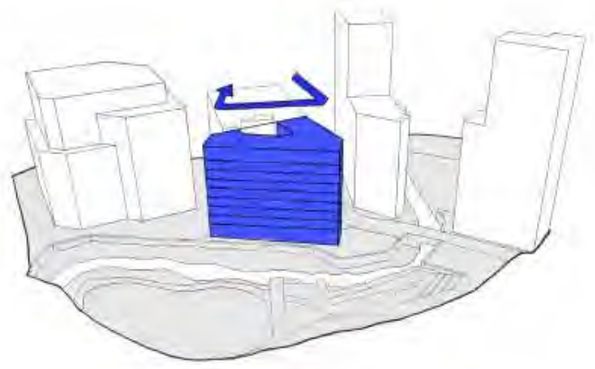
	Figure:	**4.2**		
	Title:	**Proposed SRF Masterplan Updated**		
	Project:	**Mayfield Phase 1**		
	Date:	**27/09/19**	**Scale:**	**-**



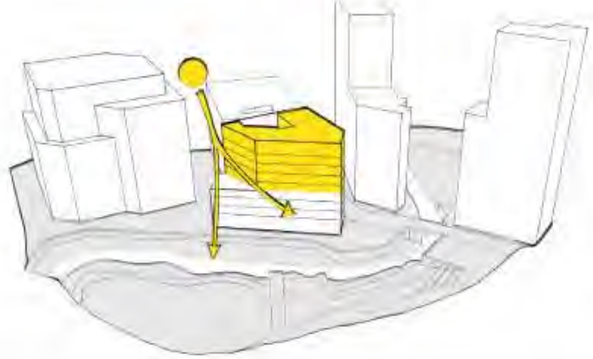
—1. Maximise site footprint



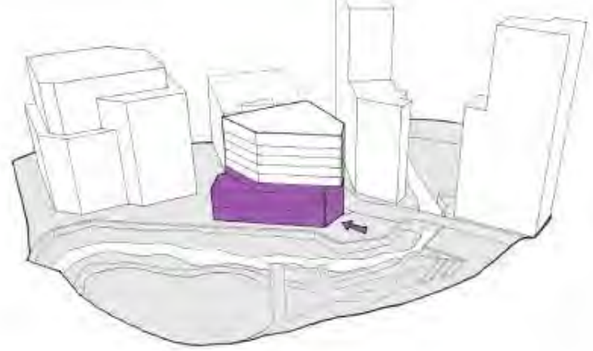
—2. Core located to maximise windows and views



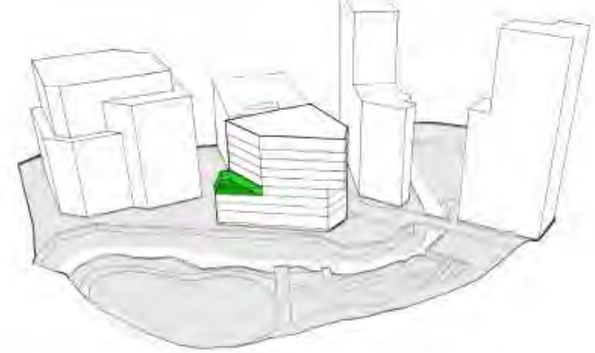
—3. Internal accommodation wraps around core



—4. Massing carved to allow sunlight to park

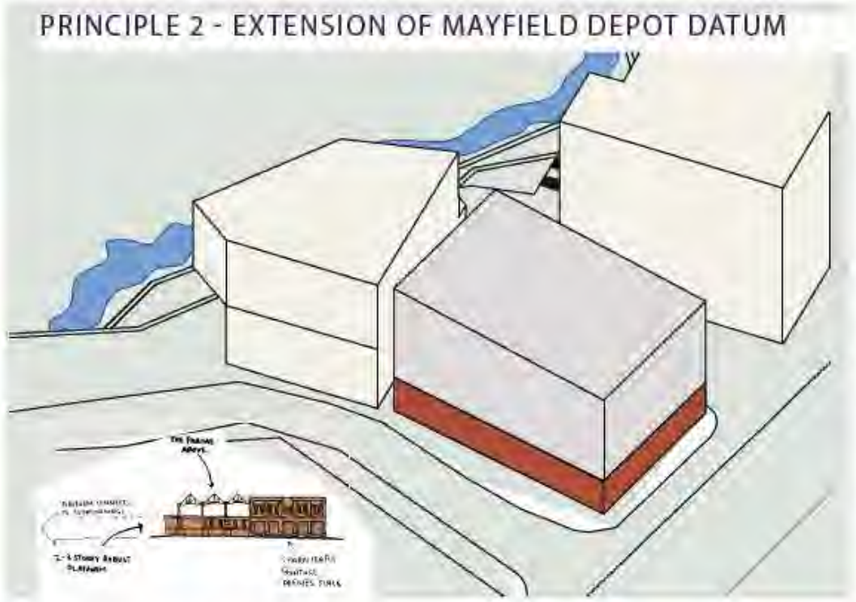


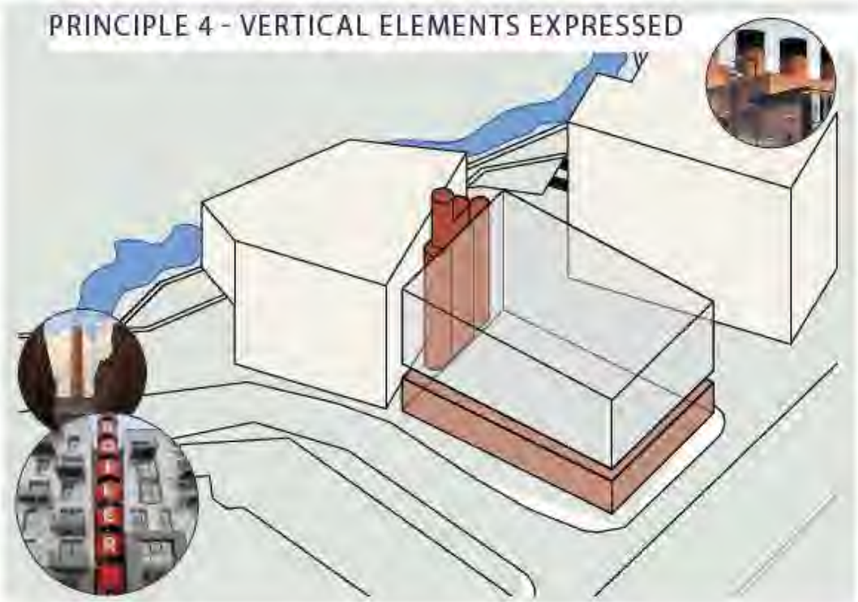
—5. Massing cut away to reveal main entrance



—6. Opportunity for terrace and connection to park

	Figure:	**4.3**		
	Title:	**Baring Street Office 1 (Plot O) design development drawings**		
	Project:	**Mayfield Phase 1**		
	Date:	**27/09/19**	**Scale:**	**-**





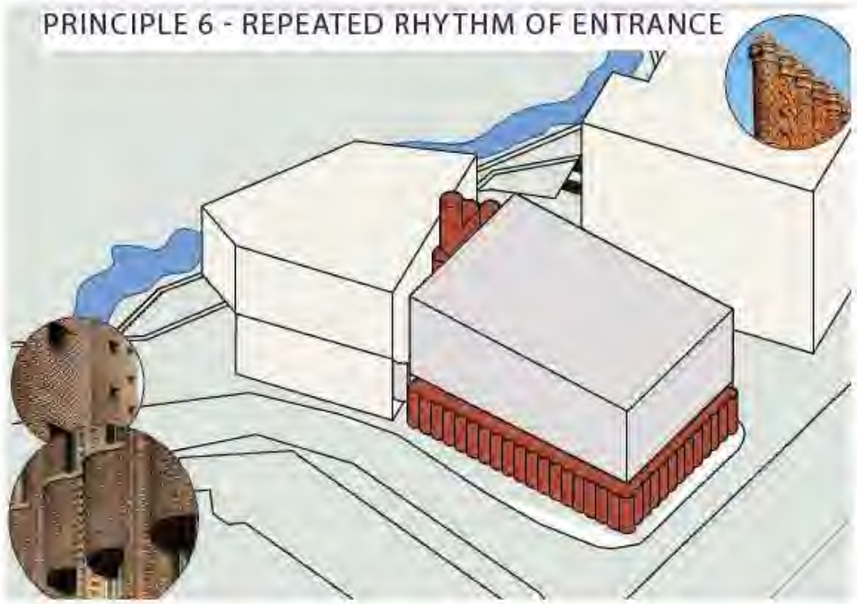




	Figure:	**4.4**		
	Title:	**Baring Street MSCP (Plot N) design development drawings**		
	Project:	**Mayfield Phase 1**		
	Date:	**27/09/19**	**Scale:**	**-**



SRF Park GA - Bridge and Seating Step locations reconsidered



Stage 2 Park GA - Views of park opened up and a better seating steps location identified



SRF Park GA - Accessible route separate to seating steps



Stage 2 Park GA - Step-free access becomes main route into the park, seating steps relocated in South facing position overlooking lawn



SRF Park GA - Topography of Play island could mean the play area becomes isolated during a high flood scenario



Stage 2 Park GA - Topography reshaped to connect better with the plots to the South of the River

Figure:	**4.5**			
Title:	**Park design development drawings**			
Project:	**Mayfield Phase 1**			
Date:	**27/09/19**	**Scale:**	**-**	

5 Construction Management and Phasing

5.1 This chapter of the Environmental Statement (ES) describes the anticipated preparatory works, construction methodology and phasing of the Proposed Development. Consideration of the likely significant effects on the environment that may arise during these phases of the Proposed Development and any necessary mitigation measures are provided within Chapters 6 to 15 of this ES, with Chapter 17 summarising the residual impact following mitigation.

5.2 Planning for preparatory works and construction is necessarily broad at this stage and may be subject to modification during detailed construction planning. However, it is not anticipated that there will be any different or new significant environmental effects if the phasing differs from that assessed. This ES Chapter is supported by the following technical appendices:

- Appendix 5.1: Park and Highways Outline Construction Management Plan
- Appendix 5.2: Baring Street Office 1 and MSCP Outline Construction Management Plan

Indicative Programme

5.3 A site preparation phase will precede construction works within each area of the Site, in order to provide a base construction level from which construction can commence. This will include important reprofiling of the Site and raising of plot levels to manage flood risk and naturalise the river and landscaping to improve sustainable drainage into the River Medlock.

5.4 The preparatory works and construction programme associated with the Proposed Development for Application 1 is anticipated to span a 3 ½ year period, from second quarter 2020 to fourth quarter 2023. The delivery of Application 2 will overlap with this period but is envisaged to extend this construction programme to 2024.

5.5 The Proposed Development forms part of a wider masterplan, as described within Chapters 3 (Site and Development Description) and Chapter 4 (Consideration of Alternatives). Applications 1 and 2 as detailed in this ES (Chapter 4) comprise the first part of the development, which are intended to be the subject of further detailed applications.

5.6 The phasing strategy for the Proposed Development has not yet been fully determined; however, it is likely that the phasing sequence for Application 1 will be as follows:

- **Phase A** - Demolition and site clearance, earthworks including re-profiling, construction of retaining walls:
  - Based on the historic uses and intrusive investigations undertaken to date and information submitted with this Application the site requires extensive and comprehensive groundworks relating to remediation. This will form the first phase of development in order to enable the delivery of the remaining phases of the Proposed Development.
  - Similarly, the location of the River Medlock running east to west through the Site requires mitigation with regard to the flood risk associated with the area. This mitigation involves creating a new topographical profile and substantial soft landscaping to improve lag time and reduce surface water run-off within the identified flood zones.
  - This phase of works will also create raised areas of land on which the plots will sit, so as to take them out of the flood plain.

- **Phase B** - London Road junction & temporary access road:
  - Junction amendments to London Road to accommodate a right hand turn lane into the city and facilitate cross junction movements, including traffic light resequencing works.
  - Improve footways and surface finish to (current Mancunian Way) access road including resurfacing and kerb line adjustments and relining.
- **Phase C** - MSCP and immediate public realm:
  - Following the re-profiling works being completed, the Proposed Development would commence the delivery of the MSCP and the associated areas of public realm. Public realm to the east will be delivered temporarily in advance of the adjacent development plot being brought forward.
  - This phase will also include the construction of the MSCP for 543 vehicles, including a security suite and includes 19 disabled car parking spaces as part of the overall provision.
- **Phase D** - Baring Street and associated highways and public realm:
  - In order to improve traffic flows and ready the Proposed Development for when it becomes operational, a permanent finish to Baring Street pavement will be commenced. Works will also include a temporary finish to Baring Street road and Travis Street area. No re-alignment works are proposed as part of this phase.
- **Phase E -** Baring Street Office 1, loading bay & immediate public realm (hard landscaping only):
  - In conjunction with Phases C and D and following the re-profiling works being completed, the Proposed Development would commence the delivery of Baring Street Office 1 and the associated areas of public realm. This will create the primary interface with the Park.
- **Phases F, G and H –** Mayfield Park delivered in 3 phases:
  - Phase F of the Park to be delivered in tandem with Phase C (MSCP). Other Phases to follow.

5.7 In relation to Application 2, which will deliver a 13 storey office development, the Proposed Development will be brought forward subject to Planning Approval and on a similar programme to Phase E.

5.8 As set out earlier in this Chapter, there is likely to be some overlap between delivering the phases. Similarly overlap with committed developments surrounding the Site is also expected to occur. The impacts of this have been fully considered in Chapters 6 – 15 of this ES.

5.9 As such, the EIA has been undertaken based on all development within the Proposed Development being complete and delivered in phases in order to provide the most robust assessment. A Phasing Plan is provided in Figure 3.1 within this ES.

5.10 Mayfield will involve the clearance of the existing Site in relation to removal of existing slabs and renaturalisation of the culverted section of river. River walls will be removed and replaced, and individual plots will be adjusted in terms of FFL, with addition or removal of materials to obtain the required level.

5.11 In order to assist the development of the Site, several TROs and stopping up orders will be required to adjacent roads, which are shown in Chapter 7 of this ES (Traffic and Transport). All works will ensure that traffic movements around the Site and taxi waiting areas are not interrupted.

Construction Methodology

5.12 All works with the exception of highway adjustments and works to the public realm (Baring Street and Fairfield square) and final feathering-in of surface paving surrounding, each plot will be undertaken within temporary site hoardings.

5.13 Detailed construction planning will be conducted prior to implementation and once a Principal Contractor is appointed and this will be set out in a detailed Construction Management Plan prior to the commencement of each plot.

5.14 A summary of the outline proposed construction methodology is provided below, which the appointed contractor will be required to follow in broad terms.

Site Preparation and Logistics

5.15 All plots will utilise a boundary hoarding during all phases of demolition and construction, which will be specified in a detailed CMP. The hoardings will be positioned at a safe distance from the line of any piled foundations, allowing the minimum safe space for operation of construction plant within the hoarding. Gates and banksmen will be provided along with appropriate traffic management.

5.16 Any fit-out works that are not completed as part of the main construction works, such as subsequent office tenant fit-out, will utilise the amenities (loading bays and goods lifts) within the building. Any temporary road closures associated with the construction phase will be agreed with Manchester City Council operational services department together with any special logistical requirements.

5.17 The hoarding will act as a security barrier to the public during the construction period. Construction Traffic will then enter and egress through gates in a one-way direction if this can be accommodated. Appropriate wheel wash and banksmen facilities will be provided by the Contractor. Unloading and storage will be contained within the screened site area.

5.18 Waste materials will be screened and sorted within the screened area prior to removal via skips. A site waste management plan will be developed further by the Contractor, again in accordance with the particular environmental criteria designated for each phase of the works.

5.19 Contractor accommodation (office and welfare facilities) will be provided within the screened site area within linked porta cabins. The Site will be fully secured based on an access permit system and security staff at vehicular entrances.

Preparatory Phase (Phase A)

5.20 The removal of remaining slabs from previous buildings will follow deconstruction methodology, as will the opening of the culvert and removal of existing river walls. All methodologies will be agreed with the Environment Agency through their permitting system prior to works commencing.

5.21 Full asbestos surveys and appropriate protection measures during the removal of hazardous materials will follow statutory guidelines and associated risk assessments. The Environment Agency will be involved in all discussions regarding potential site contamination from previous site uses.

5.22 Retaining structures will be constructed through piling and materials will be relocated within the site boundaries to create flood attenuation areas.

Construction Phase

5.23 All appointed contractors will subscribe to the Considerate Contractor Scheme and will be required to target the highest achievable scores.

5.24 Highway works will be undertaken in agreement with MCC Highways Department requirements, which will be undertaken under traffic management measures in order to maintain flows. This will generally comprise the following works:

- Creation of a new right-hand turn lane by removing central reservation;
- Removal and reshaping of existing reservations to accommodate new lanes and turning facilities;
- Relining of carriageway and installation of new signage; and
- Improvement to cycleways and pedestrian walkways in terms of finish and routing.

Park and public realm

5.25 In relation to the delivery of the park and public realm for each building plot, which will take place across the whole programmed construction period, the works will generally comprise:

- Creation of accessways through piled retaining structures;
- Regrading of river banks and installation of concrete bases for viewing platforms and bridges;
- Installation of a seating area likely to be cast in situ concrete;
- Installation of paving materials – final specification yet to be agreed;
- Installation of trees, shrubs and grasses; and
- Installation of secondary supporting elements such as lighting; fixtures and fittings.

Baring Street Multi Storey Car Park (MSCP)

5.26 The new building will be based on a steel frame with precast sections for the lift core and steel frame for the main stair core and take approximately 18 months to complete from start to finish following completion of enabling works. The works generally comprise:

- CFA piles with RC pile caps with ground beam spanning between pile caps;
- Installation of temporary tower crane;
- Erection of steel frame with precast concrete planks, lift core is precast units and steel frame stair core;
- Installation of external façade by mobile lifting equipment or crane;
- Installation of mechanical and electrical services and passenger lifts, with external plant installed by crane;
- Removal of crane from site boundary unless retained for completion of Baring Street Office 1;
- Completion of internal fit out;
- Completion of public realm; and
- Removal of site hoardings.

Baring Street Office 1

5.27 It is envisaged that Baring Street Office 1 will have a braced steel framed core, with hollow core pre cast floor. The works generally comprise:

- CFA piles with RC pile caps with ground beam spanning between pile caps;
- Installation of temporary tower crane;
- Erection of steel frame superstructure and braced steel frame core with hollow core precast floor;

- Roof coverings with precast concrete finish;
- Installation of window systems and façade by crane, and or mobile lifting equipment;
- Installation of Mechanical and Electrical Services and Lifts; external plant by Crane;
- Removal of crane and scaffolding following cleaning of the facade;
- Completion of finishes and internal fit out;
- Completion of public realm; and
- Removal of site hoarding.

Baring Street Office 2

5.28 Baring Street office 2 is also envisaged to have a braced steel frame construct with precast concrete floors. The sequencing of the development will be developed with the Principal Contractor and is expected to broadly to follow the following activities:

- CFA piles with RC pile caps with ground beam spanning between pile caps;
- Installation of temporary tower crane;
- Erection of steel frame superstructure and braced steel frame core with hollow core precast floor;
- Roof coverings with precast concrete finish;
- Installation of window systems and façade by crane, and or mobile lifting equipment;
- Installation of Mechanical and Electrical Services and Lifts; external plant by Crane;
- Removal of crane and scaffolding following cleaning of the facade;
- Completion of finishes and internal fit out;
- Completion of public realm; and
- Removal of site hoarding.

Services and Infrastructure

5.29 Infrastructure works to facilitate the Proposed Development are expected to comprise:

- New surface water drainage and amendments to the existing foul water drainage.
- Potential surface water outfall to River Medlock
- Water and Gas connections are adjacent to the Site.
- Each building will have a sub-station to serve the respective building. Incoming supplies will be taken from Baring Street and along the Mancunian Way slip road

Preparatory and Construction Impacts

5.30 During the preparatory phase, standard working practices will be implemented to minimise likely significant effects on sensitive receptors. Contractors for the demolition and construction works would adhere to the Considerate Constructors Code.

5.31 Detailed assessments of the likely significant effects on the environment that could result from the demolition and construction works are considered within Chapters 6 to 16 inclusive. However, a brief summary of potential impacts (without mitigation in place) is presented in Table 5.1 below.

Table 5.1: Potential Demolition and Construction Impacts

Topic	Potential Impact	Mitigation
Noise	Increased road noise levels from vehicles and increased noise levels from plant during preparatory and construction works.	Please refer to Chapter 6
Vibration	Increased vibration levels from vehicles and increased vibration levels from plant during demolition and construction works.	Please refer to Chapter 6
Dust / Local Air Quality	Generation of windblown dust nuisance from ground surfaces, stockpiles, vehicles, workforces and cutting and grinding of materials. Generation of exhaust emissions from lorries and plant delivering and removing materials including dust and particulates which have the potential to impact upon local air quality.	Please refer to Chapter 8
Waste / Sustainability	Waste generation and its appropriate disposal. Waste will be managed in accordance with a Site Waste Management Plan (SWMP) produced and submitted to LBL prior to work starting on Site. The SWMP will ensure that the requirements of relevant legislation are met.	Submission of a detailed CEMP including waste management.
Traffic	Traffic congestion caused by Site traffic and an increase in heavy goods vehicle (HGV) movements. Traffic disruptions from abnormal or hazardous loads. Transfer of mud and material from vehicles onto the public highway creating pollution hazards. Storage of fuels and accidental spills and discharges to drains which may create pollution hazards. Disruptions to pedestrian access and routes within the locality of the Site.	Please refer to Chapter 7
Hazardous materials	Exposure of the workforce to hazardous materials and ground contaminates and contaminated land.	Submission of a detailed CEMP including waste management.
Water Quality	Water demand for construction activities and domestic use by the contractor (however, this is anticipated to be low) and generation of domestic foul effluent by contractors.	Please refer to Chapter 11

5.32 The environmental controls (or mitigation measures) to eliminate, reduce or offset likely significant adverse environmental effects during the preparatory and construction phase (as identified above) are set below:

- Preparation of a Construction Environmental Management Plan (CEMP) which clearly sets out the methods of managing environmental issues for all involved with the demolition and construction works, including supply chain management;
- Requirement to comply with the CEMP included as part of the contract conditions for each element of the work. All contractors tendering for work will be required to demonstrate that their proposals can comply with the content of the CEMP and any conditions or obligations secured through the planning permission;
- In respect of necessary departures from the above, procedures for prior notification to the Council and affected parties would be established;
- Establishing a dedicated point of contact and assigning responsibility to deal with demolition and construction related issues if they arise. This would be a named representative from the construction team;
- Production of a regular newsletter to be circulated to the surrounding neighbours and authorities; and
- Regular dialogue with the Council and the local community.

5.33 It is anticipated that these controls would be secured by appropriate planning condition or obligation.

Construction Environmental Management Plan

5.34 The preparation of a CEMP is an established method of managing environmental impacts resulting from demolition and construction works.

5.35 To ensure that suitable contractors are appointed, all potential contractors will have their environmental credentials vetted and asked to submit their company Environmental Policies and Procedures as part of the tender process.

5.36 The CEMP would be submitted to the Council (and other relevant bodies) prior to the commencement of the works for each phase, or covering multiple phases as relevant. Compliance with the CEMP is anticipated to be secured by appropriate planning conditions or obligations, and the obligations contained within it passed onto the main contractors as 'Employer's Requirements' within the contract for the works.

5.37 An Environmental Plan will be developed to address and monitor the following issues:-

- Applicable environmental legislation
- Pollution
- Nuisance (noise, vibration, dust, emissions, light)
- Public Relations

5.38 Applicable environmental legislation will need to be identified in a register, to ensure that appropriate systems are put in place in order to comply with the legal requirements in question. Full liaison will occur with the Environment Agency due to the proximity of works to The River Medlock.

5.39 The Contractors will need to establish procedures, to ensure the prevention of water and ground pollution, relating to the following risk activities:

- Demolition
- Earthworks (including stockpiling of spoil, and movement/storage of contaminated soils)
- Dewatering of excavations
- Concrete works (including washing out concrete delivery vehicles)
- Storage and movement of fuels, oils and chemicals
- Cleaning (including plant/machinery and wheel washing).

5.40 Proposed mitigation measures for the Proposed Development are set out in relation to noise and vibration, air quality, ground conditions and water resources during the construction phase are set out in Chapters 6, 10 and 11 of this ES respectively and are summarised in this chapter for completeness.

Air Quality

5.41 The principal concerns relating to air quality are emissions from construction activities in the form of dust and fumes. The degree of dust deposition is usually dependent on the nature of the works.

5.42 Increased levels of dust are most likely to occur during site activities related to demolition, piling, moving construction traffic and ground works. In order to minimise dust and fumes, the Principal Contractor will be required to consider the following:

- Providing hard standing where vehicle movements mostly occur;
- Control measures and dust suppression techniques;
- Planning and controlling the orientation, shape and locations of stockpiles, to minimise the risk of dust rising through wind action;
- Measures such as screening and covering;
- Installing appropriate wheel washing facilities at the site exit, to minimise and reduce the risk of dust emissions and deposition of material on the public highway;
- Keeping adjacent roads and hard standing clean;
- Ensuring appropriate selection and maintenance of construction vehicles, plant and equipment (i.e. vehicle and plant which produce less emissions and are regularly serviced);
- Ensuring plant and equipment is not left running for long periods when not directly in use;
- Selecting where possible electrically powered plant, instead of petrol or diesel; and
- Ensuring no wastes or unwanted material is burned on site.

5.43 Further mitigation measures are set out in Chapter 8 of this ES.

Neighbourhood Amenity

5.44 It is important to recognise the importance of the neighbourhood liaison role in ensuring the smooth running of site activities and their relation to the local residents and general public's welfare.

5.45 This represents a key function through which the co-ordination of site activities, the needs of the neighbours and requirements of the statutory authorities are effectively communicated and dealt with. In this way all stakeholders are consulted and informed.

5.46 During the execution of the works, the Principal Contractor will be tasked with ensuring all works are carried out safely and in such a way it will not inconvenience pedestrians or other road users and with a positive consideration to the needs of the local residents, local businesses, and adjacent meanwhile uses of the Mayfield site, site personnel and visitors as well as the general public.

5.47 The Contractors to be appointed for the various plots will make regular progress updates either as a leaflet drop to adjacent properties or via the Management Company and provide on line updates. Under the Considerate Contractor's scheme, and in accordance with the target Environmental standards, the contractor will be required to maintain regular dialogue with neighbours and provide regular updates on site progress and logistics.

5.48 Risks of noise, dust and air pollution will be considered for each proposed activity and associated mitigation measures will be implemented to minimize the impact of construction activities.

Traffic Management

5.49 A Traffic Management Plan (TMP) will be prepared to address the following issues: -

- Management procedures
- Integration of traffic management with other projects on-going in the area
- Access, egress and turning points
- Temporary or permanent alterations to local traffic routes (vehicle and cycle)
- Additions or alterations to signage and road markings (incl. pedestrian crossings)

- Temporary suspension of existing parking bays
- Temporary re-location of existing taxi waiting areas
- Temporary relocation of existing bus stops
- Safe maintenance of existing designated cycle lanes
- Segregation of vehicles and pedestrians on site
- Car parking
- Loading bays
- Any other measures to ensure the safe movement of pedestrians and vehicles, both on and off site

5.50 In preparing the TMP, the Contractor will be required to consider: -

- A site delivery booking system;
- Pre-fabrication to assist in reducing deliveries; and
- A materials transportation plan to include a methodology for deliveries, unloading and distributing materials.

5.51 Delivery routes for the delivery of large items of construction plant (tower crane sections, piling rigs etc.) and building components (steelwork, M&E plant etc.) will be discussed and agreed with Manchester City Council Highways Department, with operations undertaken during agreed periods, to minimise disruption to local traffic and the normal workings of the surrounding properties. Where possible, general construction items will be delivered within site working hours.

5.52 Full details of the measures to reduce traffic movements and reduce the impact on the local highway network during the construction phase of works are provided in Chapter 7 and Appendices 7.1 (Transport Assessment) and 7.2 (Framework Travel Plan).

Health and Safety

5.53 Health and Safety is an integral part of the planning process for each project. Implementation of the Principal Contractor's comprehensive Health and Safety System and Procedures will ensure every facet of the construction process is planned, managed, and monitored. This will also ensure compliance with statutory obligations.

5.54 Designers and contractors engaged on the project must be competent and adequately resourced. This will be achieved by;

- Completion of prequalification health and safety questionnaires;
- Interviews, to ascertain compliance with their legal duties;
- Review of existing Health and Safety Policies and procedures; and
- Review of their Health and Safety performance and site visits.

5.55 The Principal Contractor will produce a detailed construction Programme based on the current information and the pre-tender plan. The plan will set out the arrangements for managing and monitoring the project. Sub or trade contractors engaged by the Principal Contractor to carry out works on the project will be issued with this Health and Safety Plan so that they can integrate the project management philosophy into their Health and Safety Plans. The project team will implement the plan assisted by the Principal Contractor's own Health and Safety Advisors.

5.56 All persons on the project will be encouraged to express their views and concerns about Health and Safety. This will be achieved by the formulation of various routes. These include;

- Project Health and Safety committees;
- Safety representatives from each contractor;
- Toolbox talks including a feedback process; and
- Discussion and briefing on method statements and risk assessments.

5.57 An 'open door' policy will be employed whereby any individuals can discuss Health and Safety issues with any member of the project team. Site notice boards Tool Box Talks, and posters are used to convey environmental, health and safety information to persons on the project.

5.58 Entry onto the Site will be restricted to authorised people only. Before entry, all persons will be required to undertake an induction dealing with site specific construction activities, site hazards, site rules, enforcement and nonconformity procedures, welfare facilities, first aid facilities and emergency procedures.

5.59 Following induction all persons will be issued with an induction booklet along with an induction swipe card. Automatic turnstiles will prevent unauthorised and un-inducted persons progressing beyond the security point.

Hours of Work

5.60 Working hours on the Site will be agreed with the Council through the CEMP. However, it is likely that the standard hours of work will be adhered to. These are:

- Monday to Friday – 07.30am to 18.00pm;
- Saturday - 08.30am to 14.00pm; and,
- Sunday, Bank Holidays or Public Holidays - no working or noisy activities on-site.

5.61 All work outside these hours will be subject to prior agreement of, and/or reasonable notice to the Council.

5.62 All night-time working will be restricted to exceptional circumstances or work internally with buildings. By arrangement, there may be some out of hours' construction deliveries made to the Site which will be agreed in advance.

Management of Sub-Contractors

5.63 Where individual contracts are required (for example for waste removal) these will incorporate relevant requirements in respect of environmental controls, based largely on the standard of 'good working practice' as outlined in the CEMP as well as statutory requirements.

5.64 Potential sub-contractors will also be required to demonstrate how they would achieve the provisions of the CEMP, how targets will be met and how potential effects will be minimised. Contractors will be required to comply with all provisions of relevant legislation including:

- The Control of Pollution Act, 1974, Part IV;
- The Health and Safety at Work Act, 1974;
- The Clean Air Act, 1993; and
- The Environmental Protection Act, 1990.

5.65 All trade contractors' method statements will be required to address the specific issues that may have a disruptive effect on the local community identified in the CEMP, including:

- Noise;
- Local air quality and dust emissions;

- Parking;
- Deliveries;
- Waste management; and
- Operatives' behaviour.

Management of Material Resources and Waste

5.66 Waste will be generated during all stages of the construction programme. However, this will be carefully managed and cleared to prevent nuisances such as litter, dust, odour and pests, and to maintain a "clean" working and site environment, for the benefit of all parties. Major sources of waste within the construction process are anticipated to include:

- Surplus soils from the construction;
- Packaging – plastics, pallets, expanded foams etc.;
- Waste materials generated from inaccurate ordering, poor usage, badly stored materials, poor handling, spillage etc.; and
- Liquid wastes, other than surface water run-off and foul drainage, such as waste oils and chemicals.

5.67 During the enabling and construction phase, requirements for the management of waste will be communicated to all contractors and sub-contractors to ensure that waste is managed in accordance with the waste hierarchy and relevant statutory controls. These measures will be controlled through the CEMP in consultation with the relevant authorities.

Identification and Classification of Waste

5.68 The Government removed the statutory requirement for SWMPs in England in October 2013. However, because SWMPs are considered good practice a SWMP will be produced and included within the CEMP to ensure that demolition and construction wastes are dealt with in an appropriate manner and in accordance with the waste hierarchy.

Segregation and Storage of Waste

5.69 Procedures for the segregation and storage of waste will be detailed in the SWMP. This will include the use of colour-coded skips to facilitate segregation for re-use and recycling; inspection of containers to ensure they are fit for purpose; and the use of plastic sheeting to prevent leaching from waste soils and aggregates. There will not be any mixing of hazardous and non-hazardous wastes.

Waste Transfer and Duty of Care Requirements

5.70 For waste removed from the Site, notification by the Contractor/Construction Manager for approval (via consultation with the authorities) will take place. Loads will only be deposited at authorised waste treatment and disposal sites. Deposition will be in accordance with the requirements of the Environment Agency and all relevant legislation.

5.71 Any person removing waste from the Site will hold a current waste carrier license and all waste shall be received at an authorised waste treatment or disposal facility. The nominated person(s) with responsibility for waste will ensure that all relevant authorisations are in place prior to off-site removal. No burning of construction waste will be undertaken on the Site.

5.72 In addition, removal of any inert or non-hazardous waste from the Site will be accompanied by a Waste Transfer Note (WTN), signed by both the producer and the carrier of the waste, and correctly completed in accordance with the Environmental Protection (Duty of Care) Regulations 1991 (as amended). This will apply to the removal of both solid and liquid wastes (other than surface water run-off and foul drainage).

5.73 To prove the correct depositing of waste material and to prevent the occurrence of fly-tipping, removal of any hazardous waste from the Site will be accompanied by a Hazardous Waste Consignment Note (HWCN), signed by both the producer and the carrier of the waste, and correctly completed in accordance with the Hazardous Waste Regulations (England and Wales) Regulations 2005. This will apply to the removal of both solid and liquid wastes (other than surface water run-off and foul drainage).

5.74 Where it is identified that at least 500kg of hazardous waste will be generated in any twelve-month period, the Site will be registered with the Environment Agency and a hazardous waste premises notification code obtained.

Site Drainage

5.75 The assessment of potential effects of the Proposed Development on drainage is presented in Chapter 11, Flood Risk and Drainage and associated appendices. The contractor should ensure that any water which may have come into contact with any contaminated materials during construction will be disposed of in accordance with the Water Resources Act (1991) and other legislation, and to the satisfaction of the Environment Agency. In addition, any risk will be reduced as far as practicable by adopting good management practices and relevant measures described in the Environment Agency's Pollution Prevention Guidelines.

5.76 All liquids and solids of a potentially hazardous nature (for example diesel fuel, oils and solvents) will be stored on surfaced areas, with double walled tanks, to the satisfaction of the Environment Agency.

5.77 There may be a requirement to discharge water to mains and foul sewers during construction and operation of the Proposed Development. Discharge licenses will be applied for through the normal routes.

5.78 A CEMP will be implemented to ensure that the impact of construction on water resources and drainage during construction is managed.

Summary

5.79 This chapter has outlined the anticipated demolition and construction activities and Programme for the Proposed Development. A CEMP the Proposed Development would be produced prior to the start of on-site works and will include all commitments to environmental protection; compliance with relevant planning conditions; detail on control measures and activities to minimise environmental impact; monitoring and record keeping requirements; point of contact details for dealing with any environmental enquiries; and a commitment to periodic review.

6 Noise and Vibration

6.1 This Chapter has been prepared by BuroHappold and assesses the likely significant effects of the Proposed Development with respect to Noise and Vibration. This chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.

6.2 The author of this chapter holds BSc(Hons) Audio Technology, full membership of the Institute of Acoustics (MIOA), and almost 20 years' experience working in the field of acoustics.

6.3 The following appendices support the assessments made within this Chapter:

- Appendix 6.1 Glossary;
- Appendix 6.2 Planning and Legislation;
- Appendix 6.3 Environmental Noise Survey (BuroHappold, 2017);
- Appendix 6.4 Environmental Noise Survey (WSP, 2019);
- Appendix 6.5 Baseline Traffic Flows;
- Appendix 6.6 Construction Noise Calculations;
- Appendix 6.7 Future Traffic Flows;
- Appendix 6.9 Construction Traffic Flows; and
- Appendix 6.10 Commercial Noise Breakout Calculation.

6.4 The following Figures support the assessments made within this Chapter:

- Figure 6.1 Site Location Plan/Study Area; and
- Figure 6.2 Predicted Baseline Noise Conditions around the Site.

Policy Context

Legislation and Planning Policy

6.5 The relevant legislation and planning policy applicable to the noise and vibration impact assessment is listed below. Further details are provided within Appendix 6.2 to this report.

- Control of Pollution Act 1974;
- Environmental Protection Act 1990;
- National Planning Policy Framework (NPPF), 2019;
- Noise Policy Statement for England (NPSE), 2010; and
- National Planning Practice Guidance (NPPG), 2012 revised July 2018.

Relevant Guidance

6.6 The relevant best practice guidance, including international standards, applicable to the noise and vibration impact assessment is listed below. Further details are provided within Appendix 6.2 to this report.

6.7 The following guidance documents are applicable to the noise and vibration impact assessment:

- World Health Organisation 'Environmental Noise Guidelines for the European Region' (2018);
- Manchester City Council: 'Planning & Noise Technical Guidance' (December 2015);
- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS8233);
- BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS4142);
- BS 5228-1:2009 'Code of practice for noise and vibration control on construction and open sites, Part 1, Noise' (BS5228-1);
- BS 5228, 2009: 'Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration' (BS5228-2);
- BS 6472:2008 – 'Guide to evaluation of human exposure to vibration in buildings';
- ISO 9613-2:1996 Acoustics – 'Attenuation of sound during propagation outdoors - Part 2: General method of calculation';
- Calculation of Road Traffic Noise (CRTN), Department of Transport (Welsh Office), 1988;
- Calculation of Railway Noise (CRN), Department of Transport (Welsh Office), 1988;
- Design Manual for Roads and Bridges Volume 11, Part 3, Section 7, HMSO, 1994 (DMRB 11:3:7), 2011;
- Acoustics, Ventilation and Overheating Residential Design Guide (AVO) - Draft, Association of Noise Consultants, 2018; and
- Professional Practice Guidance on Planning and Noise (ProPG), Association of Noise Consultants, 2017.

Assessment Methodology and Significance Criteria

Study Area

6.8 The study area is shown in Figure 6.1. Major local noise sources have been identified as:

- The railway to the north of the site (Manchester Piccadilly train station on the north west of the site);
- Fairfield Street to the north of the site;
- Ring Road (A635) to the south of the site;
- Baring Street to the west of the site; and

- London Road (A6) to the west of the site.

Identified Receptors

6.9 The nearest noise sensitive receptor to the development site is Unite Students Piccadilly Point, a Purpose Built Student Residential (PBSR) tower block on Baring Street. At its closest, it is around 18m from the nearest part of the Site (the park), and 110m from the nearest part of the new office buildings and car park.

6.10 There are also a number of residential properties on Thirsk Street, to the south of the site. The nearest house is around 180m from the nearest part of the new office buildings and car park.

Two Stage Assessment

6.11 The proposed Phase 1 works are to be carried out in two stages, each with its own planning application as detailed in Chapter 3 of this ES (Site, Surroundings and Description of Proposals).

EIA Methodology

6.12 This ES tests the impact of the proposals in five scenarios, described below:

- Baseline, including schemes currently under construction;
- Baseline and Phase 1 (Application 1 alone);
- Baseline and Phase 1 (Application 1 with Application 2);
- Baseline, Phase 1 (Applications 1 and 2) and Cumulative (i.e. nearby schemes with Planning Permission); and
- Baseline, Phase 1, Cumulative and Strategic Regeneration Frameworks (SRFs).

Receptor Sensitivity/Value

6.13 The receptors have been assigned the sensitivities detailed in Table 6 1.

Table 6-1 Receptor Sensitivity

Sensitivity	Typical Descriptors
High	Residential Properties (including PBSR)
Medium	Commercial/Industrial Properties
Low	Train Station
Negligible	Car parking areas

Operational Effects Significance

6.14 This section describes the assessment criteria used when considering noise and vibration arising as a result of the Proposed Development.

Noise Break-In

6.15 The assessment criteria for environmental noise intrusion into residential apartments are aligned with the requirements of BS8233 and Manchester City Council (MCC), as shown in Table 6 2.

Table 6 2 BS8233 Noise Limits

Room Type	Daytime Limit, dB $L_{Aeq,16hour}$	Night-time Limit, dB $L_{Aeq,8hour}$	Night-time Limit, dB $L_{Amax,F}$
Living Rooms	35	-	-
Bedrooms	35	30	45
Open Plan Office	45-50	45-50	-
Retail	50-55	50-55	-
Nightclub/bar/restaurant	40-45	40-45	-

6.16 BS8233 also states that "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

6.17 Table 6 3 presents indicative criteria against which the magnitude of impact of internal ambient noise level can be assessed, however the primary design aim should be to achieve the levels presented in Table 6 2 above.

Table 6 3 Internal Ambient Noise Level Magnitude of Impact

Magnitude	Typical Descriptors
High	Noise levels in Table 6-2 are exceeded by <10dB (Adverse).
	Noise levels are lower than those in Table 6-2 by <10dB (Beneficial).
Medium	Noise levels in Table 6-2 are exceeded by <6dB (Adverse).
	Noise levels are lower than those in Table 6-2 by <6dB (Beneficial).
Low	Noise levels in Table 6-2 are exceeded by <3dB (Adverse).
	Noise levels are lower than those in Table 6-2 by <3dB (Beneficial).
Negligible	Noise levels in Table 6-2 are exceeded by <1dB (Adverse).
	Noise levels are lower than those in Table 6-2 by <1dB (Beneficial).
No change	Noise levels in Table 6-2 are met

Noise Emissions

6.18 The only operations which could impact on the nearest noise sensitive receptors relate to noise from activities associated with the retail units, and from any building services plant connected to the Proposed Development.

6.19 The assessment of noise from these sources is presented in BS4142, which compares the 'rating' noise level (dBLAr,Tr) from a noise source with the background noise level (dBLA90,T) without the noise source operating.

6.20 A 'rating' noise level is derived from the character correction applied to the 'specific' noise level (dB LAeq,T) of the source if the noise has a defined acoustic character such as being tonal, impulsive, distinctive or intermittent in nature.

6.21 The impact of the noise source is calculated by subtracting the background noise level from the rating level, the resulting difference is then used to determine the likelihood of impact, as presented in Table 6 4 below. BS 4142:2014 states "Typically, the greater this difference, the greater the magnitude of impact".

Table 6 4 BS 4142:2014 Magnitude of Impact

Difference between rating and background noise level	Significance Assessment
+10dB or more	High adverse impact
+5dB	Medium impact
< 0dB	Low impact

6.22 The significance criteria detailed in Table 6 5, are proposed for building services noise.

Table 6 5 Significance Criteria for Building Services Noise

Difference between rating and background noise level	Significance Assessment
≥+10dB	High (SOAEL)
+5dB – +9.9dB	Medium (LOAEL)
-4.9dB - +4.9dB	Low (NOEL)
≤-5dB	Negligible

6.23 MCC require that the 'rating' noise level from building services plant is at least 5 dB below the existing background noise level at the nearest noise sensitive residential property, which therefore relates to 'negligible' significance.

Operational Traffic

6.24 Traffic noise, particularly from freely flowing traffic, is a relatively uniform noise source without strong tonal or impulsive characteristics. It is common practice to use the change in

noise level brought about by a scheme as the basis for evaluating noise impacts (i.e. the impact of the scheme on the pre existing noise environment and the effects this may have on the receptors in that environment).

6.25 The scale or severity of any noise change, positive or negative, requires description to indicate the degree of impact where possible. This leads to the common practice of defining noise change impact categories with an associated semantic scale.

6.26 The latest version of DMRB (2011) uses this guidance in developing the classification of magnitude of noise impacts in the short term included in Table 6 6, below. In order to determine the significance of any change in the noise environment at the location of nearby sensitive receptors, the significance criteria appear to reflect advice defined in the draft document Guidelines for Noise Impact Assessment, published by the Institute of Environmental Management and Assessment (IEMA) and the Institute of Acoustics (IOA).

Table 6 6 Significance of changes in road traffic noise levels in short term

Change in Noise Level, dB	Impact Magnitude Category	Initial Indictor of Significance Effect
+5	Major adverse	Potentially significant adverse effect
+3 to +4.9	Moderate adverse	
+1 to +2.9	Minor adverse	
-0.9 to +0.9	Negligible	Unlikely to be significant
-1 to -2.9	Minor beneficial	Potentially significant beneficial effect
-3 to -4.9	Moderate beneficial	
-5	Major beneficial	

6.27 A simplistic assessment of any noise impact can be calculated by comparing the predicted change in vehicle movements to and from the site with the existing situation, using the formula 10 x log (new movements/existing movements). A doubling of movements would, for example, potentially result in a 3 dB increase in noise levels.

Rail Noise

6.28 On a similar basis to those proposed for road traffic noise, the significance effects of rail noise are shown in Table 6.7.

Table 6.7 Significance of changes in rail noise levels in short term

Change in Noise Level, dB	Impact Magnitude Category	Initial Indictor of Significance Effect
+5	Major adverse	Potentially significant adverse effect
+3 to +4.9	Moderate adverse	
+1 to +2.9	Minor adverse	Unlikely to be significant

Change in Noise Level, dB	Impact Magnitude Category	Initial Indictor of Significance Effect
-0.9 to +0.9	Negligible	
-1 to -2.9	Minor beneficial	
-3 to -4.9	Moderate beneficial	Potentially significant beneficial effect
-5	Major beneficial	

Construction Effects Significance

Construction Noise

6.29 The magnitude and significance of effects due to construction noise is determined in a different way to the above and is based on "Example Method 2 '5dB change'" as described in BS5228-1. This method reflects the conventional approach within EIA methodologies. This method states that noise levels generated by construction activities are deemed to be significant if the 'total noise' (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB LAeq,period, from construction noise alone, for the daytime (07:00-19:00), evening (19:00-23:00) and night-time (23:00-07:00) periods, respectively.

6.30 There is no recognised guidance to determine if any predicted significant adverse effects are of 'minor', 'moderate' or 'major' significance, consistent with the EIA terminology adopted, however the following approach has been developed based on information in BS5228 and IEMA Guidelines for Environmental Noise Impact Assessments, and should be taken where there is a +5dB change or greater.

Table 6 8 Construction Noise Magnitude of Impact

Total Noise Arising from Construction	Significance
<65	Negligible
65-70 dBA	Minor
70-75 dBA	Moderate
>75 dBA	Major

6.31 It is also suggested that, depending on if the effect is for a short or long duration, the reported effects can move to adjacent significance bands. For example, piling noise may be >75dB, but may only occur over a 1-week duration and therefore would be considered as of 'moderate' significance.

Construction Vibration Significance

6.32 Construction vibration levels are discussed in BS 5228 Part 2. The document provides basic methods of vibration control relating to construction sites where work activities/operations generate significant vibration levels, describes the legislative background to vibration control and provides recommendations given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities.

6.33 Vibration during construction work may arise from activities such as piling (e.g. for building foundations), ground improvement and road construction. Selection of plant and methods will need to consider the possible effects of vibration on nearby buildings and their occupants.

6.34 Ground-borne vibration from construction work has broadly two potential impacts; cosmetic/structural damage and human sensitivity.

6.35 For building damage criteria, Table 1 of BS 7385: Part 2:1993: "Evaluation and Measurement for Vibration in Buildings - guide to damage levels from ground-borne vibration", sets out limits for primarily transient vibration above which cosmetic damage could occur. This is reproduced in Table 6 9.

6.36 Structural damage to buildings by vibration is extremely rare and, if at all, only occurs when receiving buildings or structures are located very close (e.g. at least within around 10m) to very intensive vibration generating activities and/or are vulnerable due to their structural condition.

6.37 The threshold of perception of vibration depends on the frequency. The human body is most sensitive to vibration in the frequency range 1-80 Hz. The threshold of perception is typically taken to be 0.15 mms-1 and 0.3 mms-1 peak particle velocity at frequencies between 8 Hz and 80 Hz.

6.38 Experience shows that disturbance or annoyance from vibration in residential situations is likely to arise when the magnitude of vibration is only slightly in excess of the threshold of perception.

Table 6 9 Construction Vibration Magnitude of Impact

Significance	Construction vibration – humans	Construction vibration - buildings
Negligible	0.14 mm/s PPV	15 mm/s at 4Hz increasing to 20 mm/s at 15Hz and 50mm/s at 40Hz and above
Small	0.30 mm/s PPV	15 mm/s at 4Hz increasing to 20 mm/s at 15Hz and 50mm/s at 40Hz and above
Medium	1 mm/s PPV	30 mm/s at 4Hz increasing to 40 mm/s at 15Hz and 100mm/s at 40Hz and above
Large	10 mm/s PPV	60 mm/s at 4Hz increasing to 80 mm/s at 15Hz and 200mm/s at 40Hz and above

Baseline Methodology

Noise

6.39 In order to determine the existing noise climate, noise surveys were carried out by BuroHappold on Thursday 9th and Friday 10th of March 2017. This has been agreed with MCC, through the EIA Scoping exercise, to be representative of the baseline (2019) data, due to there being no significant changes in the surrounding road and rail infrastructure, the dominant noise sources.

6.40 Full details of the survey methodology and measured levels are provided in Appendix 6.3.

6.41 In summary, noise levels around the site are relatively high, and do not change significantly between the daytime and night-time periods, with the night-time periods generally being slightly noisier. The main source of noise is road traffic.

6.42 Additional noise measurements have also been completed by WSP, and are appended to this chapter within Appendix 6.4.

Vibration

6.43 MCC's guidance document states:

"A vibration assessment (which is usually based on BS 6472: 2008) may be required where railway/tram lines are within 75m of a Proposed Development site."

6.44 As all proposed buildings are greater than 75m from the nearest rail line, it is considered unnecessary to undertake vibration monitoring at the Site.

Limitations and assumptions

6.45 At this stage of the project the use of the ground floor commercial units has not been confirmed (Planning Permission is sought for Use Classes A1, A2, B1, D1 or D2), and neither has the type or location of any building services plant. Therefore, noise level limits have been provided, based on the baseline noise levels measured on Site, which can form the basis for any planning conditions relating to noise from the development. Confirmation can be provided at a later stage that the limits set within the planning conditions should be achieved. This is considered an appropriate approach in EIA terms as noise can be controlled using conventional mitigation measures, including location/selection of plant, screening and/or plant attenuation.

6.46 No octave-band noise data has been provided. Calculations have therefore been undertaken using assumed typical (road/rail) spectra, based on the reported measured single figure values detailed in the BuroHappold acoustic report appended to this chapter (Appendix 6.3).

Baseline Conditions

Current Baseline (2019)

6.47 The full noise survey report is reproduced in Appendix 6.3. Figure 6.2 shows the predicted noise levels around the site based on the measured data.

6.48 On this basis, the daytime noise levels affecting Baring Street Office 1 are approximately 65 dB LAeq,T. Noise levels affecting Baring Street Office 2 are approximately 75 dB LAeq,T.

6.49 The lowest measured background noise levels at the nearest noise sensitive receptors were 57 dBLA90,T in the day and 53 dBLA90,T at night. However, WSP measured slightly lower background noise levels of 56 dBLA90,T in the day and 50 dBLA90,T at night.

Future Baseline (2023)

6.50 The predicted increase in road traffic movements has been provided by TFGM, and the data used to predict the future baseline conditions, as shown in Appendix 6.5.

6.51 Based on the simple relationship between the percentage change in movements, the worst case predicted increase in noise levels is less than 1dB, which is negligible – i.e. NOEL. In many cases there is a small decrease in traffic levels.

6.52 On this basis, the noise levels derived for the current baseline have been used in the assessment.

Identification and Evaluation of Likely Significant Effects

Demolition and construction effects for Application 1 (Baring Street MSCP, Baring Street Office 1 and Mayfield Park)

Relevant aspects of the scheme

6.53 Construction activities are a potential, albeit temporary, source of noise and vibration. British Standard BS 5228 "Code of practice for noise and vibration control on construction and demolition sites" provides methodologies for the assessment and control of noise and vibration from construction operations. The Standard contains detailed information on noise reduction measures and promotes the 'best practicable means' (BPM) approach to control noise and minimise the impact on local residents and construction workers.

6.54 For construction noise and vibration, it is not possible at the planning application stage to predict detailed noise effects given the uncertainty as to construction methods, processes and plant. However, indicative noise levels have been calculated at the closest noise sensitive receivers for assumed plant and processes. These calculations have been undertaken on the following basis:

- All buildings on current existing Phase 1 site are to be demolished and site cleared at one time;
- Earthworks undertaken;
- Piling undertaken (assumed Continuous Flight Auger piling);
- Baring Street Office 1, Baring Street MSCP and Mayfield Park to be constructed at the same time; and
- The distance calculations have been based the on the shortest distance from the centre of each Plot to the nearest residential property (Piccadilly Point on Baring Street). Properties at a greater distance should be subject to similar or lower noise levels.

Potential effects of the development and their significance

Construction noise

6.55 Full calculations are provided in Appendix 6.6, with the references detailed, but in summary, typical noise levels anticipated at the nearest noise sensitive location for Application 1 are detailed in Table 6 10.

Table 6 10 Predicted Construction Stage Noise Levels and Significance (Application 1)

Phase	Nearest Affected Location	Typical Daytime Noise Level, dB $L_{Aeq,T}$	Significance	Calculation Reference
Demolition	Piccadilly Point (Baring Street)	67	Minor	1
Earthworks Plot N	Piccadilly Point (Baring Street)	65	Minor	3
Earthworks Plot O	Piccadilly Point (Baring Street)	68	Minor	4
Earthworks Park	Piccadilly Point (Baring	62	Negligible	5

Phase	Nearest Affected Location	Typical Daytime Noise Level, dB $L_{Aeq,T}$	Significance	Calculation Reference
	Street)			
Earthworks (cumulative)	**Piccadilly Point (Baring Street)**	**70**	**Minor**	**-**
Piling Plot N	Piccadilly Point (Baring Street)	55	Negligible	7
Piling Plot O	Piccadilly Point (Baring Street)	57	Negligible	8
Piling (cumulative)	**Piccadilly Point (Baring Street)**	**59**	**Negligible**	**-**
Concreting Plot N	Piccadilly Point (Baring Street)	70	Minor	10
Concreting Plot O	Piccadilly Point (Baring Street)	73	Moderate	11
Concreting (cumulative)	**Piccadilly Point (Baring Street)**	**74**	**Moderate**	**-**
Main Build Plot N	Piccadilly Point (Baring Street)	71	Moderate	13
Main Build Plot O	Piccadilly Point (Baring Street)	73	Moderate	14
Main Build (cumulative)	**Piccadilly Point (Baring Street)**	**75**	**Moderate**	**-**

6.56 All construction activities are therefore likely to be of negligible, minor or moderate significance.

6.57 Furthermore, it should be noted that the noise data provided in BS5228 is representative of older machinery without the use of any mitigation measures. Based on the implementation of best practical means with the contractors CEMP, the above noise levels are likely to reduce significantly.

6.58 All properties outside of the main development site are likely to benefit from acoustic screening provided by the site boundary fence (assuming a solid construction, with a minimum mass per unit area of 10-15 kg/m2 that is well sealed to the ground and between abutting panels) during periods when construction takes place at ground level e.g. piling, earthworks etc. This would reduce noise levels at Piccadilly Point by a further 5-10 dB.

6.59 If evening, night-time and/or Sunday working is to be required, then this would need to be agreed with the Local Authority under the Control of Pollution Act (CoPA). A noise and vibration management plan and possibly a prior, CoPA Section 60 agreement with the Local Authority, could also be considered.

Construction vibration

6.60 Ground-borne vibration from construction activities is assessed for human response and effects on nearby buildings.

6.61 In the absence of specific information regarding the proposed construction activities and plant/equipment, assumptions have been made in this assessment.

6.62 Vibration levels of typical plant and equipment have been extrapolated from BS 5228-2 and CALTRAN Standard Plans 2004. Using empirical prediction formulas contained in BS 5228-2, the vibration level can be predicted at the nearest affected vibration-sensitive receptor.

6.63 Table 6 11 identifies the reference peak particle velocity (PPV) for each type of equipment that produces ground-borne vibration that is of significance along with the predicted PPV level at Piccadilly Point. This is at approximately 18m from the park, where excavation works may have a vibration impact, and 110 metres from the buildings where all other construction activities will occur. The magnitude of impact from construction vibration at the closest NSR is summarised in the last two columns of this same table.

Table 6 11 Reference and estimated PPV at NSRs. – Significance of effect from construction vibration exposure at closest NSR (Piccadilly Point)

Construction activity	Equipment	Reference PPV at 7.6 m-mm/s	Estimated PPV at Piccadilly Point – mm/s	Magnitude of impact for exposure to humans	Magnitude of impact on buildings
Site preparation and excavation - Park	Vibratory roller	5.33	2.07	Moderate	Negligible
	Large bulldozer	2.26	0.88	Minor	Negligible
	Hydraulic breakers	6.10	2.37	Moderate	Negligible
	Jackhammer	0.89	0.35	Minor	Negligible
Site preparation and excavation - Buildings	Vibratory roller	5.33	0.43	Minor	Negligible
	Large bulldozer	2.26	0.18	Negligible	Negligible
	Hydraulic breakers	6.10	0.49	Minor	Negligible
	Jackhammer	0.89	0.07	Negligible	Negligible
Piling	Rotary bored piling	-	<0.02	Negligible	Negligible
Other	Loaded trucks	1.93	<0.1	Negligible	Negligible

6.64 As presented in Table 6 11, exposure to humans from construction vibration range from minor to the moderate magnitude of impact when site preparation and excavation takes place within Mayfield Park. This is based on a typical selection of construction plant and equipment assessed at the boundary of the site.

6.65 No significant effects due to construction vibration are expected during the construction of the buildings themselves given that it is assumed that the vibration caused by construction activities can be controlled through an environmental management plan.

Summary of effects during construction

Table 6 12 Summary of pre-mitigation effects during construction of Application 1 only

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Residents at Piccadilly Point	High	Noise during earthworks	Small	Minor adverse
Residents at Piccadilly Point	High	Noise during piling	Negligible	Negligible
Residents at Piccadilly Point	High	Noise during concreting	Moderate	Moderate adverse
Residents at Piccadilly Point	High	Noise during main build	Moderate	Moderate adverse
Residents at Piccadilly Point	High	Vibration during park site preparation	Moderate	Moderate adverse
Residents at Piccadilly Point	High	Vibration during buildings preparation	Minor	Minor
Residents at Piccadilly Point	High	Vibration during piling	Negligible	Negligible
Residents at Piccadilly Point	High	Vibration during main build	Negligible	Negligible

Demolition and construction effects for Application 1 + Application 2 (Baring Street MSCP, Baring Street Office 1, Baring Street Office 2 and Mayfield Park)

Relevant aspects of the scheme

6.66 The relevant aspects of this scheme are as described for Application 1, above. The relevant aspects are identified as construction noise and vibration. The noise and vibration sources during demolition construction will be identical in character to those in Application 1 with Office 2 assumed to be constructed in the same manner as Office 1, and at a similar distance from the noise sensitive receptors.

Potential effects of the development and their significance

Construction noise

6.67 Full calculations are provided in Appendix 6.6, with the references detailed, but in summary, typical noise levels anticipated at the nearest noise sensitive location for Applications 1 and 2 simultaneously are detailed in Table 6 13, below.

Table 6 13 Predicted Construction Stage Noise Levels and Significance (Application 1 + 2)

Phase	Nearest Affected Location	Typical Daytime Noise Level, dB $L_{Aeq,T}$	Significance	Calculation Reference
Demolition	Piccadilly Point (Baring Street)	67	Minor	1
Earthworks Plot M	Piccadilly Point (Baring Street)	60	Negligible	2
Earthworks Plot N	Piccadilly Point (Baring Street)	65	Minor	3
Earthworks Plot O	Piccadilly Point (Baring Street)	68	Minor	4
Earthworks Park	Piccadilly Point (Baring Street)	62	Negligible	5
Earthworks (cumulative)	**Piccadilly Point (Baring Street)**	**71**	**Moderate**	
Piling Plot M	Piccadilly Point (Baring Street)	49	Negligible	6
Piling Plot N	Piccadilly Point (Baring Street)	55	Negligible	7
Piling Plot O	Piccadilly Point (Baring Street)	57	Negligible	8
Piling (cumulative)	**Piccadilly Point (Baring Street)**	**60**	**Negligible**	
Concreting Plot M	Piccadilly Point (Baring Street)	65	Minor	9
Concreting Plot N	Piccadilly Point (Baring Street)	70	Minor	10
Concreting Plot O	Piccadilly Point (Baring Street)	73	Moderate	11
Concreting (cumulative)	**Piccadilly Point (Baring Street)**	**75**	**Moderate**	

Phase	Nearest Affected Location	Typical Daytime Noise Level, dB $L_{Aeq,T}$	Significance	Calculation Reference
Main Build Plot M	Piccadilly Point (Baring Street)	65	Minor	12
Main Build Plot N	Piccadilly Point (Baring Street)	71	Moderate	13
Main Build Plot O	Piccadilly Point (Baring Street)	73	Moderate	14
Main Build (cumulative)	**Piccadilly Point (Baring Street)**	**76**	**Major**	

6.68 Prior to mitigation measures being implemented, all construction activities are therefore likely to be of negligible, minor or moderate significance with the exception of the main build, which could be of major significance if all three plots are under construction simultaneously.

Construction vibration

6.69 Ground-borne vibration from construction activities is assessed for human response and effects on nearby buildings.

6.70 In the absence of specific information regarding the proposed construction activities and plant/equipment, assumptions have been made in this assessment.

6.71 Vibration levels of typical plant and equipment have been extrapolated from BS 5228-2 and CALTRAN Standard Plans 2004. Using empirical prediction formulas contained in BS 5228-2, the vibration level can be predicted at the nearest affected vibration-sensitive receptor.

6.72 Table 6 14 identifies the reference peak particle velocity (PPV) for each type of equipment that produces ground-borne vibration that is of significance along with the predicted PPV level at Piccadilly Point. This is at approximately 18m from the park, where excavation works may have a vibration impact, and 110 metres from the buildings where all other construction activities will occur. The magnitude of impact from construction vibration at the closest NSR is summarised in the last two columns of this same table.

Table 6 14 Reference and estimated PPV at NSRs. Significance of effect from construction vibration exposure at closest NSR (Piccadilly Point)

Construction activity	Equipment	Reference PPV at 7.6 m-mm/s	Estimated PPV at Piccadilly Point – mm/s	Magnitude of impact for exposure to humans	Magnitude of impact on buildings
Site preparation and excavation - Park	Vibratory roller	5.33	2.07	Moderate	Negligible
	Large bulldozer	2.26	0.88	Minor	Negligible

Construction activity	Equipment	Reference PPV at 7.6 m-mm/s	Estimated PPV at Piccadilly Point – mm/s	Magnitude of impact for exposure to humans	Magnitude of impact on buildings
	Hydraulic breakers	6.10	2.37	Moderate	Negligible
	Jackhammer	0.89	0.35	Minor	Negligible
Site preparation and excavation - Buildings	Vibratory roller	5.33	0.43	Minor	Negligible
	Large bulldozer	2.26	0.18	Negligible	Negligible
	Hydraulic breakers	6.10	0.49	Minor	Negligible
	Jackhammer	0.89	0.07	Negligible	Negligible
Piling	Rotary bored piling	-	<0.02	Negligible	Negligible
Other	Loaded trucks	1.93	<0.1	Negligible	Negligible

6.73 As presented in Table 6 11, exposure to humans from construction vibration range from minor to the moderate magnitude of impact when site preparation and excavation takes place within Mayfield Park. This is based on a typical selection of construction plant and equipment assessed at the boundary of the site.

6.74 No significant effects due to construction vibration are expected during the construction of the buildings themselves given that it is assumed that the vibration caused by construction activities can be controlled through an environmental management plan.

Summary of effects during construction

Table 6 15 Summary of pre-mitigation effects during construction of Application 1 + 2

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Residents at Piccadilly Point	High	Noise during earthworks	Moderate	Moderate adverse
Residents at Piccadilly Point	High	Noise during piling	Negligible	Negligible
Residents at Piccadilly Point	High	Noise during concreting	Moderate	Moderate adverse
Residents at	High	Noise during	Major	Major adverse

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Piccadilly Point		main build		
Residents at Piccadilly Point	High	Vibration during park site preparation	Moderate	Moderate adverse
Residents at Piccadilly Point	High	Vibration during buildings preparation	Minor	Minor adverse
Residents at Piccadilly Point	High	Vibration during piling	Negligible	Negligible
Residents at Piccadilly Point	High	Vibration during main build	Negligible	Negligible

Operational effects for Application 1 (Baring Street MSCP, Baring Street Office 1, and Mayfield Park)

Relevant aspects of the scheme and designed-in mitigation

6.75 The main designed-in mitigation measures are to be the glazing specifications for the office blocks (Baring Street Office 1 and Office 2). It is assumed at this stage that the offices would be open plan, rather than a number of cellular offices. If cellular offices are proposed, then the sound insulation performance of the glazing may need to be increased.

6.76 Calculations have been undertaken to determine the minimum sound insulation performance of the glazing for these buildings, which are detailed in Table 6 16 below. It is assumed that the buildings would be mechanically ventilated.

Table 6 16 Glazing Specification

Plot	Minimum Glazing Sound Insulation Performance, dB R_w ($+C_{tr}$)	Example Glazing Construction, mm
Baring St Office 1	31 (-6)	4/12min/4mm
Baring St Office 2	40 (-6)	10/12min/6.4mm pvb

6.77 The glazing has been designed such that internal ambient noise levels are controlled to no greater than 40 dB LAeq,T. This allows some tolerance for the mechanical services plant noise Potential effects of the development and their significance

Road Traffic

6.78 Operational noise and vibration effects associated with the development are considered negligible, as the change in traffic flows as a result of the Proposed Development is considered to be negligible, acoustically.

Noise Ingress to Offices

6.79 Noise levels breaking into the office spaces should not exceed the limits detailed in Table 6 2, above. This will be controlled by noise breaking in via the glazing, and hence the sound insulation performance of the glazing required to achieve the limits has been calculated (see Table 6 16). This specification is therefore designed-in mitigation and no operational effects are expected.

Noise Egress from Commercial Units

6.80 Appendix 6.9 shows the predicted noise level from music noise breaking out of the ground floor commercial unit (assumed worst case of a bar/lively restaurant with background music).

6.81 The predicted noise level is around 23 dBLAeq,T at the nearest noise sensitive receptor (Piccadilly Place), and hence is significantly lower than the prevailing background noise levels at any time of day or night.

6.82 On this basis, noise egress from commercial units would be negligible at all nearby noise sensitive receptors.

Plant Noise Egress

6.83 Rating noise limits have been set in line with the MCC guidance identified above, which limits plant noise emissions to a level that is 5 dB below the representative background noise level (LA90,T dB). A summary of each set of rating limits, both from BuroHappold and WSP is shown in Table 6 17 below.

Table 6 17 Plant Noise Emission Limits

Period	**Maximum rating noise level from external plant, 1 m from nearest noise sensitive receptor $L_{Ar,Tr}$ (dB)**	
	BuroHappold	**WSP**
Daytime (07:00-23:00)	52	51
Night-time (23:00-07:00)	48	45

6.84 As can be seen in the table above, the rating noise limits set by WSP are slightly lower than those measured/calculated by BuroHappold. The differences are not acoustically significant, do not have any material effect on the specification of the office building facades, and are unlikely to significantly affect the selection and design of building services plant.

6.85 For the purposes of continuity for the project, through both the planning and detailed design processes, the lower and more robust rating noise limits should be adopted.

Summary of effects during operation

Table 6 18 Summary of effects during operation of Application 1

Receptor	**Sensitivity**	**Description of effect**	**Magnitude of change/impact**	**Effect significance**

Residents at Piccadilly Place	High	Road Traffic Noise	Negligible	Negligible
Residents at Piccadilly Place	High	Entertainment noise from commercial units	Negligible	Negligible
Residents at Piccadilly Place	High	Plant noise egress	Negligible	Negligible

Operational effects for Application 1 + Application 2 (Baring Street MSCP, Baring Street Office 1, Baring Street Office 2 and Mayfield Park)

Relevant aspects of the scheme and designed-in mitigation

6.86 As for Application 1, above. The addition of Baring Street Office 2 does not have any effect on the incident noise levels on the office buildings or on the background sound levels at the nearest noise sensitive receptors, which are derived from the noise survey.

Potential effects of the development and their significance

Road Traffic

6.87 As for Application 1, above, as the difference in predicted vehicle movements is negligible for both applications.

Noise Ingress to Offices

6.88 As for Application 1, above, as there is a negligible change in vehicle movements, the primary source of external noise.

Noise Egress from Commercial Units

6.89 As for Application 1, above, a worst case assessment has been undertaken based on high internal noise levels breaking out of the closest building.

Plant Noise Egress

6.90 As for Application 1, above, this is a limit set by the Local Authority, and hence must be achieved regardless of the phasing of the planning applications.

Summary of effects during operation

Table 6 19 Summary of effects during operation of Application 1 with Application 2

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Residents at Piccadilly Place	High	Road Traffic Noise	Negligible	Negligible
Residents at Piccadilly Place	High	Entertainment noise from commercial units	Negligible	Negligible
Residents at Piccadilly Place	High	Plant noise egress	Negligible	Negligible

Mitigation Measures

Supplementary mitigation measures during demolition and construction

Noise

6.91 Table 6 13 identifies that simultaneous construction of all buildings would lead to a potentially major impact on the nearest noise sensitive receptors during the main build. It is recommended that construction is phased in order to mitigate this.

6.92 In general, the use of Best Practicable Means to control noise emissions from the site, in conjunction with ongoing community consultation, should be sufficient to mitigate the temporary noise impact arising from the site.

6.93 Examples of mitigation measures that can be used to control construction noise are found in Section 8 of BS 5228-1:2009+A1:2014:

- Selecting quieter plant and equipment;
- Turning equipment off when they are not in use;
- Providing enclosures around fixed plant like power generators or using mains power;
- Ensuring that all plant and equipment is well maintained;
- Keep internal haul routes well maintained and avoid steep gradients;
- Use rubber linings in chutes and dumpers to reduce impact noise;
- Minimise drop heights of materials;
- Start plant up sequentially rather than simultaneously;
- Move fixed plant away from identified noise sensitive receptors;
- Modify existing plant with noise attenuation packages such as acoustic enclosures and attenuators;
- Avoid using diesel power generators and use local electricity grid wherever possible;
- For impact driven piling, a non-metallic dolly between the hammer and the driving helmet should be used;
- Introducing an acoustic shroud for impact driven piles;
- Choose a quieter piling method; and
- Avoiding unnecessary revving of engines.

Vibration

6.94 Examples of mitigation measures that can be used to control construction vibration are found in Section 8 of BS 5228-2-2009:

- Substitute plant and/or methods with less obtrusive plant and/or methods;
- Where reasonably practical, move vibrating equipment away from identified NSRs;
- Vibration isolation of stationary plant;

- Selecting less intrusive methods of piling;
- Employ cut-off trenches which are analogous to noise barriers; and
- Pre-auguring before installing the piles.

Table 6 20 Summary of demolition and construction supplementary mitigation measures for Baring Street MSCP

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Noise during earthworks	Best Practicable Means	Contractor	Throughout Construction Period
Noise during piling	Best Practicable Means	Contractor	Throughout Construction Period
Noise during concreting	Best Practicable Means	Contractor	Throughout Construction Period
Noise during main build	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during park site preparation	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during buildings preparation	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during piling	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during main build	Best Practicable Means	Contractor	Throughout Construction Period

Table 6 21 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 1

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Noise during earthworks	Best Practicable Means	Contractor	Throughout Construction Period
Noise during piling	Best Practicable Means	Contractor	Throughout Construction Period
Noise during concreting	Best Practicable Means	Contractor	Throughout Construction Period

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Noise during main build	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during park site preparation	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during buildings preparation	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during piling	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during main build	Best Practicable Means	Contractor	Throughout Construction Period

Table 6 22 Summary of demolition and construction supplementary mitigation measures for Mayfield Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Noise during earthworks	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during park site preparation	Best Practicable Means	Contractor	Throughout Construction Period

Table 6 23 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 2

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Noise during earthworks	Best Practicable Means	Contractor	Throughout Construction Period
Noise during piling	Best Practicable Means	Contractor	Throughout Construction Period
Noise during concreting	Best Practicable Means	Contractor	Throughout Construction Period
Noise during main build	Best Practicable Means	Contractor	Throughout Construction Period

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Vibration during park site preparation	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during buildings preparation	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during piling	Best Practicable Means	Contractor	Throughout Construction Period
Vibration during main build	Best Practicable Means	Contractor	Throughout Construction Period

Supplementary mitigation measures during operation

Table 6 24 Summary of operational supplementary mitigation measures for Baring Street MSCP

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Plant noise egress	Compliance with limits set by MCC	Design team	Before project completion
Entertainment noise egress	Compliance with limits set by MCC	Design team	Before project completion
Road traffic noise	None required	N/A	N/A
Noise ingress to offices	None – designed in	N/A	N/A

Table 6 25 Summary of operational supplementary mitigation measures for Baring Street Office 1

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Plant noise egress	Compliance with limits set by MCC	Design team	Before project completion
Entertainment noise egress	Compliance with limits set by MCC	Design team	Before project completion
Road traffic noise	None required	N/A	N/A
Noise ingress to	None – designed in	N/A	N/A

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
offices			

Table 6 26 Summary of operational supplementary mitigation measures for Mayfield Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
None	N/A	N/A	N/A
None	N/A	N/A	N/A

Table 6 27 Summary of operational supplementary mitigation measures for Baring Street Office 2

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Plant noise egress	Compliance with limits set by MCC	Design team	Before project completion
Entertainment noise egress	Compliance with limits set by MCC	Design team	Before project completion
Road traffic noise	None required	N/A	N/A
Noise ingress to offices	None – designed in	N/A	N/A

Cumulative Effects

6.95 No cumulative effects are predicted. All permitted developments are significantly further from the proposed site than the nearest existing noise sensitive receptor (Piccadilly Place), and hence noise egress from site will be lower than that predicted at Piccadilly Place.

6.96 Similarly, construction noise and vibration effects will be lower than that predicted at Piccadilly Place.

6.97 In terms of noise ingress, the noise impact of the future traffic movements is negligible. The site currently experiences relatively high noise levels, and the designed-in mitigation has been calculated to achieve appropriate internal ambient noise levels in the offices.

6.98 Appendix 6.7 shows the predicted operational traffic flows and the associated potential noise impact.

6.99 As can be seen, most of the impacts are beneficial – i.e. result in a decrease in overall noise levels. The worst-case adverse impact is 3dB, which is a moderate impact. However, this only occurs at limited locations.

Residual Effects

6.100 The residual effects at the nearest noise sensitive receptor assuming implementation of proposed mitigation are presented in the table below.

Table 6 28 Residual effects table

Effect	Pre-mitigation significance	Mitigation measure	Post-mitigation significance
Demolition and construction effects			
Construction noise to residents at Piccadilly Place during earthworks and concreting	Moderate	Use of Best Practicable Means, in line with recommendations set out in Section 8 of BS 5228-1:2009+A1:2014.	Minor adverse, temporary
Construction noise to residents at Piccadilly Place during piling	Negligible	Use of Best Practicable Means, in line with recommendations set out in Section 8 of BS 5228-1:2009+A1:2014.	Negligible
Construction noise to residents at Piccadilly Place during main build	Major	Use of Best Practicable Means, in line with recommendations set out in Section 8 of BS 5228-1:2009+A1:2014.	Minor adverse, temporary
Construction vibration – earthworks - to residents at Piccadilly Place	Moderate	Use of Best Practicable Means, in line with recommendations set out in Section 8 of BS 5228-2-2009.	Moderate adverse, temporary
Construction vibration – earthworks - buildings	Negligible	None required	Negligible
Construction vibration – piling and concreting to residents and buildings at Piccadilly Place	Negligible	None required	Negligible
Construction vibration – main - to	Negligible	None required	Negligible

Effect	Pre-mitigation significance	Mitigation measure	Post-mitigation significance
residents at Piccadilly Place			
Construction vibration – main - buildings	Negligible	None required	Negligible
Operational effects (Application 1 + Application 2)			
Noise ingress	Negligible	None required – designed-in mitigation	Negligible
Commercial noise egress	Negligible	None required	Negligible
Plant noise emissions	Negligible	None required	Negligible
Operational traffic noise	Negligible	None required	Negligible

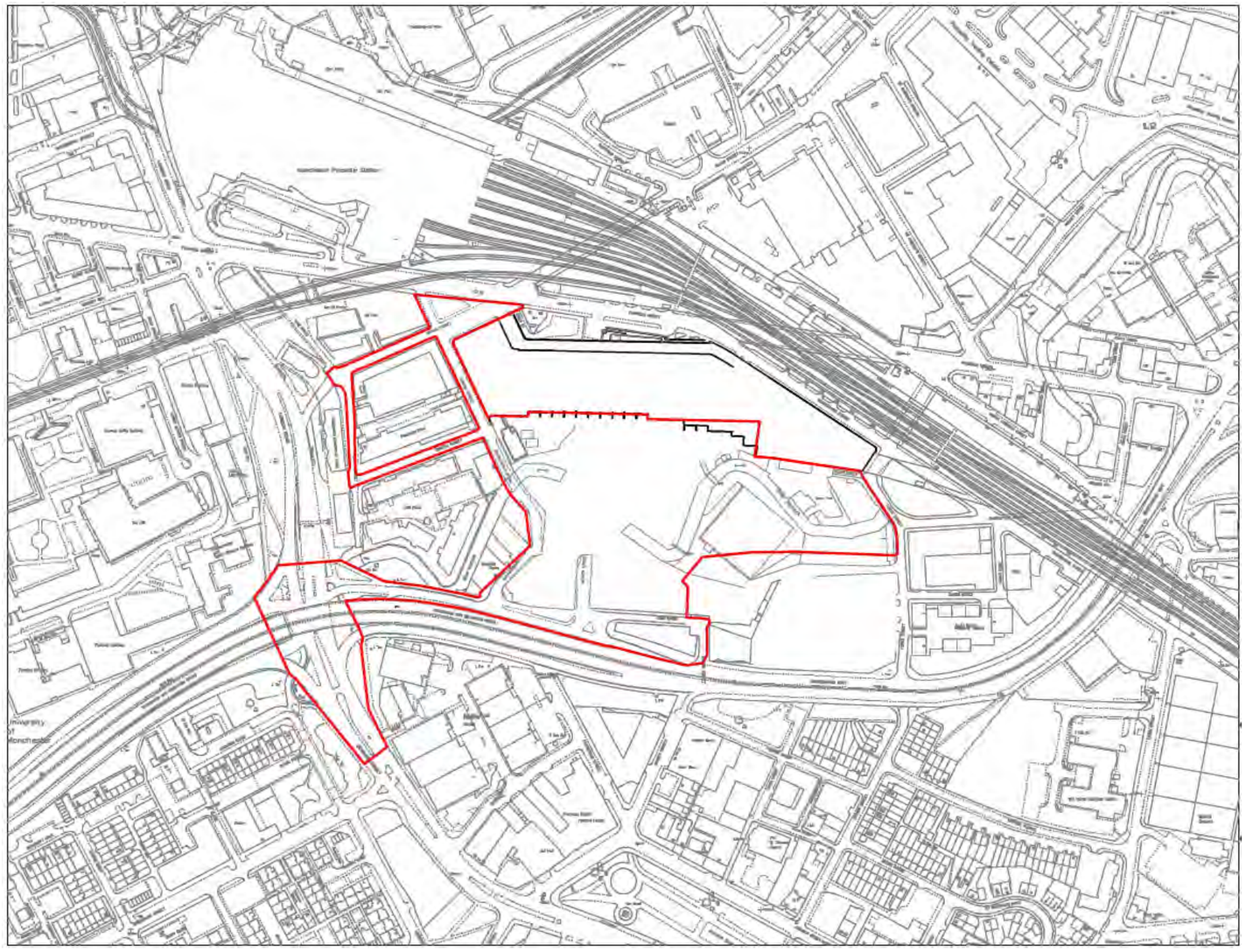


	Figure:	**6.1**		
	Title:	**Site Plan for Mayfield Phase 1 EIA (SEW Architects, Drawing Number: 0343-SEW-ZZ-ZZ-DR-Z-000028)**		
	Project:	**Mayfield Phase 1**		
	Date:	**09/09/19**	**Scale:**	**NTS**

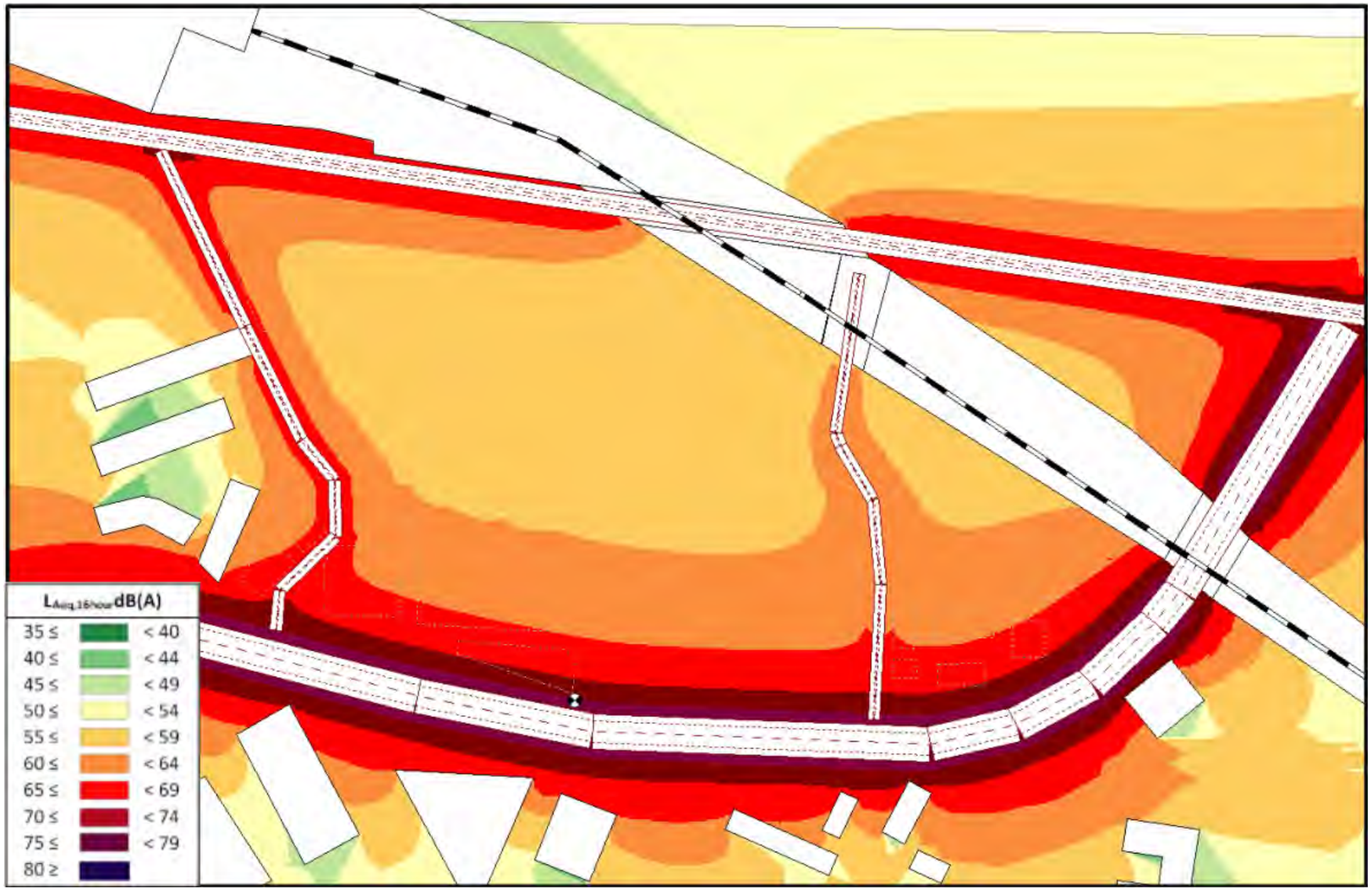


	Figure:	**6.2**		
	Title:	**Baseline Noise Levels for Mayfield Phase 1 EIA (BuroHappold Report 0035548, Figure 2-1)**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/09/19**	**Scale:**	**NTS**

7 Traffic and Transport

Introduction

7.1 This chapter of the ES assesses the environmental effects of the Proposed Development with respect to traffic and transportation. This chapter also describes the methods used to assess the effects; the baseline conditions at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant adverse effects, and the likely residual effects after these measures have been adopted.

7.2 The chapter has been informed by the Transport Assessment (TA) (Appendix 7.1), Framework Travel Plan (Appendix 7.2) and the Construction Logistics Plan (CLP) (Appendix 5.1 and 5.2) for the Proposed Development, which are submitted with this ES.

7.3 The Chapter author holds a HNC Civil Engineering, and is a Member of the Chartered Institute of Highways and Transportation (MCIHT) with over 20 years' experience in transport development planning in the UK, including the preparation of ES Transport Chapters.

7.4 Cumulative effects associated with traffic and transportation have additionally been considered within the ES and can be found in Chapter 16 Cumulative Effects, as well as summarised within this chapter.

Policy Context

National Planning Policy and Guidance

National Planning Policy Framework (MHCLG, 2019)

7.5 This National Planning Policy Framework (NPPF) was published by Ministry of Housing, Communities & Local Government (MHCLG) in February 2019. The NPPF is centred on a presumption in favour of sustainable development.

7.6 Section 9 of the NPPF, from paragraph 102 to 111, sets out the approach for promoting sustainable transport. Paragraph 102 states that there is a requirement that transport should be considered at the earliest stages of development proposals for the potential impacts to be addressed.

7.7 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 terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.'

7.8 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.'

7.9 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.'

7.10 With regards to encouraging use of sustainable transport modes, paragraph 111 states that "all developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed."

Regional Planning Policy and Guidance

Transport for the North's Strategic Transport Plan (TfN 2019)

7.11 Transport for the North (TfN) became England's first Sub-national Transport Body in April 2018.

7.12 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.

7.13 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.

7.14 TfN published its Strategic Transport Plan in 2019 setting out proposals for the northern transport network through to 2050.

7.15 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 as follows:

- Transforming economic performance;
- 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)

7.16 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.

7.17 Transport for Greater Manchester (TfGM) is the executive body of the GMCA.

7.18 In October 2016 GMCA released its second draft of the Greater Manchester Spatial Framework (GMSF) for consultation between January and March 2019.

7.19 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.

7.20 Policy GM-Strat 1 highlights a need for a strong focus on growth in the Core Growth Area (CGA). The CGA includes Manchester's city centre, the Quays, Trafford Park and Salford Port. The policy 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.

7.21 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.

7.22 It is expected that over the period of 2018 to 2037, GMSF identifies that there will be at least 1,500,000m^2 of office floorspace and nearly 50,000 new dwellings delivered 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)

7.23 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.

7.24 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".

7.25 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.

7.26 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.

7.27 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)

7.28 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, which is being led by TfGM, was then followed up by the Beelines proposal to provide a comprehensive network of walking and cycling routes.

7.29 It aims to quadruple cycling in Greater Manchester and get more people walking. 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.

7.30 The Beeline Strategy includes proposals for crossing and link improvements on highways surrounding the Site, including on Fairfield Street, London Road and Mancunian Way.

Local Policy

Manchester City Council's Core Strategy (2012)

7.31 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). 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.

7.32 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.

7.33 MCC's parking standards relevant to the scheme are detailed in the TA.

7.34 Along with the policies described above, the primary focus of Strategic Objective 5 of the Local Plan is transport. The relevant policies attached to this objective are discussed below.

7.35 In line with the GMTS ambitions, Policy T1 seeks the delivery of a *'sustainable, high quality, integrated transport system'* and 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;

- 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.

7.36 Policy T2 ensures that a good level of access to/from new developments to other parts of the city is established and states that each development will be considered 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'.

7.37 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.

Assessment Methodology and Significance Criteria

EIA Scoping

7.38 An EIA Scoping Report was submitted to MCC on 24th January 2019 with a subsequent request dated 24th July 2019. As detailed in Chapter 2 EIA Methodology, a Scoping Opinion was received from MCC on 16th August 2019, which includes comments from MCC/TfGM in relation to transport and access, which are outlined in Table 7-1.

Table 7-1 EIA Scoping Opinion – Transport Comments

Scoping Opinion Report Page	Transport Comment	Consultant Response
3	With regards to transport and traffic, the comments within the scoping report are noted as acceptable in terms of their consideration in the ES subject to consideration of mitigation measures.	The Traffic and Transport Chapter has been prepared on that basis.
3	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 TA includes an assessment of the impacts of development on all modes of transport and includes details of any mitigation measures required. This information is also summarised in the EIA.
3	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.	The EIA and TA includes an assessment of multi-modal impacts.
3	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.	The public realm and infrastructure proposals as part of the Portugal Street SRF and Piccadilly HS2 SRF have been considered as part of the TA, which includes improvements to links to the heart of the city centre.

7.39 Pre-planning application consultation has also been undertaken with highway officers at MCC/TfGM in relation to the scope of the TA. The scope of the TA reflects the output of this pre-application consultation process.

Baseline study methodology

7.40 In accordance with the IEMA guidelines, the study area has been defined by identifying any road link where it is felt that potentially significant environmental effects may occur as a result of the Proposed Development. The identified receptors are discussed later in this chapter.

7.41 Baseline conditions have been established using the following data:

- Classified turning count surveys were undertaken on Tuesday 10th July 2018, with supplementary surveys undertaken on Wednesday 5th June 2019. In addition, automatic traffic counts (ATC's) were undertaken on A635 Mancunian Way and A6 London Road for seven days commencing Friday 13th July 2018.
- Whilst strictly speaking July is not a neutral month as defined by the Department for Transport (April, May, June or September), it has been agreed with TfGM/MCC that the data is representative for a neutral month. Further details on this are included in the TA (Appendix 7.1, ES Vol II).
- This 2018 baseline survey data has been used by TfGM to validate their traffic model (discussed below);
- TfGM's City Centre Paramics Model has been interrogated by TfGM to provide traffic flow data for the following scenarios:
    - 2018 baseline (EIA Scenario 1);
    - 2023 future baseline incorporating cumulative schemes;
    - 2023 future baseline (as above) plus Phase 1 development (EIA Scenario 2*); and
    - 2030 future baseline including Mayfield Strategic Regeneration Framework (SRF) (EIA Scenario 4 excluding neighbouring SRFs).

7.42 * Operational traffic associated with Application 1 alone is identical to Application 1 + Application 2, because trips generated by Baring Street Office 2 in the Application 2 scenario would be directly replaced by external commuter trips using the car park.

- Road traffic collision data for the most recent five years to April 2019 covering the junctions and road links included in the TA study area (data sourced from TfGM).

7.43 The number of trips forecast to be generated by the Proposed Development has been based on the methodology agreed as part of the TA scoping discussions. Further details on this are included in the TA (Appendix 7.1).

7.44 The Proposed Development is to be delivered in phases. Following the demolition of the majority of on-site structures, being carried out under a separate prior approval process, the Proposed Development of Phase 1 would involve the construction of the elements set out in Table 7-2.

Table 7-2 Phase 1 Proposals – Maximum Quantum

Land Use	Maximum Quantum
B1 Office (Baring Street Office 1) and ground floor commercial	9,987sqm GEA; comprising 9,651sqm GEA B1 use and 336sqm GEA ground floor commercial use.

B1 Office (Baring Street Office 2)	Up to 31,000sqm GEA
Sui Generis Multi storey car park (Baring Street Multi-Storey Car Park)	543 spaces

7.45 It is assumed that the Mayfield Park is an ancillary facility to the Proposed Development, and will be used by those already on-site. It would therefore not generate trips in its own right, particularly during peak hours.

7.46 The Proposed Development of Phase 1 would involve the construction of the elements set out in full in Chapter 3 of this ES (Site, Surroundings and Description of Proposals) and is summarised below.

Application 1

- Phased demolition and site clearance, earthworks and re-profiling;
- Mayfield Park: provision of circa 6 acres (2.4 ha) of public park, including hard and soft landscaping;
- Baring Street Office (Block 1): 9 storey office development including active ground floor uses (A1, A3, A4 or B1), public realm and riverside walkway;
- Baring Street Multi-Storey Car Park (MSCP): 10 storey including ground and roof level MSCP for 543 car parking spaces; and
- 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

- Baring Street Office (Block 2): 13 storey office development including active ground floor uses, highways and associated access and public realm.

7.47 Initially as part of Phase 1, the 543 spaces in the MSCP will provide spaces for occupants of the office buildings as well as spaces for users of the Mayfield Park and general commuters. Within the Mayfield SRF area there are currently around 550 commuter parking spaces made up of approximately 200 formal spaces either in public car parks or associated with business premises and approximately 350 on street parking spaces.

7.48 The 'off street' commuter parking will be removed as part of the Proposed Development, and in order to improve the public realm environment within the SRF area it is proposed to restrict on street parking to a small number of permit spaces to serve the businesses that remain. Therefore, overall there will be no increase in vehicles parking within the SRF area as a result of the MSCP as part of Phase 1.

7.49 The anticipated year of opening for Phase 1 is 2023 and for the full-build out Mayfield SRF it is 2030.

7.50 The construction effects of Phase 1 have been assessed and the significance of these effects is based on the magnitude of any changes compared to the future baseline (i.e. those conditions which either exist or would exist if the scheme did not go ahead).

7.51 The construction vehicle movements for Application 1 in isolation are less than that for Phase 1 (Application 1 + 2 combined). Therefore the effects of Application 1 are assumed to be less than or equal to the effects of Phase 1 (Application 1 + 2 combined).

7.52 As described in the TA, the future baseline flows from TfGM's Paramics Model includes all cumulative schemes that TfGM have considered to have significant transport implications within the city centre and therefore relevant to Mayfield.

7.53 The operational assessment for Phase 1 (Application 1+2) assesses its impact against the 2023 future baseline situation.

7.54 TFGM have acknowledged that when future neighbouring SRF's come forward they will be robustly assessed at the appropriate time as part of their own EIA/TA.

Assessment Approach

7.55 The Design Manual for Roads and Bridges (DMRB) (Department for Transport (DfT)), Volume 11 Environmental Assessment (2011) has been referred to in the assessment to ensure that the environmental effects arising due to predicted changes in traffic levels are properly and comprehensively addressed. In addition, the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Assessment of Road Traffic' (IEMA, 1993) have also been referred to.

7.56 These guidelines advise the use of a checklist of likely effects covering noise, vibration, visual impact, severance, driver delay, pedestrian delay, pedestrian amenity, fear and intimidation, accidents and safety, hazardous loads, air pollution, dust and dirt, ecological impact and heritage and conservation areas. Many of these effects are assessed elsewhere within this ES, including Noise and Vibration (Chapter 6) and Air Quality (Chapter 7).

7.57 The potential effects of both construction traffic and operational traffic have been assessed in this chapter of the ES. It deals only with those transport effects likely to be relevant to the Proposed Development i.e. severance; pedestrian amenity (which for the purposes of this assessment includes fear and intimidation); driver delay; pedestrian delay; and accidents and safety.

7.58 The potential effects of both construction traffic and operational traffic have been assessed by comparing the likely trip generation of both construction and operation of the Proposed Development with future baseline traffic conditions in order to determine the percentage increase in traffic on each road that has been taken forward for assessment.

7.59 The guidelines acknowledge that for many developments some of the effects listed may not be widely relevant but suggest that reasons should be provided for any exclusions. In accordance with the IEMA guidelines, the study area has been defined by identifying any road link where it is felt that potentially significant environmental effects may occur as a result of the Proposed Development. A desktop exercise augmented by a number of site visits has been undertaken to identify any sensitive receptors in the study area.

7.60 To assist with identifying the magnitude of change as a result of the Proposed Development, with regard to traffic and transport, reference has been made to the DMRB/IEMA guidelines. These guidelines identify considerations and thresholds in respect to changes in the volume and composition of traffic. Where there is no set criteria, professional judgement has been used in line with best practice and industry standards.

7.61 In terms of public transport, the IEMA guidelines do not identify a specific need to assess the impact of public transport changes. Where improvements involve material changes to public transport services and/or if they form part of a mitigation measure to reduce traffic generation (such as a Travel Plan) it may be necessary to consider this.

Assessment of Effects

7.62 In assessing the environmental effects of traffic and transport, two factors are considered. Firstly, the sensitivity of receptors within the study area and secondly the anticipated magnitude of change/impact.

7.63 The above two factors are then combined to give an effect significance that depends on the sensitivity of the receptor and the anticipated magnitude of change.

Receptor Sensitivity

7.64 The sensitivity of a road can be defined by the vulnerability of the user groups who may use it such as elderly people or children. A sensitive area is where pedestrian or cyclist activity may be high, for example, in the vicinity of a school or where there is already an existing accident issue. It should be noted that the sensitivity of the receptor is judged on the sensitivity of the road users. It also takes account of the existing nature of the road; for example an existing A-class road is likely to have a lower sensitivity than a minor residential road.

7.65 The criteria used to assess receptor sensitivity is described in Table 7-3.

Table 7-3 Criteria for Determining Receptor Sensitivity

Sensitivity	Criteria
High	The receptor has little ability to absorb change without fundamentally altering its present character, or is of high importance. Receptors of greatest sensitivity to traffic flow are where they are adjacent to schools, colleges, playgrounds, accident clusters, retirement homes, roads without footways that are used by pedestrians.
Moderate	The receptor has moderate capacity to absorb change without significantly altering its present character, or is of high importance. Traffic flow sensitive receptors include: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, recreation facilities and busy transport interchanges.
Low	The receptor is tolerant of change without detriment to its character, is of low or local importance. Receptors with low sensitivity to traffic flow include: places of worship, public open space, tourist attractions and residential areas with adequate footway provision.

Magnitude of Change/Impact

7.66 The criteria used to assess how far an impact deviates from the baseline condition, which is the magnitude of change, are described here.

7.67 To assist with identifying the magnitude of change of the Proposed Development, with regard to traffic and transport, reference has been made to the previously noted DMRB/IEMA guidelines and where there is no set criteria, professional judgement has been applied in line with best practice and industry standards.

Severance

7.68 In terms of severance, this is defined as the perceived division that can occur within a community when it becomes separated by a major traffic artery. This may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself.

7.69 The measurement and prediction of severance includes an assessment of a range of factors, some of which are related to an individual's perception and therefore difficult to quantify. Relevant factors can include road width, traffic flow, speed, the presence of crossing facilities, and the number of movements across the affected route.

7.70 The IEMA guidelines suggest that changes in traffic flow of 30%, 60% and 90% are regarded as producing 'minor', 'moderate' and 'major' changes in severance respectively. These percentages have been used to assess the likely effects of the development in terms of severance.

7.71 In terms of pedestrian delay, IEMA guidelines note that changes in the volume, composition and/or speed of traffic may affect the ability of people to cross roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes to these delays. The guidelines do not set any thresholds, recommending instead that assessors use their judgement to determine the significance of the impact.

Pedestrian/Cycle Delay

7.72 Changes in the volume, composition or speed of traffic may affect the ability of people to cross roads, and therefore, increases in traffic levels are likely to lead to greater increases in delay. Delays will also depend upon the general level of pedestrian/cycle activity, visibility and general physical conditions of the crossing location.

7.73 Given the range of local factors and conditions which can influence pedestrian delay, the IEMA guidelines do not recommend that thresholds be used as a means to establish the significance of pedestrian delay, but recommend that reasoned judgements be made instead.

7.74 Based on professional judgement, a two-way traffic flow of 1,400 vehicles per hour has been adopted as a lower threshold for this assessment. Below this flow level, pedestrian/cycle delay is unlikely to be a significant factor.

Pedestrian/Cycle Amenity

7.75 IEMA guidelines define pedestrian amenity as the relative pleasantness of a journey and can include fear and intimidation if relevant to the assessment. As with pedestrian delay, amenity is affected by traffic volumes and composition along with pavement width and pedestrian activity. The guidelines suggest thresholds of significance would be where the traffic flow is halved or doubled, with the former leading to a beneficial effect and the latter an adverse effect.

Driver Delay

7.76 Delays to non-development traffic can occur at several points on the local highway network as a result of the additional traffic that would be generated by a development.

7.77 The IEMA guidelines state that delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system.

7.78 The theoretical capacity of a road or a particular junction can be determined by assessing the Ratio of Flow Capacity (RFC). When an RFC value of 0.85 or more is experienced, queuing and congestion are likely to occur during busy periods.

7.79 The anticipated increases in two-way peak hour traffic flows as a result of the Proposed Development are expressed as a percentage of two-way peak hour future baseline traffic flows at the assumed development opening year. A threshold value of 10% is generally used to determine whether or not development-generated traffic constitutes a material increase. Where congestion already exists, thresholds of 5% or lower may be considered to be appropriate.

7.80 It is generally accepted that traffic increases of 2% or less are not considered 'material' since, in practice, changes of this magnitude would be difficult to differentiate from typical daily/hourly fluctuations in background traffic. This percentage impact assessment

methodology is usually applied to determine the extent of the study area to be examined in the TA.

7.81 These impact thresholds have been adopted for the ES in order to quantify anticipated changes in traffic flows as a result of the Proposed Development and to provide a guide as to the likely effects in terms of driver delay.

Accidents and safety

7.82 Where a Proposed Development is expected to produce a change in the character of the traffic on the local road network, as a result of increased HGV movements for example, the IEMA guidelines state that the implications of local circumstances or factors which may elevate or lessen risks of accidents, such as junction conflicts, would require assessment in order to determine the potential significance of accident risk.

7.83 A judgement has been made based on an assessment of the baseline accident and safety record.

Public Transport

7.84 The IEMA guidelines do not identify a specific need to assess the impact of public transport changes. However, where improvements involve changes in service route and frequency it may be necessary to consider if these are material individually or collectively with other commercial vehicles.

7.85 The Proposed Development does not include for improvements to public transport services and therefore a judgement has been made based on the current availability of public transport facilities.

7.86 The criteria for determining magnitude of change/impact, that is how far an effect deviates from the baseline condition, is set out in Table 7-4.

Table 7-4 Criteria for Determining Magnitude of Change/Impact

Effect	Magnitude of change			
	Negligible	**Minor**	**Moderate**	**Major**
Severance	Change in total traffic flows of 30% or less (Or increase in HGV flows under 10% based on the sensitivity of the receptors).	Change in total traffic flows of 30% – 60% (Or increase in HGV flows over 10% based on the sensitivity of the receptors).	Change in total traffic flows of 60% - 90% (Or increase in HGV flows over 10% based on the sensitivity of the receptors).	Change in total traffic flows of 90% or more (Or increase in HGV flows over 10% based on the sensitivity of the receptors).
Pedestrian/Cycle Delay	Two-way traffic flow less than 1,400 vehicles per hour.	A judgement based on the characteristics of routes with a two-way traffic flow of more than 1,400 vehicles per hour.		
Pedestrian/Cycle Amenity	Change in traffic flow of less than 100%	A judgement based on the routes with greater than 100% change in context of their individual characteristics.		
Driver Delay	Change in traffic flow of 2% or less.	Change in traffic flow between 2% and 5%.	Change in traffic flow between 5% and 10%.	Change in traffic flow of 10% or more.
Accidents and Safety	A judgement based on the findings of the baseline accident analysis.			

Public Transport	A judgement based on the availability of public transport facilities

Significance evaluation

7.87 The significance of the effect is judged on the relationship of the magnitude of impact to the assessed sensitivity and/or importance of the receptor. The predicted significance of the effects is summarised in Table 7-5.

Table 7-5 Matrix for Determining the Significance of Effect

Receptor Sensitivity	Magnitude of Change			
	Major	**Moderate**	**Minor**	**Negligible**
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible

7.88 Potential effects are therefore concluded to be of negligible, minor, moderate or major significance and can be either beneficial or adverse. Moderate and major effects are considered to be significant in EIA terms.

7.89 In terms of timescales, potential effects can be described as short, medium, long-term or permanent as shown below.

- Short-term – less than 12 months;
- Medium-term – 1 to 5 years;
- Long-term – more than 5 years; and
- Permanent – effects that are considered to be 'irreversible' or extremely long-lasting.

Limitations and assumptions

7.90 This assessment has been undertaken using the material made available by the Applicant and members of their project team, together with other readily available and publicly accessible material including existing literature and studies, as well as discussions with MCC/TfGM.

7.91 Traffic data has been extracted from TfGM's strategic model (city centre Paramics traffic model). All efforts have been made to ensure that the information used as a basis for the assessment is accurate and up to date. The team is not aware of any limitations of the underlying information or of any constraints that would materially affect the evaluations.

7.92 Assumptions adopted in the evaluation of impacts reported in this chapter are often implicit and rely on expert judgement. Where technical deficiencies are known, or it has been necessary to make assumptions, these are documented.

7.93 A quantitative assessment has been undertaken in relation to the Mayfield SRF but the assessment of impact from other neighbouring SRF's has been undertaken qualitatively given that the exact siting, massing, quantum and detailed design is not yet defined. This approach has been agreed with TfGM and MCC through the pre-application discussions on scope and methodology of assessments required for Mayfield.

7.94 TFGM have advised that their traffic model adequately includes for cumulative schemes, which they consider representative of future traffic and acknowledge that when future SRF's come forward they will be robustly assessed at the appropriate time as part of their own EIA/TA.

Baseline Conditions

Current baseline (2018)

7.95 The existing baseline conditions are described in detail in the TA and are summarised in the following sections.

Walking and Cycling

7.96 There is an extensive provision of pedestrian footways within and around the Site as illustrated on Figure 7-1.

7.97 The Site can be accessed at multiple locations and the majority have pedestrian footways along both sides of the carriageway, which are of good quality and well-lit.

7.98 The northern boundary of Mayfield SRF 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. To the north-west, the city centre is approximately a 1.2km (15-minute) walk from the SRF, via the A6 London Road.

7.99 Figure 7-2 shows the walking accessibility for the Site in 5, 10 and 15 minute walk catchments. Cycle routes in the vicinity of the Site are shown on Figure 7-2.

7.100 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 junction, which is located north-west of Mayfield.

7.101 Figure 7-4 shows the cycling accessibility for the Site within a 10, 20, and 30-minute cycle ride.

Public transport

7.102 The Site is well-connected by bus, with 12 bus routes available within a 400m (5-minute) walk of the Site. Table 7-6 shows the local bus routes and service frequencies.

Table 7-6 Local Bus Routes and Service 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 -	2	2	-

Bus Service	Route	Peak Frequency (buses per hour per direction)		
		Weekday	Saturday	Sunday
	Manchester			
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

7.103 Located immediately adjacent to Manchester Piccadilly, which is Manchester's principal railway station, and served by numerous bus routes within easy walking distance, Mayfield has a high level of accessibility to public transport.

7.104 Table 7-7 summarises the main rail services from Manchester Piccadilly.

Table 7-7 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

Destination	Operator	Weekday AM	Weekday PM	Saturday	Sunday
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

7.105 The Metrolink tram/light rail service also operates Manchester Piccadilly and a summary of the services and frequencies are shown in Table 7-8.

Table 7-8 Manchester Piccadilly Tram/Light Rail Services and Frequencies

Service	Frequency (per hour per direction)
Ashton-under-Lyne – MediaCity UK	5
Ashton-under-Lyne – Eccles	5
Altrincham - Piccadilly	5
Bury – Piccadilly	5

7.106 There are also proposals for two new High Speed Two (HS2) tracks via Manchester Piccadilly station. HS2 is intended to link London and Birmingham to Manchester, the East Midlands and Leeds. As part of this proposal, Manchester Piccadilly station is planned to be redeveloped to incorporate all the public transport elements and form a gateway to the city. Permeability at the station will also be improved, which in its present form is limited to its western end. These proposals are identified in the 2018 Piccadilly Strategic Regeneration Framework Area.

7.107 It is understood that these improvements are planned to be in place for HS2, which is anticipated to be completed by 2032.

Highway network

7.108 The local highway network surrounding the development is shown on Figure 7-5, which also shows the vehicular access points to the Mayfield SRF.

7.109 Access from the north is from Fairfield Street, which is a single carriageway with one lane in each direction subject to a speed limit restriction of 30mph. From Fairfield Street, individual plots within Mayfield 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 in the vicinity of the Site are priority junctions.

7.110 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.

7.111 The A635 (M) Mancunian Way runs parallel to the southern edge of Mayfield. Mancunian Way is a dual carriageway with two lanes per direction. At the south-western corner of Mayfield, 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 in the form of 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.

7.112 There are direct access points into the Site from the A635 Mancunian Way eastbound carriageway via priority junctions with Manor Street and Hoyle Street.

7.113 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 Mayfield. The signalised junction with Fairfield Street is located approximately 300m north of Travis Street.

7.114 The 2018 baseline traffic flows are shown in **Error! Reference source not found.**.

Table 7-9 2018 Baseline Traffic Flows

Paramics Link Ref	Receptor	2018 Baseline Traffic Flows			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
1	A635 Mancunian Way (east of Hoyle St)	45,884	1,615	47,258	1,775
2	A635 Mancunian Way (west of Fairfield St)	45,884	1,615	47,258	1,775
3	Fairfield Street (between Temperance & A635)	7,796	40	7,812	44
4	Fairfield Street (east of Travis St)	7,517	38	7,533	41
5	Fairfield Street (west of Travis St)	12,825	171	12,851	188

Paramics Link Ref	Receptor	2018 Baseline Traffic Flows			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
7	Travis Street (north of Fairfield St)	7,642	54	7,658	60
8	A6 London Road (north of Travis St)	16,512	54	14,656	69
9	A6 London Road (south of Travis St)	19,716	63	17,501	80
10	Downing Street (south of A635)	30,229	928	30,292	1,019
11	A635 Mancunian Way (north of Fairfield Street)	31,418	884	31,483	971
12	Fairfield Street (east of A635)	24,242	680	24,292	747
13	Pill Mill Brow	18,143	133	18,181	147
14	A635 Ring Road (north of Pill Mill Brow)	46,238	928	46,334	1,019
15	A635 Ring Road (south of Pollard St)	33,798	609	33,868	669
18	A6 London Rd (north of Fairfield St)	14,076	98	14,105	108
19	Fairfield Street (west of A6)	15,981	204	16,014	224
20	Whitworth St (north of A6)	6,732	31	6746	34
21	Store Street (east of A6)	634	0	635	0
22	A6 London Rd (north of Store St)	8,109	102	8,126	112
23	Whitworth Street (east of Sackville St)	19,039	271	19,079	298
24	Aytoun Street (north of Fairfield St)	8,955	102	8973	112
25	Auburn Street (west of A6)	6,841	85	6,856	94
26	Ducie Street (east of A6)	4,105	8	4,114	9
27	Piccadilly (north of Ducie St)	8,193	117	8,210	128
28	Portland Street (west of Piccadilly)	2,076	17	2,080	18
29	Newton Street (east of Piccadilly)	5,544	79	5,555	87
30	Store Street (south of Ring Rd)	2,795	4	2,801	5
31	Ardwick Green (north of Hyde Rd)	26,121	934	26,175	1026
33	Hyde Road (east of Ardwick Green)	18,334	611	18,372	671
36	Pollard Street (north of Ring Rd)	5,517	108	5,529	119
37	A665 Ring Road (north of Pollard St)	41,214	544	41,299	598

Paramics Link Ref	Receptor	2018 Baseline Traffic Flows			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
38	A665 Ring Road (north of Old Mill St)	39,212	498	39,293	547
39	Old Mill Street (north of Store St)	10,683	334	10,706	367
108	A635 Mancunian Way e/b slip (east of A6)	0	0	0	0
109	A635 Mancunian Way e/b slip (west of A6)	11,642	432	11,666	474
110	A635 Mancunian Way w/b slip (east of A6)	5,391	150	5,403	165
111	A635 Mancunian Way w/b slip (west of A6)	4,762	329	4,771	362

Accidents and safety

7.115 In terms of accidents and safety, collision data has been obtained from TfGM for the key junctions and links within the study area for the latest five-year period to April 2019 and this has been fully assessed as part of the TA.

7.116 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 as part of the detailed design process for the Mayfield SRF development.

Future baseline (2023)

7.117 The future baseline accounts for changes that would occur irrespective of the Proposed Development coming forward. There are no notable changes anticipated in 2023 to that described in the existing baseline conditions.

7.118 The 2023 future baseline traffic flows (expected year of completion for Phase 1) are shown in Table 7-10.

Table 7-10 2023 Baseline Traffic Flows

Paramics Link Ref	Receptor	2023 Baseline Traffic Flows			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
1	A635 Mancunian Way (east of Hoyle St)	47,463	1,629	48,884	1,792
2	A635 Mancunian Way (west of Fairfield St)	47,463	1,629	48,884	1,792

Paramics Link Ref	Receptor	2023 Baseline Traffic Flows			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
3	Fairfield Street (between Temperance & A635)	7,630	30	7,646	33
4	Fairfield Street (east of Travis St)	7,446	30	7,461	33
5	Fairfield Street (west of Travis St)	13,066	180	13,093	198
7	Travis Street (north of Fairfield St)	8,353	48	8,371	53
8	A6 London Road (north of Travis St)	16,561	59	15,479	61
9	A6 London Road (south of Travis St)	18,553	63	17,341	65
10	Downing Street (south of A635)	30,787	942	30,850	1,035
11	A635 Mancunian Way (north of Fairfield Street)	31,902	868	31,968	954
12	Fairfield Street (east of A635)	25,002	700	25,054	769
13	Pill Mill Brow	18,999	163	19,039	180
14	A635 Ring Road (north of Pill Mill Brow)	47,358	904	47,456	994
15	A635 Ring Road (south of Pollard St)	34,451	549	34,523	604
18	A6 London Rd (north of Fairfield St)	13,355	110	13,383	121
19	Fairfield Street (west of A6)	17,047	222	17,082	244
20	Whitworth St (north of A6)	6,643	27	6,657	30
21	Store Street (east of A6)	421	0	422	0
22	A6 London Rd (north of Store St)	7,562	116	7,578	127
23	Whitworth Street (east of Sackville St)	19,831	318	19,872	350
24	Aytoun Street (north of Fairfield St)	8,651	129	8,669	142
25	Auburn Street (west of A6)	6,580	112	6,593	123
26	Ducie Street (east of A6)	3,745	7	3,752	7
27	Piccadilly (north of Ducie St)	8,352	134	8,369	147
28	Portland Street (west of Piccadilly)	1,944	17	1,948	19
29	Newton Street (east of Piccadilly)	5,437	86	5,449	94
30	Store Street (south of Ring Rd)	2,818	2	2,824	2
31	Ardwick Green (north of Hyde Rd)	29,137	963	29,197	1,058

Paramics Link Ref	Receptor	2023 Baseline Traffic Flows			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
33	Hyde Road (east of Ardwick Green)	19,359	619	19,399	680
36	Pollard Street (north of Ring Rd)	5,526	96	5,537	105
37	A665 Ring Road (north of Pollard St)	40,881	485	409,65	533
38	A665 Ring Road (north of Old Mill St)	38,646	454	38,726	498
39	Old Mill Street (north of Store St)	10,389	335	10,410	368
108	A635 Mancunian Way e/b slip (east of A6)	0	0	0	0
109	A635 Mancunian Way e/b slip (west of A6)	12,169	453	12,194	497
110	A635 Mancunian Way w/b slip (east of A6)	5,388	163	5,399	179
111	A635 Mancunian Way w/b slip (west of A6)	4,960	312	4,970	343

Identified receptors and their sensitivity

7.119 A full audit of the highway network surrounding the Phase 1 Site has been undertaken to identify local roads that should be considered sensitive in accordance with the IEMA guidelines, which includes evaluating:

- Potential effects on local roads and the users of these roads, including pedestrians and cyclists; and
- Potential effects on land uses and environmental resources fronting those roads, including the relevant occupiers and users.

7.120 In order to define the scale and extent of this assessment, the IEMA guidelines identify the following rules by which to undertake an assessment of potentially significant traffic-related environmental effects:

- Rule 1: Include roads where traffic flows are predicted to increase by more than 30%; and
- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

7.121 As a result of this audit, a number of local road links in the vicinity of the Site were identified as sensitive and these are set out in Table 7-11.

7.122 Potential effects of additional traffic on the highway network further afield have not been assessed as the effects would be negligible as development traffic dissipates across a variety of locations.

Table 7-11 Identified Receptors and their Sensitivity

Paramics Link Ref	Receptor	Sensitivity
1	A635 Mancunian Way (east of Hoyle St)	Low
2	A635 Mancunian Way (west of Fairfield St)	Low
3	Fairfield Street (between Temperance & A635)	Low
4	Fairfield Street (east of Travis St)	Low
5	Fairfield Street (west of Travis St)	Moderate
7	Travis Street (north of Fairfield St)	Low
8	A6 London Road (north of Travis St)	Moderate
9	A6 London Road (south of Travis St)	Moderate
10	Downing Street (south of A635)	Moderate
11	A635 Mancunian Way (north of Fairfield Street)	Moderate
12	Fairfield Street (east of A635)	Moderate
13	Pill Mill Brow	Moderate
14	A635 Ring Road (north of Pill Mill Brow)	Moderate
15	A635 Ring Road (south of Pollard St)	Moderate
18	A6 London Rd (north of Fairfield St)	Moderate
19	Fairfield Street (west of A6)	Moderate
20	Whitworth St (north of A6)	Low
21	Store Street (east of A6)	Low
22	A6 London Rd (north of Store St)	Moderate
23	Whitworth Street (east of Sackville St)	Low
24	Aytoun Street (north of Fairfield St)	Low
25	Auburn Street (west of A6)	Low
26	Ducie Street (east of A6)	Low
27	Piccadilly (north of Ducie St)	Moderate
28	Portland Street (west of Piccadilly)	Moderate
29	Newton Street (east of Piccadilly)	Low
30	Store Street (south of Ring Rd)	Low

Paramics Link Ref	Receptor	Sensitivity
31	Ardwick Green (north of Hyde Rd)	High
33	Hyde Road (east of Ardwick Green)	High
36	Pollard Street (north of Ring Rd)	High
37	A665 Ring Road (north of Pollard St)	Moderate
38	A665 Ring Road (north of Old Mill St)	Moderate
39	Old Mill Street (north of Store St)	Low
108	A635 Mancunian Way e/b slip (east of A6)	Low
109	A635 Mancunian Way e/b slip (west of A6)	Moderate
110	A635 Mancunian Way w/b slip (east of A6)	Moderate
111	A635 Mancunian Way w/b slip (west of A6)	Low

Identification and Evaluation of Likely Significant Effects

Demolition and Construction Effects (Application 1 and Application 1+2)

Relevant aspects of the scheme

7.123 The construction of the Proposed Development will lead to additional construction vehicle movements on the highway network. The Construction Methodology Chapter (ES Chapter 5) sets out the programme of works together with the anticipated phasing and management for the construction activities. This information will be detailed in a Construction Logistics Plan (CLP), which will be submitted prior to construction works commencing.

7.124 This initial assessment contained in this Traffic and Transport Chapter has been completed under the assumption that this CLP is implemented.

Potential effects of the development and their significance

Effects on the local highway network

7.125 Construction related traffic would comprise staff transport, deliveries and disposal of construction materials and excess excavated material. The Construction Methodology Chapter sets out the forecast number of construction vehicles during construction of Phase 1 (Application 1 + 2) and this is shown in Table 7-12**Error! Reference source not found.**.

Table 7-12 Provisional Forecast of Construction Vehicles for Phase 1 (Application 1 + 2)

Period		Typical Vehicle Arrivals Per Month	Per Hour
2020	Q1	0	0
	Q2	151	1
	Q3	264	1

	Q4	641	2
2021	Q1	1,091	4
	Q2	969	3
	Q3	690	2
	Q4	424	1
2022	Q1	298	1
	Q2	287	1
	Q3	298	1
	Q4	158	1

7.126 The construction data shows that 2021 is the peak construction year for the Phase 1 development (Applications 1 + 2).

7.127 TfGM have confirmed that the 2023 baseline traffic flows set out in this chapter (which have been extracted from TfGM's traffic model) represent a future baseline year scenario and can therefore be used to represent the 2021 baseline (peak construction year) for the purpose of assessing the construction impact.

7.128 In accordance with the IEMA guidelines, a 30% increase in traffic (10% on the roads identified as sensitive) would trigger the need to assess the environmental effects associated with traffic and transport.

7.129 The identified receptors shown to have an increase in construction traffic in 2021 are shown below in Table 7-13.

7.130 Table 7-13 excludes any identified receptors that are not expected to have an increase in traffic during the construction phase.

Table 7-13 Identified Receptors with an increase in traffic during the construction phase (Application 1 + 2)

Paramics Link Ref	**Receptor**	**2021 Baseline**		**Construction Vehicles for Application 1 + 2 (Total Vehs inc HGV)**		**% Increase**	
		AADT	**AAWT**	**AADT**	**AAWT**	**AADT**	**AAWT**
1	A635 Mancunian Way (east of Hoyle St)	47,463	48,884	5	7	0.01%	0.01%
2	A635 Mancunian Way (west of Fairfield St)	47,463	48,884	5	7	0.01%	0.01%
3	Fairfield Street (between Temperance & A635)	7,630	7,646	26	37	0.34%	0.48%
4	Fairfield Street (east of Travis St)	7,446	7,461	26	37	0.35%	0.50%

Paramics Link Ref	Receptor	2021 Baseline		Construction Vehicles for Application 1 + 2 (Total Vehs inc HGV)		% Increase	
		AADT	AAWT	AADT	AAWT	AADT	AAWT
9	A6 London Road (south of Travis St)	18,553	17,341	13	18	0.07%	0.10%
11	A635 Mancunian Way (north of Fairfield Street)	31,902	31,968	10	15	0.03%	0.05%
12	Fairfield Street (east of A635)	25,002	25,054	10	15	0.04%	0.06%
14	A635 Ring Road (north of Pill Mill Brow)	47,358	47,456	10	15	0.02%	0.03%
15	A635 Ring Road (south of Pollard St)	34,451	34,523	10	15	0.03%	0.04%
37	A665 Ring Road (north of Pollard St)	40,881	40,965	10	15	0.02%	0.04%
38	A665 Ring Road (north of Old Mill St)	38,646	38,726	10	15	0.03%	0.04%
108	A635 Mancunian Way e/b slip (east of A6)	0	0	13	18	100%	100%
109	A635 Mancunian Way e/b slip (west of A6)	12,169	12,194	13	18	0.11%	0.15%
111	A635 Mancunian Way w/b slip (west of A6)	4,960	4,970	13	18	0.26%	0.36%

7.131 The increase in construction traffic is shown to be significantly less than 1% on all receptor links in the future baseline situation, with the exception of the A635 Mancunian Way eastbound slip (east of the A6), which is shown to have an increase of 100%. This large increase is because there is no traffic flow on this road link in the 2018 baseline situation within the Paramics traffic model. This is because there is currently no (permitted) vehicular access to this road link from the A6 London Road, which will be enabled in the future baseline situation through implementation of highway improvements at this junction (discussed later in this section).

7.132 Whilst this would technically result in a temporary impact of moderate significance, in real terms, the increase in traffic on this receptor is not considered to be significant and is well within the road's capacity, particularly noting that they are temporary impacts.

7.133 The construction effect of Phase 1 (Applications 1+2) is assessed as being of negligible significance on all identified receptors in relation to severance, driver delay, accidents and safety. This effect would be the same for Application 1 in isolation given that construction vehicle movements would be less for Application 1.

Effects on pedestrians and cyclists

7.134 The increased construction vehicle movements on local pedestrian and cyclist routes would have the potential to affect the amenity of pedestrians and cyclists. The Heavy Goods Vehicles

(HGV) could also increase noise levels, create additional dust and/or increase the volume of large vehicles in proximity to pedestrian and cycle routes and this is assessed further in the ES in Noise and Vibration (Chapter 6) and Air Quality (Chapter 8).

7.135 The increase in construction traffic would result in temporary, local adverse effects of negligible significance to pedestrian and cyclist amenity (which for the purposes of this assessment includes fear and intimidation) on identified sensitive receptors.

7.136 Any construction impact would be mitigated by managing construction traffic through the implementation of the CLP, which will control the routing and timing of HGV movements and ensure that sensitive routes and receptors are avoided. It is therefore considered that the impact of HGV traffic during the construction period will not be significant.

Climate change and adaptation

7.137 There are no climate change effects to be assessed in relation to traffic and transport.

Summary of effects during construction

7.138 Table 7-14 summarises the effects during demolition and construction.

Table 7-14 Summary of Effects during Demolition and Construction

Receptor and Sensitivity	Description of Effect	Magnitude of Change/Impact	Effect Significance
All local roads and road users	Construction impact on road users	Negligible	Negligible

Operational effects (Application 1 and Application 1+2)

Relevant aspects of the scheme and designed-in mitigation

7.139 Given the city centre location and accessibility to public transport services, the majority of trips to and from the Site are expected to be by sustainable modes of travel.

7.140 The pedestrian and cycling proposals at the Site provide free movement within the development and connections to the external infrastructure. The Proposed Development also provides on-site cycle parking facilities and improved pedestrian linkages in and around the Proposed Development.

7.141 In addition to the benefits realised through the design, a Framework Travel Plan (Appendix 7.2) will be implemented to further encourage the use of sustainable transport. It will help to manage the travel needs of employees and visitors and to increase the range of travel options by which the Proposed Development could be accessed.

7.142 Implementation of the Framework Travel Plan will have a beneficial influence on public transport given that it will seek to encourage a modal shift from public transport to healthy modes of travel such as walking and cycling.

7.143 The submission of a Framework Travel Plan will also ensure that potential employees and visitors to the Site are aware of their transport options. This, together with the pedestrian and cycle improvements at the Site is likely to create a beneficial effect.

Potential effects of the development and their significance

Effect on local highway network

7.144 The effect on the local highway network in 2023 (when Phase 1 is complete) is set out in Table 7-15, which shows the percentage change in traffic from the 2023 baseline traffic flows in terms of Annual Average Daily and Weekday Traffic flows (AADT & AAWT).

7.145 Receptors identified as moderate or high sensitivity are highlighted in the Table. All other receptors are identified as low sensitivity.

Table 7-15 Change in Traffic Flows (2023 AADT)

Paramics Link Ref	Receptor	Percentage Change in Traffic in 2023			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
1	A635 Mancunian Way (east of Hoyle St)	0.59%	0.23%	0.59%	0.21%
2	A635 Mancunian Way (west of Fairfield St)	0.59%	0.23%	0.59%	0.21%
3	Fairfield Street (between Temperance & A635)	-4.96%	-0.22%	-4.96%	-0.58%
4	Fairfield Street (east of Travis St)	-8.36%	-0.22%	-8.37%	-0.58%
5*	Fairfield Street (west of Travis St)	-9.88%	-67.25%	-9.88%	-67.41%
7	Travis Street (north of Fairfield St)	-13.50%	-12.41%	-13.50%	-12.31%
8*	A6 London Road (north of Travis St)	10.40%	-1.96%	10.40%	-1.79%
9*	A6 London Road (south of Travis St)	18.74%	13.91%	18.74%	13.49%
10*	Downing Street (south of A635)	-3.29%	0.99%	-3.29%	0.94%
11*	A635 Mancunian Way (north of Fairfield Street)	-3.22%	-1.05%	-3.22%	-1.02%
12*	Fairfield Street (east of A635)	3.00%	1.74%	3.00%	1.71%
13*	Pill Mill Brow	-4.62%	-32.68%	-4.62%	-32.54%
14*	A635 Ring Road (north of Pill Mill Brow)	-2.89%	-1.82%	-2.89%	-1.77%
15*	A635 Ring Road (south of Pollard St)	-5.04%	-4.42%	-5.04%	-4.46%
18*	A6 London Rd (north of Fairfield St)	8.75%	17.82%	8.75%	18.10%
19*	Fairfield Street (west of A6)	-10.89%	-51.77%	-10.88%	-51.84%
20	Whitworth St (north of A6)	-3.70%	39.31%	-3.70%	37.57%
21	Store Street (east of A6)	35.45%	0.00%	35.53%	0.00%
22*	A6 London Rd (north of Store St)	21.64%	30.29%	21.64%	30.28%
23	Whitworth Street (east of Sackville St)	-8.71%	-33.04%	-8.71%	-32.93%

Paramics Link Ref	Receptor	Percentage Change in Traffic in 2023			
		AADT		AAWT	
		Total Vehicles	HGVs	Total Vehicles	HGVs
24	Aytoun Street (north of Fairfield St)	3.97%	9.21%	3.96%	9.28%
25	Auburn Street (west of A6)	4.49%	-0.22%	4.49%	-0.63%
26	Ducie Street (east of A6)	7.14%	-70.51%	7.14%	-69.26%
27*	Piccadilly (north of Ducie St)	10.20%	14.37%	10.20%	14.16%
28*	Portland Street (west of Piccadilly)	7.50%	78.00%	7.50%	75.26%
29	Newton Street (east of Piccadilly)	11.23%	38.94%	11.23%	39.35%
30	Store Street (south of Ring Rd)	11.29%	91.87%	11.28%	108.43%
31**	Ardwick Green (north of Hyde Rd)	-6.38%	1.55%	-6.38%	1.55%
33**	Hyde Road (east of Ardwick Green)	-4.08%	0.70%	-4.08%	0.76%
36**	Pollard Street (north of Ring Rd)	-9.95%	-10.32%	-9.96%	-10.69%
37*	A665 Ring Road (north of Pollard St)	-4.70%	-3.10%	-4.69%	-3.05%
38*	A665 Ring Road (north of Old Mill St)	-5.58%	-1.67%	-5.58%	-1.73%
39	Old Mill Street (north of Store St)	0.33%	-13.44%	0.33%	-13.43%
108	A635 Mancunian Way e/b slip (east of A6)	100.00%	100.00%	100.00%	100.00%
109*	A635 Mancunian Way e/b slip (west of A6)	-14.06%	17.29%	-14.06%	17.35%
110*	A635 Mancunian Way w/b slip (east of A6)	12.18%	3.80%	12.19%	3.84%
111	A635 Mancunian Way w/b slip (west of A6)	60.26%	-3.12%	60.25%	-3.06%

* Moderate Sensitivity

** High Sensitivity

7.146 Table 7-15 shows that the AADT/AAWT total vehicle trips on Ardwick Street, Hyde Road and Pollard Street (the three high sensitivity receptors Links 31, 33 and 36), are expected to reduce by around 6%, 4% and 10% respectively. HGVs on Ardwick Street and Hyde Road are shown to increase by less than 2%, which is not a material increase. HGVs on Pollard Street are shown to decrease by around 10%.

7.147 The change in AADT/AAWT total vehicle trips is shown to be less than 30% on all the moderate sensitivity receptors. The change in HGVs is shown to be less than 10% on all these moderate receptors, with the exception of the following (AADT/AAWT):

- (Link 9) A6 London Road (south of Travis St) 13.91%/13.49% = 9 HGVs;
- (Link 18) A6 London Rd (north of Fairfield St) 17.82%/18.10%= 20 HGVs;
- (Link 22) A6 London Rd (north of Store St) 30.29%/30.28%= 35 HGVs;
- (Link 27) Piccadilly (north of Ducie St) 14.37%/14.16%= 19 HGVs;

- (Link 28) Portland Street (west of Piccadilly) 78.00%/75.26%= 13 HGVs; and
- (Link 109) A635 Mancunian Way e/b slip (east of A6) 17.29%/17.35%= 78 HGVs;

7.148 In real terms, the increase in daily HGV movements on these road links are shown to be small and well within the road's theoretical capacity. Therefore, the impact is not considered to be significant.

7.149 All the remaining (low sensitivity) receptors show a change in AADT/AAWT total vehicle trips of less than 30% and HGVs of less than 10%, with the exception of the following four receptors (AADT/AAWT):

(Link 21) Store St (east of A6)

- 35.45%/35.43% = 149 Total Vehs
- 0%/0% = 0 HGVs;

(Link 29) Newton Street (east of Piccadilly)

- 11.23%/11.23% = 611 Total Vehs
- 0%/0% = 0 HGVs;

(Link 30) Store Street (south of Ring Rd)

- 11.29%/11.28% = 318 Total Vehs
- 91.87%/108.43% = 2 HGVs;

(Link 108) A635 Mancunian Way e/b slip (east of A6)

- 100%/100% = 1,922 Total Vehs
- 100%/100% = 40 HGVs;

7.150 It is noted that the 100% increase in traffic shown on the A635 Mancunian Way eastbound slip road is due to this link having zero flow in the baseline situation. In real terms, the increase in daily vehicle movements on these links are negligible as total traffic flows are well within the road's theoretical capacity.

7.151 Therefore, the overall effect in terms of severance is considered to be of negligible significance.

7.152 In terms of driver delay, the effects are summarized below:

Receptors of High Sensitivity

- Beneficial effect of major significance = Ardwick Street and Pollard Street (Links 31 and 33)
- Beneficial effect of moderate significance = Hyde Road (Link 36)

Receptors of Moderate Sensitivity

- Adverse effect of major significance (Links 9, 22, 27 and 110)
- Beneficial effect of major significance (Links 19 and 109)
- Adverse effect of moderate significance (Links 8, 18 and 28)
- Beneficial effect of moderate significance (Links 5, 15 and 38)
- Adverse effect of minor significance (Link 12)
- Beneficial effect of minor significance (Links 10, 11, 13, 14 and 37)

Receptors of Low Sensitivity

- Adverse effect of moderate significance (Links 21, 29, 30, 108 and 111)
- Beneficial effect of moderate significance (Link 7)

- Adverse effect of minor significance (Link 26)
- Beneficial effect of minor significance (Links 4 and 23)
- Negligible effects (Links 1, 2, 3, 20, 24, 25 and 39)

7.153 The receptors shown to have an adverse effect of moderate or major significance are located on the A6 London Road and A635/A665 Ring Road both of which are heavily trafficked routes with the A6 forming a main access route to/from the city centre and the Ring Road distributing traffic around the city of Manchester. Whilst congestion does occur on these routes, traffic will generally divert to alternative routes, which would result in a less significant impact in terms of driver delay. Given the potential for drivers to re-route, the magnitude of this impact is considered to be minor.

7.154 Given that the predicted increase in driver delay is mainly along these major routes, and taking into account the beneficial impact of major to moderate significance upon driver delay elsewhere across the network, the overall impact of driver delay on the local highway network is considered to be an adverse effect of minor significance.

Effect on pedestrians and cyclists

7.155 The total impact on the pedestrian network is the sum of those that walk as their main mode of transport to/from the Site plus those using public transport or parking off-site, as walking will make up the final mode of their journey to and from of the Site.

7.156 The increase in walking trips generated by Phase 1 is shown in Table 7-16. The increase in walking trips generated by the Mayfield SRF is shown in Table 7-17.

Table 7-16 Increase in Walking Trips for Phase 1 (Application 1+2)

Mode	AM Peak Hour			PM Peak Hour			Daily		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Walk (Main Mode)	142	10	152	10	141	151	735	730	1466
Walk (Public Transport)	580	40	620	40	577	617	3,005	2,985	5,990
Walk (Car)	0	0	0	0	0	0	0	0	0
Total	722	50	771	50	719	768	3,740	3,715	7,456

Table 7-17 Increase in Walking Trips for Mayfield SRF

Mode	AM Peak Hour			PM Peak Hour			Daily		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Bus	1,758	1,545	3,303	2,140	2,468	4,608	22,922	22,932	45,854
Tram/Light Rail	2,597	691	3,288	874	2,829	3,702	18,052	18,000	36,052
Rail	555	78	633	73	561	635	2873	2855	5,728

Walk	4,910	2,313	7,223	3,087	5,858	8,945	43,848	43,787	87,635

7.157 In terms of cyclists, the net increase in cycling trips generated by Phase 1 is shown below in Table 7-18. The increase in cycling trips generated by the Mayfield SRF is shown in Table 7-19.

Table 7-18 Increase in Cycling Trips for Phase 1 (Application 1+2)

Mode	**AM Peak Hour**			**PM Peak Hour**			**Daily**		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Cycle	37	3	40	3	37	39	192	191	382

Table 7-19 Increase in Cycling Trips for Mayfield SRF

Mode	**AM Peak Hour**			**PM Peak Hour**			**Daily**		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Cycle	160	40	200	48	171	219	1,062	1,059	2,120

7.158 The following sensitive receptors are shown to have a two-way traffic flow greater than 1,400 vehicles per hour in the 2023 future baseline scenario:

- (Link 1) Mancunian Way east of Hoyle St (Low)
- (Link 2) Mancunian Way west of Hoyle St (Low)
- (Link 11) Mancunian Way north of Fairfield St (Low)
- (Link 12) Fairfield Street east of Mancunian Way (Moderate)
- (Link 14) A665 Ring Road north of Pill Mill Brow (Moderate)
- (Link 15) A665 Ring Road south of Pollard St (Moderate)
- (Link 31) Ardwick Green North of Hyde Rd (High)
- (Link 37) A665 Ring Road north of Pollard St (Moderate)
- (Link 38) A665 Ring Road north of Old Mill St (Moderate)

7.159 All other receptors have traffic flows below the threshold adopted for assessment, which means that pedestrian/cycle delay is unlikely to be a significant factor on these road links.

7.160 Given that the increase in pedestrian/cycle movements as a result of the Proposed Development are small, and that this would dissipate further across the surrounding highway network, particularly on the receptors located further afield (of moderate/high sensitivity), the magnitude of change is considered to be negligible and thus, the significance of the effect will be negligible.

7.161 In terms of pedestrian/cycle amenity, there is only one link that is shown to have an increase in traffic flow by 100%. This is the A635 Mancunian Way eastbound slip road. This increase is due to there being zero flow in the baseline situation.

7.162 Given that the increase in pedestrian/cycle movements as a result of the Proposed Development are small, and the resultant pedestrian/cycle demand using the A635 Mancunian Way eastbound slip road is likely to be small, the magnitude of the change will be minor and thus, the significance of the effect will be negligible.

7.163 As part of Phase 1 (Application 1+2) and the full build-out of Mayfield SRF, there will be improvements to the public realm within and surrounding the Site. This is anticipated to have a beneficial effect of minor significance for pedestrian/cycle amenity.

Effect on accidents and safety

7.164 The Proposed Development is not predicted to generate significant volumes of HGV traffic therefore it is unlikely to produce a change in the character of the traffic on the local road network. The increase in total traffic flows as a result of the Proposed Development may however result in adverse effects on accidents and safety.

7.165 The review of accident data undertaken as part of the TA identified that 103 accidents were recorded on the highway network in the vicinity of the site, which were identified as being caused primarily as a result of driver error. Pedestrians, cyclists and motorcyclists were involved in 1%, 14%, and 7% of these accidents respectively.

7.166 It is considered that the additional traffic generated by the development would not have a significant adverse impact on accidents and safety. It is noted also 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 therefore be undertaken as part of the Road Safety Audit process for the new and amended highway infrastructure.

7.167 Given the magnitude and factors detailed above, the overall effect on accidents and safety on the surrounding road network is considered to be negligible.

Effect on public transport

7.168 The summary of baseline public transport facilities demonstrates that the site has an excellent level of accessibility to public transport given the Proposed Development's central location in Manchester and close proximity to Manchester Piccadilly station.

7.169 The Proposed Development does not include for changes to public transport services and therefore, there are no material changes to consider as part of this assessment.

7.170 The public transport trips generated by the Proposed Development are discussed in detail in the TA (Appendix 7.1).

Climate change and adaption

7.171 There are no climate change effects relevant to traffic and transport to be assessed.

Summary of effects during operation

7.172 Table 7-20 summarises the effects once the Proposed Development becomes operational.

Table 7-20 Summary of Operational Effects for Phase 1 (Application 1+2)

Receptor and sensitivity	Description of effect	Effect significance
All Local Roads and road users	Increase in traffic - Severance/Pedestrian and Cycle Delay/Pedestrian and Cycle Amenity/Accidents and Safety	Negligible

Receptor and sensitivity	Description of effect	Effect significance
	Increase in traffic - Driver Delay	Adverse effect of minor significance
	Improvements to public realm and cycle/pedestrian amenity	Beneficial effect of minor significance

Mitigation Measures

Supplementary mitigation measures during demolition and construction

7.173 The assessment has demonstrated that there will be an impact of negligible significance on traffic and transportation as a result of the Proposed Development during construction, assuming that the CLP is implemented.

7.174 The CLP will help manage all types of freight vehicles to and from the Site during construction; with the aim of improving the safety and reliability of deliveries to the Site and minimising the environmental impact.

7.175 No further measures are required beyond delivery of the CLP from a transport perspective. The full CLP is expected to be secured by condition. A Construction Environmental Management Plan (CEMP) is additionally expected to be secured by condition and will encompass a wide range of environmental considerations.

7.176 A summary of the supplementary mitigation measures during construction are set out in Table 7-21.

Table 7-21 Summary of Supplementary Mitigation Measures during Construction

Receptor	Adverse Effect	Mitigation Measure	Means of Implementation	Timing	Essential/Desirable
All local roads and road users	None	Construction Logistics Plan (CLP)	Contractor/ Applicant during construction	Throughout the construction period	Essential

Supplementary mitigation measures during operation

7.177 No significant adverse effects resulting from the Proposed Development have been identified in relation to severance, pedestrian and cycle delay, pedestrian and cycle amenity, accidents and safety. This determination is based on the net change in trips over and above the future baseline traffic flows.

7.178 A minor adverse effect has been identified in relation to driver delay but as traffic would generally divert to alternative routes, this is likely to result in a less significant impact. Implementation of the Framework Travel Plan and improvements to sustainable travel options will also mitigate some of this impact by reducing the volume of traffic generated by the scheme.

7.179 While no quantitative analysis can be undertaken to determine the overall effect of a Travel Plan it is widely acknowledged that a successful Travel Plan for a site such as this (with limited

car parking) will have a beneficial effect on influencing sustainable travel modes, particularly as it will seek to encourage a modal shift from public transport to healthy modes of travel such a walking and cycling.

7.180 The increase in walking and cycle trips will be mitigated through proposed 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 Site from the north will also be enhanced with a new pedestrian crossing on Fairfield Street directly adjacent to Piccadilly station, which is in parallel to the general improvements proposed to the pedestrian environment along Fairfield Street. Three strategic cycle routes will also be created as part of the SRF masterplan; along Baring Street, Hoyle Street and parallel to Mancunian Way.

7.181 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.

7.182 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.

7.183 These proposed improvements will have a beneficial effect on walking and cycling.

Table 7-22 Summary of Operational Supplementary Mitigation Measures

Adverse Effect	Mitigation Measure	Responsibility / Mechanism for implementation	Timing
Additional Demand on Pedestrian / Cycle Network and effect on Driver Delay	Proposed improvements at the A6 London Road/Mancunian Way signal junction	Subject to discussion between the Applicant and MCC/TfGM	Prior to occupation (subject to agreement and further discussion with MCC/TfGM)
Additional Demand on Pedestrian / Cycle Network	Improvements to walking/cycling network and public realm	The Applicant	From Phase 1 development

Cumulative Effects

Demolition and Construction

7.184 The construction of the scheme in combination with other developments in the area could create short term disruption to road users with temporary closures/diversions and increased driver stress as a result of delays caused by traffic management and diversions. With mitigation in place, the significance of the cumulative temporary effects in relation to severance, pedestrian/cycle delay and amenity, driver delay and accidents and safety on local roads is considered to be negligible.

Operational

7.185 Traffic flows from cumulative developments are included within the future baseline traffic data upon which the operational assessment for Phase 1 (Application 1+2) has been based. Therefore cumulative effects are considered inherently as part the operational assessment.

7.186 In terms of Mayfield SRF, the full build out of this has been assessed cumulatively in 2030 as part of the TA, which concludes that it would not have a significant impact on the local transport network.

7.187 TFGM have acknowledged that when future surrounding SRF's come forward as planning applications, they will be robustly assessed at the appropriate time as part of their own detailed EIA/TA.

Residual Effects

7.188 Residual impacts are defined as those impacts that remain following the implementation of mitigation measures.

Demolition and Construction

7.189 With the mitigation measures in place and in consideration of the predicted maximum volumes of construction traffic, in comparison to the substantial baseline traffic levels on the local transport network, the residual impact of construction traffic on the local highway network is considered to be negligible.

Operational

7.189.1 It is considered that the Proposed Development, with the implementation of the public realm improvements, will have a beneficial effect of minor significance in relation to severance, pedestrian and cycle delay, pedestrian and cycle amenity, accidents and safety and public transport.

7.189.2 In terms of the impact of the Proposed Development on driver delay, the Framework Travel Plan and improvements to sustainable travel options will mitigate some of this impact by reducing the volume of traffic generated by the scheme. It is therefore considered that the residual impact on driver delay is considered to be negligible.

7.190 A summary of the residual effects during construction are set out in Table 7-23.

Table 7-23 Summary Residual Effects during Demolition and Construction

Receptor	Effect	Significance before supplementary mitigation	Supplementary mitigation	Residual effect significance
All local roads and road users	Construction Impact on all road users	Negligible	No further mitigation required. CLP should be implemented and secured through appropriate planning condition	Negligible

7.191 A summary of the residual effects of the change in trips associated with Phase 1 compared to the 2023 future baseline traffic flows is set out below in Table 7-24.

Table 7-24 Summary of Residual Effects during Operation in 2023 (Appication1+2)

Receptor	Effect	Significance before supplementary mitigation	Supplementary mitigation	Residual effect significance
All local roads	Traffic Impact on all Road Users - severance, pedestrian and cycle delay, pedestrian and cycle amenity, driver delay and accidents and safety	Negligible	No further mitigation required	Negligible
All local roads	Improvements to public realm and cycle / pedestrian amenity (which for the purposes of this assessment includes fear and intimidation)	Negligible	No further mitigation required	Minor beneficial

Future monitoring of significant residual environmental effects

7.192 There are no significant residual environmental effects identified in this chapter.

8 Air Quality

Introduction

8.1 This chapter of the ES assesses the likely environmental effects of the Proposed Development with regards to air quality. The chapter describes the methods used to assess the baseline conditions currently existing at the Site and surrounding area; the likely effects of the Proposed Development; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been adopted.

8.2 The Chapter author is a Chartered Scientist (CSci), member of the Institute of Environmental Science and Institute of Air Quality Management and holds an Environmental Science MSc with over seven years' experience in air quality consultancy, including writing numerous ES chapters for projects throughout the UK.

8.3 The chapter takes into account relevant legislation, policy and key technical guidance, in line with industry best practice. A comprehensive review of air quality data from Greater Manchester Combined Authority (GMCA) has also been undertaken and, where relevant, considered as part of the baseline sections of the report.

8.4 This chapter is supported by the following appendices:

- Appendix 8-1: Supplied Traffic Data
- Appendix 8-2: Construction Assessment Methodology
- Appendix 8-3: Construction Mitigation
- Appendix 8-4: Receptor Locations
- Appendix 8-5: Modelling Results

8.5 The chapter assesses the likely impacts and subsequent effects of the Proposed Development on local air quality through the identification and assessment of direct and indirect emission sources. Likely changes to air quality in the area because of the Proposed Development are considered in relation to national air quality objectives and EU limit values. Where required, the assessment considers mitigation measures to reduce the effect of the proposals on local air quality.

8.6 Cumulative effects associated with air quality have additionally been considered within the ES and can be found in Chapter 16 Cumulative Effects.

Legislation and Policy Context

8.7 The 2008 Ambient Air Quality Directive (2008/50/EC) sets legally binding limits for pollutant concentrations. This directive was made law in England through the Air Quality (Standards) Regulations 2010.

8.8 Part IV of the Environment Act 1995 places a duty on the Secretary of State for the Environment to develop, implement and maintain an Air Quality Strategy (AQS) with the aim of reducing atmospheric emissions and improving air quality. The latest AQS for England, Scotland, Wales and Northern Ireland was published in 2007, and provides the framework for ensuring the air quality limit values are complied with based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of Local Air Quality Management (LAQM). This requires local authorities to

regularly and systematically review and assess air quality within their boundaries against a series of objectives, and appraise development and transport plans against these assessments.

8.9 In areas where air quality objectives are not likely to be met by the relevant target date, local authorities are required to declare an Air Quality Management Area (AQMA) and develop an air quality action plan in pursuit of the air quality objectives. The national air quality objectives relevant to this assessment are detailed in Table 8-1.

Table 8-1 NO_2 and PM_{10} National Air Quality Objectives included in the Air Quality (England) Regulations 2000

Pollutant	Objective	Date to be achieved and maintained thereafter
Nitrogen dioxide (NO_2)	200µg/m^3 measured as a 1-hour mean, not to be exceeded more than 18 times a year	31st December 2005
	40µg/m^3 measured as an annual mean	
Particulate Matter (PM_{10})	50µg/m^3 measured as a 24-hour mean, not to be exceeded more than 35 times a year	31st December 2004
Particulate Matter ($PM_{2.5}$)	25µg/m^3 measured as an annual mean	2020

National Planning Policy

8.10 The National Planning Policy Framework (NPPF) (February 2019) sets the planning policy for England, and underlines the importance of local authorities contributing towards improving and protecting the environment. The NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development.

8.11 With particular regard to air quality management, Section 9 of the NPPF notes that the environmental impact of transport and traffic should be identified and assessed, whilst mitigating adverse effects to bring about net environmental gains. The guidance states that the planning system should actively manage patterns of growth, offering a choice of transport modes to reduce air pollution:

'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. This can help to reduce congestion and emissions, and improve air quality and public health.'

8.12 Further to this, Section 15 of the NPPF notes that planning policies should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of AQMAs and Clean Air Zones (CAZ), and the cumulative impacts from individual sites in local areas.

8.13 Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Additionally, the NPPF states that planning decisions should ensure that any new development in AQMAs and CAZs is consistent with the local air quality action plan.

8.14 National Planning Practice Guidance (NPPG) will, where necessary, be updated in due course to reflect the changes to the NPPF. NPPG Air Quality Guidance provides guiding principles on how planning can take account of the impact of new development on air quality. Guidance states when air quality is considered relevant to a planning application, which includes when the proposals:

- 'significantly affect traffic in the immediate vicinity of the Proposed Development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads';
- 'introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area';
- 'give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations'; or
- 'expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality'.

8.15 Additionally, the guidance suggests a number of factors that local planning authorities may want to consider when there are concerns about air quality. These include:

- The 'baseline' local air quality;
- Whether the Proposed Development could significantly change air quality during the construction and operational phases; and/or
- Whether there is likely to be a significant increase in the number of people exposed to a problem with air quality, such as when new residential properties are proposed in an area known to experience poor air quality.

Local Policy and Guidance

Manchester Core Strategy Development Plan (2012-2027) (MCC, 2012)

8.16 The Manchester Core Strategy Development Plan (MCC, 2012) is the primary strategic planning document in the city's Local Development Framework. It outlines the council's vision for Manchester for a period of 15 years (from 2012 to 2027) and sets out planning policies that aim to help the city achieve the Local Development Framework's vision.

8.17 With particular regard to air quality, Policy EN 16 (Air Quality) states that:

- Any new generating plant capable of producing heat and cooling as well as electricity should be located in a way that facilitates future connection to a local distributed energy system;
- That any energy centre, including generating plant, standby/boiler plant and substations, shall be located and designed to a high quality so as to integrate with and contribute to the townscape;
- Biofuels should be obtained from sustainable sources and processes and in a way that minimise transport impacts, following a sequential approach in order to minimise CO_2 emissions – firstly prioritising local and regional sources, followed by national, European and international;
- Consideration should be given to biofuel delivery by rail and waterways where possible. Where large-scale fuel or feedstock delivery is required by road the energy centre must be located in or adjacent to light industrial, industrial or leisure uses with any impact on local residential amenity minimised; and
- The cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN 16 (Air Quality).

8.18 Policy EN 5 (strategic areas for low and zero carbon decentralised energy infrastructure) highlights strategic areas which will have a major role to play in achieving an increase in the

level of decentralised, low and zero carbon energy supplies available. These areas include the following:

- The Regional Centre, which also includes the Oxford Road Corridor and Eastlands;
- District Centres and associated major development sites;
- Airport Strategic Site;
- Strategic housing location; and
- Strategic employment locations.

8.19 Within these areas new development, regeneration and retrofit projects, will be expected to take place in the context of more detailed proposals for decentralised low and zero carbon energy infrastructure in the form of energy proposals plans.

8.20 The Council will work with all relevant stakeholders, which may include developers, landowners, residents, community groups, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward such plans.

8.21 Where investment or development is being undertaken into or adjacent to a public building/asset or district heating network, full consideration shall be given to the potential role that these can have in providing an anchor load within a decentralised energy network or in creating opportunities for CO_2 reduction funded by contributions.

The Greater Manchester Strategy (GMCA, 2017 – 2018 update)

8.22 The GMCA have produced the Greater Manchester Strategy, which sets out the city's ambition to become one of the top places in the world to live and work. The strategy addresses key priorities aimed at improving education and skills, health, wellbeing, the environment, work opportunities, and economic growth across the towns, cities, communities, and neighbourhoods that make up Greater Manchester. The strategy has been prepared by all 10 councils, the Mayor, the NHS, transport, police and fire services, and has had input from a number of key stakeholders (including the public, businesses and voluntary/community/social enterprise organisations).

8.23 With regards to improving the environmental conditions of Greater Manchester, particularly air quality, the following statement is made in the strategy (Priority 7 – A green city region and a high quality culture and leisure offer for all):

8.24 "Air pollution and greenhouse gas emissions cause significant harm to the environment, to the health of communities, and damage Greater Manchester's economy. Road transport contributes 32% of carbon dioxide emissions with emissions from commercial and domestic buildings accounting for 32% and 37% respectively."

8.25 The strategy highlights the need to rethink how energy is supplied, managed, and consumed in Greater Manchester. It identifies the need for "urgent innovation in our buildings, transport, and energy infrastructure." Greater Manchester will work with local and national stakeholders to develop a means of responding to these challenges through the preparation of their Climate Change and Low Emissions Implementation Plan and by defining "a robust low carbon pathway to 2050 to accelerate the point at which Greater Manchester can become carbon neutral."

8.26 Through a combination of sustained proactive national policy, aligning of priorities, and resources from Greater Manchester, the city will develop new local renewable energy sources and improve the energy efficiency of new and existing building stock; in turn helping reduce emissions and energy bills for residents and businesses. Additionally, the strategy notes the importance of adapting to a rapidly changing energy system. With the challenges of

decarbonisation, ageing infrastructure, and the expectation that energy availability should adapt to demand shows that there needs to be a change in the way we supply, manage, and consume energy. As such, the Greater Manchester Strategy highlights a need to deploy smart energy systems such as storage systems to reduce energy consumption and shift/reduce peak demand. In turn, helping consumers be aware of and minimise their energy usage and bills.

Climate Change and Low Emission Strategies Whole Place Implementation Plan (2016-2020) (GMCA, 2016)

8.27 Greater Manchester's Implementation Plan is the city's whole place low carbon plan for the period between 2016 and 2020. Building upon the city's 2012 Climate Change Strategy, the Implementation Plan sets out the city's priority actions and delivery plan to address both climate change and improve air quality in Greater Manchester.

8.28 Some of the key objectives of the plan are to achieve a 48% carbon reduction target by 2020, to promote carbon literacy, and to transition Greater Manchester into a low carbon and low emissions economy with clean air and sustainable lifestyles; all as a means of preparing the city to adapt to the unavoidable threat of climate change.

8.29 Ten key actions have been identified within the Implementation Plan to achieve the 2020 targets and lay strong foundations for a long-term future low carbon economy and society:

- **"Major infrastructure changes: Identifying spatial, technological and market opportunities and funding to deploy the type and scale of energy efficient/low carbon development, generation, distribution, storage and smart technologies required to deliver carbon and emission targets;**
- **Reducing fossil fuels in transport: Decreasing reliance on fossil fuels across all transport activities and influencing how and when people choose to travel;**
- **Living low carbon lives: Reaching out to Greater Manchester's communities, to increase understanding of the opportunities and implications of climate change, incentivising and supporting action to make the transition to a low carbon economy;**
- **Trading energy intelligently: Intervening in how energy is traded to ensure cost effective energy efficient/low carbon energy generation is prioritised at cost effective and fair prices for consumers;**
- **Supporting clean businesses: Supporting our businesses to become more resource efficient, access new low carbon market opportunities and make the transition to a low carbon economy;**
- **Making informed decisions: Making sure our existing and planned major investments, assets, purchases and programmes comply with our climate change goals;**
- **Preparing for a volatile climate: Addressing the existing and future effects of climate change, equipping residents, businesses and communities with the skills and resources needed to be fit for a changed climate;**
- **Local to global climate action: Using local experience to shape national and international performance, by negotiating with national government to continue to secure devolved responsibilities, funding, freedoms and flexibilities and collaborating with local, national and international cities and partners to secure supportive legal, policy and fiscal frameworks;**
- **Reinforcing the right behaviours: Make sure our plans have the intended effect, by considering setting and enforcing clear standards and a more diverse landscape of incentives and penalties to ensure that the required results are achieved; and**
- **Planning for the future: We will put in place post 2020 targets, plans, programmes and key milestones to reach a clean energy future, and integrate these across Greater Manchester's wider strategies, plans, policies and projects."**

Greater Manchester's Plan for Homes, Jobs and the Environment (Greater Manchester Spatial Framework 2019 Draft)

8.30 GMCA are currently in the process of consultation of the new Greater Manchester Spatial Framework, with the hope of publishing this new plan by the end of 2019. This new plan strengthens the objectives and targets of Air Quality specifically with Policy GM-S 6- Clean Air which offers a comprehensive range of measures to improve air quality, and adds emphasis on minimising exposure at residential locations and areas where at risk individuals are likely to be (e.g schools and nurseries).

8.31 The ten clean air measures are:

- **"Locating and designing development, and focusing transport investment, so as to reduce reliance on forms of transport that generate air pollution;**
- **Determining planning applications in accordance with the most recent development and planning control guidance published jointly by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK), and the most recent IAQM Guidance on the Assessment of Dust from Demolition and Construction, or relevant successor guidance, including the requirement for developers to submit construction management plans as appropriate;**
- **Requiring applications for developments that could have an adverse impact on air quality to submit relevant air pollution data and, if approved, to make appropriate provision for future monitoring of air pollution;**
- **Restricting and carefully regulating developments that would generate significant point source pollution such as some types of industrial activity and energy generation;**
- **Significantly expanding the network of electric vehicle charging points, both for public and private use, including as part of new developments;**
- **Investigating measures to reduce concentrations of NO_2 to legal Limit Values in the shortest possible time, including (but not limited to) different types of Clean Air Zone and travel demand measures;**
- **Facilitating the more sustainable distribution of goods within the urban area, including through accommodating urban consolidation centres and urban distribution centres that use ultra-low-emission vehicles, and local delivery facilities to reduce repeat delivery attempts;**
- **Designing streets to avoid trapping air pollution at ground level, including through the appropriate location and scale of buildings and trees;**
- **Controlling traffic and parking within and around schools and early years sites; and**
- **Promoting actions that help remove pollutants from the air, such as enhancing the green infrastructure network and using innovative building materials that capture air pollutants. Development should be located in areas that maximise the use of sustainable travel modes and be designed to minimise exposure to high levels of air pollution, particularly for vulnerable users."[2]**

Assessment Methodology and Significance Criteria

Construction Impacts

8.32 Potential construction impacts have been assessed in accordance with the Institute of Air Quality Management (IAQM) best practice guidance. This guidance provides a methodology for assessing air quality impacts from demolition, earthworks, construction and trackout activities which may be associated with a development. The IAQM dust assessment methodology involves the following steps:

- A screening assessment to identify the need for detailed assessment. Detailed assessment will be required where there is:

[2] Greater Manchester Combined Authority (2019), Greater Manchester Plan for Homes, Jobs and the Environment.

- A human receptor within:
  - 350m of the site boundary; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- An ecological receptor within:
  - 50m of the site boundary; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

8.33 IAQM has deliberately made the screening criteria conservative in order to ensure that most, if not all, development schemes will require assessments of their air quality impacts.

- Assess the risk of dust impacts by: (a) defining the potential dust emission magnitude, (b) defining the sensitivity of the area, and (c) assessing the risk of impacts. Criteria for defining the dust impacts are shown in Appendix 6-A.
- Determine site-specific mitigation for each of the four possible construction activities; and
- Examine residual effects to determine whether or not these are significant.

8.34 This assessment will focus on demolition, earthworks, construction, and trackout. IAQM guidance suggests that the significance of any adverse effects are reported post-mitigation, assuming all actions to avoid or reduce environmental effects are an inherent part of the Proposed Development.

Operational Impacts

8.35 The Environmental Protection UK (EPUK)/IAQM has published guidance[3] on the consideration of air quality within the planning and development control process. This guidance includes criteria which identify when relevant operational impacts can be screened out, or require further assessment. Criteria relevant to this assessment are detailed in Table 8-2.

Table 8-2 Indicative criteria for requiring an air quality assessment

The development will:	Criteria:
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans.	A change of LDV flows of: - more than 100 annual average daily traffic (AADT) within or adjacent to an AQMA - more than 500 AADT elsewhere.
Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.

[3] Moorcroft, Barrowcliffe. *et al*. (2017) Land-use Planning & Development Control: Planning for Air Quality. V1.2. Institute of Air Quality Management, London

The development will:	Criteria:
Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/seca is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

Traffic emissions

8.36 Road traffic emissions are considered in relation to the impact from the change in traffic flows resulting from the Proposed Development.

8.37 Traffic data has been provided by BuroHappold transport consultants for the existing baseline, 'do minimum' and 'do something' scenarios. Roads that will see the largest change in traffic flows as a result of the Proposed Development have been taken into consideration in the assessment, as well as surrounding roads that contribute towards the likely total pollutant concentrations at modelled receptors. Traffic data utilised in the assessment is presented in Appendix 8-1.

8.38 Pollutant concentrations are predicted at worst case sensitive receptor locations using the dispersion model ADMS-Roads. This model is developed by Cambridge Environmental Research Consultants (CERC) and can be used to assess the impact of vehicle emissions and industrial sources on local air quality. Unlike simpler spreadsheet screening tools, it can include parameters such as variable meteorological conditions, complex road networks (including the combined contribution of multiple road links on single sensitive receptors) and the capability of including the effects of complex terrain, atmospheric chemistry and street-canyon effects. The model is widely used by local authorities in the UK as part of their review and assessment obligations.

8.39 This assessment considers traffic-related pollutant concentrations (NO¬2 and PM10) at existing receptors in the vicinity of the Proposed Development. The assessment considers existing traffic flows on the local road network as well as the predicted change in traffic resulting from the Proposed Development.

8.40 Pollutant concentrations are predicted at receptors for the following scenarios:

- 2018 Existing baseline (used for model verification);
- 2023 Do Minimum – Future baseline (including committed developments) without the Proposed Development; and
- 2023 Do Something – Future baseline (including committed developments) with the Proposed Development.

8.41 The impact of the project has been assessed by comparing the two future scenarios. Owing to predicted year on year improvements in vehicle fleet emissions, the first year of development opening (2023) will represent a worst case assessment. Therefore whilst it is acknowledged that the SRF will generate additional cumulative traffic by 2030, the worst case in terms of the impact from the Proposed Development will be the opening year.

8.42 Traffic flows were input into the model as link flows and emissions were calculated using the latest UK vehicle emission factors toolkit (version 9.0). Emission factors for 2018 were used for the baseline year and 2023 emission factors were used in the Do Minimum and Do Something scenarios.

8.43 Pollutant concentrations were predicted at existing and future offsite receptors likely to be worst affected by emissions generated by the project. All receptors considered are facades of buildings where there is relevant exposure to air quality objectives (see section 8.59).

8.44 Receptor locations and the roads modelled in the assessment scenarios are shown in Figure 8-2..

Meteorological data

8.45 Hourly sequential meteorological data from Manchester Airport for 2018 were used in the dispersion modelling. The data provides information on hourly wind speed, direction and extent of cloud cover. A wind rose displaying wind speed and direction data is presented in Figure 8.1.

NOx – NO¬2 conversion and background concentrations

8.46 The model predicts NOx and PM10 road increment at the selected receptor points. These values are then added to relevant ambient background concentrations to enable the comparison with air quality objectives. NO2 and PM10 background concentrations were obtained from Defra's website and subsequently added to the predicted road increment. The NOx to NO¬2 conversion spreadsheet, available from the UK Air Information Resources website (Defra, 2018) has been used to calculate NO¬2 concentrations from predicted NOx concentrations.

Surface Roughness

8.47 Surface roughness is a key modelling parameter which represents the extent of mechanical turbulence in the atmosphere caused by the roughness of the ground over which the air is passing. A surface roughness value of 1.5m was used at the study area which represents 'cities'. A value of 0.2m was used at the meteorological measurement site which represents 'agricultural areas'.

Model Verification

8.48 Modelled NO2 concentrations, calculated using the ADMS-Roads model, were compared against local monitoring data from 2018 in order to ensure that the results are representative of monitored data from the study area. Local Air Quality Management Technical Guidance (TG16) provides a methodology for model verification which has been followed for the purposes of this assessment. Most NO2 is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NOx = NO + NO2). The model has been run to predict the annual mean NOx concentrations during 2018 at the MAN71 and MAN82 diffusion tube monitoring sites. These sites have been selected due to their appropriate siting and proximity to modelled roads. Concentrations have been modelled at the height of the monitors as indicated by local authority records and then appraised using google street view.

8.49 The model output of road-NOx (i.e. the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO¬2 concentrations and the predicted background NO¬2 concentration using the NOx from NO¬2 calculator (Version 7.1) available on the Defra LAQM Support website.

8.50 An adjustment factor has been determined as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero.

The calculated adjustment factor of 1.645 has been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations.

8.51 The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO¬2 concentration within the NOx to NO¬2 calculator. Figure 8.3 shows both the unadjusted NOx values and the final adjusted NO¬2 values predicted. After adjustment the modelled concentrations show a close agreement with monitored concentrations.

8.52 The results imply that the model has under predicted the road-NOx contribution. This is a common experience with this and most other road traffic emissions dispersion models.

8.53 The model outputs of road-PM10 have been adjusted by applying the adjustment factor calculated for road-NOx.

Combustion plant emissions

8.54 It is currently anticipated that heating and hot water demand for Baring Street Office 1 (Plot O) and Baring Street Office 2 (Plot M) of the Proposed Development will be met using reverse cycle heat pumps, which will give rise to no local emissions. Baring Street Multi Storey Car Park (MSCP) will have no heating requirements. This is in line with the overall Mayfield site target of minimising decentralised gas fired heating and associated emissions. Therefore, further assessment of combustion plant is scoped out of this assessment.

Receptor sensitivity

8.55 Sensitive receptors are considered for both construction and operational phases of the Proposed Development. Receptor sensitivity is defined in line with air quality guidance and therefore differs from the standard approach used elsewhere in the ES.

Construction

8.56 IAQM construction guidance describes a construction dust receptor as "a location that may be affected by dust emissions during demolition and construction. Human receptors include locations where people spend time and where property may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust".

8.57 In accordance with IAQM guidance, the principles that are applied to assess and classify sensitivity of receptors are described in Table 8-3.

Table 8-3 Receptor sensitivity principles: construction

Sensitivity of receptor	Sensitivity to dust soiling	Sensitivity to health effect of PM_{10}	Sensitivity to ecological effects
High	Areas where a high level of amenity would be reasonably expected; Areas where the appearance, aesthetics or value of a property would be diminished by soiling; and the people or property would reasonably be expected 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 dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	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 objective, 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 residential care homes.	Locations with an international or national designation and the designated features may be affected by dust soiling; Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain; Indicative examples include a Special Area of conservation (SAC) designated for acid heathlands or a local site

Sensitivity of receptor	Sensitivity to dust soiling	Sensitivity to health effect of PM_{10}	Sensitivity to ecological effects
			designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings
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; The appearance, aesthetics or value of their property could be diminished by soiling; The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods; 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 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; Locations with a national designation where the features may be affected by dust deposition; Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	The enjoyment of amenity would not reasonably be expected; Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time; 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 include 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.

Operation

8.58 Operational impacts are considered at receptor locations where there is relevant exposure to national air quality objectives, in line with LAQM TG16[4]. Examples of receptors, dependent on the averaging period for pollutant concentration, are shown in Table 8-4. Air quality objectives are based on standards which are set at a level below the lowest concentration at which more sensitive members of the public have been observed to be affected by pollutant exposure. As any member of the public could be present at receptors which have relevant exposure, it is considered that all receptors are of equal sensitivity. Therefore all receptors considered, where there is relevant exposure, will be of high sensitivity.

[4] Defra (2018) *Part IV of the Environment Act 1995: Local Air Quality Management: Technical Guidance (TG16)*, Department for Environment Food and Rural Affairs, February 2018

Table 8-4 Receptor sensitivity principles: operation

Averaging period	Sensitive receptors occur at	Sensitive receptors generally do not occur at
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24 hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
Hourly mean	All locations where the annual mean and 24 -hour mean objective apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access.

Significance criteria

8.59 EPUK and IAQM have produced guidance[5] to ensure adequate consideration of air quality matters in the development control process. This guidance provides a framework for describing the degree of impact resulting from a change in air pollutant concentration (Table 8-5). Impact is described by expressing the magnitude of incremental change as a proportion of a relevant assessment level and then to examine this change in the context of the new total concentration and its relationship with the assessment criterion (or Air Quality Assessment Level (AQAL)).

[5] Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. Institute of Air Quality Management, London

Table 8-5 Long term impact descriptors for individual receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Limitations and assumptions

8.60 Several key factors contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

8.61 An important stage in the process is model verification, which involves comparing the model output with measured concentrations. Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2018) concentrations.

8.62 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions.

Baseline Conditions

Current baseline

8.63 Baseline data was gathered from the following sources:

- MCC Air Quality Annual Status Report;
- Defra's national air quality background maps;
- Baseline traffic flows (in Annual Average Daily Traffic (AADT)) supplied by the project transport consultant; and
- Department for Transport (DfT) Traffic Counts.

Local Air Quality Management

8.64 An AQMA has been declared across the City of Manchester owing to exceedances of the annual mean Air Quality Objective for nitrogen dioxide (NO_2). These exceedances have been identified as being predominantly from road transport sources with 65%[6] of NO_2 emissions within Greater Manchester being attributable to road transport. Of the road transport

[6] https://www.greatermanchester-ca.gov.uk/media/1710/gm_plan_for_homes_jobs_and_the_environment_1101-web.pdf

emissions the majority were from diesel cars and diesel light goods vehicles, a full break down of the NOx source apportionment is presented in Figure 8.1.

8.65 As a result of the declaration of the Greater Manchester AQMA, an Air Quality Action Plan has been produced by the GMCA, which outlines the mitigation measures and strategic approach to improve air quality within the city and surrounding boroughs. The seven targeted actions aimed at improving air quality, and specific mitigation measures, are outlined below:

Actions for Managing New Development:
- Creation and management of a database of significant planning application and related air quality assessments.

Actions for Freight Vehicles:
- Locations for potential distribution centres will be identified in the Greater Manchester Spatial Framework.

Actions for Buses:
- Consideration and trial of a range-extender bus or other ultra-low emission vehicles which can be implemented to the wider public transport strategy.

Actions for Cycling:
- Improvement to the cycle networks focusing on safe green routes, away from areas of high pollution.

Actions for Travel Choices:
- Appraisal of existing car sharing schemes and their impacts on modal shift. Use this information to expand existing schemes and inform future areas of focus.

Actions for Car:
- Continual expansion of EV charging points through the Plugged-in-Places programme.

Actions for Information and Resources:
- More resource and investment to the GreatAir Manchester website[7].

8.66 As well as this, GMCA were one of 33 Local Authorities who were issued a ministerial direction from the UK Government to tackle poor air quality and achieve compliance with air quality objectives in the shortest time possible. In response to this GMCA have carried out feasibility studies into the implementation of a CAZ. This study will assess the different ways to implement a CAZ, an air quality assessment, health impact assessment and an economic assessment. As of August 2019 it is expected that a CAZ will be implemented in Manchester by 2021 but specific details regarding the CAZ are still being developed.

Air quality monitoring data

8.67 GMCA undertake air quality monitoring at 200+ monitoring sites across the 10 boroughs within Greater Manchester; 37 of these sites are located within MCC. Within MCC there are two automatic monitors and 35 non-automatic monitoring sites (diffusion tubes). The nearby site 72 is the closest monitoring site to the Proposed Development, located approximately 100m to the southwest of the Site. A number of monitoring sites are located in the vicinity of the Proposed Development site. Nearby monitoring locations are presented in Figure 8.2.

8.68 Data from nearby monitoring sites is presented in Table 8-6 to Table 8-8. Diffusion tube monitoring data indicates that the annual mean NO_2 air quality objective has been exceeded at urban traffic (i.e. roadside) monitoring sites in the vicinity of the Proposed Development. There are also a number of diffusion tube sites where the annual mean NO_2 concentration exceeds 60µg/m^3, indicating a potential exceedance of the hourly mean NO_2 objective. The short term NO_2 objective is also shown to have been exceeded at the Oxford Road automatic monitoring site in 2015 and 2016. Urban Traffic monitoring sites are located next to busy roadsides where pollutant concentrations will be elevated and higher than background levels.

[7] Great Air Manchester: https://cleanairgm.com/

Air quality objectives have been achieved in recent years at nearby urban background monitoring sites. Air quality objectives for PM_{10} are achieved at both nearby automatic monitoring locations.

Table 8-6 Nearby diffusion tube monitoring results

Site ID	Location	Site type	NO_2 concentration (µg/m³)			
			2014	2015	2016	2017
9	Newton Street	Urban Traffic	**56.2**	**55.9**	**51.9**	**51.6**
29AB	Chethams School	Urban Traffic	**62.8**	**56.4**	**66.2**	**58.4**
58/59/61	Piccadilly Gardens	Urban Background	36.1	35.5	39.1	36.4
71	Great Ancoats Street	Urban Traffic	**47.4**	**45.9**	**51.2**	**50.9**
72	Lockton Close	Urban Background	36.1	34.8	**40**	35
82/83/84	Hyde Rd/Clowes St	Urban Traffic	**63.0**	**60.7**	**61.6**	**56.6**

Figures in **bold** indicate an exceedance of the long term air quality objective
Figures **underlined and bold** indicate a potential exceedance of the short term air quality objective.

Table 8-7 Automatic NO_2 Monitoring Data in the City of Manchester

Site ID	Site Name	Site type	Annual mean NO_2 concentration (µg/m³)				Number of hourly mean NO_2 exceedances > 200 µg/m³ (18 allowable)			
			2014	2015	2016	2017	2014	2015	2016	2017
MAN1	Oxford Road	Urban Traffic	**68**	**66**	**66**	**65**	14	**60**	**90**	-
MAN3	Piccadilly	Urban Background	**40**	39	**40**	36	2	1	0	1

Figures in **bold** indicate an exceedance of the relevant air quality objective

Table 8-8 Automatic PM_{10} Monitoring Data in the City of Manchester

Site ID	Site Name	Site type	Annual mean PM_{10} concentration (µg/m³)				Number of 24-hourly mean PM_{10} exceedances >50 µg/m³ (35 allowable)			
			2014	2015	2016	2017	2014	2015	2016	2017
MAN1	Oxford Road	Urban Traffic	28	28	27	-	18	25	16	-
MAN3	Piccadilly	Urban Background	20	20	20	-	5	3	3	-

Background Air Quality Data

8.69 The Defra website includes estimated background air pollution data for NO_2 and PM_{10} for each 1km by 1km OS grid square, as shown in Figure 8.3. Background pollutant concentrations are modelled from the reference year of 2017 based on ambient monitoring and meteorological data from 2017 and includes projections for future years up to 2030.

8.70 Predicted background concentrations for 2019 in the grid square where development lies (centred at 384500, 397500) are outlined in Table 8-9. The development lies across two grid squares, and in the interest of worst case assumptions, the grid with the highest predicted concentrations has been presented below. Annual mean concentrations of NO_2 and PM_{10} meet their relevant objectives.

Table 8-9 Predicted Defra mapped background concentrations of NO_x, NO_2, and PM_{10} for 2019

Pollutant	Annual mean background concentrations (µg/m³) Grid Square: 384500, 397500
	2019
Nitrogen dioxide (NO_2)	28.9
Particulate matter (PM_{10})	13.4

Meteorological Conditions

8.71 The Manchester airport meteorological station is located 13km south of the Site, this station is the closest to the development site and as such considered representative of meteorological conditions onsite. In 2018, the prevailing wind direction was from a southerly (13%) direction, at speeds predominantly between 2-4m/s. Some winds of higher speed were also monitored from the west, albeit less frequently. The wind rose for this station can be found in Figure 8.4.

Identification and Evaluation of Likely Significant Effects

Demolition and construction effects for Application 1 (Baring Street Office 1, Baring Street MSCP and Mayfield Park)

Relevant aspects of the scheme

8.72 The enabling and construction works proposed will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from the trackout of dust and dirt by vehicles onto the public highway. An overview of construction timescales are set out in Table 8-10; Phase 1a activities are related to Application 1.

Table 8-10 Anticipated construction timeline

Date	Planned Phase Progress
Q1 2020	Start construction of development
Q1 2020-2021	Phase 1a delivery (re-profiling works, highway works, delivery of plots O and N and first portion of park

8.73 The construction of Phase 1a will begin in Q1 2020, when the majority of the demolition works will be completed and the construction works, starting with Mayfield Park, Baring Street Office 1 (Plot O, Office) and Baring Street MSCP, will begin. The demolition works required will generate dust however this will be over a relatively short time span and mitigation measures will minimise the impacts of dust generated. Earthworks will also generate high proportions of dust, activities such as piling and excavation can be significant sources of emissions.

Potential effects of the development and their significance

Nuisance Dust/Dust Soiling

8.74 The IAQM guidance criteria used to assess the potential impacts from construction activities is detailed in Appendix 8-1.

8.75 The following steps explain the assessment in the context of the IAQM criteria.

Step 1: Screen the need for a detailed assessment

8.76 In accordance with screening criteria in the IAQM guidance, an assessment is required as receptors are located within 350m of the site boundary. The nearest receptors are student accommodation, offices and the Macdonald Hotel to the west of the Site and residential/commercial properties to the south of Mancunian Way, which are within 350m of the site boundary.

Step 2A: Define the potential dust emission magnitude

8.77 Dust emission magnitudes for the proposed construction activities are shown in Dust emission magnitudes for the proposed construction activities are shown in Table 8-11.

Table 8-11 Dust emission magnitudes

Activity	Dust emission magnitude
Demolition	Small (total building volume to be demolished <20,000m^3)
Earthworks	Large (total site area >10,000m^2)
Construction	Medium (total building between 25, 000 - 100,000m^3)
Trackout	Medium (10-50 HDV outward movements in any one day)

Step 2B: Define the sensitivity of the area

8.78 The sensitivity of the surrounding area is defined using a number of factors, including receptor sensitivity, the number of receptors, the distance of receptors from the Site, and existing PM_{10} concentrations. Sensitivity of surrounding areas to potential construction impacts are shown in Table 8-12. The main receptors which may be affected are off site student accommodation, a hotel, residential and commercial properties. There are no ecological receptors in the vicinity of the Site.

Table 8-12 Area sensitivity

Potential impact	Sensitivity of surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	High	High	High	High
Human health	Low	Low	Low	Low

Step 2C: Define the risks of impacts

8.79 The risk of dust impacts from relevant construction activities is summarised in Table 8-13. These results take into account both the potential dust emission magnitude and the sensitivity of the area. Results show that the impact is considered low risk. It is acknowledged that any harmful activities are temporary in nature and will be mitigated through implementation of good industry practices, appropriate to the level of risk.

Table 8-13 Summary of risk from dust

Source	Dust soiling	Human health
Demolition	Medium Risk	Negligible
Earthworks	High Risk	Low Risk
Construction	Medium Risk	Low Risk

Trackout	Medium Risk	Low Risk

Summary of effects during construction

Table 8-14 Summary of effects during construction of Application 1

Receptor	Sensitivity	Description of effect	Magnitude of change/impact (risk)	Effect significance
Surrounding dust sensitive receptors (student accommodation, a hotel, residential and commercial properties)	High	Dust Soiling	High risk	Major adverse

Demolition and construction effects for Application 1 + 2 (Baring Street Office 1, Baring Street MSCP, Mayfield Park and Baring Street Office 2)

Relevant aspects of the scheme

8.80 The enabling and construction works proposed will give rise to a risk of dust impacts during earthworks and construction, as well as from the trackout of dust and dirt by vehicles onto the public highway. The construction timeline for both Application 1 (Phase 1a) and Application 2 (Phase 1b) is outlined in Table 8-15.

Table 8-15 Anticipated construction timeline

Date	Planned Phase Progress
Q1 2020	Start construction of development
Q1 2020-2021	Application 1 delivery (re-profiling works, highway works, delivery of plots O and N and first portion of park
Q3 2020-2023	Application 2 delivery (completion of remaining areas of park, temporary landscaping, delivery of plot M)

8.81 Application 2 will begin in Q3 2020, when Plot M (Office) will be constructed and the completion of the park and landscaping will be completed.

8.82 Earthworks will generate high proportions of dust, activities such as piling and excavation can be significant sources of emissions.

Potential effects of the development and their significance

Nuisance Dust/Dust Soiling

8.83 The IAQM guidance criteria used to assess the potential impacts from construction activities is detailed in Appendix 8-2.

8.84 The following steps explain the assessment in the context of the IAQM criteria.

Step 1: Screen the need for a detailed assessment

8.85 In accordance with screening criteria in the IAQM guidance, an assessment is required as receptors are located within 350m of the site boundary. The nearest receptors are student accommodation, offices and the Macdonald Hotel to the west of the Site and residential/commercial properties to the south of Mancunian Way, which are within 350m of the site boundary.

Step 2A: Define the potential dust emission magnitude

8.86 Dust emission magnitudes for the proposed construction activities are shown in Table 8-16.

Table 8-16 Dust emission magnitudes

Activity	Dust emission magnitude
Demolition	Small (total building volume to be demolished <20,000m^3)
Earthworks	Large (total site area >10,000m^2)
Construction	Large (total building volume >100,000m^3)
Trackout	Medium (10-50 HDV outward movements in any one day)

8.87 Construction dust emissions have increased from medium to large, due to the estimated building volume to be constructed exceeding the 100,000m^2 criteria outlined by IAQM.

Step 2B: Define the sensitivity of the area

8.88 The sensitivity of the surrounding area remains the same when considering Application 1 and 2 collectively.

8.89 The sensitivity of the surrounding area is defined using a number of factors, including receptor sensitivity, the number of receptors, the distance of receptors from the Site, and existing PM_{10} concentrations. Sensitivity of surrounding areas to potential construction impacts are shown in Table 8-17. The main receptors which may be affected are off site student accommodation, a hotel, residential and commercial properties. There are no ecological receptors in the vicinity of the Site.

Table 8-17 Area sensitivity

Potential impact	Sensitivity of surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	High	High	High	High
Human health	Low	Low	Low	Low

Step 2C: Define the risks of impacts

8.90 The risk of dust impacts from relevant construction activities is summarised in Table 8-18. These results take into account both the potential dust emission magnitude and the sensitivity of the area. Results show that the impact is considered low risk. It is acknowledged that any harmful activities are temporary in nature and will be mitigated through implementation of good industry practices, appropriate to the level of risk.

Table 8-18 Summary of risk from dust

Source	Dust soiling	Human health
Demolition	Medium Risk	Negligible
Earthworks	High Risk	Low Risk
Construction	High Risk	Low Risk
Trackout	Medium Risk	Low Risk

Summary of effects during construction

Table 8-19 Summary of effects during construction of Application 1 and 2 combined

Receptor	Sensitivity	Description of effect	Magnitude of change/impact (risk)	Effect significance
Surrounding dust sensitive receptors (student accommodation, a hotel, residential and commercial properties)	High	Dust Soiling	High risk	Major adverse

8.91 The major adverse impact identified is negligible following the mitigation measures outlined below

Operational effects for Application 1 (Baring Street Office 1, Baring Street MSCP and Mayfield Park)

8.92 The following operational aspects will have a potential impact on local air quality:

- Vehicle emissions from traffic generated as a result of the Proposed Development on the local road network; and
- Application 1 will generate traffic from Baring Street Office 1 staff, visitors to Mayfield Park and car park users. The multi storey car park will serve Baring Street Office 1.

8.93 As detailed within the transport assessment, a full travel plan will be prepared that will outline the strategy to minimise private vehicle use and encourage the use of sustainable transport options.

Operational Emissions

8.94 Predicted pollutant concentrations at selected receptors are presented in Appendix 8-5.

8.95 The impact of operational emissions associated with the development is predicted to be slight adverse owing to the change in annual mean NO2 concentration at nine considered receptors; Receptor 30, 51, 52, 52a, 53, 53a, 69, 69a and committed scheme 1-6.

8.96 There is predicted to be a slight beneficial impact at six receptor locations; Receptor 1, 2, 44 59, 60 and 65. These receptors are located on Whitworth and Fairfield Street. These beneficial impacts are due to a reduction in predicted traffic flows on a number of roads in the vicinity of the site.

8.97 There is predicted to be a negligible impact on annual mean NO2 concentration at all remaining receptors. The impact on PM10 concentrations is predicted to be negligible at all receptors.

8.98 The locations of receptors predicted to see slight adverse and slight beneficial impacts are presented in Figure 8.7.

8.99 With regards to short term air quality objectives, in accordance with LAQM.TG(16), it is considered that as all annual mean NO¬2 concentrations are below 60µg/m3, the hourly objective will be met.

8.100 With regards to PM10, dispersion models are inherently less accurate at predicting the number of exceedances of the 24-hour mean objective for PM10 than the annual mean objective. Accordingly, the relationship between annual mean and the number of 24-hour mean exceedances of 50 µg/m3, devised by LAQM.TG(16), has been used for assessment of the short-term PM10 objective (No. 24-hour mean exceedances = -18.5 + 0.00145 x annual mean3 + (206/annual mean). The maximum number of days exceeding the objective concentration is two, which is predicted at only four of the receptors considered. This is well within the allowable 35 exceedances which are permitted in the objective.

8.101 It can therefore be concluded that the effect of operational traffic emissions generated by the Proposed Development will not be significant

Operational effects for Application 1 + Application 2 (Baring Street Office 1, Baring Street MSCP, Mayfield Park and Baring Street Office 2)

8.102 The following operational aspects will have a potential impact on local air quality:

- Vehicle emissions from traffic generated as a result of the Proposed Development on the local road network; and
- Application 1 and Application 2 will generate traffic from Baring Street Office 1 and Office 2 staff, visitors to Mayfield Park and car park users. The multi storey car park will serve Baring Street Offices 1 and 2.

8.103 As detailed within the transport assessment, a full travel plan will be prepared that will outline the strategy to minimise private vehicle use and encourage the use of sustainable transport options.

Operational emissions

8.104 Predicted pollutant concentrations at selected receptors are presented in Appendix 8-5

8.105 The impact of operational emissions associated with the development is predicted to be slight adverse owing to the change in annual mean NO2 concentration at nine considered receptors; Receptor 30, 51, 52, 52a, 53, 53a, 69,69a and committed scheme 1-6.

8.106 There is predicted to be a slight beneficial impact at six receptor locations; 1, 2, 44, 59, 60 and 65. These receptors are located on Whitworth and Fairfield Street. These beneficial impacts are due to a reduction in predicted traffic flows on a number of roads in the vicinity of the site.

8.107 There is predicted to be a negligible impact on annual mean NO2 concentration at all remaining receptors. The impact on PM10 concentrations is predicted to be negligible at all receptors.

8.108 The locations of receptors predicted to see slight adverse and slight beneficial impacts are presented in Figure 8.7.

8.109 With regards to short term air quality objectives, in accordance with LAQM.TG(16), it is considered that as all annual mean NO¬2 concentrations are below 60µg/m3, the hourly objective will be met.

8.110 With regards to PM10, dispersion models are inherently less accurate at predicting the number of exceedances of the 24-hour mean objective for PM10 than the annual mean objective. Accordingly, the relationship between annual mean and the number of 24-hour mean exceedances of 50 µg/m3, devised by LAQM.TG(16), has been used for assessment of the short-term PM10 objective (No. 24-hour mean exceedances = -18.5 + 0.00145 x annual mean3 + (206/annual mean). The maximum number of days exceeding the objective concentration is two, which is predicted at only four of the receptors considered. This is well within the allowable 35 exceedances which are permitted in the objective.

8.111 It can therefore be concluded that the effect of operational traffic emissions generated by the Proposed Development will not be significant.

Mitigation Measures

Supplementary mitigation measures during demolition and construction

8.112 Recommended mitigation measures are detailed in Appendix 8-3. These measures are recommended based on the magnitude of emissions and sensitivity of nearby receptors. If these measures are appropriately implemented and adhered to throughout the construction and demolition phases of the Proposed Development, the residual effects from the development will be insignificant.

8.113 Mitigation measures from the demolition and construction phases are considered on a plot by plot basis; the measures represent best practice with respect to dust emission control and minimisation and as such it is recommended they should implemented where feasible across the entirety of the construction site.

Table 8-20 Summary of demolition and construction supplementary mitigation measures for Baring Street MSCP

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Nuisance from dust deposition and impact from elevated PM_{10} concentrations on human health	Best practice mitigation measures for controlling dust/emissions during construction as detailed in Appendix 8-3	Secured via condition and implemented via CEMP	Ongoing through construction phase

Table 8-21 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 1 (Plot O)

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Nuisance from dust deposition and impact from elevated PM_{10} concentrations on human health	Best practice mitigation measures for controlling dust/emissions during construction as detailed in Appendix 8-3	Secured via condition and implemented via CEMP	Ongoing through construction phase

Table 8-22 Summary of demolition and construction supplementary mitigation measures for Mayfield Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Nuisance from dust deposition and impact from elevated PM_{10} concentrations on human health	Best practice mitigation measures for controlling dust/emissions during construction as detailed in Appendix 8-3	Secured via condition and implemented via CEMP	Ongoing through construction phase

Table 8-23 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 2 (Plot M)

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Nuisance from dust deposition and impact from elevated PM_{10} concentrations on human health	Best practice mitigation measures for controlling dust/emissions during construction as detailed in Appendix 8-3	Secured via condition and implemented via CEMP	Ongoing through construction phase

Supplementary mitigation measures during operation

8.114 As the development operation will not have a significant effect on air quality, no further mitigation is required. However an overview of measures that will minimise the air quality impact of the Proposed Development are outlined below. It should be noted that traffic data used in the assessment does not take into account these measures.

8.115 Proposed mitigation to be implemented within phase 1 of the development includes the following:

- Implementation of a travel plan with the aim of delivering substantial benefits to the community by helping reduce vehicle trips, and in turn traffic congestion, noise and air pollution, and greenhouse gas emissions; and
- Provision for 10% electric vehicle charging spaces to encourage the use of zero tailpipe emission vehicles.

8.116 There will also be wider measures implemented by MCC and GMCA with the aim of improving air quality throughout the City and Greater Manchester, including the following:

- A Greater Manchester Clean Air Zone which the most polluting buses, coaches, HGVs, vans, taxis and private hire vehicles would pay a daily penalty to drive in;
- A multi-million pound funding package to support local businesses and sole traders to upgrade to cleaner vehicles; and

- Trebling the number of electric vehicle public charging points)

Cumulative Effects

Demolition and construction

8.117 It is assumed that an appropriate assessment of potential construction impacts will have been carried out and necessary mitigation for the cumulative developments will have been identified. Mitigation for the application site will therefore complement the mitigation identified for the other cumulative developments.

Operational

8.118 Traffic flows from cumulative developments are included within the traffic data provided by the project transport consultant upon which the operational assessment is based, therefore cumulative effects are considered inherently in the assessment.

Residual Effects

Table 8-24 Residual effects table

Impact	Description of effect	Pre-mitigation significance	Post-mitigation significance
Dust and other emissions generated during enabling and construction works	Nuisance from dust deposition and impact from elevated PM_{10} concentrations on human health	Major Adverse	Negligible
Operational traffic emissions	Changes in pollutant concentration owing to emissions from operational traffic generated by the development.	Slight Adverse	Slight Adverse

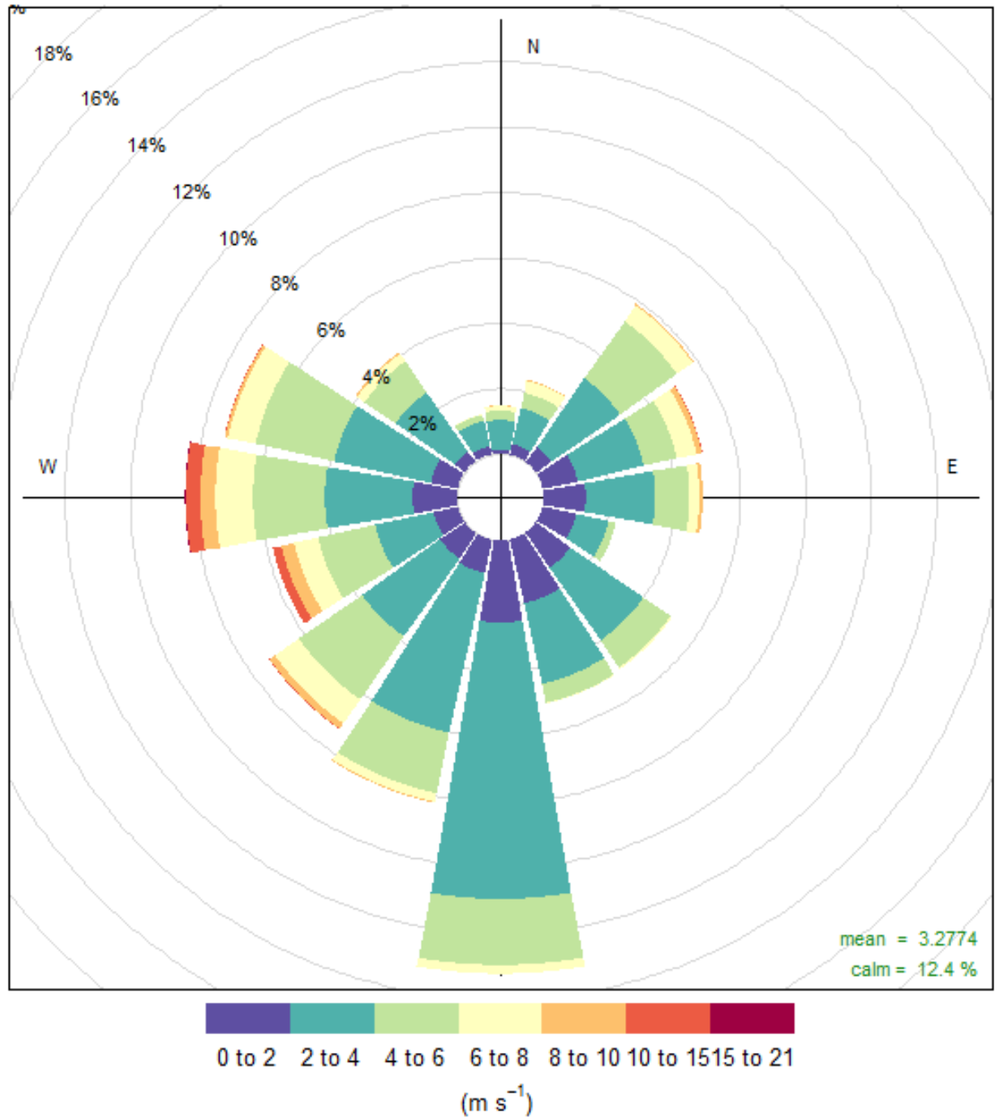


	Figure:	**8.1**		
	Title:	**Manchester Meteorological Data 2018**		
	Project:	**Mayfield Phase 1**		
	Date:	**10/09/19**	**Scale:**	**NA**

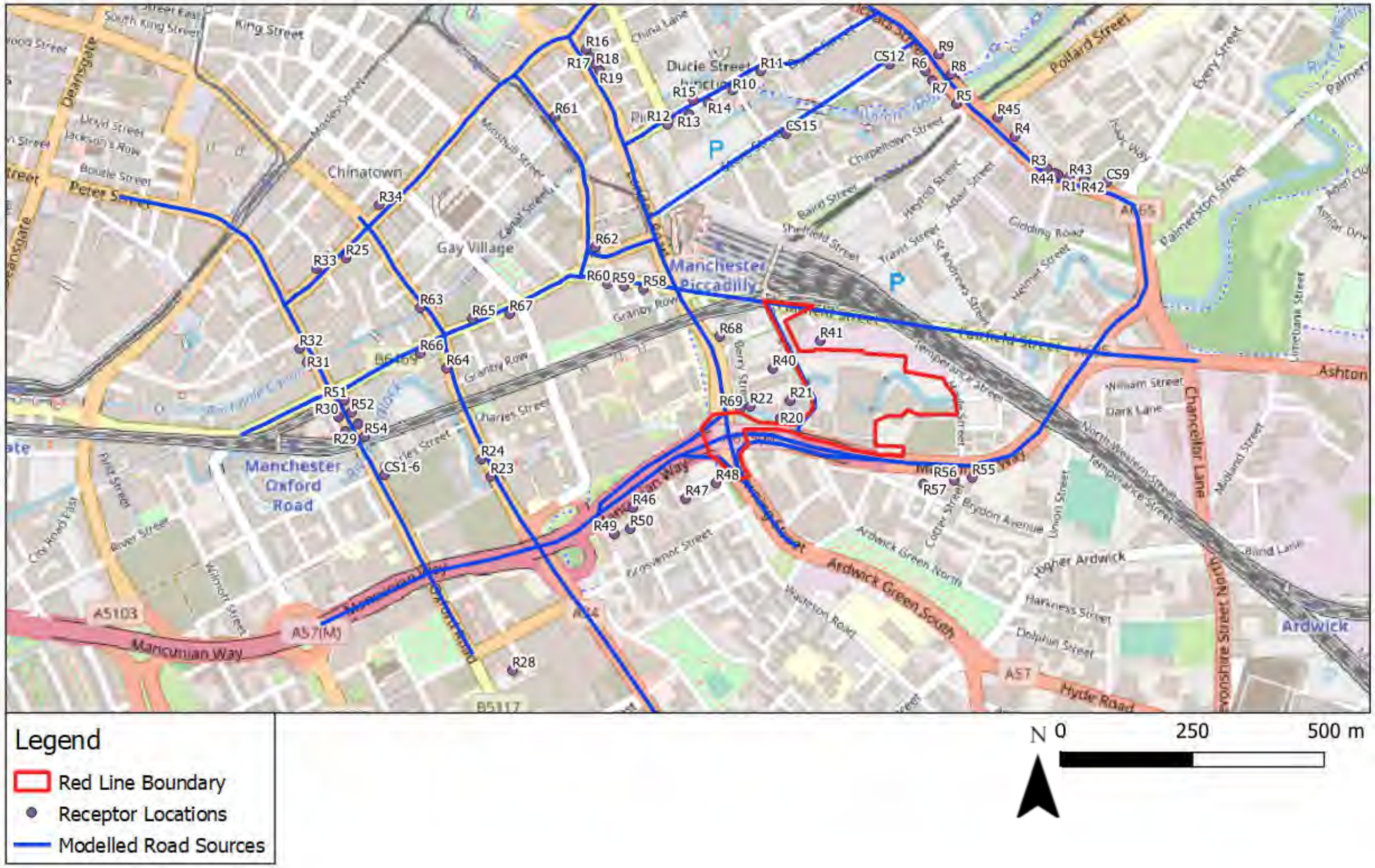
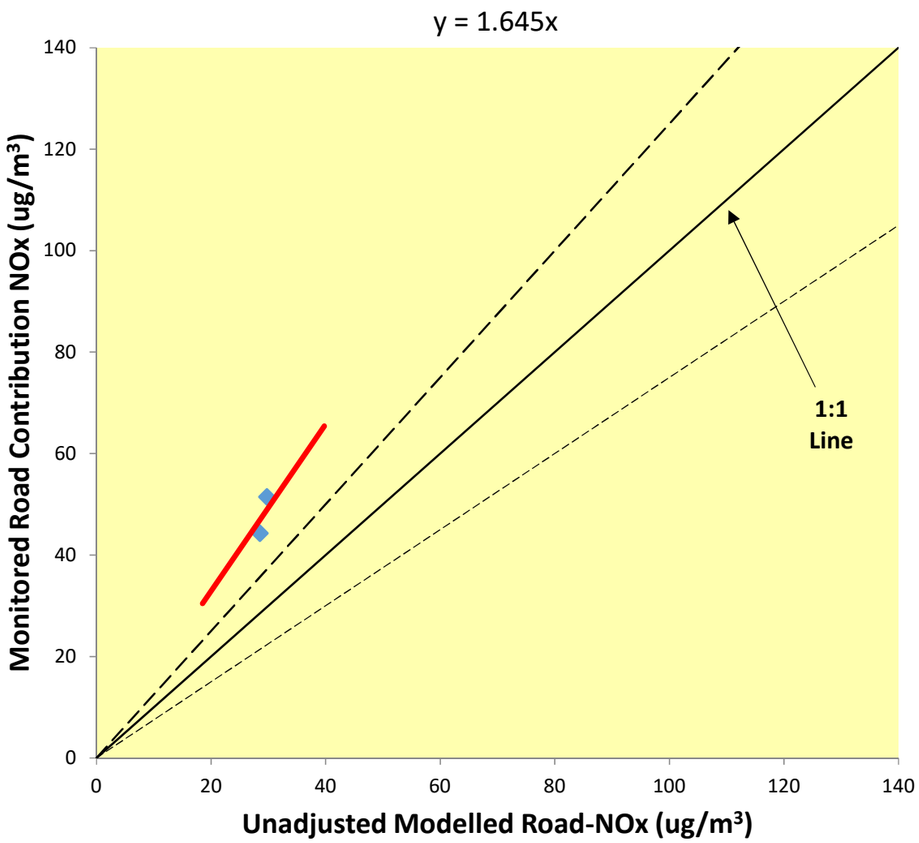


	Figure:	**8.2**		
	Title:	**Modelled Receptors and Road Sources**		
	Project:	**Mayfield Phase 1**		
	Date:	**10/09/19**	**Scale:**	**1:9200**



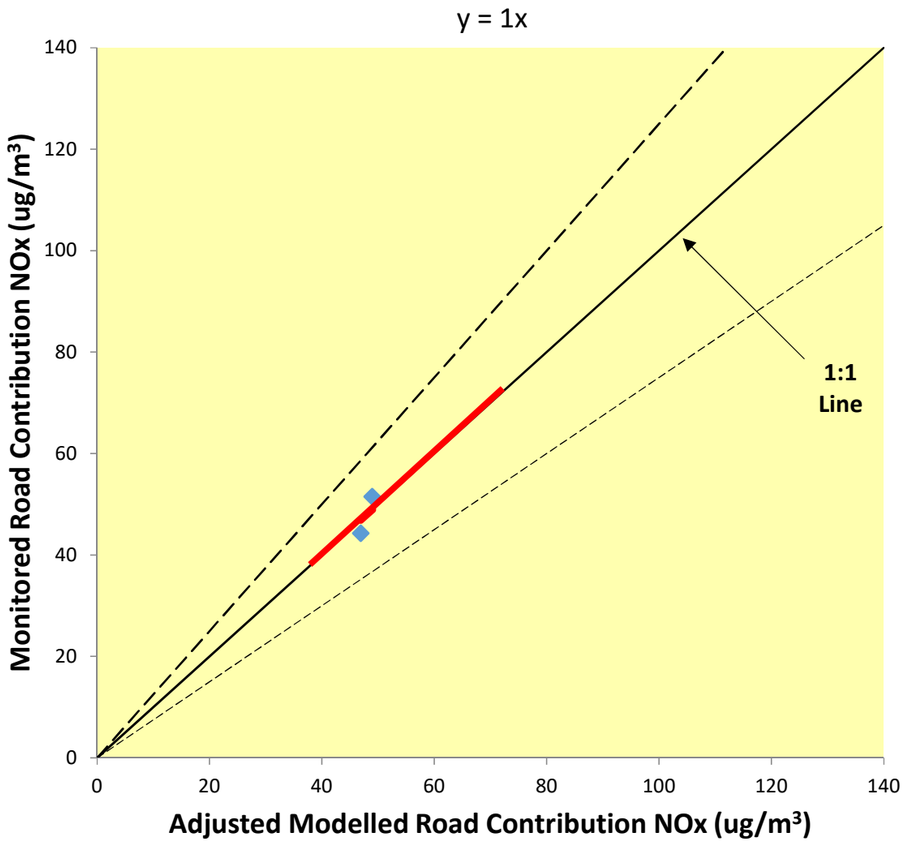


	Figure:	**8.3**		
	Title:	**Model Verification Results**		
	Project:	**Mayfield Phase 1**		
	Date:	**01/10/2019**	**Scale:**	**NA**

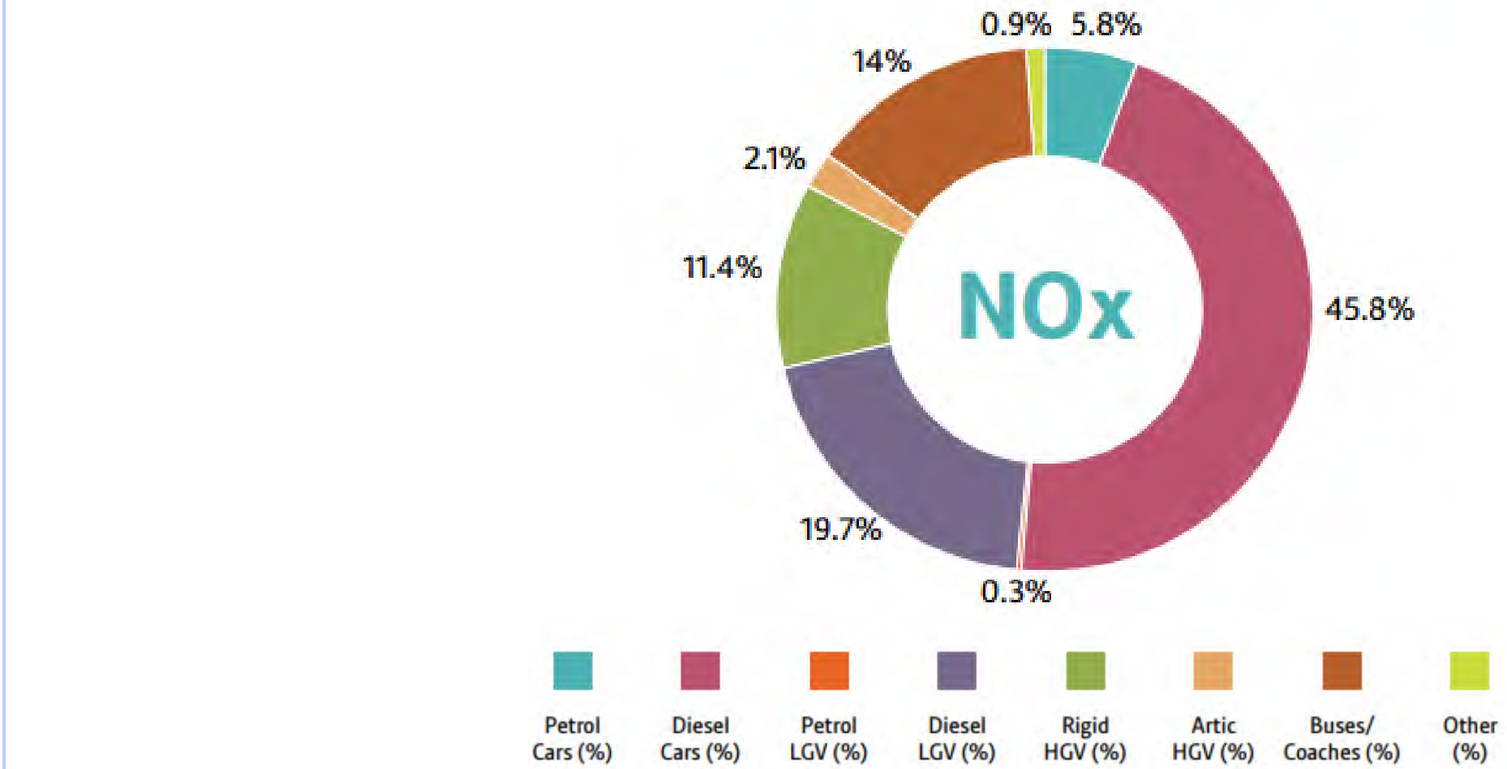


	Figure:	**8.4**		
	Title:	**NO_x Source Apportionment within Manchester (TfGM, 2016)**		
	Project:	**Mayfield Phase 1**		
	Date:	**10/09/2019**	**Scale:**	**N/A**

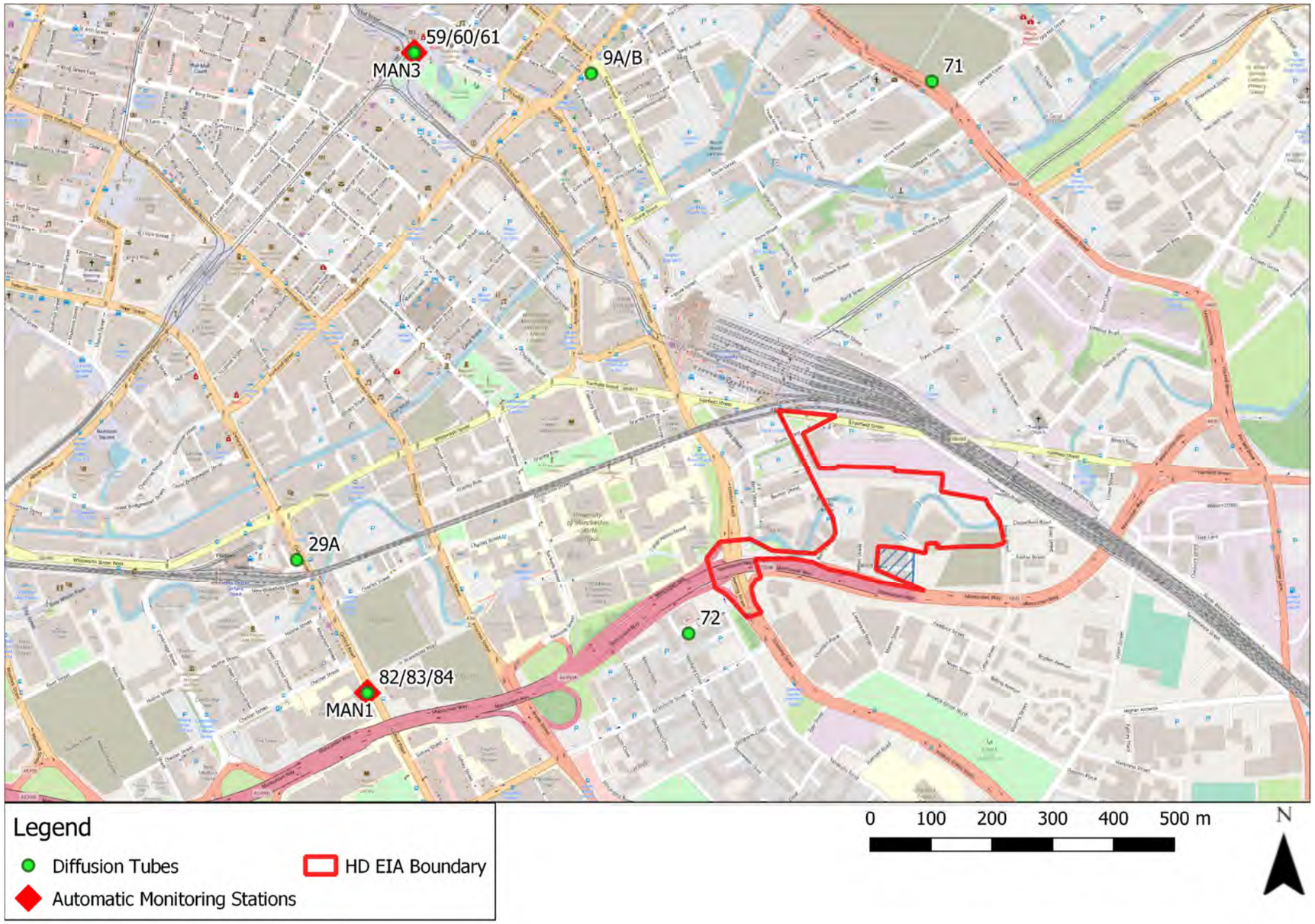


Figure:	**8.5**			
Title:	**Nearby monitoring stations**			
Project:	**Mayfield Phase 1**			
Date:	**10/09/19**	**Scale:**	**1:7000**	

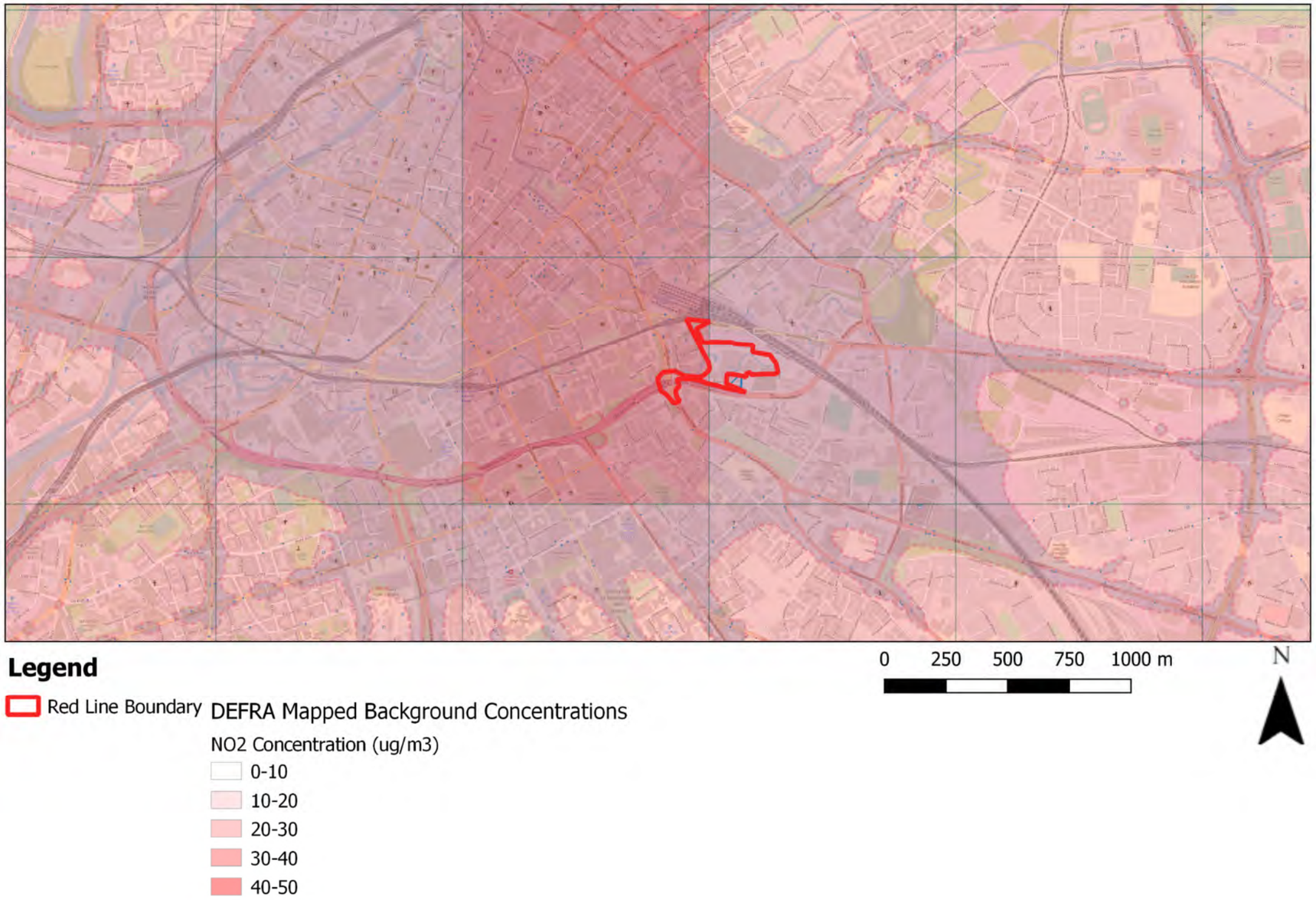


	Figure:	**8.6**		
	Title:	**Defra mapped background annual mean NO2 concentration**		
	Project:	**Mayfield Phase 1**		
	Date:	**10/09/19**	**Scale:**	**1:18000**

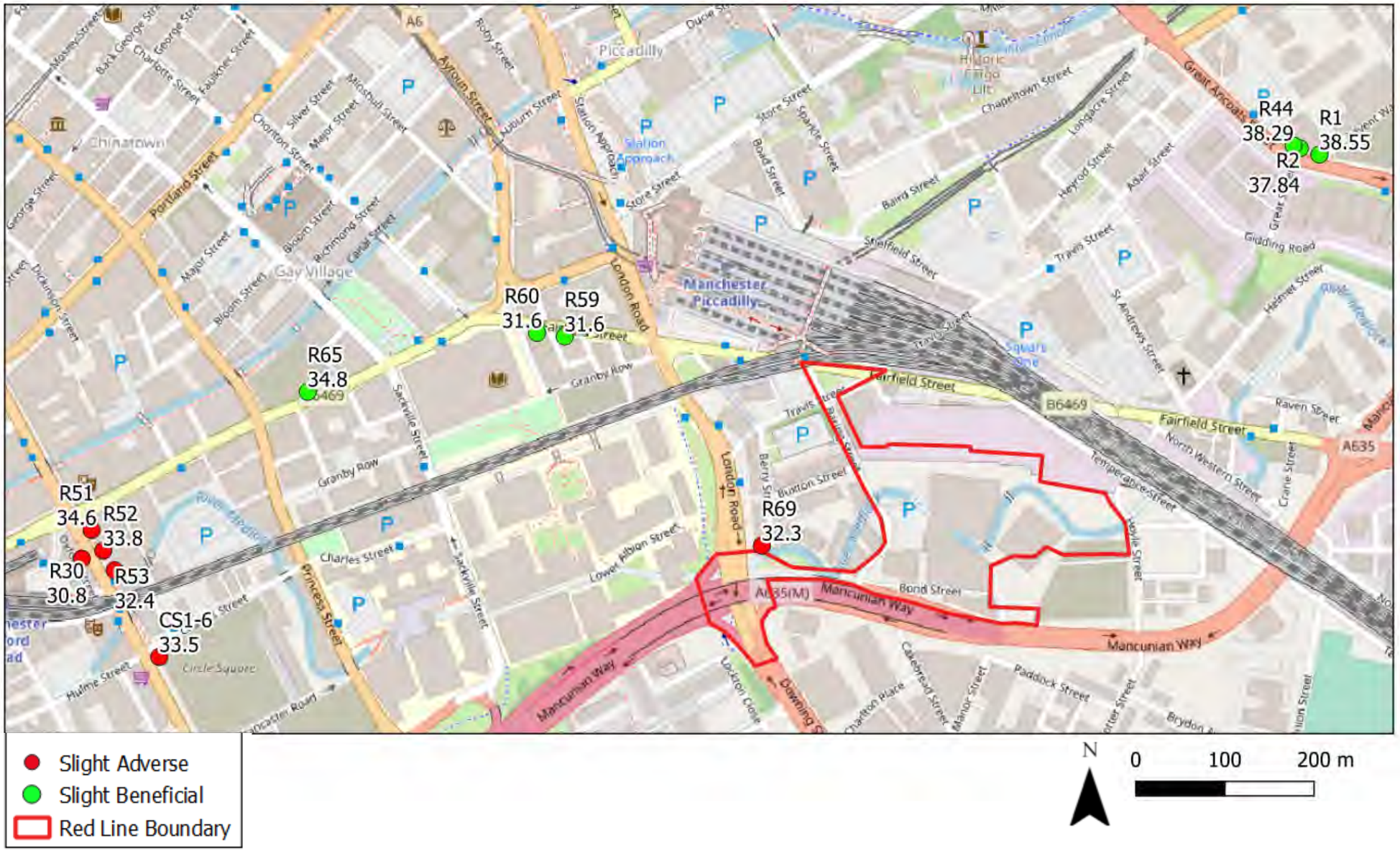


	Figure:	**8.7**		
	Title:	**Impacted receptors and predicted annual mean NO2 ug/m3 in DS scenario**		
	Project:	**Mayfield Phase 1**		
	Date:	**10/09/19**	**Scale:**	**1:5500**

9 Ecology

Introduction

9.1 This chapter of the Environmental Statement (ES) assesses the likely environmental effects of the Proposed Development with respect to terrestrial ecology. This chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been adopted.

9.2 The ecological baseline presented in this chapter is based on extended Phase 1 habitat surveys of the Site, a targeted river habitat survey, protected species surveys for bats, black redstart and breeding birds, and a desk study of biological records for the Site and in the surrounding area. From these, important ecological features (e.g. Sites, species and habitats) have been identified. The ecology survey reports, and further supporting information, are available in the following Appendices:

- 9-1 Glossary and Legislation & Policy;
- 9-2 Ecological Assessment Report, November 2017;
- 9-3 Bat Survey Report, November 2017;
- 9-4 Breeding Bird Survey Report, November 2017;
- 9-5 River Survey Report, November 2017;
- 9-6 Update Ecological Assessment Report, March 2019;
- 9-7 Update Bat Survey Report, March 2019;
- 9-8 Update Ecological Assessment Report, August 2019;
- 9-9 Update Bat Survey Report, September 2019;
- 9-10 Ecology Strategy with Biodiversity Net Gain Calculations;
- 9-11 Arboricultural Impact Assessment and Arboricultural Method Statement; and
- 9-12 Consultation with Greater Manchester Ecology Unit (GMEU) and Environment Agency.

9.3 Potential impacts and effects have subsequently been assessed for each important ecological feature within the Zone of Influence (ZoI).

9.4 Cumulative effects associated with ecology have additionally been considered within the ES and can be found in Chapter 16.

Pre-submission consultation

9.5 Pre-submission consultation, presented in Appendix 9-12, has been undertaken with Greater Manchester Ecology Unit and the Environment Agency as follows:

- A telephone conversation with Derek Richardson (Greater Manchester Ecology Unit – 'GMEU'), was undertaken on 17th July 2019 and followed up by emails documenting the conversation and requesting GMEU confirmation of the proposed approach on 18th July and 5th August 2019. Although no written response was received from GMEU, the second email was worded so that in the absence of receiving a response from GMEU, it would indicate general agreement with the proposed approach.

- Preliminary technical meeting with Environment Agency on 8th September 2017 followed by a biodiversity meeting and visit to the Mayfield Site on 14th February 2019, both with Gary Morris (Biodiversity Officer, Environment Agency) present, to discuss options for naturalising the river including delivery of biodiversity enhancements.

9.6 The approach discussed with GMEU and the Environment Agency has been adopted in preparing this ecological impact assessment and the accompanying Ecology Strategy (Appendix 9-10) with biodiversity net gain calculations.

Policy Context

9.7 The following legislation and policy is relevant to and has had an influence on the assessment or mitigation proposed in the ES. A summary of relevant legislation and policy considered can be found in Appendix 9-1:

International legislation, agreements and conventions

- United Nations Convention on Biological Diversity (1992);
- The Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar Convention); and
- European Council Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive).

National Legislation

- Conservation of Habitats and Species Regulations (2017);
- Wildlife & Countryside Act (WCA) (1981 as amended);
- Countryside and Rights of Way (CRoW) Act (2000);
- Natural Environment & Rural Communities (NERC) Act (2006);
- Protection of Badgers Act (1992); and
- Hedgerows Regulation (1997).

National planning policy and guidance

- National Planning Policy Framework (NPPF) (MHCLG, 2019);
- Planning Practice Guidance 2014 (MHCLG, updated 2018);
- Office of the Deputy Prime Minister Circular 06/2005, (ODPM, 2005); and
- Draft Planning Practice Guidance (2018) (Draft PPG).

Regional planning policy and guidance

- Greater Manchester Strategy 2009–20 (2009);
- Greater Manchester Spatial Framework (Draft, 2019) (GMSF); and
- Manchester's Local Development Framework Core Strategy Development Plan Document (MCC, 2012).

Local biodiversity strategies and action plans

9.8 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);
- Manchester Biodiversity Action Plan 2012–2016; and

- Valuing Manchester's Nature (2012).

9.9 Other relevant local plans include:

- Greater Manchester Green Infrastructure Framework ('GMGIF');
- Greater Manchester Ecological Framework (GMEF);
- Urban Pioneer /Natural Capital Account and Investment Plan; and
- Manchester's Great Outdoors – a Green and Blue Infrastructure Strategy for Manchester 2015 – 2025 and Stakeholder Implementation Plan 2015-2018 (MCC, 2015).

Assessment Methodology and Significance Criteria

9.10 This assessment of potential impacts and effects on ecology has been undertaken in line with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland[8].

Assessment of Effects

Scope of the Assessment

9.11 The 'study area' includes all land within the Site. An additional 'study buffer' is also included, where appropriate, around the ecological feature being investigated. The study area can therefore vary according to the target species or species group being surveyed. Details of the study area and study buffer are provided in this section for each survey type.

9.12 The extended Phase 1 habitat survey (Appendices 9.2 Ecological Assessment Report, November 2017, 9.6 Update Ecological Assessment Report March 2019, 9.8 Update Ecological Assessment Report August 2019) area covered all accessible land within the wider Mayfield development area, including the Site. The survey area excluded the roads to the west of the development area as works were confirmed to only affect hardstanding. The ecological desk study included a search for records of protected species, habitats and species of conservation concern, and sites designated for nature conservation, within the Site and with the following additional buffers:

- 5km desk study buffer for internationally protected sites;
- 2km desk study buffer for designated sites; and
- 1km desk study buffer for non-statutory designated sites and protected/notable species and habitats.

9.13 No internationally or nationally designated sites were located within the relevant buffers. The 2km desk study buffer and locations of non-statutory designated sites are shown in Appendix 9.8.

9.14 The Zone of Influence ('ZoI') for terrestrial ecology is defined as the 'area over which ecological features may be subject to significant effects as a result of the proposed project and associated activities'[8].

9.15 The ZoI may extend beyond the site boundary and is dependent on the receptor's sensitivity to environmental change, how mobile a receptor is, and whether there are hydrological or airborne links between planned activities and the features. The previously defined buffer distances are deemed suitable for the species or habitats present or with potential to be present on-site.

[8] Chartered Institute for Ecology and Environmental Management (CIEEM) (2018) Guidelines For Ecological Impact Assessment In The UK And Ireland: Terrestrial, Freshwater, Coastal and Marine, CIEEM, Winchester

Methodology for establishing the baseline conditions

Importance of ecological features

9.16 Under CIEEM 2018 guidelines[8,] ecological receptors (or features) are referred to in terms of their value, rather than their sensitivity. The relative value of ecological features, established through the desk study, extended Phase 1 survey and species-specific surveys, are based on the following geographic scale:

- International;
- National;
- Regional;
- County/Metropolitan;
- Local; and
- Site (negligible).

9.17 Designated sites have already been assessed for their nature conservation value. For example, sites important at the European level include those designated as Special Areas of Conservation (SAC) which are protected under the Conservation of Habitats and Species Regulations (2017)9 and sites important at the national level include those designated as Sites of Special Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981 as amended[10].

9.18 Examples of designated sites that are of importance at a county/metropolitan level include Local Nature Reserves (LNR) or Grade A Sites of Biological Interest (SBIs) while those of importance at a local level include Grade B and C SBIs.

9.19 Some habitats and species located outside of designated sites also have a geographic frame of reference which has been used as an objective starting point for identifying their importance such as those:

- considered to be priorities for conservation in England and Wales;
- listed as habitats and species of principal importance under the Natural Environment and Rural Communities Act 2006 (NERC)[11]; and/or
- listed as being of local importance in local Biodiversity Action Plans (BAPs)[12,13.]

9.20 However, the final value of habitats and species outside of designated sites has been determined by considering a number of additional criteria, for example local rarity, diversity, or function as a habitat corridor[14].

Scope of the assessment

9.21 Following the baseline evaluation of the importance of ecological features described above, only those assessed as being of local or higher importance are considered within the impact assessment along with all legally protected species in order to ensure statutory compliance.

[9] The Conservation of Habitats and Species Regulations 2017. Available from: https://www.legislation.gov.uk/uksi/2017/1012/contents/made
[10] The Wildlife and Countryside Act 1981 (England and Wales), as amended. Available from: http://www.legislation.gov.uk/ukpga/1981/69/contents
[11] The Natural Environment and Rural Communities Act 2006. Available from:
[12] Greater Manchester Biodiversity Action Plan (2009) Greater Manchester Biodiversity Project
[13] Manchester Biodiversity Action Plan 2012-2016 (2012) Manchester City Council
[14] (CIEEM, 2018 based on) Ratcliffe (1977) Nature conservation review: The Selection of Biological Sites of National Importance to Nature Conservation in Britain, Cambridge University Press

9.22 Likewise, the impact assessment only considers the potentially 'significant' effects of the development on ecology and nature conservation. Impacts on important ecological features are considered during both the construction and operational phases of the development.

Assessment of significant effects

9.23 The assessment of likely significant effects presents an assessment for all ecological features that have been scoped in because they are of nature conservation importance or are legally protected and there is a reasonable potential for there to be a significant effect.

9.24 At this stage, the assessment considers the impacts and effects of the development with the scheme and landscape design, and incorporating embedded mitigation, but without the implementation of supplementary mitigation measures.

Mitigation measures and assessment of residual effects

9.25 Where a potential effect exists, supplementary mitigation measures are provided. An assessment of the significance of any residual effects after mitigation is then made.

Characterising ecological impacts

9.26 Impacts on ecological features (adverse or beneficial) can be direct or indirect. These have been characterised based on the following parameters set out in the CIEEM guidelines:

- Extent (the spatial or geographical area over which the impact may occur);
- Magnitude (size, amount, intensity or volume of the impact);
- Duration (defined in absolute terms and where relevant in relation to the species/habitat being assessed i.e. a species lifecycle or the period over which habitat succession may occur);
- Reversibility (based on whether recovery is likely within a reasonable timeframe); and
- Frequency and timing (the number of times the impact is repeated and whether the timing of an impact coincides with important seasons or life cycle stages).

Determining significance

9.27 The following definitions are used for the terms 'impact' and 'effect':

- Impact – Actions resulting in changes to an ecological feature. For example, the construction activities of a development resulting in removal of a hedgerow; and
- Effect – Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from the loss of a hedgerow.

9.28 Effects can be significant at a wide range of geographical scales. CIEEM defines a significant effect to be:

'an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy, or more wide-ranging (enhancement of biodiversity)'.

9.29 Ecologically significant effects include impacts on the integrity of a designated site or the conservation status of a habitat or species within a given geographical area. If an impact is not likely to have an adverse or beneficial effect on the conservation status of a species or habitat, or stop recovering species or habitats from reaching favourable conservation status, then it is not considered to be a significant effect.

9.30 For species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within

a given geographical area. The known distribution, abundance and likely trends and variations in population size are considered.

9.31 Conservation status of natural habitats is the sum of influences acting on a natural habitat, and its typical species, that may affect its long-term natural distribution, structure and functions, as well as the long-term survival of its typical species within a given geographical area.

9.32 This chapter determines significance at geographical scales in accordance with the CIEEM 2018 guidelines. As set out in Chapter 2 EIA Methodology, the significance of effect is also considered as being negligible, minor, moderate or major. Moderate and major effects are considered to be significant at the geographical level specified in this assessment. Minor or negligible effects are considered not significant.

Limitations and assumptions

9.33 Species data collated during the desk study is mainly derived from records submitted by members of the public and previous surveys undertaken by professional consultants and volunteers not associated with the Proposed Development. Therefore, it should not be taken as a definitive list of the protected species that may occur in the local area.

9.34 During some site surveys, parts of the Site were not accessible to surveyors due to other uses, safety risks and, during later surveys, parts of the Site being an active demolition area. However, across the numerous surveys on the Site, it is considered that all parts of the Site have been accessed and assessed at some point, even if not all at the same time.

9.35 No additional limitations or constraints to the surveys were identified.

Baseline Conditions

Current and assessment baselines

9.36 Ecological baseline conditions are those existing in the absence of the proposed activities associated with the development. The aim of the assessment is to determine how the ecological conditions will change in relation to the assessment baseline to facilitate a clear understanding of the effects of the development. The assessment baseline may differ from the existing (or current) baseline as conditions on the Site may have changed and/or other developments located in the surrounding area may materially affect the current baseline.

9.37 Since adoption of the Mayfield Strategic Regeneration Framework (SRF 2018), a number of meanwhile uses have been implemented on the Site which have included building demolition and removal of structures, associated vegetation clearance and temporary changes of use. These have altered some of the habitats present on the Site.

Assessment baseline (2017)

9.38 For this reason, the ecological baseline conditions which existed on site immediately prior to implementation of the meanwhile uses will be adopted as the baseline against which the impact of the development is assessed. This baseline will be known as the 'assessment baseline' and is taken as those conditions which were present on the site in 2017.

Current baseline (2019)

9.39 The existing (or current) baseline is taken to be August 2019 and comprises a partially cleared Site as a result of clearance of trees, scrub and other vegetation and removal of a bat roost to facilitate the meanwhile uses. The current baseline is assessed where relevant e.g. some buildings and habitats have been removed so assessment of demolition impacts is not applicable. However, the effects of the loss of these as habitats still requires assessment and have been included in this assessment.

Survey scope

9.40 Evaluation of the ecological baseline conditions is based on a range of site and protected species surveys as well as desk study data collected between 2017 and 2019. These are summarised below and are presented in detail in Appendices 9.2 to 9.9. A full site description is provided in Chapter 3 (Site, Surroundings and Description of Proposals).

Statutory designated sites

9.41 No statutory designated sites are located within or adjacent to the Site. Within 500m to the north of the site is the Rochdale Canal. Certain stretches of the canal have been designated as an SAC and SSSI because it supports protected species alongside other red data book and priority species. The closest designated stretch is approximately 4km downstream from the closest point of the canal to the Site.

Non-statutory designated sites

9.42 There are two non-statutory designated sites located within 2km of the Site. Both are Grade A Sites of Biological Interest (SBI). Grade A SBIs are considered to be of county or regional importance. The sites are: The Rochdale Canal, Stotts Lane – Ducie Street Basin and the Ashton Canal (West). As discussed above, the Rochdale Canal supports regionally important aquatic habitat and species while the Ashton Canal is recognised as important for its submerged aquatic flora.

Ancient woodland

9.43 No ancient woodland occurs on site or within 2km of the Site.

Habitats of Principal Importance

9.44 Two Habitats of Principal Importance (HPI)15 for the conservation of biodiversity in England, listed under Section 41 of the NERC Act, occur within the Site. The Phase 1 habitat survey identified running water, in the form of the River Medlock, and several small pockets of self-established broadleaved woodland within the Mayfield boundary.

9.45 Rivers are a UK and Manchester priority habitat. The River Medlock at Mayfield is heavily channelised with vegetation comprising tall herb species, dominated by non-native invasive Japanese knotweed and Himalayan balsam, on silt banks within the river channel with occasional semi-mature broadleaved trees adjacent to retaining walls. All of the plants recorded were common and widespread species typical of urban brownfield habitats.

9.46 The woodland pockets generally contain young trees and have a poor structure, often dominated by single (birch) or a few species (ash, sycamore, elder) with bramble dominated understorey. There are further HPI broadleaved woodlands within 2km of the Site, as identified on MAGIC. There are approximately 10 separate locations of deciduous broadleaved woodlands, most of which are isolated and surrounded by otherwise urban habitat. The closest area of woodland is approximately 260m to the south of the Site.

9.47 Open Mosaic Habitat on previously developed land (OMH) is another HPI which can occur on brownfield Sites such as the application Site. The main elements of OMH are ephemeral / short-perennial vegetation with early successional plant and species; neutral and flower-rich grassland; and heathland[16]. The habitats on Site are described in Table 9.1. Although some of the habitats present are components of general brownfield Sites, none were considered to qualify as OMH as no specific priority features of OMH were present.

[15] Joint Nature Conservation Committee (JNCC) (2011) UK Biodiversity Action Plan Priority Habitat Descriptions (Updated December 2011)
[16] JNCC (2010) Handbook for Phase 1 habitat survey: A technique for environmental audit. Joint Nature Conservation Committee, Peterborough, England

Habitats on site

9.48 A number of extended Phase 1 habitat surveys of the Site have been undertaken to assess the habitats on Site amongst the ongoing changes as part of the redevelopment of the Site (Appendices 9.2, Ecological Assessment Report, November 2017; 9.6 Update Ecological Assessment Report, March 2019; and 9.8 Update Ecological Assessment Report, August 2019). The surveys reveal that the Site is mainly buildings with associated hard standing.

9.49 The Site was previously used for a mix of industrial and commercial activities with the northern boundary of the Site consisting of a disused railway depot with associated track bed. The semi-natural vegetation is generally associated with building edge, the old track bed and Site boundaries. The semi-natural vegetation types found on Site in 2017 (Appendix 9.2 Ecological Assessment Report, November 2017) survey comprised:

- Semi-natural broadleaved woodland;
- Scattered broadleaved trees;
- Scattered scrub;
- Semi-improved neutral grassland;
- Tall ruderal
- Amenity grassland
- Ephemeral/short perennial;
- Introduced shrub; and
- Running water.

9.50 Since the 2017 survey, additional surveys in February and July 2019 (Appendices 9.6 Update Ecological Assessment Report, March 2019 and 9.8 Update Ecological Assessment Report, August 2019) indicate a deterioration in habitats on site due to the removal of vegetation.

9.51 The Site will be assessed as per its surveyed condition in 2017, with consideration taken of any changes recorded in the unaffected habitats in the 2019 surveys. The changes on site to its current condition will be taken into account when considering the presence of protected and priority species on site later in the chapter.

9.52 The distribution of the habitats recorded during the 2017 extended Phase 1 habitat survey is shown in Appendix 9.2 Ecological Assessment Report, November 2017 and the change in habitat on site due to vegetation removal and building demolition between the current and the assessment baselines is illustrated in Appendix 9.8 Update Ecological Assessment Report August 2019 Table 9.1 describes these habitats and determines the importance of each for nature conservation.

Table 9.1 Habitats on site

Habitat	Area within site (m^2)	Likely importance	Description and Justification
Running water – River Medlock	2987.3[17]	Metropolitan	A UK and Manchester biodiversity priority habitat and HPI. Also considered to form an important element of the 'ecological framework' within the GI Framework. Whilst the stretch of the river that runs through the site is heavily modified with entirely engineered banks, it is still likely to provide an important wildlife corridor through and beyond urban Manchester including Clayton Vale. An assessment of

[17] The Running Water area in m^2 excludes in-channel vegetation incl. Japanese knotweed, Himalayan balsam and tall herb, but includes Baring Street and Hoyle Street culverts.

Habitat	Area within site (m^2)	Likely importance	Description and Justification
			aerial imagery indicates that the river links to more open greenspace to the north east of the site.
Semi-natural broadleaved woodland	6426.22	Local	Several small blocks of broadleaved woodland have self-established across the site. The woodlands are largely dominated by silver birch *Betula pendula* with sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior*, willow *Salix sp.* and holly *Ilex aquifolium* also present. These vary in maturity but are likely to provide value to local wildlife.
Semi-improved neutral grassland	4506.12	Local	The semi-improved neutral grassland has largely colonised the ballast of the old track beds associated with the depot in the north of the site. Whilst species present are considered to indicate succession from ephemeral/short perennial habitat, the presence of marsh orchids (*Dactylorhiza praetermissa)* was noted during the 2017 survey. It is therefore considered to be of local importance.
Scattered broadleaved trees	219.78	Site	A number of broadleaved trees are present across the site ranging from immature to mature. Most mature trees occur along the south-eastern boundary of the site where there is a row of poplars (*Populus sp.*). Trees are also present at the edges of the river corridor. Whilst most trees are of a common species, they are likely to provide value to local wildlife including invertebrates and birds.
Scattered scrub	125.43	Site	There are small patches of bramble (*Rubus fruticosus agg*.) dominated scrub throughout the site in areas of low use/or and management. These are not species rich and are considered to be of site importance.
Tall ruderal	4387.91	Site	Tall ruderal vegetation is scattered largely through the southern area of the site. It consists of widespread and common species such as nettle *Urtica dioica*, willowherb *Epilobium sp.* and creeping thistle *Cirsium arvense*, and so is considered to be of importance at a site level only.
Amenity grassland	1906.46	Site	The areas of amenity grassland continue to be managed by regular mowing. They are considered to be species poor, with perennial rye-grass *Lolium perenne* abundant. It is considered to be of importance at a site level only.
Ephemeral/short perennial	1174.51	Site	Throughout the site, small patches typical of this habitat has colonized building edges areas where hard standing surfaces have degraded. The vegetation comprises mostly low growing species which are common and widespread and typically found in urban and wasteland habitats, therefore it is considered to be of importance at a site level only.
Introduced shrub	1571.48[18]	Site	Throughout the site buddleia *Buddleja davidii* has established in gaps within hardstanding and the mortar of buildings and walls. It frequently occurs within the river corridor where there is also the invasive non-native species (INNS)[19] Japanese knotweed and Himalayan balsam. As these are invasive species they are considered to have a negative importance at a site level.
Bare ground & hardstanding	45380.85	Negligible	Comprises mainly tarmac roads and gravel access tracks which support no native species and have negligible value for nature conservation.
Built structures	14580.78	Negligible (unless roosting bats or breeding	There are 23 buildings on site, of which eight haverecently been demolished,and two culverts over the River Medlock. Nine of the built structures were considered to have moderate or high potential to support roosting bats. The importance of the buildings on site in relation to bat roosts

[18] The Introduced Shrub area in m^2 includes in-channel vegetation incl. Japanese knotweed, Himalayan balsam and tall herb.
[19] Schedule 9, The Wildlife and Countryside Act 1981 (England and Wales), as amended. Available from https://www.legislation.gov.uk/ukpga/1981/69/schedule/9

Habitat	Area within site (m^2)	Likely importance	Description and Justification
		birds present)	and breeding birds is covered under the baseline assessment for each species group.

Protected and priority species

9.53 A description of the species identified during the ecological surveys and the nature conservation importance of the populations of these species within the site boundary is provided in the following sections. A full description of the survey methods and results are provided in Appendices 9.3 Bat survey Report, November 2017, 9.4 Breeding Bird Survey Report, November 2017, 9.5 River survey Report, November 2019, 9.7 Update Bat Survey Report, March 2019 and 9.9 Update Bat Survey Report, September 2019.

Bats – foraging and commuting

9.54 The desk study returned multiple records for bats within 2km of the Site. Species returned in the data search included common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle P. pygmaeus, unidentified pipistrelle Pipistrelle sp., Daubenton's bat Myotis daubentonii, and unidentified bat species Chiroptera sp.. The closest records of these occur within 100m of the Site. Two walked activity transects and one passive detector monitoring period, undertaken in 2017, indicate that the wider Mayfield site is utilised predominantly by common pipistrelle bats in low numbers, with a Daubenton's bat recorded once on the river corridor. Full survey methods and results are included in Appendix 9.3 Bat Survey Report, November 2017.

9.55 Due to the demolition and vegetation clearance works that have occurred on site since the bat surveys were undertaken in 2017, it is considered likely that bat activity may have reduced on site with less foraging habitat present on site. Activity on the River Medlock corridor, however, is not anticipated to have changed. Bat surveys undertaken in 2019 confirmed that common pipistrelle bats continue to utilise the Site.

Bats - roosting

9.56 An assessment of the roosting potential of the built structures on the wider Mayfield site was completed in 2017 (full details in Appendix 9.2 Ecological Assessment Report, November 2017). Nine structures were considered to have features suitable for roosting bats and the 2017 bat roost surveys confirmed presence of roosting bats within four buildings and potentially within two culverts over the River Medlock (full details in Appendix 9.3 Bat Survey Report, November 2017)).

9.57 Further surveys in 2018 and 2019, with access to inspect the structure of the culverts, confirmed that the Baring Street culvert was likely to support roosting bats, whilst the Hoyle Street culvert was considered unsuitable and the recorded bats during the 2017 surveys had likely flown through the feature along the river corridor (Appendix 9.7 Update Bat Survey Report, March 2019).

9.58 In addition to the survey results, the data search also returned six records for pipistrelle bat roosts on site, indicating long-term faithful use of the wider Mayfield site by pipistrelle bats. Offsite, there are also records for a soprano pipistrelle bat roost within 350m of the Site and two records of a common pipistrelle bat roost within 850m of the Site.

9.59 All roosts on site are utilised by a low number (maximum count of 5 individuals) of common pipistrelle bats as summer day roosts. None of the roosts are considered likely to be maternity roosts. One of the buildings is considered to have potential to support hibernating bats.

9.60 All bats and their roosts and resting places are legally protected. As part of site clearance and demolition, one building containing a bat roost has been demolished with potential disturbance impacts to the roosts in one culvert and one building. All works affecting these roosts were covered within a European Protected Species (EPS) mitigation licence issued by Natural England (NE). Surveys during July and August 2019 (Appendix 9.9 Update Bat Survey Report, September 2019) confirmed that bats continue to use the Mayfield site for roosting despite the demolition and removal of vegetation in the vicinity.

9.61 Whilst common pipistrelle bats are considered a common and widespread species, and are not included as a Species of Principal Importance (SPI) in England, all bats are considered within the Greater Manchester BAP and have their own action plan within the Greater Manchester Biodiversity Project Therefore, the population of bats roosting, commuting and foraging on site is considered to be of local level value.

Black redstart and breeding birds

9.62 In the desk study, four Schedule 1 (WCA) species of bird were identified as occurring within 2km of the Site. These include the black redstart Phoenicurus ochruros, kingfisher Alcedo atthis, peregrine falcon Falco peregrinus and little ringed plover Charadrius dubius. However, it is not considered that the Site contains suitable nesting habitat for kingfisher and little ringed plover.

9.63 Part of the Site falls within the Black Redstart Priority Area as identified as part of the Species Action Plan which aims to maintain a breeding population in Greater Manchester.

9.64 Targeted black redstart and breeding bird surveys in 2017 (Appendix 9.4 Breeding Bird Survey Report, November 2017) did not identify use of the Site or the wider Mayfield site by black redstarts.

9.65 Peregrine falcons have been present on and off in Manchester since the early 1990s, with breeding occurring in occasional years. Although loyal to nest sites, breeding has moved location several times within the city, potentially due to loss of nest sites as a result of building demolition and disturbance. They breed in towns and cities using buildings such as churches, warehouses, tall chimneys, and tower blocks. No evidence of peregrine falcons nesting was observed on Site.

9.66 The desk study also returned a number of Section 41 (NERC Act) bird species as well as those listed on the red and amber Birds of Conservation Concern lists20 (BoCC) within the 1km search area. During the breeding bird surveys, five birds of BoCC were recorded on the wider Mayfield site including the red listed starling Sturnus vulgaris, and the amber listed bullfinch Pyrrhula pyrrhula, dunnock Prunella modularis, willow warbler Phylloscopus trochilus and mallard Anas platyrhynchos.

9.67 Whilst eleven species were identified as either possible, probable or confirmed breeders on the wider Mayfield site, the species assemblage is considered to be common and widespread and characteristic of a central Manchester site. Therefore, the bird assemblage on Site is considered to be of site importance.

Other protected species

9.68 No records of otters or water voles were returned as part of the data search. A survey of the river undertaken in 2017 (Appendix 9.5 River Survey Report, November 2017) concluded that the section of the River Medlock that runs through the Site is unlikely to support breeding or resting habitat for either species.

[20] British Trust for Ornithology (BTO) (2015) Birds of Conservation Concern 4: the Red List for Birds.

9.69 In addition, no signs characteristic of these species passing through the site, such as footprints and spraint, were identified and the river is considered to offer limited foraging opportunities. It is considered that works to facilitate improvements to the river corridor are not likely to have a direct impacts on riparian mammals.

9.70 Other protected and priority species including reptiles, great crested newts, dormice and invertebrates are not considered to be present on site due to the habitats present on, and adjacent to, the Site as well as the urban nature of the Site.

9.71 Riparian mammals and protected species, other than those discussed above, are, therefore, scoped out of any further assessment.

Invasive species

9.72 Japanese knotweed and Himalayan balsam are both listed on Schedule 9 (WCA) and have been recorded within the corridor of the River Medlock on site. Eradication of these species by a specialist contractor to prevent further spread is recommended.

9.73 Whilst not listed on Schedule 9, buddleia was also recorded across the site and is a non-native species.

Future baseline (2030)

9.74 The future baseline accounts for how the assessment baseline conditions would change in the absence of the Proposed Development; 2030 is assessed as this is the expected year of completion for the Mayfield Strategic Regeneration Area. If the development did not proceed it is expected that the buildings retained on site following the 2019 Prior Approval demolition work would continue to be in meanwhile use and the active yards would continue in their current usage also.

9.75 Derelict and less used areas of the Site would likely continue to be colonised by scrub, including buddleia, and ephemeral vegetation. Over the 11 year time frame, these may begin to succeed into self-established sapling woodland as can be seen in pockets on site currently. It is anticipated that the Site would continue to support wildlife species that are largely adapted to urban environments such as the common pipistrelle bat.

Identified features and their importance

Designated sites

9.76 Two non-statutory designated sites, both SBIs, occur within 2km of the Site. These are both classified as Grade A – sites of county or regional importance for nature conservation. Both sites are sections of canals approximately 400m to the north of the Site. Neither are linked directly to the Site or the River Medlock that runs through the Site and there is a significant amount of urban development between the SBIs and the Site. It is therefore considered unlikely that direct or indirect effects from the development proposals are likely to occur at these SBIs.

Habitats

9.77 The River Medlock, whilst heavily engineered, is considered to be a habitat with ecological importance at a Metropolitan level due to its corridor properties linking the Site to the wider landscape. It is a UK and Manchester HPI and BAP habitat and considered to form an important element of the 'ecological framework' within the Manchester GI Framework. Whilst the stretch of the river that runs through the Site is heavily modified with entirely engineered banks, it is still likely to provide an important wildlife corridor through and beyond urban Manchester including Clayton Vale. It is known to be used by bats for foraging and commuting purposes and is likely to be utilised by a number of bird species with an association with

water. The value of this ecological feature has been assessed as being of Metropolitan level importance.

9.78 The small pockets of broadleaved woodland on the wider Mayfield site could be considered to fall into the HPI category of lowland mixed deciduous woodland, although they are a poor example of the habitat type due to the dense structure and low diversity of tree species. They are still, however, likely to provide value to local wildlife and so are considered to be of ecological importance at a local level.

9.79 The other habitats on site are considered to be common and widespread and are not indicative of further HPI or BAP habitats. These are considered to be of ecological importance at a site or local level.

Protected and principal species

9.80 Five built structures on the wider Mayfield site, including four buildings and one culvert, were confirmed as bat roosts as part of the 2017, 2018 and 2019 bat surveys. The structures are utilised by low numbers of common pipistrelle bats as low status summer day roosts, with one building also being considered to have potential for use by hibernating bats. Two of the confirmed bat roosts are located within the Site, one of which has been demolished as part of the demolition works, under an approved European Protected Species Mitigation licence from Natural England.

9.81 In addition, activity transects and passive detector monitoring of the wider Mayfield site and river corridor confirms that the Site is also used by common pipistrelle bats for foraging and commuting as well as Daubenton's bats at a lower frequency. As bats and their roosts are legally protected and all species are considered within the GMBP bat SAP, the Site is assessed to be of local level value with regards to roosting and commuting and foraging bats.

9.82 Despite part of the Site falling within the Black Redstart Priority Area for Manchester, this species was not recorded during targeted black redstart and breeding bird surveys of the Site. Therefore, the Site is considered to be of site level importance for this species.

9.83 All nesting birds are protected under the WCA 1981 as amended. Following some building and vegetation clearance in 2019, the remaining scrub, buildings and trees provide a small amount of nesting and foraging opportunities for widely distributed garden and woodland bird species, there is other higher quality nesting and foraging habitat within the local area. As the extent of habitat on site is relatively small and nesting opportunities thus few, and as the Site is in an urban environment, breeding birds are considered to be of value at a site level only.

9.84 The Site is assessed to be of negligible ecological value with regards to other protected faunal species.

9.85 The Schedule 9 (WCA) INNS Japanese knotweed and Himalayan balsam occur on site, primarily within the river corridor. Buddleia occurs widely across the Site and whilst not listed on Schedule 9 it is a non-native species that readily colonises and spreads across urbanised and ex-industrial sites. These non-native species are considered to have a negative value at the site level.

9.86 A list of the features scoped into the assessment and the level of importance attributed to each is provided in Table . Those with negligible or site level importance or which have been identified as unlikely to be significantly impacted by the development activities (i.e. there is no clear pathway of effect), as described previously, are excluded from further assessment

Table 9.2 - Identified features and their importance

Ecological feature	Importance	Justification
River Medlock	Metropolitan	The river runs through the Site. Whilst heavily engineered and currently with little aquatic diversity, it is an HPI and BAP priority habitat, part of the Manchester GI ecological network and provides an important commuting and foraging corridor for a range of species, providing value to local wildlife.
Broadleaved woodland	Local	Lowland mixed deciduous woodland is a HPI. Whilst the pockets of self-established broadleaved woodland on the wider Mayfield site are considered to be in poor condition, the lack of woodland areas within central Manchester means that these small blocks may provide value for local wildlife.
Semi-improved neutral grassland	Local	The habitat is rare on the wider Mayfield site and in places supports species not frequently encountered on urban sites, such as marsh orchid.
Bats – foraging and commuting	Local	The Site, including the River Medlock is considered to provide some foraging and commuting habitat for common pipistrelle bats and, to a lesser extent, Daubenton's bat.
Bats - roosting	Local	Across the wider Mayfield site, four structures are known to contain low status summer roost of common pipistrelle bats, with one of the buildings also identified as having potential to support hibernating bats. Two of these structure are within the Site, one of which has already been demolished under prior approval.

Identification and Evaluation of Likely Significant Effects

Demolition and construction effects for Application 1 (Baring Street Multi-storey Car Park (MSCP), Baring Street Office 1 and Mayfield Park)

Relevant aspects of the scheme

9.87 A detailed description of the development is provided in ES Chapter 3 (Site, Surroundings and Description of Proposals). It is anticipated that the following demolition and construction activities are relevant to ecological considerations:

- Phased clearance of the Site prior to works including demolition of remaining existing building for the second phase of construction of Mayfield Park as well as vegetation clearance;
- Re-profiling of ground for Mayfield Park and removal of existing river walls to naturalise the River Medlock;
- Demolition of culvert over the River Medlock and clearance of vegetation from the river corridor;
- Ground works for installation of services and infrastructure;
- Constructions of new buildings, hardstanding and associated infrastructure;
- Tree planting and landscaping within the scheme; and
- Disturbance – construction lighting and plant/vehicle noise, vibration, movement and general activity.

Potential effects of the development and their significance

River Medlock

9.88 The River Medlock runs through the Site and will be entirely encompassed within the Mayfield Park area of the Proposed Development. As part of the delivery of the Park, the river will be reverted to a more natural watercourse with the removal of the existing engineered walls. The edges of the river will be re-profiled to allow a more natural flow of the river with allowance for flooding into the park during high rainfall events.

9.89 The construction would result in the loss of the existing scattered vegetation along the banks, including the removal of the Schedule 9 listed (WCA) INNS Japanese knotweed and Himalayan

balsam. As these species are dominant within the river corridor, it is considered that they likely provide some value to local wildlife utilising the corridor, in comparison to the river having no vegetation along its banks. Therefore, this loss of this habitat will still likely have an effect.

9.90 Removal of the brick built river walls may impact on faunal species using the walls as refuge. Given the shallow nature of the river, this is unlikely to include larger fish, but may impact on very small fish and aquatic invertebrates within the river channel and nesting birds which utilise riparian environments such as the grey wagtail.

9.91 Noise/vibration generated during the demolition and construction of surrounding buildings could disrupt birds or other wildlife that utilise the river as a foraging and commuting corridor during the daytime. Any night time lighting that illuminates the river corridor may result in an adverse effect on its use by bats as a foraging and commuting corridor.

9.92 There is a risk that waste materials, dust and contaminated run off from demolition and construction activities may enter the river and be washed downstream, damaging habitats and plants. This could also include the spread of the Schedule 9 listed (WCA) INNS if removal of the vegetation in the river corridor is not undertaken in a sufficiently controlled way.

Broadleaved woodland

9.93 No areas of broadleaved woodland fall within the boundary for the works to deliver Baring Street MSCP, Baring Street Office 1 or the area of the Park to be delivered within Application 1, and so negligible effects due to habitat loss are predicted on this habitat type.

9.94 Noise/vibration generated during the demolition and construction of surrounding buildings could disrupt birds or other wildlife that utilise the small areas of woodland for nesting and foraging during the day time.

Semi-improved neutral grassland

9.95 A small area of semi-improved neutral grassland with scattered scrub will be lost as part of the construction works associated with the Park and improvements to the River Medlock. As part of site clearance and preparation of interim temporary use of the depot, the area of semi-improved neutral grassland to the north of the site, which contained the marsh orchids, was recorded as cleared vegetation during the July 2019 update habitat survey of the site. Together, this will result in a temporary loss of this habitat type from the site.

Bats – foraging and commuting

9.96 Habitats across the wider Mayfield site including the small woodland blocks, scrub and semi-improved grassland are likely to support invertebrates which local bat populations will utilise as a food source. The River Medlock corridor through the Site will also provide a further foraging source of invertebrates associated with aquatic habitats as well as a commuting corridor from, and through, the Site to offsite habitats to the north east of the site.

9.97 Habitat loss during construction, noise and night-time lighting will reduce the suitability of the Site to support foraging and commuting bats. Works to naturalise the River Medlock may restrict, divert or halt the flow of the river through the Site, removing a foraging source for local bats, including those roosting within the retained buildings on the wider Mayfield site. Impacts resulting from these works have the potential to result in a moderate adverse temporary effect at a local level.

Bats - roosting

9.98 Five structures were identified to support bat roosts on the wider Mayfield site. Of these, one building has already been demolished under Prior Approval and the culvert containing the bat roost over the River Medlock will also be demolished to deliver Mayfield Park and associated

improvements to the river corridor. The remaining three roosts are within the depot building, or structures associated with the depot, to the north of the Site, and so should not be directly impacted by the works.

9.99 All bats in the UK are protected under the Conservation of Species and Habitats Regulations 2017 which makes killing, injuring or disturbance of individual bats, and damage or destruction of their roosts (whether they are utilising it at the time or not) an offence. To avoid an offence, an EPS mitigation licence was granted by NE for the demolition of the building containing a bat roost earlier in 2019. A subsequent licence will need to be obtained for the demolition of the culvert. The loss of two bat roosts is considered to have a moderate adverse permanent effect at a local level.

9.100 Noise and vibration from works within Application 1 may cause disturbance to retained roosts elsewhere on the wider Mayfield site, or roosts within the culvert should other works commence on site before this is demolished. Habitat loss and night-time lighting may also cause a severance in commuting routes and a loss of suitable foraging habitat for bats roosting elsewhere on the wider Mayfield site. These have the potential to result in a moderate adverse temporary effect at a local level.

Climate change and adaptation

9.101 The main predicted impacts of climate change in England, based on the 2018 UK Climate Projections (UKCP18)[21], are increases in summer and winter temperatures, with an associated increase in extended summer dry spells, a reduction in winter frost days, wetter winters and drier summers with an increase in extreme precipitation events.

9.102 Increases in extreme precipitation events during demolition and construction could increase the potential for pollution events occurring while drier summers could increase levels of dust generated. Both could increase the severity, occurrence or duration of adverse effects on the local habitats including the River Medlock

Summary of effects during construction

9.103 The potential effects for Application 1, identified above, are summarised in Table .

Table 9.3 Summary of effects during demolition and construction of Application 1 only

Ecological feature	Importance	Description of effect	Effect significance
The River Medlock	Metropolitan	Habitat loss	Minor adverse, temporary
		Damage and disturbance from noise/vibration, lighting, dust and run-off during demolition and construction	Minor adverse, temporary
		Potential spread of Schedule 9 listed (WCA) INNS species	Moderate adverse, permanent
Broadleaved woodland	Local	Damage and disturbance from noise/vibration, lighting, dust and run-off during demolition and construction	Minor adverse, temporary
Semi-improved neutral grassland	Local	Loss of habitat	Moderate adverse, permanent
Bats – foraging and	Local	Loss of foraging habitat due to vegetation removal across the site, including the river corridor	Moderate adverse, permanent

[21] Met Office Hadley Centre (2018) UKCP18 Science Overview Report November 2018 (Updated March 2019) Version 2.0; Available from: https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf

Ecological feature	Importance	Description of effect	Effect significance
commuting		Indirect impacts from noise/vibration, light, dust and run-off during demolition and construction	Minor adverse, temporary
Bats - roosting	Local	Loss of roosts in one building and the Baring Street culvert structure. Destruction and potential for killing or injury of bats.	Moderate adverse, permanent
		Indirect impact to retained roosts elsewhere on site from noise/vibration, light, dust and run-off during demolition and construction.	Minor adverse, temporary
		Severance of commuting routes from roosts due to habitat loss and/ or night-time lighting.	Moderate adverse, permanent

Demolition and construction effects for Application 1 + Application 2 (Baring Street MSCP, Baring Street Office 1, Mayfield Park, and Baring Street Office 2)

Relevant aspects of the scheme

9.104 Application 2 includes the addition of Baring Street Office 2 on the southern boundary of the Site, and adjacent to the plots delivered within Application 1. The addition of this building within Phase 1 is not considered to contribute any additional impacts to those assessed above and summarised in Table 9.3.

9.105 No demolition works are required to deliver Baring Street Office 2, as any buildings originally on the plot footprint were demolished as part of the Prior Approval works. Habitats on site prior to demolition were dominated by hardstanding and built structures which were not identified to provide nesting opportunities for birds or roosting opportunities for bats. Impacts associated with the construction of the plot will likely be noise and vibration, lighting dust and run-off. The effects would be similar to those assessed in Table 9.3 and are not considered to create a cumulatively higher effect significance in combination with the Application 1 demolition and construction phases.

Intermediate year construction effects

Mayfield Park and the River Medlock

9.106 The construction of Phase 1 is proposed to come forward in two phases. Phase 1a will include the delivery of re-profiling and highways works, the Baring Street MSCP, Baring Street Office 1 and the western part of Mayfield Park, with construction on these plots to be completed by Q3 2022. Phase 1b, which will commence construction in Q3 2020, will subsequently deliver Baring Street Office 2 and the remaining areas of Mayfield Park by Q4 2024.

9.107 As Phase 1b will continue construction activities until Q4 2024, the delivered areas of Mayfield Park and the improved River Medlock will need to be considered as future receptors and assessed as an ecological feature during the extended construction period of Phase 1b.

9.108 Temporary effects as a result of pollution by waste and run-off, noise, vibration and dust during continuing Phase 1b construction adjacent to the receptors could have a minor adverse effect, significant at a local level, on the newly created habitats and the species which might use these in the absence of mitigation.

Summary of additional effects during construction

9.109 The potential effects summarised in Table are not considered to be materially affected by the construction phase of Application 2. The remaining additional potential effects for Application 1 + Application 2 are summarised in Table 9.4.

Table 9.4 - Summary of additional effects during demolition and construction of Application 1 with Application 2

Ecological feature	Importance	Description of effect	Effect significance
Completed phases of Mayfield Park and improved River Medlock (future receptor)	Metropolitan	Damage and disturbance from noise/ vibration, light, dust and run-off during demolition and construction of Plot M and remaining phases of the park.	Minor adverse, temporary

Operational effects for Application 1 (Baring Street MSCP, Baring Street Office 1 and Mayfield Park)

Relevant aspects of the scheme and designed-in mitigation

9.110 Upon completion of Application 1, the Site will incorporate new built structures as well as extensive areas of soft landscaping associated with the delivered part of the park. Operational aspects of the scheme that have the potential to affect ecology are:

- Naturalised river corridor
- Extensive soft landscaping; and
- Increased human activity, noise levels and lighting.

Potential effects of the development and their significance

9.111 Impacts from noise, human disturbance and lighting have the potential to create adverse indirect effects on the newly created Mayfield Park. However, as these will be created and maintained within a highly urban area, potential effects are considered to be negligible.

9.112 The Proposed Development will result in an increase in the level of use of the Site by local residents and visitors. While this would result in a slight increase to the levels of disturbance to breeding birds and foraging/ commuting bats, this is considered unlikely to be significant given the Site already occurs in an urban area and is likely to be used by urban-adapted species. This is considered likely to have a negligible effect on breeding birds and bats.

9.113 A detailed lighting plan will be prepared for each phase of the Site, including the park. The lighting plan will incorporate a number of strategies as outlined within the Institute of Lighting Professional's (ILP) guidance note Bats and artificial lighting in the UK22 which will aim to minimise any impacts from light spill on and adjacent to sensitive habitats, including the river corridor and any artificial roosting sites for bats which are installed by the development. Such strategies may include, but are not limited to, directional lighting, low level bollards, low UV content fixtures and timed or sensor triggered lighting.

9.114 Obtrusive light spill from new structures including Baring Street MSCP and Baring Street Office 1 will also need to be assessed. The proximity of Baring Street Office 1, in particular, to the River Medlock corridor will lead to a risk of the spill of internal lighting out of the windows on

[22] Institute of Lighting Professionals (ILP) (2018) Guidance Note 08/18 Bats and artificial lighting in the UK

to the river corridor. In combination with the external lighting, operational lighting of the development is anticipated to have a permanent moderate adverse effect in the absence of mitigation and a suitable lighting plan.

9.115 Reconstruction of the river edge will provide a significant enhancement for biodiversity both on the Site and for the River Medlock in general. The heavily engineered vertical brick and stone retaining walls will be replaced with more naturalised slopes and terraces, with set-back retaining walls where required, along the length of the river as it passes through the Site.

9.116 Naturalised flooding areas within the wider river channel and park will be allowed for, with suitable planting reflecting these areas of occasional inundation. Planting for the river corridor includes emergent planting within the edges of the channel, wetland verge planting above the water line and flood plain meadow planting where flooding will be accommodated within the more formal park areas.

9.117 The newly naturalised river channel will provide a more diverse habitat to that currently supported on site and will benefit the local invertebrate, bat and bird populations by providing shelter and foraging habitat. Similar works to naturalise the river banks upstream of the Site on the River Medlock has seen marked results with brown trout fisheries recorded on that stretch of the river following the completion of the works.

9.118 The wider park buffers the River Medlock and incorporates a range of landscaped areas reflecting different usage areas for future users of the Site. Habitats will vary across the Site from more formal lawn areas to tall wildflower grassland patches, scrub and woodland. A diversity of species planting is proposed within the landscape plans, to include wildflower species within the lawn area which are proven to withstand the regular mowing and fertilising regime often implemented to maintain lawns.

9.119 Around and within the lawn areas, a forb-rich wildflower mix will be used and left to grow tall, creating a mosaic of habitats within the grassland areas. Terraces associated with level changes from the retained depot to the north of the Application 1 boundary are proposed to be planted with brownfield species mix and include habitat suitable for invertebrates within the planting areas.

9.120 The proposed habitats, including species mix, within Mayfield Park, alongside the improvements to the River Medlock will provide long-term habitat opportunities and improvements for species currently utilising the Site as well as those with the potential to use the future site including bats, black redstart, breeding birds and invertebrates. Therefore, it is likely to have a moderate beneficial effect with regard to these species and the green infrastructure of the local area.

Biodiversity net gain calculations

9.121 Biodiversity net gain (BNG) calculations using the updated Defra Biodiversity Metric (version 2.023) have been undertaken to calculate the change in biodiversity units for the site before and after development.

9.122 Two sets of calculations were undertaken for the development. The first demonstrates how Mayfield Park can deliver BNG for the wider Mayfield site and the core development area within the Mayfield Strategic Development Framework, working on the assumption that the majority of recorded habitats will be lost.

9.123 The second calculation considers Phase 1 in isolation, comparing the pre- and post-habitats and subsequent BNG delivered by this application alone, in the advent that future phases of the Mayfield SRF do not come forward.

[23] Natural England (2018) Updating the Defra Biodiversity Metric. Defra. December 2018

9.124 These calculations demonstrate that the level of ecological design embedded within the proposed park will result in a net positive gain for biodiversity on the basis of the habitats to be provided for both the wider Mayfield site and Phase 1.

9.125 The pre-development calculations are based on the site-wide 2017 Phase 1 habitat survey (Appendix 9.2 Ecological Assessment Report, November 2017) while the post-development calculations are based on the proposed Planting Character Areas and Planting Strategy for Mayfield Park only and exclude any soft landscaping provided within other plots due to no fixed schemes or areas at the time of assessment. The full calculations and assumptions are provided in Appendix 9.10 Ecology Strategy and Biodiversity Net Gain Calculations.

9.126 Based on the above, the pre-development value of the habitats on the wider Mayfield site as 13.25 Biodiversity Units (BU). The pre-development value of the habitats within Phase 1 only is 5.90 BU.

9.127 The proposed soft landscaping for Mayfield Park will result in a predicted 16.50 Biodiversity Units post-development for the wider Mayfield site. For Phase 1, the calculation is slightly less (16.31 BU) due to the Phase 1 redline excluding the majority of Hoyle Street culvert from the calculations, otherwise the habitat delivery is the same.

9.128 This results in a total increase of +3.224 Biodiversity Units post-development (Table); an increase of just under 20% Biodiversity Net Gain, primarily contributed through delivery of the Park.

Table 9.5 Change in Biodiversity Units

Calculation area	Post-Development Biodiversity Units		Pre-Development Biodiversity Units		Change in Biodiversity Units
Wider Mayfield site	16.50	minus	13.25	=	+3.254
Phase 1 site	16.31		5.90	=	+10.404

Climate change and adaptation

9.129 As previously discussed, the main predicted impacts of climate change in England, based on the 2018 UK Climate Projections (UKCP18), are warmer, drier summers and warmer, wetter winters with an increase in extreme precipitation events.

9.130 For this site, the naturalisation of the river corridor, with the creation of areas for flooding allowance will help the River Medlock accommodate extreme precipitation events. The extensive planting within the Mayfield Park area including wildflower and native tree and shrub planting will contribute to reducing the urban heat island effect in the densely built up area.

9.131 The combination of the River Medlock improvement works and the introduction of the Mayfield Park through the centre of the wider SRF site will help buffer the effects of climate change on biodiversity, consequently increasing the resilience of species and habitats, and providing more places and habitats for urban wildlife to occupy as they adapt to future climatic conditions.

Summary of effects during operation

9.132 The potential effects during operation identified above, for Application 1 only, are summarised in Table 9.6.

Table 9.6 - Summary of effects during operation of Application 1

Ecological feature	Importance	Description of effect	Effect significance
River Medlock	Local	Impacts from noise, human disturbance and lighting	Negligible
		Naturalisation of the river corridor including aquatic planting	Moderate beneficial, permanent
Roosting and foraging and commuting bats	Local	Impacts from noise and human disturbance	Negligible
		Impacts from light spill from external lighting and obtrusive light spill from built structures	Moderate adverse, permanent
		Incorporation of a range of soft landscaping across masterplan area including wildflower grassland wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Moderate beneficial, permanent
Local fauna including black redstart, generalist birds and local invertebrates	Local	Impacts from noise, human disturbance and lighting	Negligible
		Incorporation of a range of soft landscaping across masterplan area including wildflower grassland wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Moderate beneficial, permanent

Operational effects for Application 1 + Application 2 (Baring Street MSCP, Baring Street Office 1, Mayfield Park and Baring Street Office 2)

Relevant aspects of the scheme and designed-in mitigation

9.133 Upon completion of Baring Street Office 2, there will be additional users of the Site associated with additional office space and the potential effects an additional operational building may have on the surrounding area. At a similar time, under the phased construction programme, the remaining areas of Mayfield Park will be completed, delivering the completed wider habitat and river corridor for the Site.

- Extensive soft landscaping; and
- Increased human activity, noise levels and lighting.

Potential effects of the development and their significance

9.134 Following the delivery of Phase 1a, completion of Phase 1b construction will likely increase the number of site users on site due to the delivery of another office building (Baring Street Office 2) and the completion of Mayfield Park creating a draw for local residents as well as those directly working within the operational office buildings within the Site. However, the additional areas of the park that will be delivered within Phase 1b alongside the Application 2 office building will diffuse this impact by providing a greater area for visitors to be present in.

9.135 Given the highly urbanised area that the development is situated in, it is not considered that the delivery of the additional built structure within Application 2 and the potential noise and human disturbance impacts associated with it will have a significant impact.

9.136 On the whole, it is considered that the significant effects for Application 1 will remain unchanged. The effects of Application 1 + Application 2 are summarised within

9.137

9.138 Table

Summary of effects during operation

Table 9.7 Summary of effects during operation of Application 1 with Application 2

Ecological feature	Importance	Description of effect	Effect significance
River Medlock	Local	Impacts from noise, human disturbance and lighting	Negligible
		Naturalisation of the river corridor including aquatic planting	Moderate beneficial, permanent
Roosting and foraging and commuting bats	Local	Impacts from noise and human disturbance	Negligible
		Impacts from light spill from external lighting and obtrusive light spill from built structures	Moderate adverse, permanent
		Incorporation of a range of soft landscaping across masterplan area including wildflower grassland wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Moderate beneficial, permanent
Local fauna including black redstart, generalist birds and local invertebrates	Local	Impacts from noise, human disturbance and lighting	Negligible
		Incorporation of a range of soft landscaping across masterplan area including wildflower grassland wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Moderate beneficial, permanent

Mitigation Measures

Supplementary mitigation measures during demolition and construction

9.139 The following section sets out the proposed mitigation for likely significant adverse effects identified in the demolition and construction effects section, as well as those measures which will be employed to further reduce non-significant (minor) adverse effects and ensure that the relevant statutory requirements are met.

Habitat loss

9.140 In order to deliver Phase 1, a number of existing habitats on site will be lost. These include semi-improved neutral grassland, scrub, tall ruderal vegetation, scattered broadleaved trees and buildings.

9.141 The landscape strategy of Mayfield Park intends to replace and, in line with national and local planning policies, deliver a net gain in habitats not only for Phase 1, but also for the wider Mayfield SRF development. Using Defra's updated biodiversity metric, the proposed park design was assessed in comparison to the existing habitats across the wider Mayfield site and was shown to deliver just under 25% net gain in biodiversity as measured by habitats. When assessed for Phase 1 alone, this increases to just over 175%

9.142 As part of the delivery of Mayfield Park, the River Medlock corridor will be substantially improved. Whilst a short-term loss of scrub within the river corridor will be incurred, the

majority of this is comprised of Schedule 9 (WCA) invasive non-native species, the removal of which will be of benefit to the local ecology.

9.143 The new naturalised river corridor through the Site will deliver planting within and adjacent to the river, improving the aquatic environment for invertebrate species associated with this habitat type. In turn, this can be considered to provide an improved foraging source for local bird and bat populations.

9.144 As well as delivering substantial improvements to the River Medlock corridor, the value of which is not captured within biodiversity net gain calculations, the park will also deliver the following habitat areas:

- Wetland and riverside mosaic planting;
- Species rich lawn;
- Forb rich grassland, to be left unmown;
- Brownfield terraces;
- Woodland; and
- Wetland tolerant scrub.

9.145 Without mitigation, the loss of habitat could have a permanent moderate negative impact on bats and a minor negative impact on breeding birds. However, the Proposed Development to provide 1.22ha of new habitat, creating 13.01 BU post-development, plus enhancement of 0.23ha of the River Medlock, comprising 3.18 BU post-development will, in the long-term, provide compensatory habitat for foraging and commuting bats, breeding birds and invertebrates.

Damage to habitats from pollution

9.146 Chapters 5 (Construction Management and Phasing) and 8 (Air Quality) included in this ES give detail on control and management of dust. A detailed Construction Environmental Management Plan ('CEMP') will be secured by way of Planning Condition for each phase of development within the Proposed Development, which will detail how airborne dust, run-off, and demolition and construction materials will be managed during the demolition and construction activities.

9.147 Controls will follow national standards and best practice to ensure that these risks are minimised and that they do not affect the wider River Medlock, retained or adjacent habitats or species and habitats beyond the Site boundary. Dust attenuation and suppression measures will be agreed and detailed in the CEMP which will avoid an impact on designated sites, and habitats which support species of conservation value on site (where retained) and off-site.

9.148 Chapter 11 (Water Resources and Flood Risk) gives details on control of water quality and final details for the control of run-off, which will be detailed in the CEMP and will seek to prevent siltation of watercourses and damage to habitats connected to the site via the River Medlock.

9.149 The CEMP will also detail how waste materials from demolition and ground works and storage of construction building materials will be managed to avoid damaging or contaminating adjacent habitats.

9.150 Removal and/or treatment of invasive non-native species on site will be undertaken and managed by a specialist contractor using methods to control the removal of plant material and soil which may contain plant material.

9.151 This waste will be disposed of at a landfill licensed to take invasive non-native species to prevent the spread of the plants both on and off site. Contractors working within or near to these removal areas will be required to adhere to strict biosecurity protocols as implemented by the removal specialist to prevent any further spread across the Phase 1 construction site or the wider Mayfield site.

Disturbance of fauna by noise/vibration and lighting

9.152 The CEMP will include provisions for minimising indirect impacts such as noise/vibration and construction lighting on the surrounding area and sensitive species such as bats, black redstart and breeding birds.

9.153 Chapter 6 (Noise and Vibration) provides details on the management of noise and vibration, which will include use of hoarding and restrictive working hours.

9.154 Lighting also has a risk of affecting sensitive fauna within and adjacent to the Site such as foraging and commuting bats. The CEMP will detail how lighting will be managed during the construction phase of works to limit any potential effects.

9.155 Particular consideration will be given to the requirement for lighting on or close to the river corridor and the position of lighting with regards to retained bat roosts to the north of the Site. Connectivity between these roosts and the river via a dark corridor should be maintained.

Disturbance as a result of creation of habitat suitable for black redstart during demolition and construction

9.156 The CEMP will detail how waste materials from demolition and ground works and storage of construction building materials will be managed to avoid creating potentially suitable habitat for black redstart. Waste materials, especially building rubble, will need to be removed from Site promptly, or contained appropriately, to prevent any habitat being created to support black redstart.

Killing and injury of birds by the destruction of active nests

9.157 Breeding birds, their nests and young are protected under Schedule 1 of the Wildlife and Countryside Act 1981 as amended and any site clearance which takes place within the bird breeding season (i.e. between March and August inclusive), could kill or injure adults, chicks or damage eggs. Full details on the avoidance of killing and injury of birds, and avoidance of active nest destruction, will be included in and agreed on in the CEMP prior to works commencing.

Destruction of a bat roost and killing or injury of individual bats

9.158 All bats in the UK are protected under the Conservation of Species and Habitats Regulations 2017 which makes killing, injuring or disturbance of individual bats, and damage or destruction of their roosts (whether they are utilising it at the time or not) an offence. Bats found to be roosting in five structures across the wider Mayfield site, including one building which has been demolished under Prior Approval and a culvert over the River Medlock which is due to be removed as part of the improvements to the river corridor.

9.159 The roost that has already been destroyed was done so under an EPS licence approved by NE. An additional licence will be required in order to remove the culvert and subsequently destroy a low status summer roost used by individual or low numbers of common pipistrelle bats. The licence will need to be approved by NE ahead of works commencing on or in proximity to the roost.

9.160 Within the licence, methods of demolition will be detailed to minimise the risk of injuring or killing a bat during works. This may include the use of soft demolition techniques to remove

the identified roosting features with a licensed bat ecologist present to safely remove any bats that are found and relocate them to a suitable location (e.g. a bat box on site). Licences will also include provision of compensatory roosting habitat to replace the roosting potential of the site.

9.161 A summary of the recommended demolition and construction mitigation measures is provided in Table .

Table 9.8 Summary of demolition and construction supplementary mitigation measures for Phase 1

Ecological feature	Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
River Medlock, semi-natural habitat on site, and fauna of conservation value on site including bats and breeding birds	Loss of habitat	Creation of ecologically valuable habitat within the Mayfield Park by incorporating native and species diverse pollinator planting, replacement brownfield habitat and tree planting across the park. Improving the River Medlock by removing heavily engineered banks, creating a more naturalised river with aquatic species planting.	Management plan for the park and River Medlock to be secured through planning condition and implemented by contractor.	Prior to and during demolition and ground works in Application 1
River Medlock, Mayfield Park (intermediate year effects), and habitats used by fauna of conservation value	Damage of habitats from pollution	Airborne dust, siltation and pollution caused by run-off, spread of invasive species and management of demolition waste and construction materials will be controlled and managed in keeping with national guidelines, following recommendations made in Chapters 5, 8 and 11 of this ES and in the CEMP, to avoid damage of retained habitats on site, habitats created ahead of construction completion and habitats beyond the site boundary.	CEMP to be secured through planning condition and implemented by contractor.	Prior to and during demolition and construction of Application 1 & Application 2.
	Disturbance by noise/vibration and lighting	Noise and lighting will be managed in keeping with national and local guidelines following recommendations made in Chapter 6 of this ES and in the CEMP, to avoid as much as possible, disturbance beyond the development site boundary.	CEMP to be secured through planning condition and implemented by contractor.	Prior to and during demolition and construction of Application 1 and Application 2.
Breeding birds roosting and foraging and commuting bats	Disturbance by noise/vibration and lighting	Noise and lighting will be managed in keeping with national guidelines, following recommendations made in Chapter 6 of this ES and in the CEMP, to avoid as much as possible, disturbance to fauna of conservation value retained within or adjacent to the development site boundary.	CEMP to be secured through planning condition and implemented by contractor.	Prior to and during demolition and construction of Application 1 and Application 2.

Ecological feature	Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Roosting bats	Killing, injury or disturbance of individual bats, and damage or destruction of their roosts.	Prevention of an offence under legislation due to destruction of bat roosts for Phase 1 will be ensured by the production of a European Protected Species licence from Natural England. Methods of demolition and removal of any bats in-situ during demolition as well as provision of compensatory habitat replacement will be detailed within this document or a relevant Methods Statement.	Licence to be secured following planning approval and prior to demolition works to the culvert. To be implemented by contractor and licensed bat worker.	Prior to and during demolition for Application 1.
Breeding birds	Killing and injury of birds, and destruction of active nests	Avoidance of harm to birds, their nests and young to prevent an offence under legislation, will be ensured through following the recommendations outlined in the Chapter which will be detailed in the CEMP.	CEMP to be secured through planning condition and implemented by contractor.	Prior to and during site clearance for Application 1.

Supplementary mitigation and enhancement measures during operation

9.162 In addition to the specific recommendations for the landscaping of Mayfield Park and naturalisation of the River Medlock, a number of recommendations are made to enhance the Phase 1 site's ecological value in line with planning policies and BAP guidance in areas of landscaping within and surrounding the Baring Street MSCP, Baring Street Office 1 and Baring Street Office 2. These are summarised below:

- Incorporate the use of native species and those of benefit to biodiversity (i.e. flowering/fruiting species) within landscaping;
- Plant a variety of native species within the site such that there will be a large positive increase in the number and diversity of species in comparison to the existing site;
- Incorporate features and select planting species to create additional opportunities for invertebrates (including pollinators) in order to provide nesting habitat, cover and foraging;
- Apply sustainable horticultural practices to increase the sustainability of the soft landscaping by:
  - no, or low, use of residual pesticides;
  - no use of peat based products;
  - avoiding a design that is heavily reliant on irrigation;
  - utilise rainwater harvesting in the irrigation system;
  - design-in features to reduce water use and enable composting and integrated pest management;
  - source and use UK-produced plants to reduce risk of introduction of imported pests and diseases and to reduce the carbon footprint;
  - select plants that require less water and chemical inputs and are suited to the local conditions;

- widen the diversity of species planted to increase resilience to climate change and new pest/disease outbreaks.

9.163 The integration of these recommendations into the proposed landscaping of each building demise and public realm will maximise the benefit of the soft landscaping across the entire Proposed Development for local biodiversity, providing connectivity and continuity across the site, and not restricted to the park.

9.164 A summary of the recommended operational mitigation measures is provided in Table .

Table 9.9 - Summary of operational mitigation and enhancement measures for Phase 1

Ecological feature	Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
River Medlock, Mayfield Park and habitats used by fauna of conservation value	Impacts from noise, human disturbance and lighting	A detailed lighting plan will be prepared for Mayfield Park and each plot to minimise impacts from external and obtrusive light spill on adjacent sensitive habitats. No other specific measures – impacts assessed as negligible.	Implementation of lighting plan within and adjacent to Mayfield Park.	During construction and operation of Application 1 and Application 2.
Roosting and foraging and commuting bats	Impacts from noise, human disturbance and lighting	A detailed lighting plan will be prepared for Mayfield Park and each plot to minimise impacts from external and obtrusive light spill on retained and mitigation bat roosts as well as important commuting and foraging areas, including the River Medlock. No other specific measures – impacts assessed as negligible for noise and disturbance.	Implementation of lighting plan within and adjacent to Mayfield Park.	During construction and operation of Application 1 and Application 2.
	Habitat creation and enhancement	Incorporation of a range of soft landscaping across the Mayfield Park area including wildflower grassland wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Production and implementation of a management plan for the Mayfield Park and River Medlock to be secured through planning condition.	Installation during construction, maintenance during operation of Application 1.
Local fauna including black redstart, generalist birds and invertebrates	Impacts from noise, human disturbance and lighting	A detailed lighting plan will be prepared for Mayfield Park and each plot to minimise impacts from external and obtrusive light spill on adjacent sensitive habitats. No other specific measures – impacts assessed as negligible.	Implementation of lighting plan within and adjacent to Mayfield Park.	During construction and operation of Application 1 and Application 2.
	Habitat creation and enhancement	Incorporation of a range of soft landscaping across the Mayfield Park area including wildflower grassland wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Production and implementation of a management plan for the Mayfield Park and River Medlock to be secured through planning condition.	Installation during construction, maintenance during operation of Application 1.

Cumulative Effects

9.165 The cumulative developments considered relevant to terrestrial ecology are those that lie within 200m of the Site and are not affected by a significant barrier to connectivity, such as a major railway or road.

9.166 Those outside of 200m are not considered due to the highly urbanised environment in which the sites are located which likely creates a barrier to dispersal between sites at a greater distance. Nearby relevant approved developments are listed below and summarised in Chapter 2 of this Statement.

- Mayfield Depot and Temperance Street Arches Fairfield Street (123728/FO/2019)
- Macdonald Manchester Hotel (123095/FO/2019)
- Chandos Hall (118267/FO/2017)

9.167 Application 116099/FO/2017 (Refurbishment, restoration, reconfiguration and extension of former London Road Fire Station), although within 200m of the application site, was not considered relevant to terrestrial ecology given the absence of habitat on site prior to development and little scope for it to be added post-development. The building to be converted is also considered generally unsuitable for black redstart and there will be no changes to the building that will increase or decrease its value in relation to bats or nesting birds. Construction effects will be mitigated as part of a site specific CEMP.

9.168 An assessment is also provided for relevant SRFs where a cumulative effect may occur. Relevant SRFs (as per the criteria listed above) considered in this assessment are listed below and summarised in Chapter 2 of this Statement.

- Mayfield SRF May 2018
- Manchester Piccadilly SRF March 2018
- Piccadilly Basin SRF October 2016
- North Campus SRF December 2016
- Portland Street SRF November 2017

Demolition and Construction Cumulative Effects

9.169 The cumulative developments, SRFs and Proposed Development will all be subject to a CEMP with best practice working methods and mitigation measures to manage emissions to air and land including noise, vibration and light spill and to protect adjacent habitats and sites and associated fauna from the respective development works. It is anticipated that cumulative Type 1 effects of demolition and construction on adjacent habitats will be minimal as long as the proposed mitigation detailed in the respective CEMP are implemented. As a result, no Type 2 effects should be observed.

Approved developments

9.170 Construction relating to the Mayfield Depot was completed in September 2019 and so will not coincide with the demolition and construction of the Site. As a result, no cumulative effect is anticipated.

9.171 Demolition and construction relating to the Macdonald Manchester Hotel and Chandos Hall have the potential to be concurrent with the demolition and construction activities of the Proposed Development. The clearance of habitats on site and at Chandos Hall will result in a temporary reduction in available habitat in the area, however as the existing habitats on site at Chandos Hall have been assessed as being of low ecological value, no significant cumulative effect is anticipated.

9.172 No clearance of habitat is planned at Macdonald Manchester Hotel. 9 no. trees on site are to be retained with 3 no. of these being dug out and replanted elsewhere on site. Therefore no cumulative effect is anticipated.

9.173 No cumulative effects on protected and priority species are considered likely. Whilst construction works have the potential to disturb protected species such as black redstart and foraging/commuting bats, work to the Mayfield Depot is anticipated to be completed before the main construction works for the Proposed Development commence. In addition, Chandos Hall was indicated to be unsuitable for use by nesting or foraging black redstart and no survey was required for the Macdonald Hotel, therefore no cumulative effect is anticipated.

Strategic Regeneration Frameworks

9.174 Mayfield SRF is generally of low ecological value, comprising mostly hardstanding, buildings and recently cleared ruderal vegetation. There are some habitats on the wider site however that are of an increased ecological value including small areas of self-seeded broadleaved woodland and neutral grassland. These are anticipated to be removed as part of delivery of the wider SRF. Bats were also found to be roosting in an additional three structures across the wider site. The removal of these habitats during demolition and construction will have a minor adverse cumulative effect (Type 1) on terrestrial ecology in the area.

9.175 Within the development of the Mayfield SRF, the Park is intended to provide the biodiversity net gain for the entire development. Delivery of the Mayfield Park will occur in Phase 1 resulting in 175% biodiversity net gain for this phase. However, when this is applied across the entire SRF area, the overall biodiversity net gain effect achieved by the Park will be reduced to 25%. This will result in a minor adverse cumulative effect, when applied to delivery of future phases within the SRF, however, this is not considered significant as the residual effect of biodiversity net gain over and above policy requirements will still be achieved for the SRF area with a moderate beneficial residual effect.

9.176 All other SRFs that are classed as relevant to terrestrial ecology on the Proposed Development consist of sites that are considered to be of low ecological value. Portland Street Village, Manchester Piccadilly and Piccadilly Basin consist largely of hard standing and buildings and as a result the removal of habitat associated with the demolition and construction of these developments and the Mayfield SRF, no cumulative effect relating to the Proposed Development would be observed.

9.177 All existing parks in the North Campus SRF are to be retained, however Vimto Park will be reduced in size to accommodate a new building. This will result in a temporary loss of habitat during demolition and construction that will have a minor adverse cumulative effect on terrestrial ecology in the area. This effect however is not considered to be significant owing to the park being of amenity value only, providing little value to terrestrial ecology.

Operational Cumulative Effects

9.178 The majority of developments are likely to cause an increase in light, noise and general human activity during operation (Type 1 effect) which could increase disturbance levels for species such as black redstart, nesting birds and bats. However, the developments, including future applications and SRFs within the vicinity of the Proposed Development, are already located within a highly urbanised environment.

9.179 Therefore the species occupying the sites are already subject to relatively high levels of traffic, disturbance and human activity and are likely to be tolerant of a level of disturbance typical of the urban development once operational. No cumulative effects of disturbance are anticipated.

Approved developments

9.180 Daylighting of a section of the Medlock will be accompanied by ecological river edge planting, landscaping with vegetation of known benefit to pollinators and the provision of bat and bird compensation and enhancements such as roosting features and boxes will be provided as part of the park and have been recommended for the future building developments at Mayfield. Green roofs and courtyards planned as part of Chandos Hall also make use of plant species of known benefit to pollinators.

9.181 The cumulative effect of provision of a variety of soft landscaping, some of it specifically designed for ecological enhancement for these developments, and incorporation of artificial habitat features for a variety of wildlife including black redstart and other birds, bats and invertebrates is likely to be of a minor beneficial effect on local protected and priority species. As a result, no Type 2 effects should be observed.

Strategic Regeneration Frameworks

9.182 In line with local and national planning guidance and legislation, all SRFs assessed will be will providing new habitat as enhancements within the developments, be that by pocket parks, amenity spaces, or roof gardens. These additional habitats within the vicinity of the application site may serve as habitats for species such as black redstarts, foraging bats and generalist nesting birds and will result in a minor beneficial non-significant effect to terrestrial ecology.

9.183 Although no details of the landscaping for Medlock Park (Manchester Piccadilly SRF) are available, the beneficial effects associated with creation of the Mayfield Park including daylighting and river edge planting of the River Medlock as part of the Mayfield SRF, along with the anticipated creation of Medlock Park, will result in an increased semi-natural corridor along this section of the river. This increases the habitat available to local wildlife and enhances the local ecology by linking the two SRFs through to further habitat to the east. Therefore, an overall moderate beneficial Type 2 effect to terrestrial ecology will occur.

Summary of cumulative effects

Table 9.10 Local developments with potential inter-project cumulative effects relevant to terrestrial ecology

Scheme and planning reference	Consent status	Anticipated construction phasing	Potential Environmental effects	Cumulative effect
Mayfield Depot and Temperance Street Arches Fairfield Street 123728/FO/2019	Temporarily Approved 02/09/2019	Construction of the temporary structure has begun with completion due September 2019.	Construction dust, noise, light, pollution - to be controlled by a site-specific CEMP.	No cumulative effect anticipated
			2 no. bat roost boxes erected.	Minor beneficial cumulative effect, not significant
Macdonald Manchester Hotel 123095/FO/2019	Validated on 10/06/2019	Decision pending	9no. trees on site, all to be retained, 3no. Trees to be transplanted from the southern end of the site to the northern end.	No cumulative effect anticipated
Chandos Hall 118267/FO/2017	Approved 13/05/19	Completion 2021	Courtyards and 3 no. green roofs with planting of native, pollen rich species.	Minor beneficial cumulative effect, not significant

Scheme and planning reference	Consent status	Anticipated construction phasing	Potential Environmental effects	Cumulative effect
			Construction dust, noise, light, pollution - to be controlled by a site-specific CEMP.	No cumulative effect anticipated

Table 9.11 Local SRFs with potential inter-project cumulative effects relevant to terrestrial ecology

SRF	Potential Environmental effects	Cumulative effect
Mayfield SRF May 2018	Construction dust, noise, light, pollution - to be controlled by a site-specific CEMP	No cumulative effect anticipated
	Clearance of existing habitat	Minor adverse cumulative effect, not significant
	Mayfield Park delivering biodiversity net gain for the entire SRF, resulting in a reduction in net gain when compared to Phase 1 alone	Minor adverse cumulative effect during implementation of future SRF phases, not significant Note the residual effect across the entire SRF is still moderate beneficial – see 9.12.
Manchester Piccadilly SRF March 2018	Construction dust, noise, light, pollution - to be controlled by a site-specific CEMP	No cumulative effect anticipated
	New park (Medlock Park) along River Medlock	Moderate beneficial cumulative effect
	Inclusion of Green Roofs where feasible	Minor beneficial cumulative effect, not significant
Piccadilly Basin SRF October 2016	Construction dust, noise, light, pollution - to be controlled by a site-specific CEMP	No cumulative effect anticipated
	Amenity planting of a small number of trees and the inclusion of Green Roofs where feasible	Minor beneficial cumulative effect, not significant
North Campus SRF December 2016	Construction dust, noise, light, pollution - to be controlled by a site-specific CEMP	No cumulative effect anticipated
	Reduction in size of Vimto Park resulting in lost habitat	Minor adverse cumulative effect, not significant
	Planting of open spaces will improve local ecological value	Minor beneficial cumulative effect, not significant
	Inclusion of Green Roofs where feasible	Minor beneficial cumulative effect, not significant
Portland Street SRF November 2017	Construction dust, noise, light, pollution - to be controlled by a site-specific CEMP	No cumulative effect anticipated

SRF	Potential Environmental effects	Cumulative effect
	2no. proposed green roofs and 1no. proposed small public space	Minor beneficial cumulative effect, not significant

Residual Effects

9.184 Two significant residual effects have been identified: namely creation of the Phase 1 Mayfield Park and the improvements to the River Medlock corridor, both of which will be positive and provide habitat to support a number of local bat, bird and invertebrate species.

9.185 The provision of habitats within Mayfield Park provides a net gain in biodiversity for the Phase 1 Site and is considered to provide a moderate beneficial effect overall for the development. Whilst there will be a short term loss of semi-natural habitats across the site to implement the Proposed Development, these are considered to be common urban habitat types generally in a poor condition.

9.186 The Mayfield Park will include the replacement of these habitats including wildflower rich neutral grassland, broadleaved woodland, scrub and brownfield habitat; creating a mosaic of enhanced habitats through the centre of the Proposed Development and buffering the River Medlock corridor from the built environment.

9.187 In terms of loss of roosts for common pipistrelle bats on site, there will be the loss of two confirmed bat roosts to facilitate the delivery of the Plots and park within Application 1 of Phase 1, with three other confirmed roosts retained within the wider Mayfield site.

9.188 An EPS licence from NE will be obtained ahead of any roost destruction and mitigation roosts in the form of bat boxes will be provided. These will include, in the long term, roosting space suitable for small crevice dwelling bats to use as day roosts as well as larger boxes suitable for bats to use as maternity and hibernation roosts.

9.189 The provision of the park and improvements to the River Medlock will also likely improve the foraging opportunities for bats on site and lighting will be designed to ensure that light spill does not impact on the use of important features by bats.

9.190 The risk of effects to ecology from run-off, airborne dust, noise and lighting will be controlled through mitigation that will be detailed in the CEMP to manage these factors and ensure no detrimental effect to potential receptors.

9.191 During clearance of the Site there will be a loss of semi-natural vegetation which has potential to support breeding birds and invertebrates. Clearance of any remaining vegetation and buildings on site, following that already removed under Prior Approval, should follow the guidance outlined in the detailed CEMP to ensure no offence occurs with regards to species protection.

9.192 A summary of the residual effects on terrestrial ecology, taking account of intended mitigation for demolition/ construction and operational phases in provided in Table 9.12.

Table 9.12 Residual effects table

Ecological feature	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
Demolition and construction				
The River	Habitat loss in	Minor adverse	Improving the River Medlock by removing heavily engineered banks,	Moderate

Ecological feature	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
Medlock	Application 1		creating a more naturalised river with aquatic species planting.	beneficial
	Damage and disturbance from noise/vibration, lighting, dust and run-off during demolition and construction of Application 1 and Application 2	Minor adverse	Airborne dust, pollution caused by run-off and handling/storage of demolition waste and construction materials will be managed to limit and mitigate for spread beyond the site. Construction noise /vibration and light will be managed on-site to limit disturbance beyond the site boundary.	Negligible
	Potential spread of Schedule 9 (WCA) INNS in Application 1	Moderate adverse	Specialist contractors will implement INNS removal programme with protection measures in place to prevent the spread of invasive weeds	Negligible
Broadleaved woodland	Damage and disturbance from noise/vibration, lighting, dust and run-off during demolition and construction of Application 1 and Application 2	Minor adverse	Airborne dust, pollution caused by run-off and handling/storage of demolition waste and construction materials will be managed to limit and mitigate for spread beyond the site. Construction noise /vibration and light will be managed on-site to limit disturbance beyond the site boundary.	Negligible
Semi-improved neutral grassland	Loss of habitat in Application 1	Moderate adverse	Provision of replacement habitat will result in a net gain of habitat on site.	Negligible
Roosting, and foraging and commuting bats	Loss of roosts in Application 1. Destruction and potential for killing or injury of bats	Moderate adverse	Destruction of roosts will be undertaken under an EPS licence issued by NE. Mitigation roosts will be installed on site during works with additional roosting features provided once works are complete.	Negligible
	Indirect impacts from noise/vibration, light, dust and run-off during demolition and construction in Application 1 and Application 2.	Minor adverse	Airborne dust, pollution caused by run-off and handling/storage of demolition waste and construction materials will be managed to limit and mitigate for spread beyond the site. Construction noise /vibration and light will be managed on-site to limit disturbance to retained and mitigation roosts.	Negligible
	Loss of foraging and commuting habitat across the site in Application 1	Moderate adverse	Other habitats still available adjacent to Phase 1 site boundary. Lighting will be managed to limit severance effects due to the illumination of dark corridors, including the River Medlock.	Negligible
Breeding birds	Possible killing and injury of birds, by the destruction of active nests in	Moderate adverse	Recommendations provided to avoid impact on breeding birds	Negligible

Ecological feature	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
	Application 1			
Completed phase of Mayfield Park and improved River Medlock corridor (future receptor)	Damage and disturbance from noise/vibration, lighting, dust and run-off during demolition and construction in Application 1 and Application 2	Minor adverse	Airborne dust, pollution caused by run-off and handling/storage of demolition waste and construction materials will be managed to limit and mitigate for spread beyond the site. Construction noise /vibration and light will be managed on-site to limit disturbance beyond the site boundary.	Negligible
Operational				
River Medlock, Mayfield Park and habitats used by fauna of conservation value	Impacts from noise, human disturbance and lighting from Application 1 and Application 2	Negligible	A detailed lighting plan will be prepared for Mayfield Park and each plot to minimise impacts from external and obtrusive light spill on adjacent sensitive habitats. No other specific measures – impacts assessed as negligible.	Negligible
Roosting, and foraging and commuting bats	Impacts from noise, human disturbance and lighting from Application 1 and Application 2	Moderate adverse	A detailed lighting plan will be prepared for Mayfield Park and each plot to minimise impacts from external and obtrusive light spill on retained and mitigation bat roosts as well as important commuting and foraging areas, including the River Medlock. No other specific measures – impacts assessed as negligible for noise and disturbance.	Negligible
	Biodiversity enhancements in Application 1	Moderate beneficial	Incorporation of a range of soft landscaping across masterplan area including naturalisation of the River Medlock, wildflower grassland, wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Moderate beneficial
Local fauna including black redstart, generalist birds and invertebrates	Impacts from noise, human disturbance and lighting from Application 1 and Application 2	Negligible	A detailed lighting plan will be prepared for Mayfield Park and each plot to minimise impacts from external and obtrusive light spill on adjacent sensitive habitats. No other specific measures – impacts assessed as negligible.	Negligible
	Biodiversity enhancements in Application 1	Moderate beneficial	Incorporation of a range of soft landscaping across masterplan area including wildflower grassland wetland and marginal planting, brownfield terracing, native trees and shrub planting.	Moderate beneficial

10 Ground Conditions

Introduction

10.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to Ground Conditions. This Chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.

10.2 The baseline Ground Conditions presented in this chapter is supported by the following Figures and Appendices:

- Figure 10.1 Site Constraints Plan;
- Figure 10.2 Pre-construction Conceptual Site Model;
- Figure 10.3 Post-construction Conceptual Site Model;
- Appendix 10.1 Ground Investigation & Piling Limited[24] report entitled 'Factual ground investigation and test report for redevelopment of land to the south of Manchester Piccadilly Railway Station, Manchester' (ref: 17855 – Final Report), dated October 2009, on behalf of the British Railway Board (Residuary) Limited;
- Appendix 10.2 Buro Happold Report entitled 'Geoenvironmental & Geotechnical Desk Study Report – Mayfield SRF UK' (Ref: 031130), dated September 2015, on behalf of Turner & Townsend Limited[25](Appendix 10.2); and
- Appendix 10.3 REC Report[26] entitled Phase II Geo-Environmental and Geotechnical Assessment, Plots N + O Mayfield, Baring Street, Manchester (Ref: 106841p2r0), April 2019. (Appendix 10.3 – REC 2019 GI).

10.3 Cumulative effects associated with Ground Conditions have additionally been considered within the ES and can be found in Chapter 16 in addition to being summarised in this chapter.

Policy Context

National Planning Policy

10.4 Land contamination is regulated under several regimes, including environmental protection, pollution prevention and control, waste management, planning and development control and health and safety legislation. The primary regulatory regimes under which contaminated land are managed in the UK are: the planning process described in the National Planning Policy Framework[27] (MHCLG, 2019) and Part 2A of the Environmental Protection Act[28] [29][30](DEFRA, 1990).

10.5 The framework for the assessment of potential land contamination adopted in this assessment

[24] GIP Limited Factual Report on Ground Investigation (Ref: 17855 – Final Report), dated October 2009.
[25] BuroHappold Engineering Report 'Ground Engineering Desk Study Report – Mayfield SRF UK' (Ref: 031130), dated September 2015, on behalf of Turner & Townsend Limited..
[26] REC Phase II Geo-Environmental and Geotechnical Assessment, Plots N + O Mayfield, Baring Street, Manchester (Ref: 106841p2r0), April 2019.
[27] Ministry of Housing Communities & Local Government (MHCLG) (2019); National Planning Policy Framework (NPPF).
[28] Part IIA of the Environmental Protection Act 1990
[29] Department of the Environment Transport and the Regions (2000). "Contaminated Land-Implementation of Part IIA of the Environmental Protection Act 1990". DETR Circular 02/2000, HMSO
[30] Department of Environment Food and Rural Affairs (DEFRA) Circular 01/2006 EPA 1990 Part 2A. 2006

will be based on current guidance documents regarding the implementation of these regimes and the assessment of potentially contaminated land, with particular reference to: the Environment Agency (EA) Model Procedures[31](Environment Agency, 2004) and their Guiding Principles on Land Contamination; and the relevant British Standard 10175[32](British Standards Institute, 2011).

Local Planning Policy

10.6 Reference will also be made to regional and local planning policy, namely:

- Manchester City Council: Contaminated Land Strategy[33];
- Manchester City Council: Planning Guidance in Relation to Ground Contamination[34]; and
- Manchester City Council: Core Strategy Policy EN 18 Contaminated Land and Ground Stability[35].

Assessment Methodology and Significance Criteria

10.7 This assessment includes the following:

- Details of existing information and any previous site investigations to assess geoenvironmental baseline conditions with respect to soil and ground conditions, hydrogeology and hydrology;
- Identification of potential sources of contamination from historical land uses on the Site or within the immediate vicinity;
- Development of a Conceptual Site Model (CSM) and preliminary risk assessment to assess impacts of the development during construction and operation on identified receptors. (Impacts of development on surface waters are included in Chapter 11 Water Resources and Drainage);
- Determination of the need for and scope of any additional site investigation required following the results of the preliminary risk assessment; and
- Mitigation measures to account for any identified significant impacts.

Spatial Scope

10.8 An assessment of ground conditions has been made for the Site. It takes into account:

- Any impact on receptors at the Site and within the immediate vicinity from potential sources of contamination within this boundary during construction and operation phases; and
- Any impact on receptors at the Site from potential sources of contamination outside the boundary during construction and operation phases.

Temporal Scope

10.9 This assessment summarises historical information available from Ordnance Survey (OS) maps. Potential impacts arising from significant historical activities at the Site or in the surrounding area will be detailed. Potential impacts from these potential contamination sources will be assessed with respect to the construction phase and site.

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[31] Environment Agency/ DEFRA Model Procedures for the management of land contamination (CLR 11). 2004

[32] British Standards Institute (BSI) BS 10175:2011+A2:2017.

[33] Manchester City Council: Contaminated Land Strategy (Updated March 2011).

[34] Manchester City Council: Planning Guidance in Relation to Ground Contamination: Guidance Note for Applicants, Developers, Land Owners and Consultants - Version 6.00, September 2016.

[35] Manchester City Council: Manchester's Local Development Framework - Core Strategy Development Plan Document - Policy EN 18 Contaminated Land and Ground Stability, Adopted 11th July 2012

10.10 The ground conditions assessment will establish baseline conditions in 2019. Enabling works may be undertaken prior to the main construction works, dependent upon programme and risk profile associated with archaeology and ground contamination.

10.11 The assessment of potential impacts of construction and operational activities resulting from the development will therefore be made to this 2019 baseline.

Technical Scope

10.12 The technical scope of this assessment will:

- Identify existing baseline conditions;
- Identify potential impacts on ground conditions from earthworks, construction and operation;
- Identify potential receptors and their sensitivity;
- Assess the likely magnitude of change of identified impacts on receptors;
- Assess any cumulative effects with respect to adjacent developments;
- Identify the need for specific mitigation measures, where significant impacts are identified; and
- Identify any residual impacts following the application of mitigation measures.

Methodology

10.13 Following the procedure set out in the EA Contaminated Land Report 1131 (EA, 2004), baseline and post-construction CSMs have been developed to illustrate source-pathway-receptor linkages identified for the Site. From these conceptual models, the likely relevant impacts due to contamination have been identified in Paragraphs 10.52 to 10.68. Proposed mitigation measures are outlined from Paragraph 10.115. The conceptual site models are presented in Figures 10.2 and 10.3.

10.14 The significance of potential effects posed by potential sources of contamination to receptors both on and off the Site is assessed by the methodology set out in Paragraphs 10.15 to 10.18 with the identification and evaluation of key effects being outlined in Paragraphs 10.73.

Determination of Significance

10.15 Criteria for assessing the significance of identified effects are based on a qualitative assessment of the receptor sensitivity and the magnitude of the effect, or how far the effect deviates from the baseline condition.

Prediction of Receptor Sensitivity

10.16 A qualitative assessment of receptor sensitivity has been made according to the criteria in Table **Error! Reference source not found.** with the key receptors being outlined in P aragraphs 10.68 to 10.70.

Table 10-1 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.

Prediction of Impact Magnitude

10.17 The qualitative criteria used to assess how far an impact effect deviates from the baseline condition, i.e. the magnitude of change, are described in Table 10-2.

Table 10-2 Methodology for Assessing Magnitude of Change

Magnitude of Impact	Criteria for assessing impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-demolition) conditions such that the post demolition 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 demolition 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-demolition circumstances / situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Assessment of Effect Significance

10.18 The assessment of magnitude of change and sensitivity of the receptor will be used to qualitatively assess the impact significance of the Proposed Development, as shown in Table 10-3. Impacts may be either adverse or beneficial.

Table 10-3 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

Limitations and Assumptions

10.19 The limited amount of site specific ground investigation (SSGI) has led to the assumption that the information is truly representative of the ground conditions across both Application 1 and Application 2. Further SSGI's have been proposed and are due to be undertaken over the coming months on a plot by plot basis.

10.20 Please also note, the SRF is not yet defined in terms of exact siting, massing, quantum and detailed design and therefore the assessment of impact from the SRF will be assessed both quantitatively and qualitatively.

Baseline Conditions

10.21 An assessment of the baseline conditions at the Proposed Development has been based on the following information. Please also see the site constraints plan (Figure 10.1).

- Envirocheck Report Order No 7229271811 (9 September 2015) Mayfield, Manchester. Landmark Information Group Service[36];
- The Coal Authority Non- Residential Coal Mining Report – Mayfield, Manchester, Greater Manchester (ref: 72292718_2), dated 9 September 2015, on behalf of the Landmark Information Group[37];
- British Geological Society (BGS) Geological Map (2010). Manchester, England and Wales Sheet 85, Bedrock, (1:50,000)[38];
- British Geological Society (BGS) Geological Map (2011). Manchester, England and Wales Sheet 85, Bedrock and Superficial Deposits, (1:50,000)[39]
- BGS (2002) British Regional Geology[40]: The Pennines and Adjacent Areas, (4th Ed), British Geological Survey Nottingham.
- National Rivers Authority Groundwater Vulnerability Map 1996 (Sheet 17)[41],
- Buro Happold Report entitled 'Geoenvironmental & Geotechnical Desk Study Report – Mayfield SRF UK' (Ref: 031130), dated September 2015, on behalf of Turner & Townsend Limited[42](Appendix 10.2);
- Penny Anderson Associates Limited (Consultant Ecologists) Report entitled, 'Mayfield Site, Piccadilly, Ecological Report. Dated July 2010[43];
- Ground Investigation & Piling Limited[24] report entitled 'Factual ground investigation and test report for redevelopment of land to the south of Manchester Piccadilly Railway Station, Manchester' (ref: 17855 – Final Report), dated October 2009, on behalf of the British Railway Board (Residuary) Limited. (Appendix 10.1 – GIP 2009 GI);
- BuroHappold Technical Note 1[44] entitled 'BRBR Manchester – Preliminary GI – Data Review' (Ref: 025656_Tech_Note1), dated October 2009, on behalf of the British Railway Board (Residuary) Limited. ;
- BuroHappold Geoenvironmental Summary Note[45] entitled Mayfield Temporary Use – Geoenvironmental Summary Note, dated January 2017;
- Groundsure report [46]. Order No. GS-4028399, dated June 2017;
- BuroHappold Report [25] entitled 'Ground Engineering Desk Study Report – Mayfield Regeneration' (Ref: 035548), dated August 2017, on behalf of U+I. (Appendix 10.2);
- REC Report[26] entitled Phase II Geo-Environmental and Geotechnical Assessment, Plots N + O Mayfield, Baring Street, Manchester (Ref: 106841p2r0), April 2019. (Appendix 10.3 – REC 2019 GI);
- Published technical reports;

[36] Envirocheck Report Order Number 7229271811 (9 September 2015) Mayfield, Manchester. Landmark Information Group Service
[37] Coal Authority Report entitled 'Non- Residential Coal Mining Report – 121 Water Street, Manchester' (ref: 79633581_2), dated 10 February 2016, on behalf of the Landmark Information Group.
[38] British Geological Survey (BGS) England and Wales Sheet 85 Manchester, 2010, Bedrock (1:50,000)
[39] British Geological Survey (BGS) England and Wales Sheet 85 Manchester, 2010, Bedrock and Superficial Deposits (1:50,000).
[40] BGS (2002) British Regional Geology: The Pennines and Adjacent Areas, (4th Ed), British Geological Survey Nottingham.
[41] National Rivers Authority Groundwater Vulnerability Map 1996 (Sheet 17).
[42] BuroHappold Engineering Report 'Ground Engineering Desk Study Report – Mayfield SRF UK' (Ref: 031130), dated September 2015, on behalf of Turner & Townsend Limited..
[43] Penny Anderson Associates Limited (Consultant Ecologists) Report entitled, 'Mayfield Site, Piccadilly, Ecological Report. Dated July 2010
[44] BuroHappold Technical Note – BRBR Preliminary GI Review (Ref: 025656_Tech_Note1), October 2009.
[45] BuroHappold Geoenvironmental Summary Note entitled Mayfield Temporary Use – Geoenvironmental Summary Note, dated January 2017
[46] Groundsure Report No. GS-4028399, June 2017.

- Documents found during internet searches; and
- Any information provided by the Client i.e. previous desk study or ground investigation / utilities information.

10.22 Please note that some of the ground investigation works have been undertaken beyond the application red line boundary. Please refer to the GIP 2009 GI and REC 2019 GI reports for full details located in Appendix 10.1 and 10.2.

10.23 The Proposed Development redline boundary is included within Figure 2.1.

Site History

10.24 Ordnance Survey (OS) maps covering the site have been studied to detail the historical development of the Site and the surrounding area. Extracts of historical maps are included in the BuroHappold Desk Study Report (Appendix 10.2) and are not reproduced herein, although a summary constraints plan is included as Figure 10.1. Key features recorded on-site are identified in Table 10-4 and Table 10-5, in chronological order.

- Area 1 – area of land located immediately north of the River Medlock, Boardman Street and triangular plot north of the intersection of Travis Street and Boardman Street; and
- Area 2 – area of land located to the south of the River Medlock (inclusive of plots L, M, N & O and exclusive of plots J & K).

10.25 Area 1 and 2 do not directly relate to Application 1 and Application 2 areas, though both application boundaries are within these areas.

10.26 The earliest available map (1:10,560 scale) for the Site is dated 1848, however, it is of extremely poor quality.

Table 10-4 Area 1 - Site History

Ordnance Survey Map	Key features recorded
1851 (1:1,056)	Mayfield Works (Dye & Print) & associated Reservoirs/Filtering Pools, various roads and residential housing.
1908 (1,2,500)	Mayfield Works (Dye & Print) & associated reservoirs no longer recorded but buildings/reservoir outlines remain.
1948 (1:1,250)	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. Residential housing in the east is no longer recorded.
1950 (1:2,500)	Fairfield Street garage is no longer recorded.
1960-1977 (1:1,250)	Unnamed building recorded north of the River Medlock and south of Mayfield Station (Goods).
1978-1986 (1:1,250)	The Works to the west of Baring Street is no longer recorded.
1987-1991 (1:1,250)	A Scrap Yard is recorded to the south of Mayfield Station in the far east of the Plot.
1992 (1:2,500)	The Plot is in its current layout.

Table 10-5 Area 2 - Site History

Ordnance Survey Map	Key features recorded
1851 (1:1,056)	Chapelfield Dye Works, Ardwick Dye Works, Britannia Brewery, Mayfield Baths, Tipping Street Chapel, a Tannery, northern extent of Ardwick Print Works, various roads and residential housing.
1893 (1:2,500)	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, the northern extent of Ardwick Print Works is now recorded as Medlock Works (Cotton & Indian Rubber). 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. Medlock Works (Cotton) recorded in the west of the site immediately south of the River Medlock.
1908 (1,2,500)	Chapelfield Works (Indian Rubber) has expanded to the west and Ardwick Tannery is no longer recorded.
1922 (1:2,500)	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.
1948 (1:1,250)	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. A Timber Yard is recorded west of Medlock Works (Cotton & Rubber).
1950 (1:2,500)	Ruins are recorded at the former Mayfield Public Baths and the former Britannia Brewery.
1954-1963/64 (1:1,250)	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.
1960-1977 (1:1,250)	The Dairy (Disused) is now recorded as Works, the Leather & Cloth Factory is now recorded as Factory, Medlock Works (Cotton & Indian Rubber) is now recorded as Works. Timber Yard no longer recorded.
1970 (1:2,500)	The Works in the southwest corner of the Plot are no longer recorded.
1978-1986 (1:1,250)	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.
1992 (1:2,500)	The Plot is in its current layout.

Ground Conditions

Published Geology

10.27 The British Geological Survey (BGS) Maps[38] [13] and Regional Geology Guide[40] have been obtained and reviewed as part of this study, with relevant information presented below.

Superficial Deposits

10.28 The 1:50,000 geological maps were studied to determine the probable nature and extent of any drift deposits under the Site and in the surrounding area. The maps indicate that the Site is underlain by Made Ground and Quaternary Glacial Till. No Glacial Till are recorded in the southwest portion of the Site. The total thickness of the drift deposits is not recorded on the geological map.

10.29 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.

10.30 It is also worthy of note that Alluvial deposits are recorded adjacent to the River Medlock which meanders across the middle of the site from east to west.

Solid Geology

10.31 The 1:50,000 British Geological Survey (BGS) maps indicate the solid geology on site to be Triassic Chester Formation (former nomenclature Chester Pebble Beds). The Envirocheck Report[36] indicates the solid geology to be the Triassic Chester Pebble Beds (CPB – now obsolete) present nomenclature Chester Formation. The Chester Formation typically comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone.

10.32 The Chester Formation is shown to be underlain by the Manchester Marls (mudstone) over the Collyhurst Sandstone lying unconformably over Carboniferous Upper Coal Measures (Westphalian C) typically comprising a mixture of mudstones, siltstones and sandstones with coal seams. 4 No. Coal seams, namely: the Openshaw Coal, Charlotte Coal, Bradford Three Quarters Coal and Bradford Four Foot Coal are indicated to outcrop between 1.80 km and 2.00 km northwest of the Site. The geological map cross-section indicates that productive coal measure strata are at least 300-500 m beneath the Proposed Development.

10.33 The Site is located between two faults both trending northwest-southeast, namely, the Ardwick Fault which is indicated to run along the north eastern edge of the Site, downthrown to the northeast by approximately 100 m, and the East Manchester Fault approximately 200 m southwest of the Site, downthrown to the northeast by approximately 90 m. The angle and direction of dip of the bedrock strata between these faults is not recorded but the regional dip is indicated to be to the south and southwest.

Unpublished Geology

10.34 As part of this study the BGS Geoscience Database and has been consulted to ascertain whether any exploratory borehole records exist for the site or the immediate surrounding area.

10.35 In addition, exploratory borehole logs from the historical GIP 2009 GI and the recent REC 2019 GI for the Site have also been reviewed. The GIP 2009 GI comprised a total of 7 No. window sample boreholes. Of the 7 No. window sample boreholes, 5 No. namely; WS1, WS1a, WS1b, WS4 and WS5 are indicated to be within the Red Line Boundary for Application 1. The 2019 REC GI comprised 6 No. Hand Dug Trial Pits, 4 No. window sample boreholes and 8 No. cable percussive with rotary drilling follow on boreholes with associated monitoring and testing. A summary of the ground conditions encountered in the exploratory holes from the 2 No. ground investigations is provided in Table 10-6.

Table 10-6 Summary of Ground Conditions encountered in GIP 2009 GI & REC 2019 GI's

Depth to Top of Strata (m BGL)	Typical Thickness (m)	Generalized Description
0.00	>0.25 – 5.50	Concrete/TARMACADAM OVER Ashy gravelly SAND. Gravel is of brick, coal, limestone and sandstone & cobbles of brick. AND Gravelly sandy clay with cobbles of brick. [MADE GROUND]
1.50 – 2.80	0.00-3.25	Loose orange SAND AND Very stiff gravelly sandy CLAY

Depth to Top of Strata (m BGL)	Typical Thickness (m)	Generalized Description
		AND Sandy GRAVEL [ALLUVIUM]
1.60	2.40	Stiff CLAY. OR Yellow SAND & CLAY. OR GRAVEL & CLAY [GLACIAL TILL]
2.80 – 5.50	>1.65 – 4.00	Orange, brown, red brown SAND. [WEATHERED CHESTER FORMATION]
4.45 – 9.35	>10.65	Red SANDSTONE. [CHESTER FORMATION]

Note: During the GIP 2009 GI and the REC 2019 GI, no groundwater was recorded in any exploratory boreholes.

10.36 It is considered that the succession recorded in Table 10-6 accords with the published geology, which records Made Ground overlying discontinuous layers of Alluvium or Glacial Till overlying weathered sandstone strata becoming more competent with depth.

Hydrogeology and Hydrology

10.37 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.

10.38 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 EA information. The centre of the Site, adjacent to the River Medlock, is indicated to be within either a 'Zone 2' or both 'Zone 2' and 'Zone 3a' Floodplain.

10.39 The EA 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)'. 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 proven otherwise'.

10.40 The Chester 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).

10.41 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 500 m of the Site. There are 2 No. abstractions locations within 1 km of the Site including: G T Energy UK Limited (778 m SE) and Manchester Metropolitan University (870 m SW). The Site is not within a groundwater SPZ.

Groundwater

10.42 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.

10.43 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.).

10.44 Groundwater was not recorded / encountered within any of the historic BGS boreholes, or in any exploratory holes from the GIP 2009 GI or the REC 2019 GI.

Regulatory Data

10.45 Regulatory data relating to potentially contaminative uses is summarised in Table 10-7 below. This information was obtained from the Groundsure report.

Table 10-7 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
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.			

Item	Location [on/off Site]	Information	Potential to Impact
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 – range of industrial buildings and associated works onsite e.g. Police Station, Fire Station, Unspecified Mills, Cotton Mills, Iron Works	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.			

Baseline Soil Contamination Assessment

10.46 A review of the historical development of the Site and surrounding area has shown that the Site has been subject to a reasonable degree of historical development. Land uses considered to be potentially contaminative with respect to human health, controlled waters, ecosystems and/or the built environment can be summarised as follows:

Table 10-8 Within Application 1 Site Boundary (Area 1).

Area 1 - Land uses considered to be potentially contaminative with respect to Human Health, Controlled Waters, Ecosystems and/or the built environment	
• Mayfield Works (Dye & Print) & associated reservoirs/Filtering Ponds.	• Fairfield Street Garage.
• NE extent of Hanover Mills (Cotton) & later a Printing Works.	• Scrap Yard.
• Residential properties.	• Roads & car park and any oil/petrol spills from car parking.

Table 10-9 Within Application 1 Site Boundary (Area 2).

Area 2 - Land uses considered to be potentially contaminative with respect to Human Health, Controlled Waters, Ecosystems and/or the built environment	
• Chapelfield Dye Works.	• Ardwick Dye Works & Tannery.
• Britannia Brewery.	• Mayfield Baths/Public Washhouse.
• Ardwick Print Works (later Medlock Works – Cotton & Rubber).	• Ice Factory, Dairy & Leather & Cloth Factory.
• Tipping Street Chapel.	• 2 No. Tanks.
• Residential properties.	• Roads & car park and any oil/petrol spills from car parking.

Table 10-10 Outside Application 1 and 2 Site Boundary

Offsite - Land uses considered to be potentially contaminative with respect to Human Health, Controlled Waters, Ecosystems and/or the built environment	
• London Road Station, railway lines & Good Yard.	• Hanover Mills & other works.
• Ardwick Bridge & Chemical Works.	• Ardwick Print Works & reservoirs/filtering ponds.
• Saw Mills & Timber Yard(s).	• Maskrey Mill (later Marlborough Mills).
• Garages.	• Roads & car park and any oil/petrol spills from car parking.
• Various warehouses, works & other small commercial/ industrial facilities in the vicinity of the Site.	• Residential Housing.

10.47 2 No. ground investigations have been undertaken, namely GIP 2009 GI and REC 2019 GI, which included chemical testing of a number of soil samples. 14 No. soil samples were tested during the GIP 2009 GI. Out of the 14 No. soil samples tested, 8 No. soil samples are considered to be relevant and located within the Application 1 site boundary. Of the 8 No. relevant soil samples, 2 No. soil samples tested exceed the relevant commercial/industrial assessment threshold, namely:

- WS5 1.10 m BGL Made Ground Lead 900 mg/kg
- WS5 1.50 m BGL Made Ground Lead 2800 mg/kg

10.48 As part of the REC 2019 GI 15 No. soil samples were tested. Of the 15 No. soil samples, 1 No. soil sample exceeded the relevant commercial/industrial assessment threshold for the following determinands:

- CPBH02 0.20 m BGL Made Ground Benzo[a]pyrene 42 mg/kg
- CPBH02 0.20 m BGL Made Ground Dibenzo[ah]anthracene 12 mg/kg

Baseline Groundwater Contamination Assessment

10.49 Groundwater was not encountered in any of the BGS exploratory holes. In addition, no groundwater was encountered during the fieldwork phases of the GIP 2009 GI and REC 2019 GIs (Appendix 10.1 & 10.3 refer). No groundwater testing has been undertaken at this Site. As such, a site specific ground investigation should be completed for further assessment purposes.

10.50 Areas of infilled ground represent potential sources of contamination to groundwater at the Site.

Baseline Summary

10.51 The baseline analysis suggests that the proposed mixed use (commercial/leisure/cultural facilities etc.) development of the Site is a suitable end use with respect to the identified ground conditions.

10.52 This Site has a long industrial history which has continued until present day. Potential sources of contamination within the Site boundary are considered to be the residual contamination from any infilled ground, former industrial usage and car parks. 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. Limited remediation may be required in these areas to enable the development to proceed.

Current Receptors and Potential Contamination Pathways

10.53 The site specific source-pathway-receptor linkages set out in Table 10-11 have been considered for the Site with respect to the current site use.

10.54 The potential indirect effects of the Proposed Development on water bodies such as the River Medlock through influences on the Combined Sewer System and associated Combined Sewer Overflows is considered in Chapter 11 Water Resources and Drainage.

Table 10-11 Current Potential Contamination Receptor Pathways.

Receptor Type	Receptor	Sensitivity	Pathway
Human Health	Current site users	High	Exposure pathways to contamination in Made Ground - oral ingestion of soil, dermal contact of soil, soil dust inhalation. Migration of ground gas from Made Ground. Concrete hardstanding present.
	Off-site public	High	Exposure pathways to contamination in Made Ground - oral ingestion of soil, dermal contact of soil, soil dust inhalation. Migration of ground gas from Made Ground. Concrete hardstanding present. .
Environment	Chester Formation Principal Aquifer	High	Vertical migration of leachate from on-site Made Ground. Spillage from fuel in car parks
	River Medlock	High	Vertical migration of leachate from on-site Made Ground. Spillage from fuel in car parks
	Onsite vegetation (Green Space)	Low	Plant uptake of phytotoxic metals from Made Ground.
Property	On-site Property	High	Migration of ground gas - fire/explosion in confined spaces.
	Off-site property	High	Migration of ground gas - fire/explosion in confined spaces.

Maintenance of Existing Conditions

10.55 The 'do minimum' scenario is considered to be the maintenance of existing conditions at the Site. This section considers this scenario with respect to existing baseline conditions.

Human Receptors

10.56 The Site is currently occupied by a number of existing buildings with associated car parking which was created on previously developed land. At present the site users are transient i.e. car park users, office workers. Based on available data, the degree of hardstanding currently present and the transient nature of the human receptors, it is considered that the risk to current site users under the baseline conditions can be considered low.

10.57 Potential sources of contamination on Site include on-site car parking facilities (potential for fuel/oil leaks from vehicles). At present no pathway is considered to exist between this potential source of contamination and the current site users. It is therefore considered that the risk to the current site users under the baseline conditions can be considered low.

10.58 The presence of Made Ground is also another source of contamination on-site. During the GIP 2009 GI and REC 2019 GI 3 No. soil samples recorded exceedances above the relevant commercial assessment threshold for lead, benzo[a]pyrene, and dibenzo[ah]anthracene. (GIP 2009 GI - WS5 at 1.10 m BGL, Lead 900 mg/kg and WS5 at 1.50 m BGL, Lead, 2800 mg/kg, REC 2019 GI - CPBH02 at 0.20 m BGL, Benzo[a]pyrene, 42 mg/kg and Dibenzo[ah]anthracene, 12 mg/kg). No pathway is considered to exist between any potential source of contamination from the Made Ground and the current site users due to the presence of hardstanding across the site thus it is considered that the risk to the current site users under the baseline conditions can be considered to be low.

10.59 The site history for the surrounding area (Paragraphs 10.23 to 10.24) indicates that there are a number of potential sources of ground contamination identified in the surrounding area. However, given the distance between the Proposed Development site and the majority of the sources identified and the likely mobility of the potential contaminants, the risk of these affecting the Site is considered to be low.

Environmental Receptors

10.60 The Chester Formation underlying the Site is classified by the EA as a Principal Aquifer. This is considered to be a highly sensitive receptor. Data from the BGS Boreholes, GIP 2009 GI and REC 2019 GI (Appendix 10.1, 10.2 & 10.3 refer) records the top of bedrock between 2.30 m BGL and 5.50 m BGL. A limited thickness of cohesive Glacial Till separates the Chester Formation from the Made Ground in some areas across the site. Where this layer is absent, the potential risk to the Chester Formation arises from the leaching of the ground contamination (if any) within the Made Ground material that underlies the Site. Given the degree of hardstanding currently present on Site and the limited extent of cohesive Glacial Till deposits, it is considered that under baseline conditions, the risk to this receptor is moderate.

10.61 The River Medlock which flows east to west across the Site to its confluence with the River Irwell is considered to be a highly sensitive receptor. The potential risk to the River Medlock arises from the leaching of the ground contamination (if any) within the Made Ground material that underlies the Site. Given the degree of hardstanding on the Site, the impermeable nature of some of the River Medlock walls and the presence of limited extent of cohesive Glacial Till, there are limited pathways for the contaminants to enter the River Medlock, thus the risk to this receptor is considered to be moderate under baseline conditions. Please also refer to Chapter 11 Water Resources and Flood Risk in relation to further risks to the River Medlock.

10.62 There is currently a small amount of soft landscaping at locations around the periphery of the Site. The presence of the on-site vegetation (existing/non crop) indicates that this is not being adversely affected by the existing situation thus the risk to on-site vegetation under baseline conditions is considered to be low.

Property Receptors

10.63 The risk to off-site property (existing residential apartments / hotel / commercial (office / leisure) / public realm) from the migration of ground gas under baseline conditions is considered to be low-moderate based on limited site specific data available from post fieldwork ground gas monitoring.

10.64 The exploratory borehole logs indicate the Made Ground encountered is mainly comprised of concrete, sand, gravel, ash and clay. Gravel is recorded to be composed of slate, timber, tarmac, brick, concrete and ash, which are unlikely to represent a significant source of ground gas.

10.65 3 No. post fieldwork ground gas monitoring visits were undertaken as part of the GIP 2009 GI between the 16/09/2009 and 07/10/2019. The data obtained from the monitoring undertaken classifies the site ground gas regime to be Characteristic Situation 2 (CS2) in accordance with

CIRIA C665 due to elevated levels of carbon dioxide (maximum concentration 7.3% in BH5 GIP 2009 GI).

10.66 As part of the REC 2019 GI, 2 No. post fieldwork ground gas monitoring visits were undertaken between 28/03/2019 and 09/04/2019 in ground gas monitoring wells installed as part of the associated ground investigation. The results from the monitoring visits classifies the site ground gas regime to be Characteristic Situation 1 (CS1).

10.67 Therefore, based on the available data, the worst case scenario for ground gas considering is considered to be CS2. Additional site specific ground investigation should be completed for further assessment purposes.

Future Receptors and Potential Contamination Pathways

10.68 The current Mayfield Masterplan proposal comprises a mixed use development including offices, residential, retail, hotels, bars and restaurants. A new city centre park located around the River Medlock is also proposed to provide much needed recreational space within the urban environment.

10.69 The site-specific source-pathway-receptor linkages set out in Table 10-12 have been considered for the Site with respect to future site use.

10.70 The following sections discuss potential impacts of the Proposed Development on identified receptors and possible mitigation measures required. A review of the impacts and mitigation measures will need to be undertaken following any future phases of ground investigation undertaken.

Table 10-12 Future Potential Contamination Receptor Pathways.

Receptor Type	Receptor	Sensitivity	Pathway
Human Health	Construction Workers	High	Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation. Migration of ground gas into confined spaces created during construction.
	Off-site public	High	Limited outdoor inhalation of dust. Migration of ground gas.
	Commercial site end user	High	Limited exposure to on-site Made Ground in areas of soft landscaping (oral ingestion of soil, dermal contact, soil, soil dust inhalation). Migration of ground gas into confined spaces.
Environment	Chester Formation Principal Aquifer	High	Vertical migration of leachate from on-site Made Ground during earthworks. Spillage from fuel from construction plant or storage areas/site compound.
	River Medlock	High	Vertical migration of leachate from on-site Made Ground during earthworks. Spillage from fuel from construction plant or storage areas/site compound.
Property	On-site property	High	Migration of ground gas - fire/explosion in confined spaces.
	Off-site property	High	Migration of ground gas - fire/explosion in confined spaces.

Identification and Evaluation of Likely Significant Effects

Demolition and construction effects for Application 1 (Baring Street Office 1, Baring Street Multi-Storey Car Park and the Park)

10.71 The elements of the Proposed Development that could potentially mobilise contamination sources and affect sensitive receptors are described in this section. For an impact to occur there needs to be a pathway (e.g. direct contact, inhalation, leaching) from a contamination source to a sensitive receptor. Please note that temporary pathways are typically considered to be 'Minor' with respect to this assessment due to their transient nature (chronic situations being the exception to this).

10.72 The impact of identified contamination sources at and around the Site is considered in respect of the following two stages, namely:

- The demolition and construction stage; and
- The post-construction/operational stage.

Relevant aspects of the scheme

10.73 Conditions during the demolition and construction stage differ from the other situations in that materials may be exposed to agents such as water and air that may lead to dispersion of contamination and to direct contact with construction personnel, particularly in respect to the reuse of material(s) if any. For example: demolition of existing buildings or infrastructure, groundworks, foundation installation, service trench installation etc.

Potential effects of the development and their significance

10.74 The identified demolition and construction effects in this section have been considered in relation to baseline data regarding the composition of Made Ground on-site. Potential impacts from sources of contamination on identified receptors for the construction phase are summarised in Table 10-13.

Potentially contaminated soils

10.75 The excavation and removal of potentially contaminated soils during the formation of the Proposed Development i.e. earthworks during riverbank works, building foundations, drainage / utilities and basements (if any) could bring human receptors (site users - construction workers and off-site public) into direct contact with potentially contaminated soils and soil dust. As such, the impact on these receptors is considered to be minor as a temporary pathway is created during construction only, therefore the significance of the effect is moderate- minor (adverse) despite the high sensitivity of the receptors.

10.76 The works associated with the Proposed Development could also result in off-site property receptors being brought into direct contact with potentially contaminated soils and soil dust. Dust has been considered as part of Chapter 8 – Air Quality and an appropriate mitigation plan will be put in place prior to works commencing. As such, the impact on these receptors is considered to be minor as a temporary pathway is created during demolition and construction only, therefore the significance of the effect is moderate- minor (adverse).

Ground gas

10.77 Site works could also result in gas / vapour accumulations in confined spaces (e.g. drainage areas). The potential impact is considered to be minor with respect to human receptors (on-site workers) during construction due to the fact that the workers are considered to be a temporary receptor introduced during construction only and are likely to be open to the atmosphere. The significance of the activities is therefore considered to pose a moderate-minor (adverse) impact on these high sensitivity receptors during the construction phase. The potential impact and significance of gas / vapour accumulations in confined spaces (e.g. drainage areas) during construction in respect of the off-site public is considered to be

negligible due to no foreseeable change in conditions.

10.78 The works associated with the Proposed Development could also result in gas / vapour migration and accumulation in confined spaces to off-site property receptors. The potential impact and significance are considered to be negligible due to no foreseeable change in conditions and/or reduction of the potential Made Ground source.

10.79 In terms of off-site public receptors, any such exposure due to demolition and construction activities will also be via a temporary pathway. As such, the magnitude of impact is considered to be minor in terms of this receptor also. The significance of the impact is therefore considered to be moderate-minor (adverse) impact on these high sensitivity receptors during the demolition and construction phase.

Leachate

10.80 There is a risk of increased migration of leachate from Made Ground materials during earthworks operations to environmental receptors. These temporary pathways are considered to represent a potentially minor impact on the high sensitivity Chester Formation and River Medlock and thus the significance of the effect is moderate - minor (adverse) for both receptors.

Fuel

10.81 There is also a risk of increased migration of spillage of fuel to environmental receptors from construction plant and storage areas/site compound during the construction phase. These temporary pathways are considered to represent a potentially minor impact on the high sensitivity Chester Formation and River Medlock and thus the significance of the effect is moderate - minor (adverse) for both receptors.

Phytotoxic metals

10.82 The potential impact and significance of plant uptake of phytotoxic metals from Made Ground is considered to be negligible due to no foreseeable change in conditions and/or reduction of this receptor.

Summary of effects during construction

Table 10-13 Summary of effects during construction of Application 1 only.

Receptor	Receptor sensitivity	Description of effect	Magnitude of impact	Significance of effect
Construction Workers	High	Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Migration of ground gas into confined spaces created during construction.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
Off-site public	High	Outdoor inhalation of site dust.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Migration of ground gas.	Negligible (no foreseen change)	Negligible
Chester Formation (Principal Aquifer)	High	Migration of leachate from on-site Made Ground.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Spillage from fuel in from construction plant or storage areas/site compound.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
River Medlock	High	Migration of leachate from on-site Made Ground.	Minor (temporary pathway only)	Moderate – Minor (Adverse)

Receptor	Receptor sensitivity	Description of effect	Magnitude of impact	Significance of effect
		Spillage from fuel in from construction plant or storage areas/site compound.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
On-site vegetation (Green Space)	Low	Plant uptake of phytotoxic metals from Made Ground.	Negligible (no foreseen change)	Negligible
Off-site property	High	Migration of ground gas - fire/explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of site derived dust during earthworks.	Minor (temporary pathway only)	Moderate – Minor (Adverse)

Demolition and construction effects for Application 1 (Baring Street Office 1, Baring Street Multi-Storey Car Park and the Park), and Application 2 (Baring Street Office 2)

10.83 The elements of the Proposed Development that could potentially mobilise contamination sources and affect sensitive receptors are described in this section. For an impact to occur there needs to be a pathway (e.g. direct contact, inhalation, leaching) from a contamination source to a sensitive receptor. Please note that temporary pathways are typically considered to be 'minor' with respect to this assessment due to their transient nature (chronic situations being the exception to this).

10.84 The impact of identified contamination sources at and around the Site is considered in respect of the following two stages, namely:

- The demolition and construction stage; and
- The post-construction/operational stage.

Relevant aspects of the scheme

10.85 Conditions during the demolition and construction stage differ from the other situations in that materials may be exposed to agents such as water and air that may lead to dispersion of contamination and to direct contact with construction personnel, particularly in respect to the reuse of material(s) if any. For example: demolition of existing buildings or infrastructure, groundworks, foundation installation, service trench installation etc.

Potential effects of the development and their significance

10.86 The identified demolition and construction effects in this section have been considered in relation to baseline data regarding the composition of Made Ground on-site. Potential impacts from sources of contamination on identified receptors for the construction phase are summarised in Table 10-14.

Excavation and removal of potentially contaminated soils

10.87 The excavation and removal of potentially contaminated soils during the formation of the Proposed Development i.e. earthworks during riverbank works, building foundations, drainage / utilities and basements (if any) could bring human receptors (site users - construction workers and off-site public) into direct contact with potentially contaminated soils and soil dust. As such, the impact on these receptors is considered to be minor as a temporary pathway is created during construction only, therefore the significance of the effect is moderate-minor (adverse) despite the high sensitivity of the receptors.

10.88 The works associated with the Proposed Development could also result in off-site property receptors being brought into direct contact with potentially contaminated soils and soil dust. Dust has been considered as part of Chapter 8 – Air Quality and an appropriate mitigation plan will be put in place prior to works commencing. As such, the impact on these receptors is considered to be minor as a temporary pathway is created during demolition and construction only, therefore the significance of the effect is moderate-minor (adverse).

Ground gas

10.89 Site works could also result in gas / vapour accumulations in confined spaces (e.g. drainage areas). The potential impact is considered to be Minor with respect to human receptors (on-site workers) during construction due to the fact that the workers are considered to be a temporary receptor introduced during construction only and are likely to be open to the atmosphere. The significance of the activities is therefore considered to pose a moderate-minor (adverse) impact on these high sensitivity receptors during the construction phase. The potential impact and significance of gas / vapour accumulations in confined spaces (e.g. drainage areas) during construction in respect of the off-site public is considered to be negligible due to no foreseeable change in conditions.

10.90 The works associated with the Proposed Development could also result in gas / vapour migration and accumulation in confined spaces to off-site property receptors. The potential impact and significance are considered to be Negligible due to no foreseeable change in conditions and/or reduction of the potential Made Ground source. In terms of off-site public receptors, any such exposure due to demolition and construction activities will also be via a temporary pathway. As such, the magnitude of impact is considered to be minor in terms of this receptor also. The significance of the impact is therefore considered to be moderate-minor (adverse) impact on these high sensitivity receptors during the demolition and construction phase.

Leachate

10.91 There is a risk of increased migration of leachate from Made Ground materials during earthworks operations to environmental receptors. These temporary pathways are considered to represent a potentially minor impact on the high sensitivity Chester Formation and River Medlock and thus the significance of the effect is moderate - minor (adverse) for both receptors.

Fuel

10.92 There is also a risk of increased migration of spillage of fuel to environmental receptors from construction plant and storage areas/site compound during the construction phase. These temporary pathways are considered to represent a potentially minor impact on the high sensitivity Chester Formation and River Medlock and thus the significance of the effect is moderate - minor (adverse) for both receptors.

Phytotoxic metals

10.93 The potential impact and significance of plant uptake of phytotoxic metals from Made Ground is considered to be negligible due to no foreseeable change in conditions and/or reduction of this receptor.

Table 10-14 Summary of effects during construction of Application 1 with Application 2.

Receptor	Receptor sensitivity	Description of effect	Magnitude of impact	Significance of effect
Construction Workers	High	Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Migration of ground gas into confined spaces created during construction.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
Off-site public	High	Outdoor inhalation of site dust.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Migration of ground gas.	Negligible (no foreseen change)	Negligible

Receptor	Receptor sensitivity	Description of effect	Magnitude of impact	Significance of effect
Chester Formation (Principal Aquifer)	High	Migration of leachate from on-site Made Ground.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Spillage from fuel in from construction plant or storage areas/site compound.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
River Medlock	High	Migration of leachate from on-site Made Ground.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Spillage from fuel in from construction plant or storage areas/site compound.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
On-site vegetation (Green Space)	Low	Plant uptake of phytotoxic metals from Made Ground.	Negligible (no foreseen change)	Negligible
Off-site property	High	Migration of ground gas - fire/explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of site derived dust during earthworks.	Minor (temporary pathway only)	Moderate – Minor (Adverse)

Operational effects for Application 1 (Baring Street Office 1, Baring Street Multi-Storey Car Park and the Park)

10.94 The identified operational impacts in this section have been considered in relation to baseline data regarding the composition of Made Ground and the potential for contamination on-site. Potential impacts from sources of contamination on identified receptors for the operational phase are summarised in Table 10-15.

Relevant aspects of the scheme

10.95 Conditions during the operational stage differ from the other situations in that current proposals indicate the site will be covered in hardstanding and appropriate soft landscaping build ups. This means that pathways to receptors will be blocked effectively ending the source-pathway-receptor linkage.

Potential effects of the development and their significance

Ground contamination

10.96 The current Mayfield masterplan will be a mixed use development including offices, residential, retail, hotels, bars and restaurants. A new city centre park located around the River Medlock is also proposed to provide much needed recreational space within the urban environment. The Proposed Development will be have mixed hard cover and soft-landscaping with only suitable topsoil / subsoil being used. As such, exposure pathways between potential ground contamination, if any, and future human end users are likely to be broken. Therefore, the magnitude of the impact on the future commercial/residential site end users is considered to be minor as the potential Made Ground source will be reduced and covered in hardstanding and suitable topsoil/subsoil. As such, the significance of the effect is considered to be minor (beneficial).

Ground gas

10.97 Made Ground on-site represents a potential source of ground gas and / or vapour which represents a potential risk of asphyxiation and fire / explosion in confined spaces (e.g. drainage areas) during the operational phase of the development. The potential magnitude of the impact on future site users and future on-site buildings is considered to be minor to moderate as the Made Ground source will be reduced for basement car parking in areas and covered in hardstanding. Therefore, the significance of the effect is considered to be minor (beneficial).

10.98 The potential for gas migration to the off-site members of the public is considered to be negligible during the operational phase of the Proposed Development, therefore, the magnitude of the impact and the resultant significance of the effect are also considered to be negligible.

10.99 The risk associated with gas / vapour migration and accumulation in confined spaces within on- and off-site property during the operational phase of the Proposed Development is considered to be unlikely (negligible), therefore the magnitude of the impacts and the resultant significance of the effects are also considered to be negligible.

Dust

10.100 The migration of potentially contaminated dust arising from the on-site Made Ground materials may have an impact on off-site members of the public. The Proposed Development will result in the Site being covered by development buildings and soft landscaping. As such, the Made Ground source will be reduced and covered in hardstanding and suitable topsoil/sub-soil. The magnitude of the impact on the off-site public is thus considered to be minor, and the significance of the effect is considered to be minor (beneficial).

10.101 The migration of potentially contaminated dust arising from the on-site Made Ground materials to both on-site and off-site property during the operational phase of the Proposed Development is considered to be unlikely due to cover of development buildings and the Made Ground source reduction. As such, the magnitude of the impact on these receptors is considered to be minor and thus the significance of the effect is considered to be minor (beneficial).

Leachate

10.102 The migration of leachate from on-site Made Ground to the Chester Formation and River Medlock during the operational phase is considered to be Minor with the majority of the Site being covered by development buildings and the Made Ground source will be reduced and covered in hardstanding. As such, the magnitude of the impact on the groundwater receptors is considered to be minor, therefore the significance of the effect is considered to be minor (beneficial).

Fuel

10.103 Fuel spills in car parking and service areas will occur within a managed environment during the operational phase. As a result, the pathway to groundwater receptors will be broken. As such, the magnitude of the impact on the groundwater receptors is considered to be minor, and the significance of this effect is considered to be minor (beneficial).

Phytotoxic metals

10.104 Plant uptake of phytotoxic metals from Made Ground or risk from fuel spills will be minor during the operational phase due to source reduction and because no plausible pathways will be present. As such, the significance of this effect is considered to be minor (beneficial).

Summary of effects during operation

Table 10-15 Summary of effects during operation of Application 1.

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Residential / commercial site end user	High	On-site Made Ground materials removed/reduced and replaced with hardstanding suitable topsoil/sub-soil	Minor	Minor (Beneficial)

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
		Migration of ground gas into confined spaces	Minor	Minor (Beneficial)
Off-site public	High	Migration of ground gas.	Negligible (no foreseen change)	Negligible
Chester Formation Principal Aquifer	High	Migration of leachate from on-site Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
River Medlock	High	Migration of leachate from on-site Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
On-site vegetation (Green Space)	Low (no pathway)	Plant uptake of phytotoxic metals from Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
On-site property	High	Migration of ground gas – fire / explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of dust.	Minor	Minor (Beneficial)
Off-site property	High	Migration of ground gas – fire / explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of dust.	Minor	Minor (Beneficial)

Operational effects for Application 1 (Baring Street Office 1, Baring Street Multi-Storey Car Park and the Park), and Application 2 (Baring Street Office 2)

10.105 The identified operational impacts in this section have been considered in relation to baseline data regarding the composition of Made Ground and the potential for contamination on-site. Potential impacts from sources of contamination on identified receptors for the operational phase are summarised in Table 10-15.

Relevant aspects of the scheme

10.106 Conditions during the operational stage differ from the other situations in that current proposals indicate the site will be covered in hardstanding and appropriate soft landscaping build ups. This means that pathways to receptors will be blocked effectively ending the source-pathway-receptor linkage.

Potential effects of the development and their significance

Ground contamination

10.107 The current Mayfield masterplan will be a mixed use development including offices, residential, retail, hotels, bars and restaurants. A new city centre park located around the River Medlock is also proposed to provide much needed recreational space within the urban environment. The Proposed Development will be have mixed hard cover and soft-landscaping with only suitable topsoil / subsoil being used. As such, exposure pathways between potential ground contamination, if any, and future human end users are likely to be broken. Therefore, the magnitude of the impact on the future commercial/residential site end users is considered to be minor as the potential Made Ground source will be reduced and covered in hardstanding and suitable topsoil/subsoil. As such, the significance of the effect is considered to be minor (beneficial).

Ground gas

10.108 Made Ground on-site represents a potential source of ground gas and / or vapour which represents a potential risk of asphyxiation and fire / explosion in confined spaces (e.g. drainage areas) during the operational phase of the development. The potential magnitude of the impact on future site users and future on-site buildings is considered to be minor to moderate as the Made Ground source will be reduced for basement car parking in areas and covered in hardstanding. Therefore, the significance of the effect is considered to be minor (beneficial).

10.109 The potential for gas migration to the off-site members of the public is considered to be negligible during the operational phase of the Proposed Development, therefore, the magnitude of the impact and the resultant significance of the effect are also considered to be negligible.

10.110 The risk associated with gas / vapour migration and accumulation in confined spaces within on- and off-site property during the operational phase of the Proposed Development is considered to be unlikely (negligible), therefore the magnitude of the impacts and the resultant significance of the effects are also considered to be negligible.

Dust

10.111 The migration of potentially contaminated dust arising from the on-site Made Ground materials may have an impact on off-site members of the public. The Proposed Development will result in the Site being covered by development buildings and soft landscaping. As such, the Made Ground source will be reduced and covered in hardstanding and suitable topsoil/sub-soil. The magnitude of the impact on the off-site public is thus considered to be minor, and the significance of the effect is considered to be minor (beneficial).

10.112 The migration of potentially contaminated dust arising from the on-site Made Ground materials to both on-site and off-site property during the operational phase of the Proposed Development is considered to be unlikely due to cover of development buildings and the Made Ground source reduction. As such, the magnitude of the impact on these receptors is considered to be minor and thus the significance of the effect is considered to be minor (beneficial).

Leachate

10.113 The migration of leachate from on-site Made Ground to the Chester Formation and River Medlock during the operational phase is considered to be Minor with the majority of the Site being covered by development buildings and the Made Ground source will be reduced and covered in hardstanding. As such, the magnitude of the impact on the groundwater receptors is considered to be minor, therefore the significance of the effect is considered to be minor (beneficial).

Fuel

10.114 Fuel spills in car parking and service areas will occur within a managed environment during the operational phase. As a result, the pathway to groundwater receptors will be broken. As such, the magnitude of the impact on the groundwater receptors is considered to be minor, and the significance of this effect is considered to be minor (beneficial).

Phytotoxic metals

10.115 Plant uptake of phytotoxic metals from Made Ground or risk from fuel spills will be Minor during the operational phase due to source reduction and because no plausible pathways will be present. As such, the significance of this effect is considered to be minor (beneficial).

Summary of effects during operation

Table 10-16 Summary of effects during operation of Application 1 with Application 2.

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Residential / commercial site end user	High	On-site Made Ground materials removed/reduced and replaced with hardstanding suitable topsoil/sub-soil	Minor	Minor (Beneficial)
		Migration of ground gas into confined spaces	Minor	Minor (Beneficial)
Off-site public	High	Migration of ground gas.	Negligible (no foreseen change)	Negligible
Chester Formation Principal Aquifer	High	Migration of leachate from on-site Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
River Medlock	High	Migration of leachate from on-site Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
On-site vegetation (Green Space)	Low (no pathway)	Plant uptake of phytotoxic metals from Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
On-site property	High	Migration of ground gas – fire / explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of dust.	Minor	Minor (Beneficial)
Off-site property	High	Migration of ground gas – fire / explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of dust.	Minor	Minor (Beneficial)

Mitigation Measures

10.116 Mitigation measures to address identified potential impacts are summarised in the following sections. Mitigation measures have been derived by considering risks to identified receptors in accordance with CLR11 Model Procedures[31]. Results of future site investigation may preclude any or all of the following mitigation measures.

Supplementary mitigation measures during demolition and construction

10.117 The demolition and construction phase mitigation measures listed here are considered to be worst case. Risks to construction workers from contaminants during site development may be clarified by further investigation.

Table 10-17 Summary of demolition and construction supplementary mitigation measures for Baring Street Multi-Storey Car Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Contamination in Made Ground	Appropriate hazard identification during works. Tool Box Talks during site induction	Main Contractor	Prior to and throughout demolition and construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	regarding ground conditions. The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately		
Exposure of preferential pathways for vertical migration of contaminants	Avoid deep excavations as far as is reasonably practicable. Temporary drainage measures should be provided to prevent the generation of surface water run-off and potential migration of contaminants; Stockpiling of contaminated materials, if any, should be avoided if possible and any such stockpiles should be covered when not in use. Drainage from the stockpiles should be managed to prevent the generation of contaminated run-off	Main Contractor	Prior to and throughout demolition and construction
Ground gas	Adequate gas monitoring where required. Avoidance of the creation of confined spaces, or where this is not possible, appropriate controls on entry into confined spaces	Main Contractor	Prior to and throughout demolition and construction
Dust	Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site	Main Contractor	Prior to and throughout demolition and construction
Pollution from hazardous materials	Implementation of pollution control measures for the storage of hazardous materials and spillage containment	Main Contractor	Prior to and throughout demolition and construction
Pollution from fuel	Containment of fuel and / or chemicals within suitably bunded storage areas; Refuelling and washing down of plant and equipment in contact with contaminated materials in suitably	Main Contractor	Prior to and throughout demolition and construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	bunded and controlled areas		
Asbestos Containing Materials (ACM)	The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately. Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site. Implementation of pollution control measures for the storage & removal of ACM.	Main Contractor	Prior to and throughout demolition and construction

Table 10-18 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 1

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Adverse effect	**Mitigation measure**	**Responsibility / Mechanism for implementation**	**Timing**
Contamination in Made Ground	Appropriate hazard identification during works. Tool Box Talks during site induction regarding ground conditions. The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately	Main Contractor	Prior to and throughout demolition and construction
Exposure of preferential pathways for vertical migration of contaminants	Avoid deep excavations as far as is reasonably practicable. Temporary drainage measures should be provided to prevent the generation of surface water run-off and potential migration of contaminants; Stockpiling of contaminated	Main Contractor	Prior to and throughout demolition and construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	materials, if any, should be avoided if possible and any such stockpiles should be covered when not in use. Drainage from the stockpiles should be managed to prevent the generation of contaminated run-off		
Ground gas	Adequate gas monitoring where required. Avoidance of the creation of confined spaces, or where this is not possible, appropriate controls on entry into confined spaces	Main Contractor	Prior to and throughout demolition and construction
Dust	Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site	Main Contractor	Prior to and throughout demolition and construction
Pollution from hazardous materials	Implementation of pollution control measures for the storage of hazardous materials and spillage containment	Main Contractor	Prior to and throughout demolition and construction
Pollution from fuel	Containment of fuel and / or chemicals within suitably bunded storage areas; Refuelling and washing down of plant and equipment in contact with contaminated materials in suitably bunded and controlled areas	Main Contractor	Prior to and throughout demolition and construction
Asbestos Containing Materials (ACM)	The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately. Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site. Implementation of pollution control measures for the storage & removal of ACM.	Main Contractor	Prior to and throughout demolition and construction

Table 10-19 Summary of demolition and construction supplementary mitigation measures for Mayfield Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Contamination in Made Ground	Appropriate hazard identification during works. Tool Box Talks during site induction regarding ground conditions. The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately	Main Contractor	Prior to and throughout demolition and construction
Exposure of preferential pathways for vertical migration of contaminants	Avoid deep excavations as far as is reasonably practicable. Temporary drainage measures should be provided to prevent the generation of surface water run-off and potential migration of contaminants; Stockpiling of contaminated materials, if any, should be avoided if possible and any such stockpiles should be covered when not in use. Drainage from the stockpiles should be managed to prevent the generation of contaminated run-off	Main Contractor	Prior to and throughout demolition and construction
Ground gas	Adequate gas monitoring where required. Avoidance of the creation of confined spaces, or where this is not possible, appropriate controls on entry into confined spaces	Main Contractor	Prior to and throughout demolition and construction
Dust	Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site	Main Contractor	Prior to and throughout demolition and construction
Pollution from hazardous materials	Implementation of pollution control measures for the storage of hazardous materials and spillage containment	Main Contractor	Prior to and throughout demolition and construction
Pollution from fuel	Containment of fuel and / or chemicals within	Main Contractor	Prior to and throughout demolition and

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	suitably bunded storage areas; Refuelling and washing down of plant and equipment in contact with contaminated materials in suitably bunded and controlled areas		construction
Asbestos Containing Materials (ACM)	The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately. Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site. Implementation of pollution control measures for the storage & removal of ACM.	Main Contractor	Prior to and throughout demolition and construction

Table 10-20 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 2

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Contamination in Made Ground	Appropriate hazard identification during works. Tool Box Talks during site induction regarding ground conditions. The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately	Main Contractor	Prior to and throughout demolition and construction
Exposure of preferential pathways for vertical migration of contaminants	Avoid deep excavations as far as is reasonably practicable. Temporary drainage measures should be provided to prevent the generation of surface water run-off and	Main Contractor	Prior to and throughout demolition and construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	potential migration of contaminants; Stockpiling of contaminated materials, if any, should be avoided if possible and any such stockpiles should be covered when not in use. Drainage from the stockpiles should be managed to prevent the generation of contaminated run-off		
Ground gas	Adequate gas monitoring where required. Avoidance of the creation of confined spaces, or where this is not possible, appropriate controls on entry into confined spaces	Main Contractor	Prior to and throughout demolition and construction
Dust	Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site	Main Contractor	Prior to and throughout demolition and construction
Pollution from hazardous materials	Implementation of pollution control measures for the storage of hazardous materials and spillage containment	Main Contractor	Prior to and throughout demolition and construction
Pollution from fuel	Containment of fuel and / or chemicals within suitably bunded storage areas; Refuelling and washing down of plant and equipment in contact with contaminated materials in suitably bunded and controlled areas	Main Contractor	Prior to and throughout demolition and construction
Asbestos Containing Materials (ACM)	The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately. Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site. Implementation of pollution control measures	Main Contractor	Prior to and throughout demolition and construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	for the storage & removal of ACM.		

Supplementary mitigation measures during operation

10.118 Limited site investigation data obtained to date indicates that the Site is likely to be suitable for commercial usage with minimal remediation. It is considered that in areas of hardcover and buildings any potential direct pathways between contamination sources and receptors will be negated. Mitigation measures listed here reflect a potential worst case scenario with respect to ground contamination.

Table 10-21 Summary of operational supplementary mitigation measures for Baring Street Multi-Storey Car Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Contamination in Made Ground	Remediation of contamination where unacceptable risks are identified to site receptors. Possible remediation options that might be considered are excavation and disposal of contaminated material physical, chemical or biological remediation technologies or physical removal of exposure pathways	Main Contractor	Prior to operation
Contamination in Made Ground	Removal of all source-pathway-receptor linkages within the Proposed Development. Where soft landscaping is to be present on-site, clean capping barriers will be considered, where necessary. Where the Site is to be covered with hardstanding, such as building floor slabs, roads and car parking areas, risks posed by contaminants through direct contact, ingestion and inhalation will be mitigated	Main Contractor	Prior to operation
Ground gas	Ground gas protection measures to be implemented within building and service trench fabric in accordance with CIRIA C665.	Main Contractor	Prior to operation
Pollution into water supply	Service trenches will be lined with an impermeable	Main Contractor	Prior to operation

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	membrane and backfilled with clean material to prevent contaminants entering the public water supply		
Aggressive ground conditions (sulphate)	Specific mixes of concrete may be required for building foundations where the underlying ground conditions are identified as being potentially aggressive to concrete	Main Contractor	Prior to operation
Fuel spills to controlled waters	Drains will be fitted with filtration units and oil-water interceptors, as good practice	Main Contractor	Prior to operation

Table 10-22 Summary of operational supplementary mitigation measures for Baring Street Office 1

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Contamination in Made Ground	Remediation of contamination where unacceptable risks are identified to site receptors. Possible remediation options that might be considered are excavation and disposal of contaminated material physical, chemical or biological remediation technologies or physical removal of exposure pathways	Main Contractor	Prior to operation
Contamination in Made Ground	Removal of all source-pathway-receptor linkages within the Proposed Development. Where soft landscaping is to be present on-site, clean capping barriers will be considered, where necessary. Where the Site is to be covered with hardstanding, such as building floor slabs, roads and car parking areas, risks posed by contaminants through direct contact, ingestion and inhalation will be mitigated	Main Contractor	Prior to operation
Ground gas	Ground gas protection measures to be implemented within	Main Contractor	Prior to operation

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	building and service trench fabric in accordance with CIRIA C665.		
Pollution into water supply	Service trenches will be lined with an impermeable membrane and backfilled with clean material to prevent contaminants entering the public water supply	Main Contractor	Prior to operation
Aggressive ground conditions (sulphate)	Specific mixes of concrete may be required for building foundations where the underlying ground conditions are identified as being potentially aggressive to concrete	Main Contractor	Prior to operation
Fuel spills to controlled waters	Drains will be fitted with filtration units and oil-water interceptors, as good practice	Main Contractor	Prior to operation

Table 10-23 Summary of operational supplementary mitigation measures for Mayfield Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Contamination in Made Ground	Remediation of contamination where unacceptable risks are identified to site receptors. Possible remediation options that might be considered are excavation and disposal of contaminated material physical, chemical or biological remediation technologies or physical removal of exposure pathways	Main Contractor	Prior to operation
Contamination in Made Ground	Removal of all source-pathway-receptor linkages within the Proposed Development. Where soft landscaping is to be present on-site, clean capping barriers will be considered, where necessary. Where the Site is to be covered with hardstanding, such as building floor slabs, roads and car parking areas, risks posed by contaminants through direct contact, ingestion and inhalation will be	Main Contractor	Prior to operation

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	mitigated		
Pollution into water supply	Service trenches will be lined with an impermeable membrane and backfilled with clean material to prevent contaminants entering the public water supply	Main Contractor	Prior to operation
Aggressive ground conditions (sulphate)	Specific mixes of concrete may be required for building foundations or retaining walls where the underlying ground conditions are identified as being potentially aggressive to concrete	Main Contractor	Prior to operation
Fuel spills to controlled waters	Drains will be fitted with filtration units and oil-water interceptors, as good practice	Main Contractor	Prior to operation

Table 10-24 Summary of operational supplementary mitigation measures for Baring Street Office 2

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Contamination in Made Ground	Remediation of contamination where unacceptable risks are identified to site receptors. Possible remediation options that might be considered are excavation and disposal of contaminated material physical, chemical or biological remediation technologies or physical removal of exposure pathways	Main Contractor	Prior to operation
Contamination in Made Ground	Removal of all source-pathway-receptor linkages within the Proposed Development. Where soft landscaping is to be present on-site, clean capping barriers will be considered, where necessary. Where the Site is to be covered with hardstanding, such as building floor slabs, roads and car parking areas, risks posed by contaminants through direct contact, ingestion and inhalation will be	Main Contractor	Prior to operation

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	mitigated		
Ground gas	Ground gas protection measures to be implemented within building and service trench fabric in accordance with CIRIA C665.	Main Contractor	Prior to operation
Pollution into water supply	Service trenches will be lined with an impermeable membrane and backfilled with clean material to prevent contaminants entering the public water supply	Main Contractor	Prior to operation
Aggressive ground conditions (sulphate)	Specific mixes of concrete may be required for building foundations where the underlying ground conditions are identified as being potentially aggressive to concrete	Main Contractor	Prior to operation
Fuel spills to controlled waters	Drains will be fitted with filtration units and oil-water interceptors, as good practice	Main Contractor	Prior to operation

10.119 Further mitigation for the protection of water resources and drainage is included in Chapter 11.

Cumulative Effects

10.120 The location of a number of committed developments in the vicinity can typically have a cumulative adverse effect on high sensitivity receptors. In particular the groundwater receptors and on- and off-site public receptors.

10.121 The cumulative effects have been assessed in terms of the envisaged combination of individual impacts on particular receptors from the Proposed Development and the effects from any concurrent developments considered to be in the zone of influence. Construction and demolition works associated with the Proposed Development and the concurrent developments within a 250 m radius of the Site are the only plausible activities in respect of ground related aspects likely to have cumulative effects and it is these activities that have been considered below. The planned developments within the vicinity of the Site are set out within Chapter 16.

10.122 Two types of cumulative effects have been assessed and are discussed below, namely:

- Type 1 Effects: The combination of individual effects (for example noise, dust and visual effects) from a development on a particular receptor; and
- Type 2 Effects: Effects from several developments, which individually might be insignificant, but when considered together could create a significant cumulative effect.

10.123 Other developments within a 250 m radius of the Site are considered unlikely to have a

significant cumulative effect in terms of ground and groundwater due to the nature of the baseline ground conditions and amount of hardstanding in the immediate vicinity (Paragraph 10.51). The combination of the individual effects from these developments and the Proposed Development such as dust, traffic, noise etc. (Chapters 6, 7 and 8 of this ES), may have a minor impact on a number of receptors, primarily the high sensitivity current site users and off-site public.

10.124 The groundwater receptors may also be impacted due to construction activities such as excavation or increased likelihood of leachate pathways from any Made Ground. During operation, the Proposed Development is minor (beneficial) in this regard, thus, it is anticipated that the cumulative effects should also be improved overall.

10.125 However, as good practice, mitigation measures such as appropriate health and safety and operational controls, the development of safe working procedures, dust suppression, gas monitoring where necessary, prevention / control of confined spaces, spillage containment for fuel and waste storage areas, hygiene and the use of PPE / RPE should be implemented on all the development sites within the assessment area. It is therefore expected that if the planned developments incorporate appropriate measures as far as is reasonably practicable then no significant cumulative effects of ground related activities are anticipated on the identified receptors.

Residual Effects

10.126 Residual effects following implementation of identified mitigation measures are outlined in Table 10-25 and the overall effects for the Proposed Development are outlined within the same table. Please note, the mitigation measures will be the same for Phase 1a and 1b due to the nature of the proposed works as well as industry standards and best practice. Residual effects will be reviewed as further information becomes available, prior to demolition and construction, as part of the detailed design process.

10.127 Residual effects resulting from contaminated land are not likely to be significant during the demolition and construction or operational phases of redevelopment provided:

- Appropriate hazard identification and risk assessment of potential contamination and ground gas are undertaken as part of the site works to confirm baseline conditions;
- Mitigation measures are reviewed and adopted based on site observations during the works; and
- Good practice procedures are adhered to in both construction and health and safety during remediation and site development.

Table 10-25 Residual effects table

Receptor	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
Demolition and construction (Phase 1a and 1b)				
Construction Workers	Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation. Migration of ground gas into confined spaces created during	Moderate - Minor (Adverse)	Appropriate on-site Health and Safety controls and gas monitoring where necessary. Hygiene. Use of PPE / RPE. Development of safe working procedures. Dust suppression. Prevention / control of confined spaces.	Minor (Adverse) (Temporary)

Receptor	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
	construction.			
Off-site public	Outdoor inhalation of dust. Migration of ground gas.	Moderate - Minor (Adverse)	Dust suppression, operational controls. Appropriate on-site Health and Safety controls and gas monitoring as necessary.	Minor (Adverse) (Temporary)
Chester Formation Principal Aquifer	Vertical migration of leachate from on-site Made Ground during earthworks. Spillage from fuel in from construction plant or storage areas/site compound.	Moderate - Minor (Adverse)	Avoidance of stockpiling. Covering of stockpiles where possible. Implementation of pollution controls. Drainage control. Spillage containment for fuel / waste storage areas as good practice.	Negligible (Temporary)
River Medlock	Vertical migration of leachate from on-site Made Ground during earthworks. Spillage from fuel in from construction plant or storage areas/site compound.	Moderate - Minor (Adverse)	Avoidance of stockpiling. Covering of stockpiles where possible. Implementation of pollution controls. Drainage control. Spillage containment for fuel / waste storage areas as good practice.	Negligible (Temporary)
On-site vegetation (Green Space)	Plant uptake of phytotoxic metals from Made Ground. Spillage from fuel in car parks or proposed waste storage areas.	Negligible	Operational and pollution controls. Spillage containment for fuel /waste storage areas as good practice.	Negligible (Temporary)
Off-site property	Migration of ground gas - fire/explosion in confined spaces. Migration of site derived dust during earthworks.	Minor (Adverse)	Appropriate on-site Health and Safety controls and gas monitoring where necessary. Prevention/control of confined spaces. Development of safe working procedures.	Minor (Adverse) (Temporary)
Operational (Phase 1a and 1b)				
Residential / commercial site end user	On-site Made Ground materials removed/reduced and replaced with hardstanding. Migration of ground gas into confined spaces	Moderate – Minor (Adverse)	Removal of all source-pathway-receptor linkages. Design of appropriate gas protection measures where necessary. Clean trenches for water supply pipes as good practice.	Moderate - Minor (Beneficial)

Receptor	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
Off-site public	Outdoor inhalation of dust. Migration of ground gas.	Moderate – Minor (Adverse)	Removal of all source-pathway-receptor linkages.	Moderate - Minor (Beneficial)
Chester Formation Principal Aquifer	Migration of leachate from on-site Made Ground. Spillage from fuel in car parks or waste storage areas.	Moderate - Minor (Adverse)	Removal of all source-pathway-receptor linkages. Appropriate storage of potentially polluting materials. Drainage controls in roads and parking areas.	Minor (Beneficial)
River Medlock	Migration of leachate from on-site Made Ground. Spillage from fuel in car parks or waste storage areas.	Moderate - Minor (Adverse)	Removal of all source-pathway-receptor linkages. Appropriate storage of potentially polluting materials. Drainage controls in roads and parking areas.	Minor (Beneficial)
On-site vegetation (green space)	Plant uptake of phytotoxic metals from Made Ground. Spillage from fuel in car parks or waste storage areas.	Negligible	None required.	Negligible
On-site Property Off-site Property	Migration of ground gas – fire / explosion in confined spaces. Migration of dust	Moderate - Minor (Adverse)	Design of appropriate gas protection measures where necessary as good practice. Operational and pollution controls.	Minor (Beneficial)

Conclusions

10.128 Potential impacts on the Proposed Development from soil and ground conditions have been considered, including:

- An assessment of the baseline condition of the Site based upon available desk study and ground investigation data obtained during the 2 No. Ground Investigations, namely the GIP 2009 GI and REC 2019 GI (Appendix 10.1 & 10.3);
- Impacts upon current site receptors have been assessed with respect to current geoenvironmental conditions;
- Impacts upon receptors during construction and operational phases of the development have been assessed with respect to the baseline condition;

- Cumulative effects have also been assessed in relation to other known developments in the vicinity of the Site; and
- Mitigation measures have been proposed for all identified impacts and an assessment of residual impact following implementation of these mitigation measures.

10.129 Potential sources of contamination have been identified throughout Application 1 and Application 2. These are primarily associated with Made Ground present on the Site and due to the historical uses of the Site. During the GIP 2009 GI and REC 2019 GI 3 No. soil samples recorded exceedences above the relevant commercial assessment threshold for lead, benzo[a]pyrene, and dibenzo[ah]anthracene.

10.130 Based on the currently available information, it is likely that the Proposed Development of the Site could take place with some remediation requirements which will be agreed as part of the planning process for Application 1 and 2. Current proposals include significant re-profiling of the site, clean build ups of hardstanding and soft landscaping beneath and around the buildings which will block the source-pathway-receptor relationship. Best construction practice will be used throughout the different phases in accordance with industry standards (Table 10-25 refers).

10.131 Please note, information from limited historical ground investigation undertaken at the Site to date has not identified any significant ground constraints that might render the Site unsuitable for the Proposed Development across Application 1 and Application 2. The presence of Made Ground presents minor potential impacts on the construction phase but an overall improvement for the operational phase of the development.

10.132 A combined geotechnical and geoenvironmental ground investigation is required across Application 1 and 2 to better understand the potential contamination risks identified and to produce a detailed ground model to allow geotechnical design over the whole Site area. This should comprise a series of exploratory holes ranging in depth to obtain insitu information, samples for laboratory testing as well as the installation of monitoring wells to allow post fieldwork groundwater and ground gas monitoring.

10.133 This further investigation / clarification during construction with respect to areas of Made Ground will further clarify baseline conditions with respect to ground contamination, groundwater contamination and potential for ground gas from on-site and off-site sources. The results of which may preclude any or all of the listed mitigation measures and a re-assessment of impacts and residual impacts may be required (worst credible case currently presented).

10.134 Table 10-25 summarises the key findings of this assessment.

Acronyms/ Glossary

BGL Below Ground Level.
CHES Triassic Chester Formation (previous nomenclature Chester Pebble Beds). Parent Unit: Sherwood Sandstone Group.
CLEA Contaminated Land Exposure Assessment Model. A model produced by the Department for Environment, Food and Rural Affairs (DEFRA) that estimates child and adult exposures to soil contaminants for those potentially living, working and/or playing on contaminated sites over long periods and is used to produce the Soil Guideline Values (SGV) for the United Kingdom.
cSAC Candidate Special Areas of Conservation, designated under the European Directive commonly known as the 'Habitats' Directive (Directive 92/43/EEC)
CS Ground Gas Characteristic Situation, determined by monitoring ground gas wells for gases such as carbon dioxide and flow rates over a period of time which experiences a rise and fall in atmospheric pressure
CSM Conceptual Site Model. A simplified representation of the site to indicate potential source-pathway-receptor linkages.

EA Environment Agency.

GAC Generic Assessment Criteria, derived in-house for the assessment of land affected by contamination. The GACs consider the most sensitive receptors in the respective CLEA standard land- uses scenarios (the 0 to 6 year old child for the residential with and without plant uptake scenarios and the adult for the commercial / industrial land-use scenario) using the software model 'CLEA 1.03 beta' and associated handbook (August 2008).

ICRCL Inter Departmental Committee for the Redevelopment of Contaminated Land (UK). Former guidance adopted in estimation of contamination land now replaced by CLEA model.

NNR National Nature Reserve. The National Parks and Access to the Countryside Act 1949 enabled the National Conservancy Council for England, now English Nature, to establish Nature Reserves.

OD Ordnance Datum, the levelling datum for the Government agency responsible for mapping in Britain.

PPE Personal Protective Equipment

RPE Respiratory Protective Equipment, such as dust masks and respirators.

SGV Soil Guideline Values, derived from the former CLEA model and formerly used as "intervention values" in the regulatory framework for assessment of risks in relation to land-use.

SPA Special Protected Areas, strictly protected sites classified in accordance with Article 4 of the EC Directive on the conservation of wild birds (79/409/EEC), also known as the Birds Directive, which came into force in April 1979.

SSSI Site of Special Scientific Interest, designated under the Wildlife and Countryside Act 1981 (amended 1985) for special interest by reason of flora, fauna, geological or physiographical features.

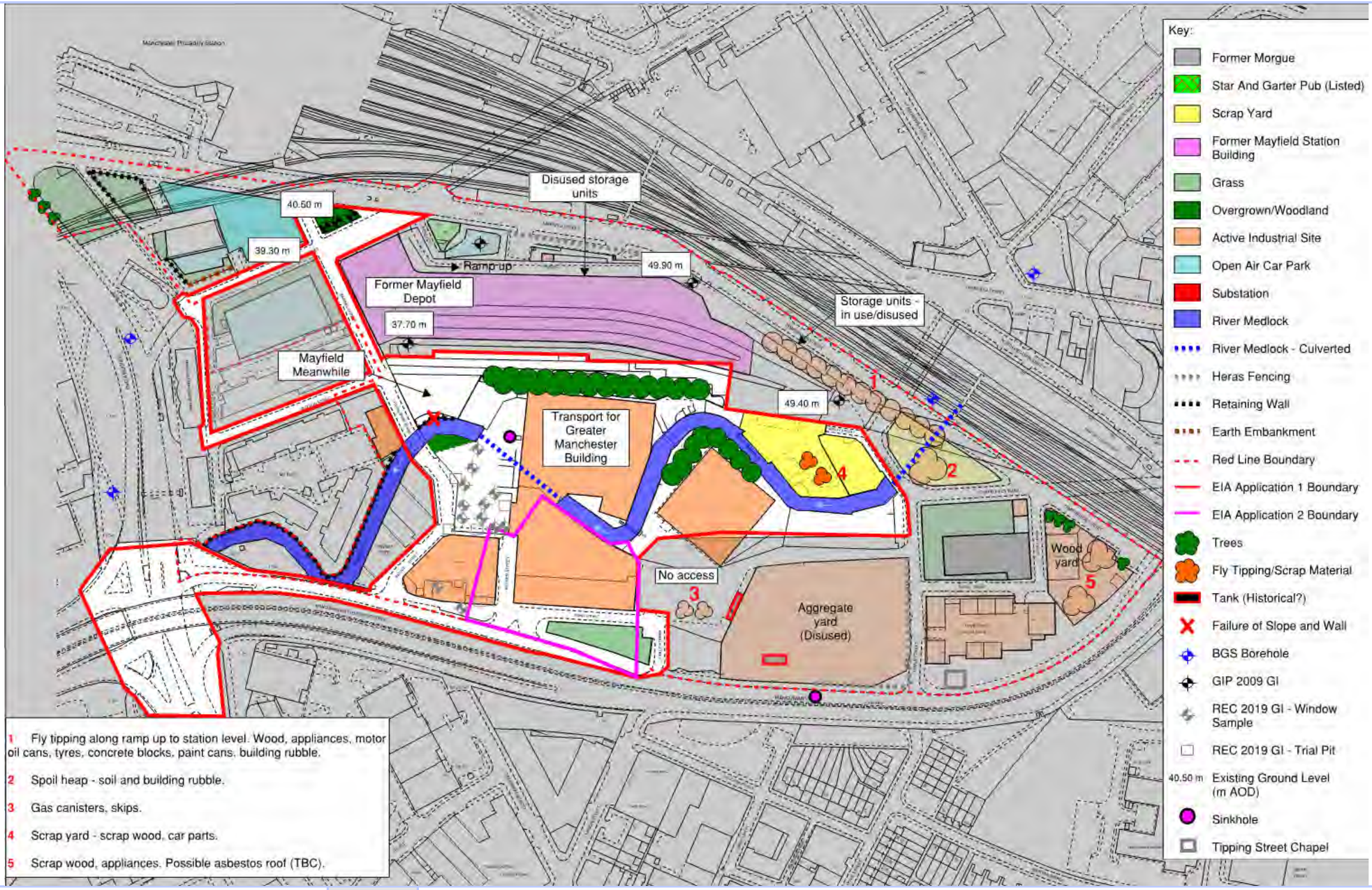


Figure:	**10.1**		
Title:	**Site Constraints Plan**		
Project:	**Mayfield Phase 1**		
Date:	**September 2019**	**Scale:**	**NTS**

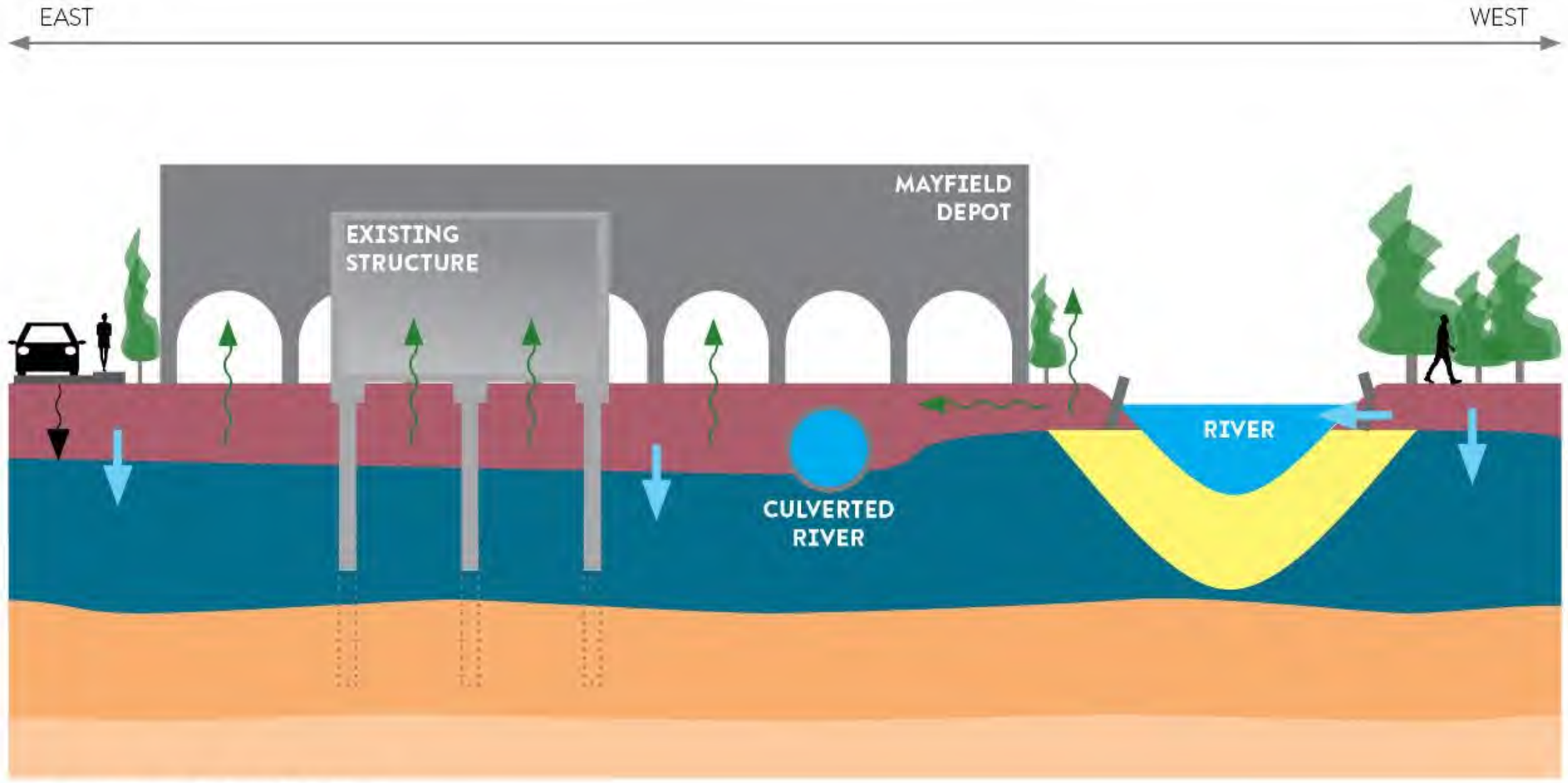
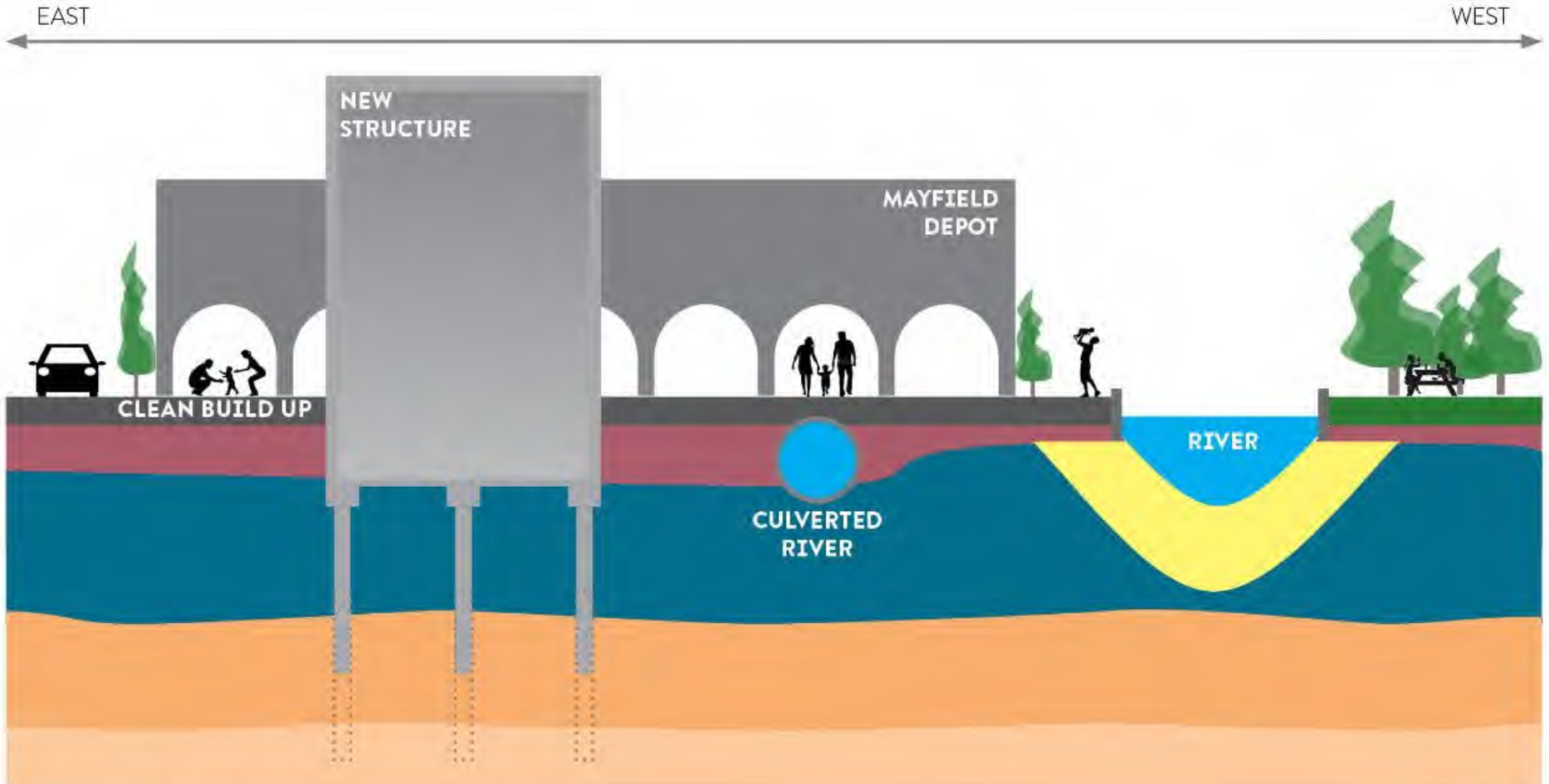


	Figure:	**10.2**		
	Title:	**Pre-Construction Conceptual Site Model**		
	Project:	**Mayfield Phase 1**		
	Date:	**September 2019**	**Scale:**	**NTS**



- CLEAN BUILD UP - HARDSTANDING
- CLEAN BUILD UP - SOFT LANDSCAPING
- MADE GROUND
- ALLUVIUM
- GLACIAL TILL
- WEATHERED CHESTER FORMATION (PRINCIPAL AQUIFER)
- CHESTER FORMATION (PRINCIPAL AQUIFER)

	Figure:	**10.3**		
	Title:	**Post-Construction Conceptual Site Model**		
	Project:	**Mayfield Phase 1**		
	Date:	**September 2019**	**Scale:**	**NTS**

11 Water Resources and Flood Risk

Introduction

11.1 This chapter of the ES assesses the likely environmental effects of the Proposed Development with respect to water resources and flood risk. This chapter also describes the methods used to assess the effects, the baseline conditions existing at the site and surrounding area, the mitigation measures required to prevent, reduce or offset any significant adverse effects, and the likely residual effects after these measures have been adopted.

11.2 A flood risk assessment (FRA) for the site has been prepared in accordance with the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government (MHCLG), 2019) and consultation with the Lead Local Flood Authority (LLFA) and Environment Agency (EA). A drainage strategy has also been prepared which provides information on how surface water from the Proposed Development will be managed to ensure existing surface water management and flood risk are not compromised; it also outlines the proposed plans for the management of foul water from the development.

11.3 This Chapter is supported by the following technical appendices:

- 11.1 BuroHappold Flood Risk Assessment and Drainage Strategy; and
- 11.2 Civic Engineers Baring Street Office 1 (Plot O) & Baring Street Multi Storey Car Park (Plot N) Drainage Statements.

11.4 A separate assessment of the potential effects on groundwater resources and groundwater quality is provided in Chapter 10 (Ground Conditions). A summary of existing conditions on groundwater is also be provided within this chapter, primarily to identify the links between groundwater and surface water effects. Ecological issues are also addressed separately in Chapter 9 (Ecology).

11.5 Cumulative effects associated with Water Resources and Flood Risk have additionally been considered within this ES Chapter and can additionally be found in Chapter 16 Type 1 Cumulative Effects.

Policy Context

11.6 The legislation, policy and guidance that has influenced this assessment is listed below.

National Policy and Guidance

- National Planning Policy Framework (NPPF) (MHCLG, 2019);
- National Planning Practice Guidance – Water Supply, Wastewater and Water Quality (MHCLG, 2015);
- National Planning Practice Guidance – Flood Risk and Coastal Change (MHCLG, 2014);
- The Water Resources Act (1991);
- The Water Resource Management Act (Amendment) (England and Wales) Regulations (2009);
- The Water Act (2014);
- The Environment Act (1995);

- The Environmental Protection Act (1990);
- Flood and Water Management Act (2010);
- The Anti-Pollution Works Regulations (1999);
- The Water Supply (Water Quality) Regulations (2016);
- The Control of Pollution (Oil Storage) (England) Regulations (2001);
- The Water Environment (Water Framework Directive) (England and Wales) Regulations (2003);
- The Environmental Damage Regulations (2009);
- The Environmental Permitting (England and Wales) (Amendment (No. 2) Regulations (2016);
- Future Water (2008);
- Making Space for Water; and
- Water for Life (white paper) (2011).

Regional Policy and Guidance

Greater Manchester Spatial Framework (2019)

11.7 The draft Greater Manchester (GM) Plan for Homes, Jobs, and the Environment (the spatial framework) was put together by Greater Manchester Combined Authority and sets out how GM should develop up until 2037. This version has been rewritten and focuses more heavily on the environment than previous plans. Consultation ran from January 2019 to March 2019 and results are currently being analysed. The key areas of policy which are considered are set out below:

- Policy GM-S 5 (Flood Risk and the Water Environment) states:

  3. Locating and designing development so as to minimise the impacts of current and future flood risk, including retrofitting or relocating existing developments, infrastructure and places to increase resilience to flooding;

  4. Expecting developments to manage surface water runoff through sustainable drainage systems and as close to source as possible (unless demonstrably inappropriate) so as to not exceed greenfield run-off rates or alternative rates specified in district local plans

Environment Agency River Basin Management Plan: North West River Basin District (2015)

11.8 Prepared by the Environment Agency (EA), in conjunction with wider stakeholders, the EA River Basin Management Plan provides a framework for protecting and enhancing the benefits provided by the water environment and will inform planning decisions and policy making. The intention is for all water bodies to achieve 'Good' status as defined by the European Water Framework Directive (WFD). The plan is updated every six years and replaces the river basin management plan published in 2009.

Greater Manchester's Strategic Flood Risk Assessment (Level 1, 2010 and Level 2, 2011)

11.9 The Manchester City, Salford City and Trafford Councils Level 1 Strategic Flood Risk Assessment (SFRA) uses mostly existing data to make an assessment of flood risk from all sources, at the time written and into the future. It looks at the risk of flooding from river, canals, reservoirs, groundwater, surface water and sewers.

11.10 The Level 1 SFRA states that the main source of flood risk in Manchester is from the River Irwell, the Rivers Irk, Medlock and Mersey and Corn Brook. It also considers that surface water flooding is also a significant risk, and that there is a residual risk from the Ashton, Rochdale and Bridgewater Canals and several reservoirs. It makes recommendations for the Level 2 SFRA including analysing the fluvial flood risk, breach of defences, and overtopping of

canals, and that a detailed surface water analysis should be undertaken.

11.11 The Level 2 SFRA builds on the Level 1 SFRA and provides a more detailed understanding of flood risk across the three local authorities from all sources and outlines the residual risks of flooding after all risk avoidance, substitution, control and mitigation measures have been taken into account.

Local Policy and Guidance

Manchester Green and Blue Infrastructure Strategy (2015)

11.12 MCC's Green and Blue Infrastructure Strategy sets out a vision for how the city will continue to grow and evolve over the 10 years from 2015 – 2025. The Strategy acknowledges that Manchester's green infrastructure has been part of the city's success. The green and blue spaces that exist within urban areas include the five river valleys, three canals, over 160 parks, street trees, woodland, private gardens and other areas of natural environment.

11.13 The vision is: "*By 2025 high quality, well maintained green and blue spaces will be an integral part of all neighbourhoods. The city's communities will be living healthy, fulfilled lives, enjoying access to parks and greenspaces and safe green routes for walking, cycling and exercise throughout the city. Businesses will be investing in areas with a high environmental quality and attractive surroundings, enjoying access to a healthy, talented workforce. New funding models will be in place, ensuring progress achieved by 2025 can be sustained and provide the platform for ongoing investment in the years to follow.*"

11.14 The Strategy sets out four main objectives which enable the vision to be achieved:

"1. Improve the quality and function of existing green and blue Infrastructure, to maximise the benefits it delivers;

2. Use appropriate green and blue infrastructure as a key component of new developments to help create successful neighbourhoods and support the city's growth;

3. Improve connectivity and accessibility to green and blue infrastructure within the city and beyond; and

4. Improve and promote a wider understanding and awareness of the benefits that green and blue infrastructure provides to residents, the economy and the local environment."

Local Flood Risk Management Strategy (MCC, 2014)

11.15 The Local Flood Risk Management Strategy (LFRMS) was adopted in 2014 and is a requirement under the Flood and Water Management Act 2010. The LFRMS's aim is '*to ensure that local flood risk is properly managed by using the full range of options in a coordinated way.*'

11.16 The Strategy states a number of policies, including LFRM Policy 6: Ensure that local flood risk is properly considered for new development proposals. It states that the LLFA (MCC in this case) should engage in the planning process to ensure flood risk is appropriately considered in new developments/landscaping.

Manchester Core Strategy Development Plan Document 2012-2027 (2012);

11.17 Manchester's Core Strategy was adopted in 2012 and is a key Development Plan document in the Local Development Framework, setting out the long term strategic policies for Manchester's future development and forming the framework against which planning applications will be assessed. The relevant policies with regard to water resource and flood risk are:

- Policy EN14 Flood Risk states that "appropriate FRA will also be required for all development proposals" and that "all new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use

of Green Infrastructure". It also states that "Manchester contains many sections of rivers which are culverted or 'hidden'; where these are indicated in the SFRA beneath the Proposed Development site, further investigation will be required and the development proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure"; and

- Policy EN17 Water Quality states "Development should avoid any adverse impact on water quality, including during the construction phase" and "should minimise surface water run-off from development and associated roads, and maximise the use of appropriate sustainable drainage systems, to minimise groundwater contamination, and to avoid pollutants reaching watercourses".

Guide to Development in Manchester Supplementary Planning Document and Planning Guidance (2007)

11.18 This document was officially adopted in 2007 and aims to support and enhance the ongoing shaping of the City by providing a set of reasoned principles which will guide developers, designers and residents to the sort of development we all want to see in Manchester. It sets out MCC's stance on a wide range of issues, demonstrating, where applicable, their links to the Manchester Unitary Development Plan (UDP).

11.19 The guide covers environmental standards, of specific interest to this Chapter is the section on water management and weather resilience, which refers to applicable UDP policy around groundwater and watercourse pollution, surface water runoff and incorporation of SuDS, identifying areas of flood risk and the effects of climate change, and using water efficiently.

Other relevant policy and guidance

Pollution Prevention Guidance Notes (now withdrawn)

11.20 The former Environment Agency Pollution Prevention Guidance (PPG) notes provide advice on statutory responsibilities and good environmental practice. Whilst this guidance was withdrawn and will no longer by updated by the EA, as of December 2015, it is still considered good practice. The guidance notes of particular relevance to the Proposed Development include:

- PPG1: General Guide to the Prevention of Pollution, which provides an introduction to pollution prevention and the pollution prevention guidance notes;
- PPG2: Above Ground Oil Storage Tanks, which provides guidance to those responsible for the storage of oil on construction sites. The document provides guidance on location, bunding, protection and operation of oil stored in addition to maintenance and brief guidance on dealing with spills;
- PPG3: Use and Design of Oil Separators in Surface Water Drainage Systems, which provides guidance on when oil separators are appropriate and what size and type of separators is required;
- PPG5: Works In, Near or Liable to Affect Watercourses which provides guidance on general precautions to take when working in the vicinity of a watercourse, along with more specific measures to prevent contamination and to minimise and adverse impacts;
- PPG6: Working at Construction or Demolition sites. This document mirrors much of PPG5 but with particular emphasis on the situations likely to occur at demolition and construction sites;
- PPG7: Refuelling Activities. This provides information on the correct delivery, storage and dispensing of fuel to help reduce the risk of pollution; and

- PPG21: Pollution Incident Response Planning. This provides guidance to those developing site-specific pollution incident response plans to prevent and mitigate damage to the environment caused by accidents such as spillages and fires.

Construction Industry Research and Information Association Guidance

11.21 The Construction industry Research and Information Association (CIRIA) carries out research activities and provides guidance for developers and contractors. The guidance with specific relevance to water resources and flood risk are:

- Guidance C532 – Control of Water Pollution from Construction Sites. This brings together the Environment Agency guidance but goes into much more detail with regard to sources of water on construction sites, pollutants and pathways, in addition to providing guidance on planning for the type and location of suitable control measures; and
- Guidance C753 – The SuDS Manual. This provides best practice guidance on the planning, design, construction, operation and maintenance of SuDS to facilitate their best effective implementation within developments.

Assessment Methodology and Significance Criteria

EIA Scoping

11.22 A formal request for an EIA scoping opinion was submitted to Manchester City Council (MCC) on 24th January 2019, followed by a subsequent request on 24th July 2019. The water resource related responses from the final MCC scoping opinion, received on 16th August 2019 are covered in the scope of this assessment and the supporting FRA and Drainage Strategy (Appendix 11.1 of ES Volume II).

11.23 Reference should additionally be made to Chapter 10 Ground Conditions for site-specific land contamination data and for groundwater issues, and to Chapter 9 Ecology for site-specific ecological considerations.

Baseline study methodology

11.24 The baseline assessment covers the site and surrounding areas which may impact the Proposed Development or be susceptible to impact as a result of the Proposed Development; this includes major water bodies (i.e. the River Medlock) within a material distance of the site, as deemed by the assessment author. The baseline review will take into account the following baseline scenarios:

- Existing baseline, or the assessment baseline (conditions in 2019, when the assessment is made); and
- Future baseline (conditions in 2023, the year of Phase 1 completion).
- It should be noted that the future baseline accounts for how existing baseline conditions could change, by the year of completion, in the absence of the Proposed Development (referred to as the 'Do Nothing' scenario).

Assessment approach

11.25 The methodology adopted in this assessment involves the following:

- Review of international, national, regional and local legislation, policies and guidelines in relation to water resources; water quality and flood risk;
- Establishment of baseline conditions on and around the site through literature review and analysis of existing data obtained from the EA and United Utilities (UU);
- Identification of sensitive receptors through desk study and consultations with the EA as reported through the FRA for the development, and with UU as report in the drainage strategy for the development;

- Identification of risks to water quality, water resources and flooding from development and hence the likely effects, magnitude of change and significance of environmental effects during both the demolition/construction and operational phases;
- Development of mitigation strategies through consultation with the design team;
- Identification of opportunities for enhancement of surface water quality and surface water management through design and mitigation;
- Identification of residual effects; and
- Identification of cumulative effects.

Assessment of effects

Receptor sensitivity

11.26 A qualitative assessment of receptor sensitivity is described in Table 11-1.

Table 11-1 Criteria for determining receptor sensitivity

Sensitivity	Criteria
High	Water body of high amenity value, including areas of bathing and water sports are regularly practiced. Water body of good or high chemical or ecological status. Includes designated bathing waters, shellfish and salmonid fisheries. A source used for public water supply or designated as a source protection zone. Site of Special Scientific Interest (SSSI), Special Protection Area (SPA)/Special Area of Conservation (SAC), Ramsar site or highly sensitive aquatic ecosystem. Water bodies currently failing water quality objectives. Areas which are highly vulnerable. With reference to flood risk. These can include essential infrastructure, emergency services and basement dwellings.
Moderate	Water body of moderate amenity value including public parks, boating, non-contact sports, popular footpaths adjacent to water courses, or watercourses running through housing developments/town centres. Water body of moderate ecological status and/ or non - public water supply or cyprinid fishery. Water body of nature conservation importance at the regional level or a moderately sensitive aquatic ecosystem e.g. Site of Nature Conservation Interest (SNCI). Areas which are more vulnerable. With reference to flood risk, these can include hospitals, residential units, educational facilities and waste management sites.
Low	Water body of poor ecological status. A source in close proximity to a source protection zone or abstraction point. Water body of particular local social/cultural/educational interest. Water body of low amenity value with only casual access, e.g. along a road or bridge in a rural area. Areas which are less vulnerable. With reference to flood risk, these can include retail, commercial and general industrial units, agricultural/forestry sites and water/sewage treatment plants.
Negligible	Low sensitivity aquatic ecosystem. Water of poor ecological status. Water body of no amenity value, seldom used for amenity purposes, in a remote or inaccessible area. Areas which are considered to be water-compatible. With reference to flood risk, these can include flood control infrastructure, docks/marinas, pumping stations and

Sensitivity	Criteria
	recreational/landscape areas.

11.27 The qualitative criteria used to assess how far an effect deviates from the baseline condition, i.e. the magnitude of change, are described in Table 11-2.

Table 11-2 Criteria used for determining the magnitude of change/impact

Magnitude	Criteria
Large	Wholesale changes to the watercourse channel, route or hydrology. Significant changes to soil erosion or sedimentation patterns. Major changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in an increase in discharge/run-off with flood/sewerage exceedance potential. A large increase to flood risk of water bodies and areas downstream. A large risk of flooding to site infrastructure and users, as determined by an on-site FRA in accordance with NPPF.
Medium	Some fundamental changes to the watercourse and hydrology. Moderate changes to soil erosion or sedimentation patterns. Moderate changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in an increase in discharge/run-off within system capacity. A medium increase to flood risk of water bodies and areas downstream. A medium risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF.
Small	Minor changes to the watercourse. Minor changes to soil erosion or sedimentation patterns. Minor changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in slight increase in discharge/run-off well within drainage system capacity. A small increase to flood risk of water bodies and areas downstream. A small risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPFF.
Negligible	No change to the watercourse, run-off and soil erosion and sedimentation patterns and water chemistry. Very minor to no change in discharge run-off and increased pressure on sewer capacity. No increased flood risk to water bodies and areas downstream. No risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF

11.28 The significance of a potential effect is derived by considering both the sensitivity of the feature and the magnitude of change, as demonstrated in Table 11-3.

Table 11-3 Matrix for determining effect significance

		Magnitude of change / impact			
		Large	**Medium**	**Small**	**Negligible**
Receptor sensitivity	**High**	Major	Major	Moderate/Minor	Negligible
	Moderate	Major	Moderate	Minor	Negligible
	Low	Moderate/Minor	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

11.29 Note that moderate and major effects are considered to be 'significant'. Effects can also be described, for example, as:

- Beneficial or adverse;
- Permanent or reversible; and
- Short, medium or long term.

Limitations and assumptions

11.30 The water environment is well understood for the purpose of this assessment.

11.31 The understanding with regard to flood risk, foul water drainage and surface water drainage has been informed though a number of best practice modelling techniques, to produce the best accurately available baseline and future scenario.

Baseline Conditions

Current baseline (2019)

Existing land use

11.32 The existing uses of the Mayfield SRF site are mainly permanent or temporary redevelopment, enabling or highways works. The north of the site is occupied by the existing Mayfield Depot building and associated railway infrastructure, which is currently in use as a leisure and cultural venue. The north-east of the site is bounded by Temperance Street and the arches of former railway infrastructure which also includes temporary uses. In the centre of the site is a low rise warehouse industrial unit with a temporary use as a BMX facility, and surrounding areas which have been demolished under the prior approval process (PP Ref.: 121901/DEM/2018 and 123372/DEM/2019), which have now been implemented.

11.33 The River Medlock meanders through the site from east to west, and is generally contained within a rectangular brick walled channel, some areas of which are in a derelict state with parts of the retaining walls having collapsed into the river.

11.34 In many locations along the river, siltation has built up on one or both sides of the river bank. These silt deposits have enabled the dense growth of vegetation along almost the entire corridor.

11.35 Japanese Knotweed is present along the riparian corridor within the site, as well as within the upstream section of the river. The river is culverted under Baring Street, to the west of the Site.

11.36 Further details of the existing land uses can be found in Chapter 3 (Site, Surroundings and Description of Proposals).

Existing site levels

11.37 The levels vary throughout the site, from approximately 34.4mAOD to the northern area adjacent to the river, to an average level of 37mAOD at the south edge of the site, and 39mAOD at the north. The full topographic survey completed in July 2017 is appended to the Flood Risk Assessment (Appendix 11.1).

Existing surface water drainage

11.38 A full description and drawings of the existing drainage infrastructure is provided in the Drainage Strategy, which forms Appendix 11.1, ES Volume II. For the purpose of this ES chapter a brief summary is provided below.

11.39 It is unclear from public sewer records how the current site is drained, however, this 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 (UU) combined sewers that surround the site.

11.40 The Site is generally sloped towards the River Medlock and it is assumed that it drains into the river. Only one outfall is shown on the topographic survey. On visual inspection of the river banks during a site visit in October 2017, one existing drainage outfall to the river was identified, assumed to be a stormwater only outfall. It is assumed that there are a number of other outfalls along both banks of the river, though due to the overgrown and inaccessible nature of the river banks, these are not currently observable.

11.41 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.

Existing foul water drainage (combined sewer capacities)

11.42 The Site is served by a network of public combined sewers (conveying both foul and surface water together) situated beneath the principal roads within the masterplan (Hoyle Street, Baring Street and Chapelfield Road) and immediately beyond its perimeter (Mancunian Way, Fairfield Street and Temperance Street). UU records show one site sewer as having been adopted, situated in Amory Street, the site of the proposed Mayfield Park.

11.43 A 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.

11.44 Plans of the existing drainage and sewer networks can be found in the Flood Risk Assessment and Drainage Strategy, found in Appendix 11.1.

Surface water features

11.45 The nearest surface water features to the Site are:

- River Medlock – 13km in length with its source in the Pennines near Oldham, this river flows from east to west through the centre of the site, meeting the Irwell at a confluence approximately 3km downstream of the Site, to the west of the city centre;
- Rochdale Canal – Runs for 33 miles across the Pennines, between Manchester and Sowerby Bridge in West Yorkshire, this canal is located 600m east of the Site, and joins a confluence of the Medlock, Irwell, and Bridgewater Canal at Castlefield, 1.9km west of the Site.
- Ashton Canal – Runs for 10km from Ashton-under-Lyne, east of Manchester, to join the Rochdale Canal approximately 450m north of the Site at Ducie St Junction.

11.46 As the Rochdale Canal and Ashton Canals are at their minimum a distance of 450m from the Site, they are not considered as receptors of the potential effects of the Proposed Development, and therefore are not considered further in this ES.

River Medlock water quality

11.47 The European Water Framework Directive (WFD) was transposed into national law through the Water Environment WFD (England and Wales) Regulations 2003 (Statutory Instrument 2003 No. 3242). The aim of this Directive is to provide an integrated, Europe-wide approach to the management of water resources, particularly water quality. As part of the Directive, River Basin Management Plans have been established.

11.48 The River Medlock falls within the North West Basin District. The associated River Basin

Management Plan establishes a number of requirements that must be met to comply with the WFD.

11.49 The River Medlock, at this location within the Site, is classified as heavily modified under the WFD and has an obligation to achieve a 'good' ecological potential. By definition, artificial and heavily modified water bodies are not able to achieve natural conditions, and instead the classification and objectives for these water bodies are measured against ecological potential rather than status.

11.50 The ecological status of the River Medlock at this location is classified as 'moderate' owing to its poor biological quality elements (specifically fish), and high levels of specific pollutants. The chemical status of the River Medlock at this location is classified as 'good'. The river is expected to maintain this status at the end of this WFD planning cycle.

Table 11-4 WFD classification of the River Medlock, Lumb Brook to Irwell (EA Catchment Data Explorer, accessed 08/08/19)

Classification item	2013	2014	2015	2016
Overall water body	Moderate	Moderate	Moderate	Moderate
Ecological	Moderate	Moderate	Moderate	Moderate
Chemical	Good	Good	Good	Good

11.51 This Site has a long industrial history which has continued until present day. Potential sources of contamination within the Site boundary are considered to be the residual contamination from any infilled ground, former industrial usage and car parks. The potential risk to the River Medlock arises from the leaching of the residual ground contamination within the Made Ground material that underlies the Site and/or the bottom sediment within the River Medlock.

11.52 Given the degree of hardstanding on the Site, the impermeable nature of some of the River Medlock walls, the undisturbed nature of the bottom sediment and the presence of limited extent of cohesive Glacial Till, there are limited pathways for the contaminants to enter the River Medlock, thus the risk to this receptor is considered to be moderate under baseline conditions.

Water supply and existing demand

11.53 The Site is served by UU for both potable and foul water. The Site is located within the Strategic Water Resource Zone (WRZ) of the North West WRZs within the UU supply area.

11.54 The level of water stress for the UU region was identified as 'moderate stress' in the final classifications of the 2013 Water Stressed Areas policy paper issued by the EA, under the current and future scenarios. This was classed as 'not serious'.

11.55 UU's current Water Resource Management Plan (WRMP) for 2020-2045 (published in 2019, also referred to as FWRMP19) highlights a significant water supply resilience risk to the Manchester and Pennines area, as a result of degrading infrastructure which will be addressed through replacing existing aqueduct tunnels with new tunnels. The WRMP identifies a surplus of water available to meet the projected demand over the next 20 years to 2040, with a deficit occurring from 2041 to 2045.

11.56 The existing daily water demand of the Site will be limited to the existing uses i.e. the existing demand is anticipated to come from Unit 5 and the Gatehouse (and associated temporary uses) only.

Existing on-site flood risk

11.57 A detailed assessment of the existing flood risk to the site and a full summary of consultations with the EA is provided in the FRA (Appendix 11.1). A summary is provided here.

Historical flooding

11.58 According to the historic flood maps shared by DEFRA under the Open Government Licence, there are no recorded historic flood extents around the site.

11.59 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.

Fluvial flooding

11.60 From inspection of the Environment Agency's online flood map for planning, shown in Figure 11.1, 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.

11.61 The flood extents for the River Medlock are based on a model developed from the EA in 2009, which was updated in 2011. BuroHappold has obtained the model from the EA, reviewed and updated in line with current best practice methodologies and hydrology data as per 2019, as well as introducing topographic information based on a survey completed in 2017. The modelled baseline is shown in the FRA (Appendix 11.1) and demonstrates that a significant area at the centre of the site is in FZ3, with adjacent areas of FZ2 to both the east and west side of Unit 5, and surrounding FZ1.

11.62 The Site therefore includes areas which are defined as having a low, medium and high risk of flooding.

Flooding from surface water and sewers

11.63 Surface water flooding occurs when the infiltration capacity during a storm event is low, or when drainage systems do not drain away rainwater.

11.64 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.

11.65 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.

11.66 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.

11.67 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).

11.68 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.

Flooding from groundwater

11.69 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.

11.70 According to the Greater Manchester sub-regional Strategic Flood Risk Assessment (SFRA) there are no known reports of groundwater flooding within the Manchester area.

11.71 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.

11.72 It is therefore considered that the site is at low risk of groundwater flooding.

Flooding from reservoirs, canals and other artificial sources

11.73 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.

11.74 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 11.3 was obtained from the EA website on long term flood risk. 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 (UU).

11.75 The risk of reservoir failure is extremely unlikely and the impact of such an event to the site is considered low.

Flood risk summary

11.76 The primary flood risk is fluvial flooding from the River Medlock. The Site itself lies within Flood Zones 1, 2 and 3. The Site is also at a low, medium and high risk of surface water flooding, mainly corresponding to localised depressions in topography within the Site and adjacent to buildings in the baseline (where the ponding of surface water appears to be occurring).

Future baseline (2023)

11.77 The future baseline year is 2023. The future baseline year is likely to be similar in terms of sensitivity to that of the current baseline of 2019.

River Medlock water quality

11.78 The River Medlock will need to continue to work towards the requirements of the WFD. Once these requirements are met they will need to be maintained. The River Medlock will therefore

retain its classification as highly sensitive.

11.79 According to the EA Catchment Management Tool, accessed online, the River Medlock at this section (Lumb Brook to Irwell) is expected to reach its overall objective of 'good' by the year 2027 (the end of the third management cycle, and final deadline for meeting objectives).

Table 11-5 Objectives for the River Medlock (Lumb Brook to Irwell) which must be achieved under the WFD (Source: EA Catchment Management Tool. Accessed: 09/09/19)

Classification item	Year	Status
Supporting elements (surface water)	Good	2027
Biological quality	Moderate	2027
Fish	Moderate	2027
Chemical quality (ammonia)	Good	2027
Overall water body	Good	2027

Foul and surface water sewer networks

11.80 The foul and surface water sewer networks will continue to be under a similar pressure as the assessment baseline.

Water supply

11.81 The UU 2019 WRMP states that the Manchester and Pennines region has an adequate supply to meet demand over the next 25 years, and that investment is proposed to reduce the risk of the aqueduct supplying water to Manchester. As construction works were expected to begin on the highest risk tunnel section in 2018, with completion by 2028, it is likely that by the future baseline year the risk to the water supply of this area would be of similar position to the existing baseline year.

Flood risk

11.82 The risk of flooding to the Site will need to be managed through the implementation of the principles of the NPPF and the North East FRMS. MCC state in their 2009 Local Flood Risk Management Strategy (LFRMS) that future impacts of climate change could include "more intense and longer lasting storms, and consequently increased flood risk. It will be important to consider potential climate change in terms of future drainage maintenance or other flood risk management interventions".

11.83 Over the build period, it is not expected that the conditions would change significantly with regard to surface water flood risk, therefore the site would remain within all three Flood Zones 1, 2 and 3 – including low, medium and high risk areas. The risk of flooding from sewers, groundwater or reservoirs and canals is not likely to change significantly from the current low risk.

Identification and Evaluation of Likely Significant Effects

Demolition and construction effects for Application 1 (Baring Street Multi Storey Car Park, Baring Street Office 1 and Mayfield Park)

Relevant aspects of the scheme

11.84 The risks to the water environment during demolition and construction include:

- Increased water demand from construction site uses;

- Increase in sediment loads caused by site run-off containing elevated suspended sediment levels. This can result from land clearance, excavation, dewatering of excavation, stockpiling, bunding, wheel washing and movement of materials to and from the site;
- The release of hydrocarbons and oils into the on-site drainage system due to a large number of vehicles accessing the site, leakage from oil/fuel storage tanks and accidental spillages;
- Accidental leaks and use of hazardous materials, particularly concrete and cement products, which can be contained in uncontrolled wash-down water and surface water run-off;
- Dust and debris caused by poor management of the site;
- Leaks or breakage of temporary sewerage system infiltrating groundwater and/or migrating to surface waters; and
- Potential for direct pollution and or disturbance of sediment in the River Medlock as a result of the river naturalisation works; and
- Flood risk associated with excavations.

11.85 These effects can be identified as temporary (construction activities) or permanent (loss of habitat) and risks relating to the water environment as a result of this development are discussed in detail below, and summarised in Table 11-6.

Potential effects of the development and their significance

Increased water demand

11.86 Processes during the site preparation, excavation and construction phase of the development which may require significant volumes of water supply include sanitary facilities for site staff, and water supply for wheel washing and washing down of construction areas.

11.87 The magnitude of change on strategic water supplies will be small. This results in a likely moderate adverse temporary/short term effect on strategic water supplies.

Increased sediment loads

11.88 Site runoff containing elevated suspended sediment levels can result from land clearance, excavation, dewatering of excavation, stockpiling, bunding, wheel washing and movement of materials to and from the site. Runoff with high sediment loads can have adverse effects on water bodies through increasing turbidity (thus reducing light penetration and reducing plant growth), and by smothering vegetation and bed substrates (thus effecting on animal communities through the destruction of feeding areas, refuges and breeding/spawning areas).

11.89 Indirect adverse effects can also be associated with suspended sediments that have inorganic or organic contaminants (e.g. heavy metals and pesticides respectively). Sediment can additionally cause issues within runoff channels through clogging and blockages resulting in reduced flow capacity.

11.90 The River Medlock could be influenced by increased sediment loads filtering into surface water drainage as the current site drainage is discharged into the river. There is potential for a large magnitude of impact on this water body. When considering the receptor sensitivity, the overall significant effect is considered to be major adverse for water quality in the River Medlock, in the absence of further mitigation.

11.91 Sediment loads could additionally block and clog the existing surface water drainage network on site. In the absence of mitigation, the magnitude of change is potentially large and the effect significance major adverse.

Hydrocarbons and oils

11.92 The release of hydrocarbons and oils into the onsite drainage system is a common form of pollution within urban areas. There is a risk such pollution will increase during construction with greater numbers of vehicles accessing the site due to trackout. Increased vehicle movements result in a greater likelihood of leakages from oil/fuel storage tanks or accidental spillages. Oils and fuels that are washed from surfaces into the on-site drainage system are likely to discharge into the drains.

11.93 Hydrocarbons form a film on the surface of the water body, deplete oxygen levels and can be toxic to freshwater fish. Even at very low concentrations the film can negatively affect the visual appearance of the water body. The effect would be temporary, and water quality within the affected water body would improve over time as pollutants disperse and are treated by natural processes.

11.94 The River Medlock could be influenced by increased hydrocarbons and oils getting into surface water drainage as the current site drainage is discharged into the river. There is potential for a large magnitude of impact on this water body. When considering the receptor sensitivity, the overall significant effect is considered to be major adverse for water quality in the River Medlock, in the absence of further mitigation.

Accidental leaks of and use of hazardous materials

11.95 The use of concrete and cement products on-site can present a pollution risk because of the potential for uncontrolled release of wash-down and surface water run-off If these activities are not carried out in designated areas; wastewater may enter a water body and adversely affect the combined sewer and aquatic environment. Concrete products are highly alkaline and corrosive; fish can be physically damaged and their gills blocked, and both vegetation and the bed of the water body can be smothered.

11.96 During demolition and construction there is an elevated risk of potential leaks or accidental spillage of hazardous chemicals infiltrating to groundwater or migrating to surface water bodies. However it is only when large quantities of hazardous substances are spilled, or the spillage is directly into the water body, that a significant risk of acute toxicity will arise in the receiving water body. The magnitude of any change will depend on the scale and nature of any potential incident and thus is difficult to predict.

11.97 For the most part, effects are likely to be temporary. Water quality within the affected water body will improve over time as pollutants are dispersed and diluted.

11.98 The River Medlock could be influenced by accidental leaks of hazardous materials getting into surface water drainage as the current site drainage is discharged into the river. There is potential for a large magnitude of impact on this water body. When considering the receptor sensitivity, the overall significant effect is considered to be major adverse for water quality in the River Medlock, in the absence of further mitigation.

Dust and debris

11.99 Demolition and construction activities located on site have the potential to release dust and debris that may be blown into adjacent water bodies. Increased dust levels in water bodies may reduce the levels of light reaching aquatic plant and animal species. Debris blown into water bodies can decrease the recreational and aesthetic quality of the water body. Effects will however be temporary; water quality within the affected water body will improve over time as dust and debris settle or are trapped by vegetation. Sediment/debris can additionally cause issues within combined sewer networks through clogging/blocking, a reduction in flow capacity and premature operation.

11.100 Considering the adjacent proximity of the River Medlock, the magnitude of change without

mitigation could be large and the effect significance major adverse.

Leak or breakage of the temporary sewerage system

11.101 Leaks and breakages of sewers from the temporary toilet facilities on-site during demolition/construction works may result in crude sewage infiltrating groundwater or being washed into the site drainage system. Sewage contains high levels of nutrients, organic matter, coliforms and suspended solids. These can result in nutrient enrichment and eutrophication, smothering of bottom-dwelling organisms and plants, and significantly reduced oxygen levels. The effect would be temporary as water quality within the affected water body would improve over time as organic matter is dispersed and treated by natural processes.

11.102 The River Medlock could be influenced by leakage or breakage of the temporary sewerage system, with sewage migrating into surface water drainage as the current site drainage is discharged into the river. There is potential for a large magnitude of impact on this water body. When considering the receptor sensitivity, the overall significant effect is considered to be major adverse for water quality in the River Medlock, in the absence of further mitigation.

Dewatering of excavations

11.103 The dewatering of excavations may need to be discharged to the combined sewer or to the River Medlock under formal agreement with the sewerage undertaker or the EA. In the case of the combined sewer, the volume will minimise the flow capacity temporarily.

11.104 The magnitude of change on the capacity of the combined sewer network, in the event that flows are not managed appropriately, is considered to be large. The magnitude of potential effect is therefore potentially major adverse.

Direct pollution and / or disturbance of sediment in the River Medlock as a result of in river works

11.105 The in river works will need to agreed as part of a licence for the works with the EA. In the absence of appropriate control for sediment and contaminant mobilisation, there could be a major adverse effect to water quality within the River Irwell.

Flood risk to construction workers and construction plant

11.106 Measures should be taken to protect construction workers from surface water flooding and the residual tidal and fluvial flood risks to the site, in addition to water ingress from any excavations on site. The magnitude of change on the construction workers and plant is likely to be small and the significance of effect is considered to be moderate in significance, without further mitigation.

Climate change and adaptation

11.107 The construction period is planned to last until 2023. Climate forecasts show that as a result of climate change, the North West of England is likely to have an increased chance of milder, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extreme weather.

11.108 Flood risk could therefore increase in the future with climate change, and the Drainage Strategy (Appendix 11.1) has recommended that a 30% allowance is made in the surface water drainage design, to allow for climate change increases and uncertainty.

Summary of effects during construction

11.109 A summary of potential effects and their significance prior to mitigation is provided in Table 11-6.

Table 11-6 Summary of pre-mitigation effects during construction of Application 1 only

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
River Medlock (water quality)	High	Increased sediment loads	Large	Major adverse
		Accidental release of hydrocarbons	Large	Major adverse
		Accidental release of hazardous materials	Large	Major adverse
		Leak or breakage of the temporary sewerage system	Large	Major adverse
		Dust and debris	Large	Major adverse
		Direct pollution and / or disturbance from in river works	Large	Major adverse
Water services infrastructure (supply)	Medium	Increased water demand during the construction period	Small	Moderate adverse
Water services infrastructure (surface water capacity)	High	Increased sediment loads	Large	Major adverse
		Sediment clogging and pollution from dewatering of excavations	Large	Major adverse
Site users (construction workers and plant users)	High	Flood risk to site workers (from groundwater, surface water, and fluvial flooding from the River Medlock)	High	Major adverse

Demolition and construction effects for Application 1 + Application 2 (Baring Street Multi Storey Car Park, Baring Street Office 1 and Mayfield Park, and Baring Street Office 2)

Relevant aspects of the scheme

11.110 The risks to the water environment during demolition and construction mirror those outlined as potential effects of the Application 1 alone scenario, in paragraphs 11.84 to 11.108, and include:

- Increased water demand from construction site uses;
- Increase in sediment loads caused by site run-off containing elevated suspended sediment levels. This can result from land clearance, excavation, dewatering of excavation, stockpiling, bunding, wheel washing and movement of materials to and from the site;
- The release of hydrocarbons and oils into the on-site drainage system due to a large number of vehicles accessing the site, leakage from oil/fuel storage tanks and accidental spillages;
- Accidental leaks and use of hazardous materials, particularly concrete and cement products, which can be contained in uncontrolled wash-down water and surface water run-off;
- Dust and debris caused by poor management of the site;
- Leaks or breakage of temporary sewerage system infiltrating groundwater and/or migrating to surface waters; and
- Potential for direct pollution and or disturbance of sediment in the River Medlock as a result of the river naturalisation works; and

- Flood risk associated with excavations.

11.111 These effects can be identified as temporary (construction activities) or permanent (loss of habitat) and risks relating to the water environment as a result of the development of Applications 1 and 2 mirror those resulting from Application 1 alone, due to the majority of enabling works being carried out under Application 1Table 11-6.

Potential effects of the development and their significance

11.112 Whilst the delivery of Application 1 and 2 together would result in additional construction work to that outlined in sections 11.86 to 11.108, the effects and their significances remain unchanged from those previously predicted for Application 1 alone.

Summary of effects during construction

11.113 A summary of potential effects and their significance prior to mitigation is provided in Table 11-7.

Table 11-7 Summary of pre-mitigation effects during construction of Application 1 with Application 2

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
River Medlock (water quality)	High	Increased sediment loads	Large	Major adverse
		Accidental release of hydrocarbons	Large	Major adverse
		Accidental release of hazardous materials	Large	Major adverse
		Leak or breakage of the temporary sewerage system	Large	Major adverse
		Dust and debris	Large	Major adverse
		Direct pollution and / or disturbance from in river works	Large	Major adverse
Water services infrastructure (supply)	Medium	Increased water demand during the construction period	Small	Moderate adverse
Water services infrastructure (surface water capacity)	High	Increased sediment loads	Large	Major adverse
		Sediment clogging and pollution from dewatering of excavations	Large	Major adverse
Site users (construction workers and plant users)	High	Flood risk to site workers (from groundwater, surface water, and fluvial flooding from the River Medlock)	High	Major adverse

Operational effects for Application 1 (Baring Street Multi Storey Car Park, Baring Street Office 1 and Mayfield Park)

Relevant aspects of the scheme and designed-in mitigation

11.114 The following commitments, made through the Drainage and Flood Risk Assessment (Appendix 11.1, ES Volume II) for this planning application, are considered to form designed-in mitigation. The subsequent assessment assumes that the design measures specified in these documents are implemented.

Potential effects of the development and their significance

Surface water drainage

11.115 The Drainage Strategy (Appendix 11.1) includes detailed proposals for surface water drainage from the development, with a plan of locations of catchment areas and discharge rates.

11.116 Following consultation with MCC, the following parameters to be agreed, with regard to surface water discharge:

- 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).

11.117 In addition, following consultation with the EA, it was agreed that the discharge of surface water to the River Medlock would be acceptable.

11.118 Not all Sustainable Urban Drainage Systems (SuDS) features are appropriate for the Mayfield site, 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 stormwater strategy for the masterplan, a design hierarchy has been adopted as detailed in the Drainage Strategy (Appendix 11.1) that includes:

- Rainwater harvesting;
- Infiltration techniques;
- Rainwater attenuation in open water features for gradual release;
- Direct discharge direct to a watercourse;
- Rainwater attenuation above ground;
- Rainwater discharge to a surface water sewer or drain; and
- Rainwater discharge to a combined sewer.

Foul water drainage

11.119 The Drainage Strategy (Appendix 11.1) includes detailed proposals for foul water drainage from the development.

11.120 It is anticipated that each plot will make a direct connection to the nearest available UU sewer. A plan of the proposed connections for Phase 1 (Applications 1 and 2) to the existing

combined/foul sewer is shown in the Drainage Strategy (Appendix 11.1), with more detailed strategies for plots in Appendix 11.2.

11.121 The indicative proposed connection route will run south between Baring Street MSCP and Baring Street Office 2, connecting to an existing combined sewer near to the southern corner between Baring Street Office 2 and the future Plot L.

Flood risk

11.122 The EA has been consulted early on to provide advice on the project, and have set their aims for the project:

- Removal of culvert and daylighting of the 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.

11.123 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.

Potential effects of the development and their significance

11.124 This section considers the potential effects that the development will have on the water environment once operational. The effects of the development on the water environment during operation include:

- Pollutants contained within surface water run-off contaminating water bodies through overflows/leaks to the sewer system;

- Any effluent that leaks out of the sewerage system due to breakages and perforations could pollute surface and ground water resources;
- Changes to vegetation and areas of hard standing in the development compared with the current baseline are likely to alter flood risk;
- Positive impacts and effects as a result of river naturalisation;
- Water services infrastructure being able to deal adequately with increased water demand; and
- Sewerage infrastructure may not have enough capacity to receive foul discharges to the network and waste water treatment works.

Pollutants contained in surface water

11.125 Pollutants, such as silts and hydrocarbons resulting from activities on-site such as vehicle storage, vehicle washing and oil/fuels leaks would be discharged to the surface water network through surface water run-off. This can increase water turbidity, deplete oxygen levels and be toxic to the aquatic environment.

11.126 The magnitude of change will depend on the activities present and their occurrence. The effect is considered permanent, although certain activities such as accidental spillages would be temporary.

11.127 It is envisaged that operational effects on all water bodies will be negligible due to the commitments made in the Drainage Strategy for water quality treatment prior to discharge. The overall significant effect is envisaged to be negligible across all receptors.

Changes to flood risk

11.128 This Flood Risk Assessment (Appendix 11.1) 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. Residual flood risk will therefore be negligible with the implementation of the measures as set out in the FRA.

Future water demand

11.129 Due to the scale of the development, the water demand once complete and operational will increase significantly from the baseline. Estimating the water demand is difficult due to the varying water requirements of commercial activities (office, retail, and public amenity land uses). The population on the site will increase as a result of the development, and without appropriate potable water demand management, the magnitude of change on the strategic water supply could be medium. As the North East WRZ is not classed as under serious stress, and is classed a medium sensitivity receptor, the increase in water demand from the development is likely to be moderate adverse without mitigation.

Foul water drainage

11.130 During the SRF feasibility stage, UU were consulted regarding the project proposals and connections of the foul sewer to their existing infrastructure. UU confirmed that there is sufficient capacity to accept the flows from the Proposed Development. The effect is therefore negligible.

11.131 It is anticipated that as the detailed design of the plots are developed, the exact connection positions to the UU combined sewer would be determined, which may require an extensive run of sewer to be installed.

River naturalisation

11.132 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 will be created. The effect of this will be at least minor beneficial, potentially up to moderate beneifical, to the morphology of the river within the site boundary.

Climate change and adaptation

11.133 Over the operational period, UKCP18 climate forecasts show that as a result of climate change, England would experience a greater chance of hotter, drier summers and warmer, wetter winters.

11.134 The FRA outlines a number of mitigation measures designed-in, including the +35% climate change allowances for development FFLs and flood plain compensation. In addition to this, it is proposed to design for a freeboard above flood levels to provide resilience against extreme flood events or a combined canal breach and fluvial flood event.

Summary of effects during operation

11.135 A summary of the potential effects during operation can be found in Table 11-8.

Table 11-8 Summary of potential pre-mitigation effects during operation of Application 1

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
River Medlock	High	Pollutants contained in surface water	Negligible	Negligible
		River naturalisation	Small	Minor beneficial to moderate beneficial
		Increased flood risk	Negligible	Negligible
Water services infrastructure (surface water)	Moderate	Flood risk Change to runoff rates	Negligible	Negligible
Water services infrastructure (foul water capacity)	Moderate	Increased foul water drainage demand	Negligible	Negligible
Water services infrastructure (supply)	Moderate	Increased potable water demand	Medium	Moderate adverse
Site users	Moderate	Flood risk to site users	Negligible	Negligible

Operational effects for Application 1 + Application 2 (Baring Street Multi Storey Car Park, Baring Street Office 1 and Mayfield Park, and Baring Street Office 2)

Relevant aspects of the scheme and designed-in mitigation

11.136 The commitments outlined in sections 11.114 to **Error! Reference source not found.**, made t hrough the Flood Risk Assessment and Drainage Strategy (Appendix 11.1, ES Volume II) are considered to form designed-in mitigation.

11.137 The re-profiling of the site, to bring plot levels above the proposed FFLs will be carried out during the Phase 1a construction works described in Chapter 5 (Construction Management and Phasing). This means that the area of the Site which will be built on as Baring Street Office 2 is developed will be brought out of Flood Zones 2 and 3 ahead of the Phase 1b build. The subsequent assessment assumes that the design measures specified in these documents are implemented.

Potential effects of the development and their significance

11.138 This section considers the potential effects that the development will have on the water environment once operational.

11.139 The effects of the development on the water environment during operation mirror those identified in the assessment of Application 1 alone scenario, in paragraphs 11.125 to 11.133 and include:

- Pollutants contained within surface water run-off contaminating water bodies through overflows/leaks to the sewer system;
- Any effluent that leaks out of the sewerage system due to breakages and perforations could pollute surface and ground water resources;
- Changes to vegetation and areas of hard standing in the development compared with the current baseline are likely to alter flood risk;
- Positive impacts and effects as a result of river naturalisation;
- Water services infrastructure being able to deal adequately with increased water demand; and
- Sewerage infrastructure may not have enough capacity to receive foul discharges to the network and waste water treatment works.

11.140 Whilst the delivery of Application 1 and 2 together would result in additional operational pressures to the River Medlock, water services infrastructure and additional site users, the effects and their significances remain unchanged from those previously predicted for Application 1 alone, detailed in sections 11.124 to 11.134.

Summary of effects during operation

11.141 A summary of the potential effects during operation can be found in Table 11-9.

Table 11-9 Summary of potential pre-mitigation effects during operation of Application 1 with Application 2

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
River Medlock	High	Pollutants contained in surface water	Negligible	Negligible
		River naturalisation	Small	Minor beneficial to moderate beneficial
		Increased flood risk	Negligible	Negligible
Water services infrastructure (surface water)	Moderate	Flood risk Change to runoff rates	Negligible	Negligible
Water services infrastructure (foul water capacity)	Moderate	Increased foul water drainage demand	Negligible	Negligible
Water services infrastructure (supply)	Moderate	Increased potable water demand	Medium	Moderate adverse
Site users	Moderate	Flood risk to site users	Negligible	Negligible

Mitigation Measures

Supplementary mitigation measures during demolition and construction

11.142 Further to the CMP in Chapter 5 of this ES (and supporting technical appendices 5.1 and 5.2), the contractor will develop a Construction Environmental Management Plan (CEMP) to cover both the demolition and construction site works. It will include mitigation measures to protect the water environment.

11.143 This will set out how construction activities will be undertaken in accordance with good practice guidance, including the Pollution Prevention Guidelines (PPG) formerly published by the EA (and now available in the National Archives), particularly 'PPG1 General guide to the prevention of water pollution', 'PPG2 Above ground oil storage tanks', 'PPG5 Works in, near or liable to affect watercourses', and 'PPG6 Working at construction and demolition sites', and other good construction guidance such as CIRIA 'Guidance C532 - Control of water pollution from construction sites'.

11.144 A summary of the mitigation measures proposed to reduce adverse effects of construction on the water and flood risk at site can be found in Table 11-10.

Table 11-10 Summary of demolition and construction supplementary mitigation measures for Baring Street MSCP

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Elevated sediment loads in surface water and dewatering of excavations	Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures: • Keep gradients of the soil as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall. Areas which are exposed should be reseeded or surfaced as soon as practicable. • Enforce tight control of site boundaries including minimal land clearance and restrictions on the use of machinery adjacent to water bodies. Where possible, do not locate stockpiles within 10 m of water bodies or drainage lines. • Wheel washing facilities should be provided at all entry and exits points. Water from wheel wash facilities must not be discharged into the River Medlock or the on-site surface water sewerage network. • Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. • Sediment should be removed from water pumped during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. • Sediment/soils encountered during construction activities such as earthworks could be contaminated. This has an associated risk of mobilising pollutants, which could be released to surface waterbodies. The working practices that should be put in place to prevent and manage this issue are described in Chapter 10 Ground Conditions.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	CEMP to include dust suppression measures such as dampening and wheel washing. See Chapter 8 Air Quality for further details on dust suppression.		
Accidental release of hydrocarbons and oils into the on-site drainage system or directly to the River Medlock	Development and implementation of a CEMP that considers the following measures: • Incorporation of interceptors where appropriate into the site drainage system at high risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge. Other measures including drip trays under equipment such as generators, and wheel washing facilities should also be implemented to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to the River Medlock	Development and implementation of a CEMP that considers the following measures: • Provision of storage facilities and tanks and conduct refuelling of machinery within bunded areas, which should not be located within 10m of water bodies or drainage lines. • Storage and bunded areas to be constructed of impervious floors and walls with the capacity for the contents of the storage tank and an additional ten per cent safety margin. • As a remedial measure, spill containment equipment such as absorbent materials should be stored on site. Mixing of construction materials, such as cement, will be conducted in designated areas located away from water bodies and drainage lines.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Leak or breakage of temporary sewerage system causing crude sewage to migrate to water	In order to improve groundwater and any subsequent impacts on health, the CEMP should consider the following: • Provision and maintenance of temporary septic tank, cesspit and/or sewerage connection for disposal of sewage from the toilet facilities to reduce the likelihood of crude sewage infiltrating groundwater or migrating towards water bodies. Any temporary toilet facilities will be positioned at least 10m away from the banks of the River Medlock.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Dust and debris blowing into the River Medlock	Apply dust management procedures which are typically implemented for air quality management issues, such as: • Damping down to suppress the creation of dust. Mitigation measures typically used for dust management are discussed in Chapter 8 Air Quality. Implement good site practice, perimeter fences and tight control of materials and waste to minimise the risk of debris entering water bodies.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Dewatering of excavations causing sediment and capacity issues in the River Medlock/foul water network	Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. Sediment should be removed from water pumped water during any extractions required. Sediment	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. If there is a requirement for discharge to the sewer network or River Medlock, this should be throttled to a flow rate that is agreed with UU or the EA prior to commencement of work.		
Increased water demand during construction	All relevant contractors should investigate opportunities to minimise and reduce the use of water, such as: • Selection and specification of equipment; • Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both onsite and within site offices; • Use of recycling water systems such as wheel washes, site toilets handwash; and • Use of a rainwater harvesting system for use in equipment and vehicle washing.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Flood risk to site workers and downstream areas during construction	Contractor to prepare a flood emergency and contingency plan including arrangements to make safe any static plant, move any mobile plant, and to evacuate site operatives in a flood risk emergency. Construction workers should be made aware of risks associated with excess surface water caused by overland flows and standing water. For example, risks to excavations and damage to plant. To minimise any risk from groundwater flooding during excavation of the site, cut levels should be limited to at least 0.5m above the groundwater level. Where this is not possible, dewatering and other groundwater control measures should be employed. Any such groundwater control measures will also require pollution control measures in accordance with EA guidance.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Table 11-11 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 1 (Plot O)

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Elevated sediment loads in surface water and dewatering of excavations	Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures: • Keep gradients of the soil as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall. Areas which are exposed should be reseeded or surfaced as soon as practicable. • Enforce tight control of site boundaries including minimal land clearance and restrictions on the use of machinery adjacent to water bodies. Where possible, do not locate stockpiles within 10 m of water bodies or drainage lines. • Wheel washing facilities should be provided at all entry and exits points. Water from wheel wash facilities must not be discharged into the River Medlock or the on-site surface water sewerage network. • Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. • Sediment should be removed from water pumped during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. • Sediment/soils encountered during construction activities such as earthworks could be contaminated. This has an associated risk of mobilising pollutants, which could be released to surface waterbodies. The working practices that should be put in place to prevent and manage this issue are described in Chapter 10 Ground Conditions. CEMP to include dust suppression measures such as dampening and wheel washing. See Chapter 8 Air Quality for further details on dust suppression.		
Accidental release of hydrocarbons and oils into the on-site drainage system or directly to the River Medlock	Development and implementation of a CEMP that considers the following measures: • Incorporation of interceptors where appropriate into the site drainage system at high risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge. Other measures including drip trays under equipment such as generators, and wheel washing facilities should also be implemented to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to the River Medlock	Development and implementation of a CEMP that considers the following measures: • Provision of storage facilities and tanks and conduct refuelling of machinery within bunded areas, which should not be located within 10m of water bodies or drainage lines. • Storage and bunded areas to be constructed of impervious floors and walls with the capacity for the contents of the storage tank and an additional ten per cent safety margin. • As a remedial measure, spill containment equipment such as absorbent materials should be stored on site. Mixing of construction materials, such as cement, will be conducted in designated areas located away from water bodies and drainage lines.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Leak or breakage of temporary sewerage system causing crude sewage to migrate to water	In order to improve groundwater and any subsequent impacts on health, the CEMP should consider the following: • Provision and maintenance of temporary septic tank, cesspit and/or sewerage connection for disposal of sewage from the toilet facilities to reduce the likelihood of crude sewage infiltrating groundwater or migrating towards water bodies. Any temporary toilet facilities will be positioned at least 10m away from the banks of the River Medlock.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Dust and debris blowing into the River Medlock	Apply dust management procedures which are typically implemented for air quality management issues, such as: • Damping down to suppress the creation of dust.	CEMP to be secured through planning condition and implemented by	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	Mitigation measures typically used for dust management are discussed in Chapter 8 Air Quality. Implement good site practice, perimeter fences and tight control of materials and waste to minimise the risk of debris entering water bodies.	contractor	
Dewatering of excavations causing sediment and capacity issues in the River Medlock/foul water network	Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. Sediment should be removed from water pumped water during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. If there is a requirement for discharge to the sewer network or River Medlock, this should be throttled to a flow rate that is agreed with UU or the EA prior to commencement of work.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Increased water demand during construction	All relevant contractors should investigate opportunities to minimise and reduce the use of water, such as: • Selection and specification of equipment; • Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both onsite and within site offices; • Use of recycling water systems such as wheel washes, site toilets handwash; and Use of a rainwater harvesting system for use in equipment and vehicle washing.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Flood risk to site workers and downstream areas during construction	Contractor to prepare a flood emergency and contingency plan including arrangements to make safe any static plant, move any mobile plant, and to evacuate site operatives in a flood risk emergency. Construction workers should be made aware of risks associated with excess surface water caused by overland flows and standing water. For example, risks to excavations and damage to plant. To minimise any risk from groundwater flooding during excavation of the site, cut levels should be limited to at least 0.5m above the groundwater level. Where this is not possible, dewatering and other groundwater control measures should be employed. Any such groundwater control measures will also require pollution control measures in accordance with EA guidance.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Table 11-12 Summary of demolition and construction supplementary mitigation measures for Mayfield Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Elevated sediment loads in surface water and dewatering of excavations	Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures: • Keep gradients of the soil as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall. Areas which are exposed should be reseeded or surfaced as soon as practicable. • Enforce tight control of site boundaries including minimal land clearance and restrictions on the	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	use of machinery adjacent to water bodies. Where possible, do not locate stockpiles within 10 m of water bodies or drainage lines. • Wheel washing facilities should be provided at all entry and exits points. Water from wheel wash facilities must not be discharged into the River Medlock or the on-site surface water sewerage network. • Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. • Sediment should be removed from water pumped during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. • Sediment/soils encountered during construction activities such as earthworks could be contaminated. This has an associated risk of mobilising pollutants, which could be released to surface waterbodies. The working practices that should be put in place to prevent and manage this issue are described in Chapter 10 Ground Conditions. CEMP to include dust suppression measures such as dampening and wheel washing. See Chapter 8 Air Quality for further details on dust suppression.		
Accidental release of hydrocarbons and oils into the on-site drainage system or directly to the River Medlock	Development and implementation of a CEMP that considers the following measures: • Incorporation of interceptors where appropriate into the site drainage system at high risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge. Other measures including drip trays under equipment such as generators, and wheel washing facilities should also be implemented to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to the River Medlock	Development and implementation of a CEMP that considers the following measures: • Provision of storage facilities and tanks and conduct refuelling of machinery within bunded areas, which should not be located within 10m of water bodies or drainage lines. • Storage and bunded areas to be constructed of impervious floors and walls with the capacity for the contents of the storage tank and an additional ten per cent safety margin. • As a remedial measure, spill containment equipment such as absorbent materials should be stored on site. Mixing of construction materials, such as cement, will be conducted in designated areas located away from water bodies and drainage lines.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Leak or breakage of temporary sewerage system causing crude sewage to	In order to improve groundwater and any subsequent impacts on health, the CEMP should consider the following: • Provision and maintenance of temporary septic tank, cesspit and/or sewerage connection for	CEMP to be secured through planning condition and implemented by	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
migrate to water	disposal of sewage from the toilet facilities to reduce the likelihood of crude sewage infiltrating groundwater or migrating towards water bodies. Any temporary toilet facilities will be positioned at least 10m away from the banks of the River Medlock.	contractor	
Dust and debris blowing into the River Medlock	Apply dust management procedures which are typically implemented for air quality management issues, such as: • Damping down to suppress the creation of dust. Mitigation measures typically used for dust management are discussed in Chapter 8 Air Quality. Implement good site practice, perimeter fences and tight control of materials and waste to minimise the risk of debris entering water bodies.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Dewatering of excavations causing sediment and capacity issues in the River Medlock/foul water network	Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. Sediment should be removed from water pumped water during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. If there is a requirement for discharge to the sewer network or River Medlock, this should be throttled to a flow rate that is agreed with UU or the EA prior to commencement of work.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Increased water demand during construction	All relevant contractors should investigate opportunities to minimise and reduce the use of water, such as: • Selection and specification of equipment; • Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both onsite and within site offices; • Use of recycling water systems such as wheel washes, site toilets handwash; and Use of a rainwater harvesting system for use in equipment and vehicle washing.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Direct pollution and / or disturbance from in river works	Pollution control will need to be a key element of all river works and the construction methodology at the Proposed Development and it will be fundamental to ensure that the risks in this regard are minimised. The construction methodology will need to adopt the following three principle objectives: • Minimise the risks associated with pollution control during the works; • Enhance buildability and maximise the quality of permanent works; and • Allow the works to be carried out as safely as possible. The appropriate controls will be discussed with the EA, and agreed as part of a licence for the works.	CEMP to be secured through planning condition and implemented by contractor. Licence to be agreed with the EA	Prior to and during construction
Flood risk to site workers and downstream areas during construction	Contractor to prepare a flood emergency and contingency plan including arrangements to make safe any static plant, move any mobile plant, and to evacuate site operatives in a flood risk emergency. Construction workers should be made aware of risks associated with excess surface water caused by overland flows and standing water. For example, risks to excavations and damage to plant. To minimise any risk from groundwater flooding during excavation of the site, cut levels should be	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	limited to at least 0.5m above the groundwater level. Where this is not possible, dewatering and other groundwater control measures should be employed. Any such groundwater control measures will also require pollution control measures in accordance with EA guidance.		

Table 11-13 Summary of demolition and construction supplementary mitigation measures for Baring Street Office 2 (Plot M)

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Elevated sediment loads in surface water and dewatering of excavations	Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures: • Keep gradients of the soil as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall. Areas which are exposed should be reseeded or surfaced as soon as practicable. • Enforce tight control of site boundaries including minimal land clearance and restrictions on the use of machinery adjacent to water bodies. Where possible, do not locate stockpiles within 10 m of water bodies or drainage lines. • Wheel washing facilities should be provided at all entry and exits points. Water from wheel wash facilities must not be discharged into the River Medlock or the on-site surface water sewerage network. • Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. • Sediment should be removed from water pumped during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. • Sediment/soils encountered during construction activities such as earthworks could be contaminated. This has an associated risk of mobilising pollutants, which could be released to surface waterbodies. The working practices that should be put in place to prevent and manage this issue are described in Chapter 10 Ground Conditions. CEMP to include dust suppression measures such as dampening and wheel washing. See Chapter 8 Air Quality for further details on dust suppression.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Accidental release	Development and implementation of a CEMP	CEMP to be secured through	Prior to and

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
of hydrocarbons and oils into the on-site drainage system or directly to the River Medlock	that considers the following measures: • Incorporation of interceptors where appropriate into the site drainage system at high risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge. Other measures including drip trays under equipment such as generators, and wheel washing facilities should also be implemented to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network.	planning condition and implemented by contractor	during construction
Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to the River Medlock	Development and implementation of a CEMP that considers the following measures: • Provision of storage facilities and tanks and conduct refuelling of machinery within bunded areas, which should not be located within 10m of water bodies or drainage lines. • Storage and bunded areas to be constructed of impervious floors and walls with the capacity for the contents of the storage tank and an additional ten per cent safety margin. • As a remedial measure, spill containment equipment such as absorbent materials should be stored on site. Mixing of construction materials, such as cement, will be conducted in designated areas located away from water bodies and drainage lines.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Leak or breakage of temporary sewerage system causing crude sewage to migrate to water	In order to improve groundwater and any subsequent impacts on health, the CEMP should consider the following: • Provision and maintenance of temporary septic tank, cesspit and/or sewerage connection for disposal of sewage from the toilet facilities to reduce the likelihood of crude sewage infiltrating groundwater or migrating towards water bodies. Any temporary toilet facilities will be positioned at least 10m away from the banks of the River Medlock.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Dust and debris blowing into the River Medlock	Apply dust management procedures which are typically implemented for air quality management issues, such as: • Damping down to suppress the creation of dust. Mitigation measures typically used for dust management are discussed in Chapter 8 Air Quality. Implement good site practice, perimeter fences and tight control of materials and waste to minimise the risk of debris entering water bodies.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Dewatering of excavations causing sediment and capacity issues in the River Medlock/foul water network	Capture runoff from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. Sediment should be removed from water pumped water during any extractions	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. If there is a requirement for discharge to the sewer network or River Medlock, this should be throttled to a flow rate that is agreed with UU or the EA prior to commencement of work.		
Increased water demand during construction	All relevant contractors should investigate opportunities to minimise and reduce the use of water, such as: • Selection and specification of equipment; • Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both onsite and within site offices; • Use of recycling water systems such as wheel washes, site toilets handwash; and Use of a rainwater harvesting system for use in equipment and vehicle washing.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction
Flood risk to site workers and downstream areas during construction	Contractor to prepare a flood emergency and contingency plan including arrangements to make safe any static plant, move any mobile plant, and to evacuate site operatives in a flood risk emergency. Construction workers should be made aware of risks associated with excess surface water caused by overland flows and standing water. For example, risks to excavations and damage to plant. To minimise any risk from groundwater flooding during excavation of the site, cut levels should be limited to at least 0.5m above the groundwater level. Where this is not possible, dewatering and other groundwater control measures should be employed. Any such groundwater control measures will also require pollution control measures in accordance with EA guidance.	CEMP to be secured through planning condition and implemented by contractor	Prior to and during construction

Supplementary mitigation measures during operation

11.145 Supplementary mitigation issues identified during operation are detailed in Table 11-14, Table 11-15, Table 11-16 and Table 11-17.

Table 11-14 Summary of operational supplementary mitigation measures for MSCP

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Increased pressure on water services infrastructure (supply)	Early engagement with UU on the potable water needs for each plot, and any current restrictions and the need for any upgrades. Water efficiency measures that will reduce potable demand and subsequent foul flows including one or more of the following: • Low flow fittings: low flush toilets, spray taps and low flow showers, if necessary; • Efficient water supply: Leak detection, smart meters and pressure reduction; and • Water from alternative sources:	Through the development of potable water and foul water strategy between now and construction of the development	Through future development of potable water and foul water utilities strategy, to be completed during detailed design stage

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	greywater recycling and rainwater harvesting. The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer.		

Table 11-15 Summary of operational supplementary mitigation measures for Office 1

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Increased pressure on water services infrastructure (supply)	Early engagement with UU on the potable water needs for each plot, and any current restrictions and the need for any upgrades. Water efficiency measures that will reduce potable demand and subsequent foul flows including one or more of the following: • Low flow fittings: low flush toilets, spray taps and low flow showers, if necessary; • Efficient water supply: Leak detection, smart meters and pressure reduction; and • Water from alternative sources: greywater recycling and rainwater harvesting. The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer.	Through the development of potable water and foul water strategy between now and construction of the development	Through future development of potable water and foul water utilities strategy, to be completed during detailed design stage

Table 11-16 Summary of operational supplementary mitigation measures for Mayfield Park

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Risk of flooding to park users	Emergency Plan to be put in place prior to the opening of Mayfield Park to the public, as stipulated within the FRA (Appendix 11.1)	Mayfield Partnership (or body with maintenance responsibility)	Pre occupation of the Park

Table 11-17 Summary of operational supplementary mitigation measures for Office 2

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
Increased pressure on water services infrastructure (supply)	Early engagement with UU on the potable water needs for each plot, and any current restrictions and the need for any upgrades. Water efficiency measures that will reduce potable demand and subsequent foul flows including one or more of the following: • Low flow fittings: low flush toilets,	Through the development of potable water and foul water strategy between now and construction of the development	Through future development of potable water and foul water utilities strategy, to be completed during detailed design

Adverse effect	Mitigation measure	Responsibility / Mechanism for implementation	Timing
	spray taps and low flow showers, if necessary; • Efficient water supply: Leak detection, smart meters and pressure reduction; and • Water from alternative sources: greywater recycling and rainwater harvesting. The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer.		stage

Cumulative Effects

Cumulative effects assessment

11.146 Two cumulative scenarios are considered below. The first includes the Proposed Development (Phase 1, including Applications 1 and 2) and nearby approved developments, and the second includes the Proposed Development (Phase 1, including Applications 1 and 2) including nearby approved developments and nearby SRFs including the full build out of the Mayfield SRF.

11.147 Possible cumulative effects include demand on foul water, changes to the capacity of the sewer network/operation of combined sewer overflows, water supply demand and changes in water quality downstream. All the developments listed will have the potential to contribute towards a cumulative effect with this scheme.

Cumulative effects for the cumulative scenario 1 (Applications 1 and 2, with nearby approved developments)

Demolition and construction effects

11.148 There is potential for cumulative effects during construction with regard to pollutant loading within the River Medlock, arising from cumulative developments acting together. This is, however, not expected to be significant with compliance and implementation of the mitigation outlined within this assessment through a Construction Environmental Management Plan (CEMP).

Operational effects

11.149 The cumulative developments will discharge surface water into the sewer network or directly to the River Medlock. Through a number of measures recommended in the Drainage and Flood Risk Assessment, and assuming other schemes implement similar flood risk measures in-line with the NPPF to help manage and attenuate flows from surface runoff, it can be assumed flood risk on site, as well as impacts downstream of the site, will be managed through designed-in measures.

11.150 Drainage implemented in line with the NPPF on each site, and the implementation of SuDS in line with planning policy, will in turn support the improvement of water quality and help the River Medlock to reach its objective of "Good" Ecological Potential by 2027. The operational cumulative effects are therefore not considered significant.

Cumulative effects arising from the committed cumulative scenario and surrounding SRFs

11.151 The possible cumulative effects are similar to those outlined in paragraph 11.148 to 11.150, and include an increased demand on foul water, changes to the capacity of the sewer network and overflows, water supply demand, and changes to downstream water quality. This will be

particularly prominent where future plots of the Mayfield SRF or adjacent SRFs are brought forwards such as the Piccadilly HS2 SRF, where earthworks and construction have the potential to contribute towards a cumulative effect with this scheme.

Demolition and construction effects

11.152 There is potential for cumulative effects during construction with regard to pollutant loading within the River Medlock, arising from cumulative developments acting together. This may particularly be the case during construction of the eastern plots of the Mayfield SRF, and the adjacent Piccadilly HS2 SRF development upstream.

11.153 This is, however, not expected to be any more significant than the effects from the Proposed Development itself so long as compliance and implementation of the mitigation outlined within a CEMP is practiced, for each scheme, as will be the case for the Mayfield Phase 1 development. The cumulative effects on the River Medlock therefore are likely to be negligible.

Operational effects

11.154 The cumulative developments will discharge surface water into the sewer network or directly to the River Medlock. Through a number of measures recommended in the Drainage and FRA and assuming other schemes implement similar flood risk measures in-line with the NPPF to help manage and attenuate flows from surface runoff, it can be assumed flood risk on site, as well as impacts downstream or upstream of the site, will be managed through designed-in measures.

11.155 Drainage implemented in line with the NPPF on each site, and the implementation of SuDS in line with planning policy, will in turn support the improvement of water quality and help the River Medlock to reach its objective of "Good" Ecological Potential by 2027. The operational cumulative effects are therefore not considered significant.

Residual Effects

11.156 If the commuted measures included in the FRA and Drainage Strategy and the further supplementary mitigation measures are implemented, along with good site practice, the residual demolition and construction effects to the water environment are considered to be negligible to minor adverse (and temporary) for the duration of the construction period.

11.157 If the measures outlined and committed to in the Drainage and Flood Risk Assessment, including agreeing a foul water connection with UU, then residual effects during operation are likely to be negligible.

11.158 A summary of all of the residual adverse or beneficial effects are detailed in Table 11-18.

Table 11-18 Residual effects table

Receptor	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
Demolition and construction (Application 1 + 2)				
River Medlock	Increased sediment loads	Major adverse	Implementation of a CEMP. • Minimise areas of exposed surface by only removing vegetation and hardstanding when necessary. • Do not locate stockpiles within 10m of water bodies or drainage lines. • Wheel wash facilities should be provided at all entry and exit points.	Minor adverse (temporary)

Receptor	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
			• Run-off and dewatering will be settled in temporary lagoons before discharge. • Apply dust management procedures which are typically implemented for air quality management issues Implement good site practice, perimeter fences and tight control of materials and waste to minimise the risk of debris entering water bodies.	
	Accidental release of hydrocarbons	Major adverse	Implementation of a CEMP. Incorporate interceptors into the site drainage system at high risk areas. Use of drip trays under equipment such as generators and wheel washing facilities.	Minor adverse (temporary)
	Accidental release of hazardous materials	Major adverse	Implementation of a CEMP. Provide storage facilities and tanks and conduct refuelling of machinery within bunded areas away from water bodies and drainage lines. Mixing of construction materials will be conducted in designated areas located away from water bodies and drainage lines.	Minor adverse (temporary)
	Leak or breakage of the temporary sewerage system	Major adverse	Contractor should provide and maintain temporary septic tank, cesspit and/or sewerage connection.	Minor adverse (temporary)
	Dust and debris	Major adverse	Develop dust management plan which will include procedures aimed at minimising dust generation on-site.	Minor adverse (temporary)
	Direct pollution and / or disturbance from in river works	Major adverse	Appropriate pollution controls agreed with the EA as part of the licence for the proposed works	Minor adverse (temporary)
Water services infrastructure (supply)	Increased water demand during the construction period	Moderate adverse	All contractors should investigate opportunities to minimise and reduce the use of water, such as: • Selection and specification of equipment; • Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both onsite and within site offices; • Use of recycling water systems such as wheel washes, site toilets	Negligible

Receptor	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
			handwash; and Use of a rainwater harvesting system for use in equipment and vehicle washing.	
Water services infrastructure (surface water capacity)	Increased sediment loads	Major adverse	Implementation of a CEMP. • Minimise areas of exposed surface by only removing vegetation and hardstanding when necessary. • Do not locate stockpiles within 10m of water bodies or drainage lines. • Wheel wash facilities should be provided at all entry and exit points. • Run-off and dewatering will be settled in temporary lagoons before discharge. • Apply dust management procedures which are typically implemented for air quality management issues Implement good site practice, perimeter fences and tight control of materials and waste to minimise the risk of debris entering water bodies.	Negligible
	Sediment clogging and pollution from dewatering of excavations	Major adverse	Capture run off from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Sediment should be removed from water during any extractions required. Sediment should be removed prior to discharges to the foul water network or on-site ponds through the use of a baffle tank system or equivalent. If there is a requirement for discharge to the foul sewer, this should be throttled to a flow rate that is agreed UU prior to commencing works.	Minor adverse (temporary)
Site users (construction workers and plant users)	Flood risk to site workers (from groundwater, surface water, and fluvial flooding from the River Medlock)	Major adverse	Contractor to prepare a flood emergency and contingency plan. Construction site users made aware of risks.	Negligible
Operational				
River Medlock	Pollutants contained in surface water	Negligible	No further measures required beyond those outlined in the Drainage Strategy and FRA.	Negligible

Receptor	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
	River naturalisation	Minor beneficial	None required	Minor beneficial to moderate beneficial
	Flood risk	Negligible	No further measures required beyond those outlined in the Drainage Strategy and FRA.	Negligible
Water services infrastructure (surface water)	Flood risk Change to runoff rates	Negligible	No further measures required beyond those outlined in the Drainage Strategy and FRA.	Negligible
Water services infrastructure (foul water capacity)	Increased foul water drainage demand	Negligible	None required	Negligible
Water services infrastructure (supply)	Increased potable water demand	Moderate adverse	Early engagement with UU on the potable water needs for each plot, and any current restrictions and the need for any upgrades. Water efficiency measures that will reduce potable demand and subsequent foul flows including one or more of the following: • Low flow fittings: low flush toilets, spray taps and low flow showers, if necessary; • Efficient water supply: Leak detection, smart meters and pressure reduction; and • Water from alternative sources: greywater recycling and rainwater harvesting. The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer	Negligible
Site users (occupants of commercial office blocks)	Flood risk to site users	Negligible	No further measures required beyond those outlined in the FRA.	Negligible



	Figure:	**11.1**		
	Title:	**Environment Agency Flood Map for Planning – Risk of flooding from rivers (from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 08/09/19)**		
	Project:	**Mayfield Phase 1**		
	Date:	**09/09/19**	**Scale:**	**NTS**



	Figure:	**11.2**		
	Title:	**Environment Agency Flood Map for Planning – Risk of flooding from surface water (from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 08/09/19)**		
	Project:	**Mayfield Phase 1**		
	Date:	**09/09/19**	**Scale:**	**NTS**



	Figure:	**11.3**		
	Title:	**Environment Agency Flood Map for Planning – Risk of flooding from reservoirs or artificial sources (from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 08/09/19)**		
	Project:	**Mayfield Phase 1**		
	Date:	**09/09/19**	**Scale:**	**NTS**

12 Wind Microclimate

Introduction

12.1 This chapter of the ES assesses the likely environmental effects of the Proposed Development with respect to wind microclimate. This chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been adopted.

12.2 The chapter considers the relevant planning policy with respect to wind issues, the methodology and criteria used to assess the wind environment in the Site and around it, including a description of the studies undertaken. The aim of wind modelling undertaken has been to assist the design team with respect to building design and landscape; in order to mitigate against both discomfort for pedestrians using and passing the Site and, in extreme cases, potentially hazardous conditions.

12.3 A quantitative assessment has been undertaken to predict and analyse the wind environment at the Site and to support the production of appropriate mitigation. This methodology has been agreed with Manchester City Council (MCC) for this project through the EIA scoping process.

12.4 The Site, for the mitigated case, has been modelled with a committed landscaping strategy which has responded to the wind environment, assuming a conservative scenario, wind effects are likely to be mitigated further when the full landscape strategy of the Park is in place. The partial modelled landscape accomplishes mitigation requirements. The chapter concludes with a summary of residual effects, taking into account the results of the modelling and influence of proposed mitigation in the form of landscaping treatment.

12.5 Cumulative effects associated with wind microclimate have additionally been considered within the ES and can be found in Chapter 16 Type 1 Cumulative Effects. Two cumulative scenarios have been modelled for Phase 1 (Applications 1 and 2): the first including the future surrounding buildings described on the cumulative schemes in Chapter 16; and the second including cumulative schemes as well as the full build out of Mayfield SRF.

12.6 The Chapter author holds a B.Eng. in Chemical Engineering, a MSc in Solar Energy and a PhD in Mechanical Engineering. He is Treasurer of the Wind Engineering Society in UK, and member of the board for several years, and has 20 years consulting experience in wind engineering and 30 years' experience in the built environment including environmental design and analysis of buildings, and masterplans, abroad and in UK for planning applications and Environmental Statement Chapters.

Legislation and Policy Context

National Planning Policy

12.7 There are no national codes of practice or legislative policies relating to the assessment of environmental wind flows in the built environment.

12.8 The UK wide National Planning Policy Framework (NPPF) came into force in March 2012, and was updated in February 2019. There are no national planning policies directly relating to wind microclimate issues; however, the benefits of a high quality built environment are emphasised in the NPPF. An example of this is presented in paragraph 127: "…using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit…".

12.9 The impact of environmental wind on pedestrian spaces and the subsequent suitability of these spaces for planned usage are described by the Lawson Comfort Criteria (LCC)[47] which are recognised by Local Planning Authorities (LPAs) as a suitable benchmark for wind assessments. LCC has been applied in the wind assessment of the Proposed Development.

Regional Planning Policy

12.10 There is no specific regional legislation or policy guidance for the assessment of the local wind microclimate impact that a new development has on the comfort and safety of users.

Local Planning Policy

12.11 Manchester City Council (MCC) refers to the design of tall buildings, for example potential effects on microclimate that can be avoided. Reference can be found in Manchester's Local Development Framework, Core Strategy Development Plan Document, July 2012.

12.12 Policy EN2 states that "Tall buildings are defined as buildings which are substantially taller than their neighbourhoods and/or which significantly change the skyline", and "By their very size tall buildings can have a significant impact on the local environment and its micro-climate. It is therefore expected that this impact be modelled and that submissions for tall buildings also include appropriate measures to create an attractive, pedestrian friendly local environment".

12.13 Furthermore, Objective 6 (Environment) states in paragraph 12.6 that development in Manchester will be expected to follow seven design principles, including "Quality of the public realm: a place with attractive, and successful outdoor areas".

12.14 This report considers the above as part of the assessments carried out, by considering the massing impact on the local conditions that may be experienced by users of the external areas around and within the site. Due to its size, location and nearby building heights the Proposed Development is not considered a tall building. However, in the cumulative scenario, the Mayfield SRF masterplan includes tall buildings. The wind microclimate assessment has been undertaken to ensure that all areas of the proposed public realm are comfortable and safe for pedestrians to use, particularly given the Proposed Development's proximity to several tall buildings outside of the red line.

Assessment Methodology and Significance Criteria

Design Criteria (standards)

Lawson Comfort Assessment

12.15 The Lawson assessment has included a direct comparison between the baseline conditions (existing) and the Proposed Development. A quantitative assessment of the likely wind environment has been carried out, with any areas of potential concern identified.

12.16 A comfort map was created to illustrate the assessment results. This map includes a direct correlation between the calculated wind speeds by the Computational Fluid Dynamics (CFD) simulations and the wind frequency data near the Site for the last 10 years. It provides a complete picture of the likely wind conditions related to certain activities, indicating when suitable conditions can be achieved for carrying out such activities or if distress is likely to be experienced. The maps cover the whole Site on a plane 1.5 m above ground level, where wind speeds are measured.

12.17 The thresholds used to determine the effect for a given activity are specified for Unacceptable, Tolerable, and Acceptable. An example of the thresholds is given in Table 12-1 for "Perceived

47 Lawson Comfort Criteria have been established for over thirty years. The Criteria, which seek to define the reaction of an average pedestrian to the wind.

response to wind for a pedestrian" (as per the Lawson Criteria) which would be Unacceptable. The definitions for these thresholds are summarised below:

- Unacceptable, unpleasant conditions for the given activity, which should not normally be allowed to occur;
- Tolerable, conditions that would be describe as 'windy' but which would be tolerated for the given activity; and
- Acceptable, conditions that will elicit no adverse comment about wind conditions.

12.18 It is considered that effects that breach the "Unacceptable" threshold could be significant and it is these effects that are considered further within this assessment, in terms of the activity occurring in the area identified, and requirement for mitigation. The Lawson criteria (Lawson, 2001) is used to assess the wind speeds for different activities. The criteria that has been used to assess the unacceptable threshold for different activities as well as the distress criteria are listed in Table 12-1.

Table 12-1 Lawson Comfort Criteria thresholds for unacceptable levels of wind speed

Lawson Comfort Criteria Classification	**Use of Space**	**Maximum acceptable combination of wind speed and occurrence**		
		Beaufort Scale	(m/s)	**Allowable occurrence**
Safety (distress)	General public	B7	15	**0.025%**
Uncomfortable	General public	B6	14.1	**0.01%**
10	Pedestrian business walking	B5	10.95	**6%**
9	Pedestrian walking around Buildings	B5	10.95	**2%**
8, 7	Pedestrian walk through	B4	8.25	**4%**
6	Entrances/standing	B3	5.6	**6%**
5	**Sitting**	**B3**	**5.6**	**3%**

Table 12-2 The Beaufort scale for wind on land

Beaufort Force	**Hourly-average wind speed (m/s)**	**Description of wind**	**Noticeable wind effect**
B0	< 0.45	Calm	**Smoke rises vertically**
B1	0.45 - 1.55	Light air	**Direction shown by smoke drift but not by vanes**
B2	1.55 - 3.35	Gentle breeze	**Wind felt on face; leaves rustle; wind vane moves**
B3	3.35 - 5.60	Light breeze	**Leaves & twigs in motion; wind extends a flag**

Beaufort Force	Hourly-average wind speed (m/s)	Description of wind	Noticeable wind effect
B4	5.60 - 8.25	Moderate breeze	**Raises dust and loose paper; small branches move**
B5	8.25 – 10.95	Fresh breeze	**Small trees, in leaf, sway**
B6	10.95 - 14.10	Strong breeze	**Large branches begin to move; telephone wires whistle**
B7	14.10 - 17.20	Near gale	**Whole trees in motion**
B8	17.20 - 20.80	Gale	**Twigs break off; personal progress impeded**
B9	20.80 - 24.35	Strong gale	**Slight structural damage; chimney pots removed**
B10	24.35 - 28.40	Storm	**Trees uprooted; considerable structural damage**
B11	28.40 - 32.40	Violent storm	**Damage is widespread; unusual in the U.K**
B12	**> 32.40**	**Hurricane**	**Countryside is devastated; only occurs in tropical countries**

12.19 Uncomfortable conditions are experienced at wind speeds above Beaufort B6, as shown in Table 12-2. Additional mitigation for these areas will be of benefit and will improve comfort conditions. Wind speeds above Beaufort B7 indicate that conditions are not suitable for pedestrian activities to be carried out safely, and therefore mitigation will be required in these cases in order to bring conditions to within safe limits.

Receptor Sensitivity

12.20 Sensitive receptors in respect of wind microclimate are the pedestrians using the site and the occupants of the Proposed Development and surrounding buildings. Their sensitivity and the magnitude of any change will determine the significance of impact. Sensitivity to wind is dependent upon the activity undertaken, in line with the LCC, as presented in Table 12-3.

Table 12-3 Urban pedestrian activities, in order of increasing sensitivity

Receptor Sensitivity	Activity
Negligible	Areas with non-pedestrian activities
Low	Pedestrian walkthrough, roads and carparks
Moderate	Entrance doors, pedestrian standing, walkthrough
High	Sitting, entrance doors

Effect Significance

12.21 The impact on sensitive receptors (i.e. pedestrians) is split into the categories in Table 12-4.

12.22 A major impact is one that impacts the safety of the receptors. This is an impact that breaches the safety criteria as described in Table 12-4, and is considered to be of major significance for the purposes of this assessment. These types of impacts will require detailed and careful mitigation.

12.23 Moderate and minor impacts are not considered to cause significant effects. However, in order to reduce the impacts further and improve the comfort of receptors, mitigation measures to reduce the effects from moderate (uncomfortable) to minor (tolerable/negligible) have been specified as appropriate.

12.24 The assessment of significance refers to the LCC as set out in Table 12-1. To determine the significance of the impact of the Proposed Development on the wind environment, a comparison can be made with the conditions on the existing site (the baseline). However, because the pedestrian use of a site can change markedly pre- and post-development, it is considered that assessment based upon the suitability of the site for the desired pedestrian use is the most informative and relevant – it is this methodology that is followed for the assessment.

12.25 The criteria used to assess the nature of the wind impacts are as follows:

- Adverse – detrimental or negative impacts to an environmental resource or receptor compared with the baseline or the intended use of the site; or
- Beneficial – advantageous or positive impact to an environmental resource or receptor compared with the baseline or the intended use of the site.

Table 12-4 Significance Criteria

Significance	Description
Major	Any impact that affects safety (or distress)
Moderate	Any impact affecting pedestrian comfort where conditions change from suitable for existing activities to unsuitable for proposed activities is to be considered moderate, and vice versa for positive impacts
Minor	Conditions that are marginal with respect to the criteria or criteria are met during key seasons only
Negligible	No or minimal impact on conditions that are likely to be experienced

The Site

12.26 The Site is bound by A57 (M) to the south and east, A6 to the west and Manchester Piccadilly train station and train lines to the north. The site location is shown in Figure 12-1.

12.27 The existing Site comprises of a warehouse unit in the centre (known as Unit 5), and low-lying warehouses to the southeast. Some mid-rise buildings exist to the east of the site boundary, i.e. Liberty Point and Unite Students Piccadilly Place; these buildings may offer some shelter from the prevailing westerly and south-westerly winds. A close up of the site and surroundings is shown in Figure 12-2.

Methodology

12.28 This section defines the different aspects of this type of study, the CFD modelling approach followed, and the assumptions and limitations of the study. Consideration is given to the characteristics of the local area to facilitate the assessment. A wind frequency analysis of the Site is carried out and from this analysis all wind directions are analysed. The results of this assessment are then available to assist the overall design process.

12.29 The wind study includes a direct comparison between the baseline conditions and those created by the Proposed Development for 12 wind directions. The Chapter describes the quantitative assessment of the likely wind environment, and the qualitative judgements that are made in order to identify areas of potential concern. This analysis included an assessment

of the relative forms, layouts and massing of the existing site, the Proposed Development, as well as landscaping and topography.

12.30 Impacts of the likely wind conditions are judged based on the CFD modelling results and BuroHappold's extensive experience of wind assessments, full-scale testing, CFD and wind tunnel modelling of similar developments.

12.31 The assessment is supported by CFD modelling of the full range of wind speeds and directions for the five scenarios (which have been agreed with the Local Planning Authority through the EIA Scoping Process), detailed below.

Tested scenarios

12.32 Five scenarios have been tested within this assessment, one of these has been tested without and with mitigation. These scenarios are as follows:

- Current baseline scenario (2019);
- Proposed scenario 1: Phase 1 Application 1 (Baring Street Office 1, Baring street MSCP, and Mayfield Park) in existing surroundings;
- Proposed scenario 2: Phase 1 Application 1 and Application 2 (Baring Street Office 1, Baring Street Office 2, Baring street MSCP, Mayfield Park) in existing surroundings;
- Proposed scenario 3: Phase 1 Application 1 and Application 2 (Baring Street Office 1, Baring Street Office 2, Baring street MSCP, Mayfield Park) in existing surroundings with mitigation;
- Cumulative scenario 1: Phase 1 Application 1 and Application 2 (Baring Street Office 1, Baring Street Office 2, Baring street MSCP, Mayfield Park) with future committed developments; and
- Cumulative scenario 2: Phase 1 Application 1 and Application 2 (Baring Street Office 1, Baring Street Office 2, Baring street MSCP, Mayfield Park) with future committed developments and the SRF (full SRF phasing).

12.33 A quantitative assessment of the likely wind environment has been performed via CFD simulations, based on the following information: 3D architectural model provided by Studio Egret West (SEW) on 23rd August 2019, named "0343-SEW-ZZ-ZZ-M3-T-001001_Design Model_EIA_Phase1andSRF.dwg.

12.34 The images of the modelled geometry are shown in Figure 12-8 (Configuration 1, current baseline scenario), Figure 12-11 (Configuration 2, proposed scenario 1), Figure 12-16 (Configuration 3, proposed scenario 2), Figure 12-24 Configuration 4, cumulative scenario 1) and Figure 12-28 (Configuration 5, cumulative scenario 2).

12.35 The boundaries of the Site are shown in Figure 12-3, where the green dotted line shows the boundary for the Proposed Phase 1 Application 1, while the red line shows the boundary for Phase 1 Application 2.

12.36 The area of study has been delimited to the area of influence from the Proposed Development including the full phase SRF development. This area is defined as the "area of study".

12.37 The wind effects outside of the application boundary are described as "surroundings". The surroundings are the areas outside of the boundary which is included in the area of study. A diagram of the area of study and surroundings is shown in Figure 12-4.

12.38 Wind microclimate comfort strongly depends on an individual's activity and therefore has been defined separately for each activity in terms of an average (mean) wind speed exceeded for a certain percentage of the year.

12.39 The pedestrian comfort criteria have been developed around the Beaufort scale in Table 12-2 (Lawson, 2001), extending its applicability to environments in and around buildings.

12.40 The assessment has been undertaken to investigate the likely pedestrian conditions in and around the Proposed Development when it is subject to wind from different directions. An assessment of the appropriateness of different parts of the Site for their intended use has also been made.

Intended uses of the Site

12.41 Detail of the intended uses of the Site is required in order to assess the effects of the wind environment on pedestrian comfort. For neighbouring buildings and open spaces, the likely pedestrian activity will be business walking to access the surrounding buildings and car parks. For the Proposed Development, information regarding the intended usage of different areas and indicative building plots is taken from the design information provided by the design team. This includes the streets and paths proposed for pedestrians, and additional areas where outdoor activities are likely to take place. The activities identified at the area of impact from the Proposed Development are shown in Figure 12-5.

12.42 Building entrances on Baring Street Office 1 (Plot O) are located to the North and North east facades, as well as to the east and south. There is one service entrance also located to the west façade of the building. These are highlighted in Figure 12-5. In the case of Baring Street Multi Storey Car Park, entrances are located to the east façade at the corners and next to the stair volume at the north of Baring Street MSCP. Three entrances at Baring Street Office 2 (Plot M) are distributed along the north façade and one entrance is located on the west façade of Baring Street Office 2.

12.43 Two zones are identified to be intended for sitting activity, one at the north of Baring Street Office 1 and the second at the north of Baring Street Office 2. These are highlighted in blue in Figure 12-5 and are expected to be used in summer conditions when weather is suitable for long term sitting.

12.44 Two roads are identified within the study area including Baring Street to the west of the Proposed Development and Mancunian Way to the south, which includes a slip road that reaches Mancunian Way (elevated road) to the south west of the Site. The MSCP entrance/exit is located at the south of the site, along Mancunian Way, where wind speeds should be suitable for people around buildings.

12.45 An external terrace is proposed at the east corner of Baring Street Office 1, where wind conditions should be suitable for people standing and walking.

12.46 The remaining surrounding areas to the buildings which are not mentioned above are intended as circulations and would require conditions suitable for pedestrian walkthrough and are identified as thoroughfares.

Computational Fluid Dynamics (CFD) Modelling Assumptions

Approach

12.47 The physical layout of the Site as described was analysed using a 3D CFD model. CFD modelling involves the solution of the fundamental equations of fluid motion using numerical techniques. The region of interest is divided into numerous small volumes, or cells, and equations are solved within each cell. Values of the variables that are solved in the model are determined in each cell and so a comprehensive assessment of velocity variation within the

calculation domain is obtained. To improve the resolution of the results, the computational cell size has been reduced in the areas of most interest, of relevance to the proposals. This ensures that large gradients of velocity at street level are modelled accurately.

Model Extents and Detail

12.48 The drawings and models are described in detail within this section. For buildings outside the development boundary, a 3D context model was acquired from Zmapping, this has been simplified and updated to match footprints and building heights from aerial survey data. The proposed buildings have been modelled according to the information provided and mentioned in the baseline Section. These buildings have been merged with the Zmapping information and simplified for CFD modelling purposes.

12.49 The CFD model is contained within one single domain for each scenario. This domain includes the Proposed Development and the surrounding buildings and features, around which the wind environment is analysed. Surrounding buildings and terrain were included in the model up to a radius of 600m from the centre of the domain. A total simulation domain of radius 800m was modelled. This distance is appropriate as it explicitly contains all buildings and structures surrounding the Proposed Development that are likely to affect the wind flows around it.

12.50 The typical edge length of the computational cells in this domain is approximately 1 to 3m, with greater cell sizes at points further from the development buildings. A refined layer of cells exists adjacent to the ground, to allow for an accurate prediction of pedestrian level wind speeds. The total number of computational cells is approximately 11 million for this study. Roughness has been applied in the outer region beyond the modelled buildings, to account for the presence of buildings and terrain features.

Atmospheric Boundary Layer

12.51 The upwind boundaries of the CFD model were prescribed with an atmospheric velocity and turbulence profile corresponding to natural winds. The atmospheric velocity profile was modelled using a log-law, based on communications with ANSYS (i.e. the developers of the CFX CFD software used).

12.52 The downwind and upper boundaries were represented as pressure opening boundaries. These are representative of the atmosphere surrounding the Proposed Development. They allow air to be entrained into the model domain or air to flow out of the domain.

12.53 For each of the 12 wind directions, a single, steady-state RANS (Reynolds Averaged Navier-Stokes) calculation was undertaken using the commercial ANSYS CFX software. Turbulence was modelled using a k-ε model, with a production limiter used to ensure realistic flow predictions close to stagnation points. This method allows for the assessment of mean wind speeds for the Proposed Development.

Wind Data Analysis

12.54 For analysis of wind behaviour, it is necessary to know the relevant wind data for the case. Velocity fluctuation and directional variance are hard to measure accurately.

12.55 Both the wind speed frequency and its direction are required for this assessment. This data is commonly presented in the form of wind speed and wind frequency distribution diagrams (wind roses). Data is usually provided for average hourly wind speeds at 10m above ground level. This data is monitored and recorded from meteorological stations all over England and reported by the Met Office.

12.56 Good quality, long-term weather data is available from Manchester Airport. The wind data from Manchester Airport was translated to meteorological standard terrain (open country) and then to the proposed site. The method used was the method set out in "The Designer's guide

to wind loading of building structures, Part 1" (1985), N.J. Cook. This allows for the sheltering effect of neighbouring terrain but does not allow for channelling of wind, for instance due to rivers and valleys. This effect is not expected to dominate conditions here. The resultant wind rose is included in the figures (Figure 12-6 for the annual wind rose, and 12-7 for the seasonal wind rose).

Direction Frequency

12.57 Figure 12-6 and Figure 12-7 show the annual and seasonal directional velocity distribution for the Site, once the wind has been translated from Manchester Airport. This shows the direction the wind is blowing from, with long bars representing frequent winds and wider bars representing stronger winds.

12.58 The wind speed for the Site can be established for both comfort and safety analysis based on a frequency of occurrence as indicated in Table 12-1

12.59 As can be seen from Figure 12-6 and Figure 12-7, the prevailing wind across Manchester is from the south and southwest, with some lesser contribution from all other directions. During the spring and winter there are some contributions from the northeast.

12.60 Wind speeds are generally highest in the winter with the seasonal pattern showing a very similar range of wind directions for winter, spring and autumn. Summer has southerly and westerly prevailing winds with the highest speeds from the south and southwest.

Limitations and assumptions

12.61 Future surrounding buildings are based on information available and current planning consents, as summarised in Chapter 2. If these buildings are amended in the future, the effects could alter the cumulative scenario. However, any future changes will need to be subject to an appropriate wind assessment as part of any amendment to the planning application for each relevant scheme.

Baseline Conditions

Current baseline (2019)

Building geometry

12.62 This section studies the comfort and safety of pedestrians in the baseline condition, i.e. the existing Site within existing surroundings. The modelled geometry for the baseline scenario is shown in Figure 12-8.

12.63 The wind conditions have been analysed for the whole year, as well as for all four seasons. Conditions for summer and winter are presented in Figures 12-9 and 12-10 and discussed below.

12.64 The study area includes the existing Depot with the proposed renovations including a roof structure at the top and the removal of the ramp to the south of the Depot. The baseline also includes a warehouse structure at the centre of the site (known as Unit 5) and six low rise buildings to the east of Rachel Street and Hoyle Street. The baseline scenario also includes the buildings between Baring Street and the River Medlock, these buildings will be replaced in the future by the Logik development, which is included within the cumulative scenario.

12.65 The current wind environment external to the Site is predominantly influenced by the existing/occupied buildings.

Wind effects on pedestrian comfort and safety

Within the site

12.66 The summer comfort map for the existing Site is shown in Figure 12-9. The full detail of the existing pedestrian uses across the wider study area are not known, and they will change with the development in place. However, the wind speeds are shown to be suitable for pedestrian sitting across the whole study area in the baseline scenario. Small areas at the south of the Depot show conditions suitable for standing activity.

12.67 Entrances areas around buildings within the site show suitable conditions for the current activity.

12.68 The winter comfort map for the existing site is shown in Figure 12-10. Conditions are more exposed during winter, as expected. Most of the site is seen to be suitable for sitting with some areas suitable for standing.

12.69 London Road to the west of the site shows suitable conditions for walk through pedestrian activity, one category lower than the planned activity.

12.70 No safety issues have been identified across the site in the existing baseline scenario.

Areas surrounding the site

12.71 The summer comfort map for the existing Site is shown in Figure 12-9. Sitting areas in the existing site surroundings are not identified. Wind speeds are shown to be suitable for pedestrian sitting across the whole site. Small areas to the east edge of the elevated railway show conditions suitable for standing activity.

12.72 Entrances around buildings surrounding the site show suitable conditions for the current activity.

12.73 The winter comfort map for the existing site is shown in Figure 12-10. Conditions are more exposed during winter, as expected. Most of the surrounding areas are seen to be suitable for sitting with some areas suitable for standing. The east side of the elevated railway shows some areas suitable for pedestrian walkthrough. To the south east of existing buildings a small area show suitable conditions for pedestrian walkthrough.

12.74 Roads and carparks in the surrounding areas show suitable conditions for the planned activities.

12.75 No safety issues have been identified in the surrounding areas of the Site in the existing baseline scenario.

Identification and Evaluation of Likely Significant Effects

Demolition and construction effects for Application 1 (Baring Street Office 1, Baring Street MSCP and Mayfield Park)

Relevant aspects of the scheme

12.76 During construction of the Proposed Development, localised wind effects are likely that will result in a gradual transition to the new conditions. These effects will be negated at ground level through the provision of hoardings (causing negligible effects in the operational phase).

12.77 It is likely that some of the surrounding developments may contribute to wind acceleration on Site as well as to provide shelter. The massing and orientation of these future developments will determine the final residual effects and this is assessed in ES Chapter 16, Cumulative Effects.

Potential effects of the development and their significance

Construction site and adjacent site users

12.78 During construction, localised wind acceleration is likely to result in a gradual transition to the new conditions. The impacts and effects will be annulled at ground level through the provision of hoardings (causing negligible effects, which are short term/temporary).

Summary of effects during construction

12.79 The potential effects identified during construction are summarised in Table 12-5.

Table 12-5 Summary of effects during construction of Application 1 only

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Pedestrian walkthrough areas, Construction site/ empty site	Low - moderate	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	Negligible
Pedestrian walkthrough areas, public realm East side	Low - moderate	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	Negligible
Sitting/entrances, public realm	Moderate – High	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	Negligible

12.80 Demolition and construction effects for Application 1 and Application 2 (Baring Street Office 1, Baring Street Office 2, Baring Street MSCP, Mayfield Park)

Relevant aspects of the scheme

12.81 During construction of the Proposed Development, localised wind effects are likely that will result in a gradual transition to the new conditions. These effects will be negated at ground level through the provision of hoardings (causing negligible effects).

12.82 It is likely that some of the surrounding developments may contribute to wind acceleration on site as well to provide shelter. The massing and orientation of these future developments will determine the final residual effects and this is assessed in ES Chapter 16, Type 1 Cumulative Effects.

Potential effects of the development and their significance

Construction site and adjacent site users

12.83 During construction, localised wind acceleration is likely to result in a gradual transition to the new conditions. The impacts and effects will be annulled at ground level through the provision of hoardings (causing negligible effects, which are short term/temporary).

Summary of effects during construction

12.84 The potential effects identified during construction are summarised in Table 12-6.

Table 12-6 Summary of effects during construction of Application 1 with Application 2

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Pedestrian walkthrough areas, Construction site/ empty site	Low - moderate	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	Negligible
Pedestrian walkthrough areas, public realm East side	Low - moderate	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	Negligible
Sitting/entrances, public realm	Moderate – High	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	Negligible

Operational effects for Phase 1 Application 1 (Baring Street Office 1, Baring Street MSCP and Mayfield Park) in existing surroundings

Relevant aspects of the scheme and designed-in mitigation

12.85 This section studies the comfort and safety of pedestrians in the Phase 1 Application 1 scenario. This is the proposed Baring Street Office 1, Baring Street MSCP and Mayfield Park within existing surroundings. The modelled geometry for this scenario is shown in Figure 12-11.

12.86 The wind conditions have been analysed for the whole year, as well as for all four seasons. Conditions for summer and winter are presented and discussed below.

12.87 The current wind environment external to the Site is predominantly influenced by the existing/occupied buildings and the inclusion of the Proposed Development at Phase 1 Application 1 (Baring Street Office 1 and Baring Street MSCP).

12.88 Mitigation has been implemented at the north corner of Baring Street Office 1 at ground level by including a low level planter (2m by 2m) with low height shrubbery to prevent this area being accessible by pedestrians.

Potential effects of the development and their significance

Wind effects on pedestrian comfort and safety

Within the site

12.89 The summer comfort map for the Phase 1 Application 1 Site is shown in Figure 12-12. Wind speeds are shown to be suitable for pedestrian sitting across the whole Site. A small area at the northwest of Baring Street Office 1 shows conditions suitable for standing activity. Sitting areas are suitable for the planned activity and the wind effects are considered to be negligible.

12.90 Entrances to Baring Street Office 1, Baring Street MSCP and to the east side of these buildings are suitable for the planned activities, therefore the significance of the effect is negligible.

12.91 The winter comfort map for the Site is shown in Figure 12-13. Conditions are more exposed during winter, as expected. Most of the Site is seen to be suitable for sitting with some areas

suitable for standing. London Road to the west of the Site shows suitable conditions for walk through pedestrian activity, one category lower than the planned activity. Towards the northwest corner at Baring Street Office 1 a localised area shows conditions suitable for pedestrian walkthrough. To the south east and south west corners of Baring Street MSCP show conditions suitable for pedestrian walkthrough.

12.92 All pathways and pedestrian walkthrough areas show suitable conditions, which can be described as a negligible effect.

12.93 The terrace at the east of Baring Street Office 1 shows that conditions are suitable for the planned activity, which can be described as a negligible effect.

12.94 Most roads show conditions suitable for sitting and sitting/entrances, with exception of London Road, which shows conditions suitable for pedestrian walkthrough. Therefore, all show suitable conditions for the planned activity and the wind effect is beneficial.

12.95 A detailed safety map is shown on Figure 12-14. This shows a small area located adjacent to the north corner of Baring Street MSCP of approximately 2m by 2m that has exceeded the safety criteria. This is considered as a major adverse effect. Therefore, this area will be mitigated.

12.96 The mitigation has been implemented by including a low level planter (2m by 2m) with low height shrubbery to prevent that this area is accessible by pedestrians. Therefore, this area is no longer part of the public realm and no safety exceedances are considered within the public realm. The mitigation strategy for this area is shown in Figure 12-15.

Areas surrounding the site

12.97 Entrances at the surroundings are not fully defined. However, wind speeds are shown to be suitable for pedestrian sitting in most of the surroundings. A small area at the northwest of Baring Street MSCP shows conditions suitable for standing activity. Sitting areas are suitable for the planned activity and the wind effects are considered to be negligible.

12.98 Entrances at surrounding buildings show the same wind effects as the baseline conditions, therefore the wind effect is considered to be negligible.

12.99 Most of surrounding areas are suitable for sitting with some areas suitable for standing. The east side of the elevated railway shows some areas suitable for pedestrian walkthrough. To the south east of existing buildings a small area shows suitable conditions for pedestrian walkthrough. The south edge of the elevated level at the Depot show suitable conditions for pedestrian walkthrough. The wind effects are considered negligible.

12.100 Surrounding terraces are not assessed as these are considered not to be in a proximity that could be affected by the Proposed Development.

12.101 All surrounding roads and carparks show suitable conditions for the planned activities, which can be described as a negligible effect.

12.102 No safety issues are shown in the surroundings of the Site boundary. This can be described as a negligible effect.

12.103 A summary of the potential effects identified during operation, with the absence of any mitigation, can be found in Table 12-7.

Table 12-7 Summary of effects during operation of Application 1

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Sitting areas to the north of Baring Street Office 1 (Plots O)	High	Calm wind conditions	Negligible	Negligible
Entrances to Baring Street Office 1 and Baring Street MSCP (Plots N and O)	Moderate	Calm wind conditions	Negligible	Negligible
Thoroughfares	Low	Slight localised wind acceleration	Negligible	Negligible
Terrace of Baring Street Office 1 (Plot O)	Moderate - High	Calm wind conditions	Negligible	Negligible
Roads and carparks	Negligible - Low	Calm wind conditions	Minor beneficial	Minor beneficial
Safety exceedances	High	Localised safety identified at the northwest corner of Baring Street Office 1 (Plot O), mitigation in place inaccessible area to pedestrian activity	Negligible	Negligible
Surrounding sitting areas	High	Calm wind conditions	Negligible	Negligible
Surroundings entrances	N/A	Calm wind conditions	N/A	N/A
Surroundings thoroughfares	Low	Slight localised wind acceleration	Negligible	Negligible
Surroundings terraces	N/A	N/A	N/A	N/A
Surroundings roads and carparks	Low - Negligible	Calm wind conditions	Minor beneficial	Minor beneficial
Surroundings safety exceedances	High	Calm wind conditions	Negligible	Negligible

12.104 Operational effects for Phase 1 Application 1 and Application 2 (Baring Street Office 1 and Office 2, Baring Street MSCP and Mayfield Park) in existing surroundings and designed-in mitigation

Relevant aspects of the scheme and designed-in mitigation

12.105 This section studies the comfort and safety of pedestrians in the Phase 1 Application 1 and Application 2 scenario, with Baring Street Office 1 and Office 2, Baring Street MSCP and Mayfield Park within existing surroundings. The modelled geometry for this scenario is shown in Figure 12-16.

12.106 The wind conditions have been analysed for the whole year, as well as for all four seasons. Conditions for summer and winter are presented and discussed below.

12.107 The current wind environment external to the Site is predominantly influenced by the existing/occupied buildings and the inclusion of the Proposed Development at Phase 1 Application 1 and Application 2 (Baring Street Office 1 and No.2, Baring Street MSCP and Mayfield Park).

12.108 The summer and winter comfort maps are shown in Figure 12-19, Figure 12-20 and a detailed safety map is shown on Figure 12-21. The adverse effects found in this initial test are summarised as follows:

12.109 A small area at the northwest of Baring Street Office 1 shows conditions suitable for standing activities, which can be considered as a moderate adverse effect.

12.110 Entrances to the east of Baring Street Office 1 and Baring Street MSCP show moderate adverse effects at these locations, therefore mitigation is required.

12.111 A larger area of acceleration is shown to the south east of Baring Street Office 2, which is caused by the southerly winds that produce a façade downwash effect on this building and create acceleration at the south east corner. This results in conditions suitable for walking around buildings, which is considered a minor adverse effect. However, because of the size of the area of acceleration it was strongly recommended that mitigation should be considered to reduce this adverse effect. It should be noted, as described in the Cumulative Effects section of this report, that this effect is eliminated when the full build out of the SRF (i.e. the complete build out of the Mayfield development) is in place.

12.112 The eastern edge of the rooftop of the carpark at Baring Street MSCP shows slightly windy conditions suitable for pedestrians walking around buildings, which can be considered as a minor adverse effect as the acceleration of wind is close to the edge.

12.113 A small area located adjacent to the north east corner of Baring Street Office 1 of approximately 2m by 2m that has exceeded the safety criteria. This is considered as a major adverse effect. Therefore, this area will require mitigation.

12.114 The east side of Baring Street MSCP also shows high wind velocities breaching the safety criteria and therefore requires mitigation.

12.115 After the initial test with no mitigation (i.e. the worst case scenario), mitigation has been implemented and tested as shown in Figure 12-17. The mitigation measures are detailed below:

- A series of fifteen, seven meter tall trees to the north of the Baring Street Office 1 and No.2 (Plots O and M), inside the Park, as agreed with the landscape designers Studio Egret West (SEW).
- A 50% porous 1.1m tall balustrade at the podium wall along the edge of Mayfield Park.
- Three, 7 metres tall trees to the northwest corner of Baring Street Office 2 including a lower level planter with shrubbery up to 1m tall.
- Four, 7 metre tall trees to the southeast corner of Baring Street Office 2, including a lower level planter with shrubbery up to 1m tall.
- Four, 7 metre tall trees along the east façade of Baring Street MSCP, including a lower level planter with shrubbery up to 1m tall.
- One 2m by 2m low-level planter including shrubbery up to 0.5m at the north corner of Baring Street Office 1.

Potential effects of the development and their significance with designed-in mitigation

Wind effects on pedestrian comfort and safety

Within the site

12.116 The small area at the northwest of Baring Street Office 1 (Plot O) previously showed conditions suitable for standing activities, after mitigation is in place this area shows condition for sitting in summer scenario which is a negligible effect.

12.117 Entrances to the east of Baring Street Office 1 and Baring Street MSCP show suitable conditions for the planned activities after mitigation is in place.

12.118 After mitigation, all thoroughfares are suitable for the planned activities. This results in negligible effects.

12.119 The acceleration to the southeast corner of Baring Street Office 2 has been reduced to a small area approximately 3m by 1m to that remains with conditions suitable for walking around buildings which can be considered as a minor adverse effect and acceptable for comfort conditions and suitable for the planned activities.

12.120 Terraces do not require mitigation.

12.121 Roads and carparks do not require mitigation.

12.122 No safety exceedances are shown after mitigation is in place.

Areas surrounding the Site

12.123 All proposed sitting areas show suitable conditions for these activities. This can be described as a negligible effect.

12.124 Entrances at surrounding buildings show the same wind effects as the baseline conditions, therefore the wind effect is considered to be negligible.

12.125 Most surrounding pathways and pedestrian walkthrough areas show suitable conditions and therefore negligible effects, with the exception of the southeast corner of the elevated rail track, that has suitable conditions for pedestrian walkthrough which is acceptable for the planned pedestrian walking activity, therefore mitigation is not required.

12.126 Surrounding terraces are not assessed as these are considered not to be in a proximity that could be affected by the Proposed Development.

12.127 Surrounding roads and carparks show suitable conditions for the planned activities, which can be described as negligible effects.

12.128 No safety exceedances are shown in the surrounding areas to the Phase 1 Application 1 and Application 2 scenario.

Summary of effects during operation

Table 12-8 Summary of effects during operation of Application 1 with Application 2

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Entrances of Baring Street Office 1, No. 2 and MSCP (Plots 0, M and N)	Moderate	Calm wind conditions with mitigation in place	Negligible	Negligible

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Sitting Areas North of Baring Street Office 1 (Plots O)	High	Calm wind conditions with mitigation in place	Negligible	Negligible
Thoroughfares	Low	Localised wind acceleration	Minor adverse	Minor adverse
Terrace at Plot O	Moderate - High	Calm wind conditions	Negligible	Negligible
Roads and Carparks	Low - Negligible	Calm wind conditions	Minor beneficial	Minor beneficial
Parking roof level	Moderate - High	Localised wind acceleration	Minor adverse	Minor adverse
Safety exceedances (North of Baring Street Office 1, East of Baring Street MSCB and South East of Baring Street Office 2	High	Calm wind conditions with mitigation in place	Negligible	Negligible

Supplementary Mitigation Measures

12.129 None required, note mitigation measures have been included in the landscaping strategy.

Cumulative Effects

12.130 Operational effects for Cumulative Scenario 1: Phase 1 Application 1 and Application 2 (Baring Street Office 1 and No.2, Baring Street MSCP and Mayfield Park) in future surroundings

12.131 This section studies the comfort and safety of pedestrians in Cumulative Scenario 1 for Phase 1 Application 1 and Application 2 in future surroundings, i.e. the Proposed Development with future surroundings and any nearby committed schemes.

12.132 The wind conditions have been analysed for the whole year, as well as for all four seasons. Conditions for summer and winter are presented and discussed below.

12.133 The Cumulative Scenario 1 for Application 1 and 2 consists of Baring Street Office 1, Baring Steet MSCP, Mayfield Park and Baring Street Office 2 added to the future site surroundings, which include the developments highlighted in green in the Figure 12-24 which have planning applications approved.

12.134 The existing buildings predominantly influence the current wind environment, external to the Site. In addition, it will be influenced by the inclusion of the Proposed Development at Phase 1 Application 1 (Baring Street MSCP, Baring Street Office 1 and Mayfield Park).

Potential effects of the development and their significance

Wind effects on pedestrian comfort and safety

Within the site

12.135 Comfort maps for the Application 1 and Application 2 in future surroundings are shown in Figure 12-25 and Figure 12-26.

12.136 Sitting areas show the same wind effects in summer as the simulated Application 1 and Application 2 in existing surroundings. The change between existing surroundings and future surroundings scenarios is negligible.

12.137 The change for entrances doors is negligible to those shown in the Application 1 and Application 2 in existing surroundings scenario.

12.138 Comfort conditions in this scenario show the same results as the modelled Application 1 and Application 2 in existing surroundings. Wind effects at the site are the same as the mentioned on the existing surroundings scenario. The cumulative committed/future buildings are a relatively large distance from the Site to create a significant influence on wind conditions. Therefore the same conclusions made for the scenario at existing surroundings can be applied to this scenario with future surroundings.

12.139 The change for thoroughfares is negligible to those shown in the Application 1 and Application 2 in existing surroundings scenario.

12.140 The effects on terraces is negligible to those shown in the Application 1 and Application 2 in existing surroundings scenario.

12.141 The change for roads and carparks is negligible to those shown in the Application 1 and Application 2 in existing surroundings scenario.

12.142 A detailed safety map is shown in Figure 12-27. The same areas that breached safety in the existing surroundings scenario are found in this future surroundings scenario. The mitigation tested and verified for the existing surroundings scenario will be adequate to mitigate the safety exceedances identified, for this cumulative scenario.

Areas surrounding the site

12.143 The effects identified upon the immediate surroundings, in terms of sitting areas, entrances, thoroughfares, terraces, roads/carparks and safety exceedances is negligible when compared to those identified in the Application 1 and Application 2 in existing surroundings scenario.

12.144 Operational effects for Cumulative Scenario 2: Phase 1 and Application 1 and 2 (Baring Street Office 1 and No.2, Baring Street MSCP and Mayfield Park) and SRF (full Mayfield SRF) in future surroundings

Potential effects of the development and their significance

12.145 Note the cumulative effects of Mayfield Phase 1 with the future phases of the Mayfield SRF will be analysed as each individual planning application comes forward for the future phases.

Residual Effects

12.146 There are two residual effects that are considered to be minor adverse. These are described below:

- The small area of wind corner acceleration at the southeast corner of Baring Street Office 2 which is acceptable, almost imperceptible in the comfort map; and
- The comfort exceedance at the east edge of the roof top of the Baring Street MSCP. In this case mitigation is recommended, but not compulsory as this is considered a minor adverse effect.

Table 12-9 Residual effects table

Impact	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
Demolition and construction effects for Phase 1 (Application 1 and Application 2)				
Pedestrian walkthrough areas, Construction site/ empty site	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	N/A	Negligible
Pedestrian walkthrough areas, public realm East side	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	N/A	Negligible
Sitting/entrances, public realm	Localised wind acceleration is likely to result in a gradual transition to the new conditions	Negligible	N/A	Negligible
Operational effects for Phase 1 Application 1				
Sitting areas to the north of Baring Street Office 1 (Plots O)	Calm wind conditions	Negligible	N/A	Negligible
Entrances to Baring Street Office 1 and Baring Street MSCP (Plots N and O)	Calm wind conditions	Negligible	N/A	Negligible
Thoroughfares	Slight localised wind acceleration	Negligible	N/A	Negligible
Terrace of Baring Street Office 1 (Plot O)	Calm wind conditions	Negligible	N/A	Negligible
Roads and carparks	Calm wind conditions	Minor beneficial	N/A	Minor beneficial
Safety exceedances	Localised safety identified at the northwest corner of Baring Street Office 1 (Plot O), mitigation in place inaccessible area to pedestrian	Negligible	None required, as designed-in mitigation reduces the effect to negligible	Negligible

Impact	Description of effect	Pre-mitigation significance	Mitigation	Post-mitigation significance
	activity			
Surrounding sitting areas	Calm wind conditions	Negligible	N/A	Negligible
Surroundings entrances	Calm wind conditions	N/A	N/A	N/A
Surroundings thoroughfares	Slight localised wind acceleration	Negligible	N/A	Negligible
Surroundings terraces	N/A	N/A	N/A	N/A
Surroundings roads and carparks	Calm wind conditions	Minor beneficial	N/A	Minor beneficial
Surroundings safety exceedances	Calm wind conditions	Negligible	N/A	Negligible
Operational effects for Phase 1 Application 1 and Application 2				
Entrances of Baring Street Office 1, No. 2 and MSCP (Plots 0, M and N)	Calm wind conditions with mitigation in place	Negligible	None required, as designed-in mitigation reduces the effect to negligible	Negligible
Sitting Areas North of Baring Street Office 1 (Plots O)	Calm wind conditions with mitigation in place	Negligible	None required, as designed-in mitigation reduces the effect to negligible	Negligible
Thoroughfares	Localised wind acceleration	Minor adverse	None required	Minor adverse
Terrace at Plot O	Calm wind conditions	Negligible	N/A	Negligible
Roads and Carparks	Calm wind conditions	Minor beneficial	N/A	Minor beneficial
Parking roof level	Localised wind acceleration	Minor adverse	None required	Minor adverse
Safety exceedances (North of Baring Street Office 1, East of Baring Street MSCB and South East of Baring Street Office 2	Calm wind conditions with mitigation in place	Negligible	None required, as designed-in mitigation reduces the effect to negligible	Negligible



	Figure:	**12-1**		
	Title:	**Site Location**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**



	Figure:	**12-2**		
	Title:	**Site location and surrounding buildings**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

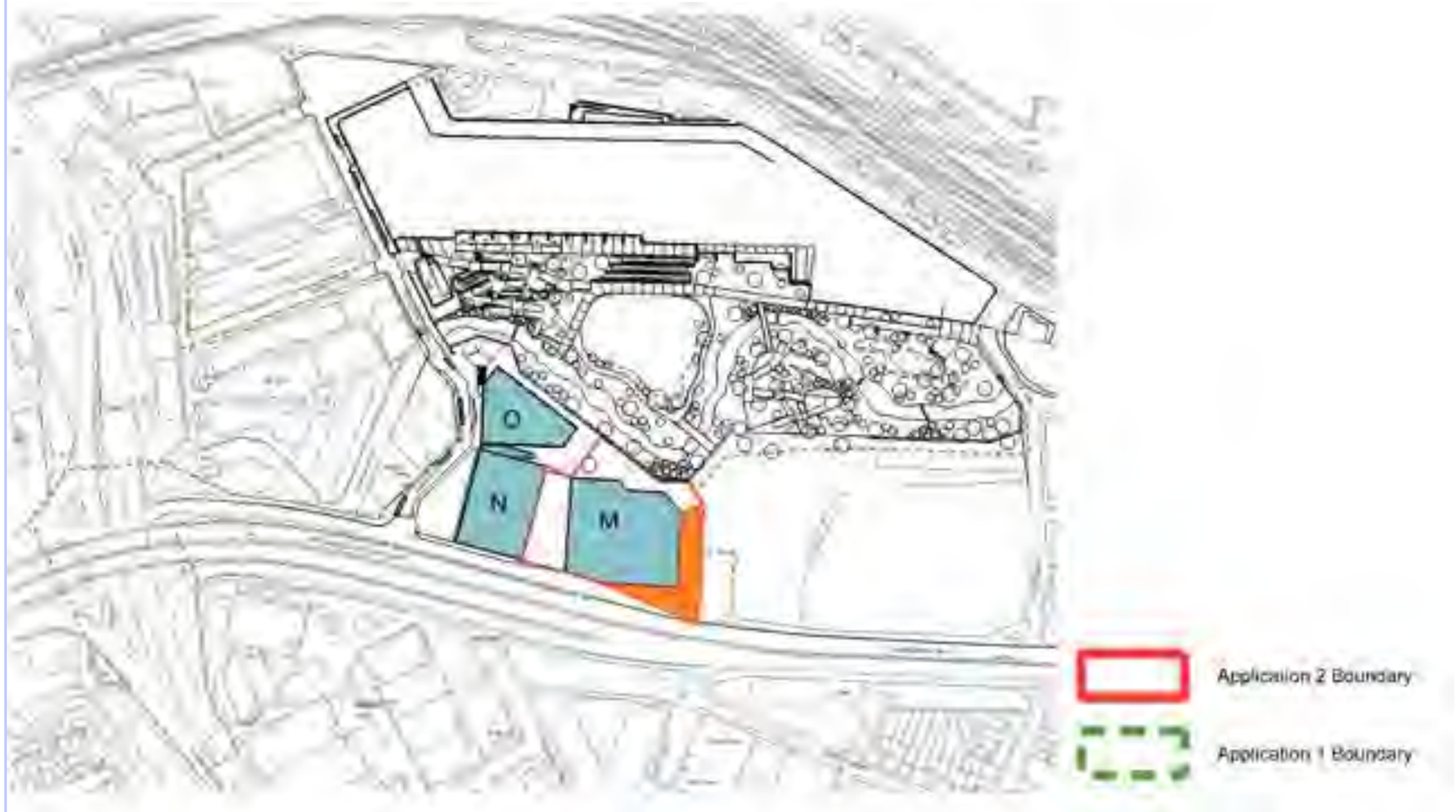


	Figure:	**12-3**		
	Title:	**Application 1 and 2 Boundaries**		
	Project:	**Mayfield Phase 1**		
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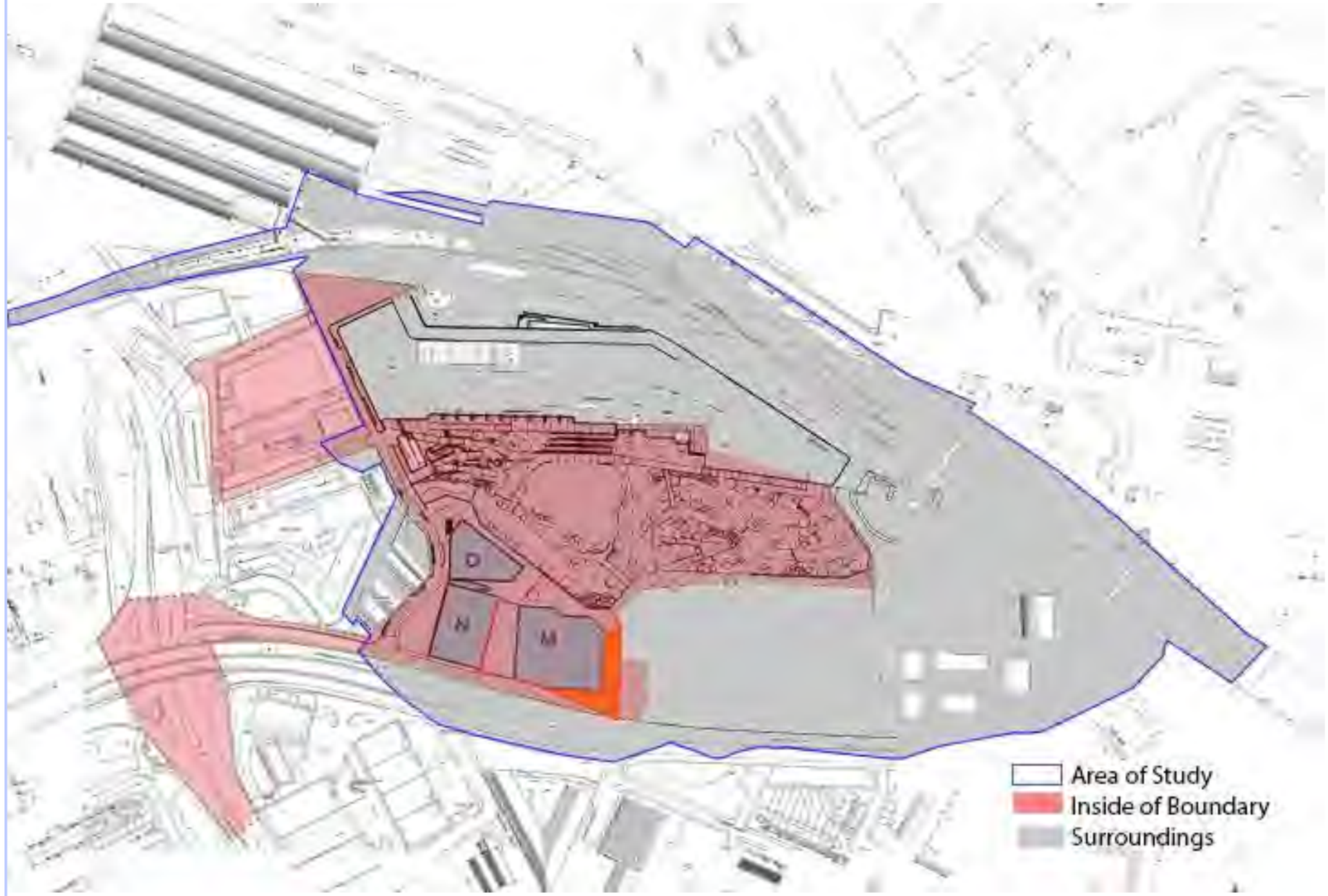


	Figure:	**12-4**		
	Title:	**Area of study, boundary and surroundings**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

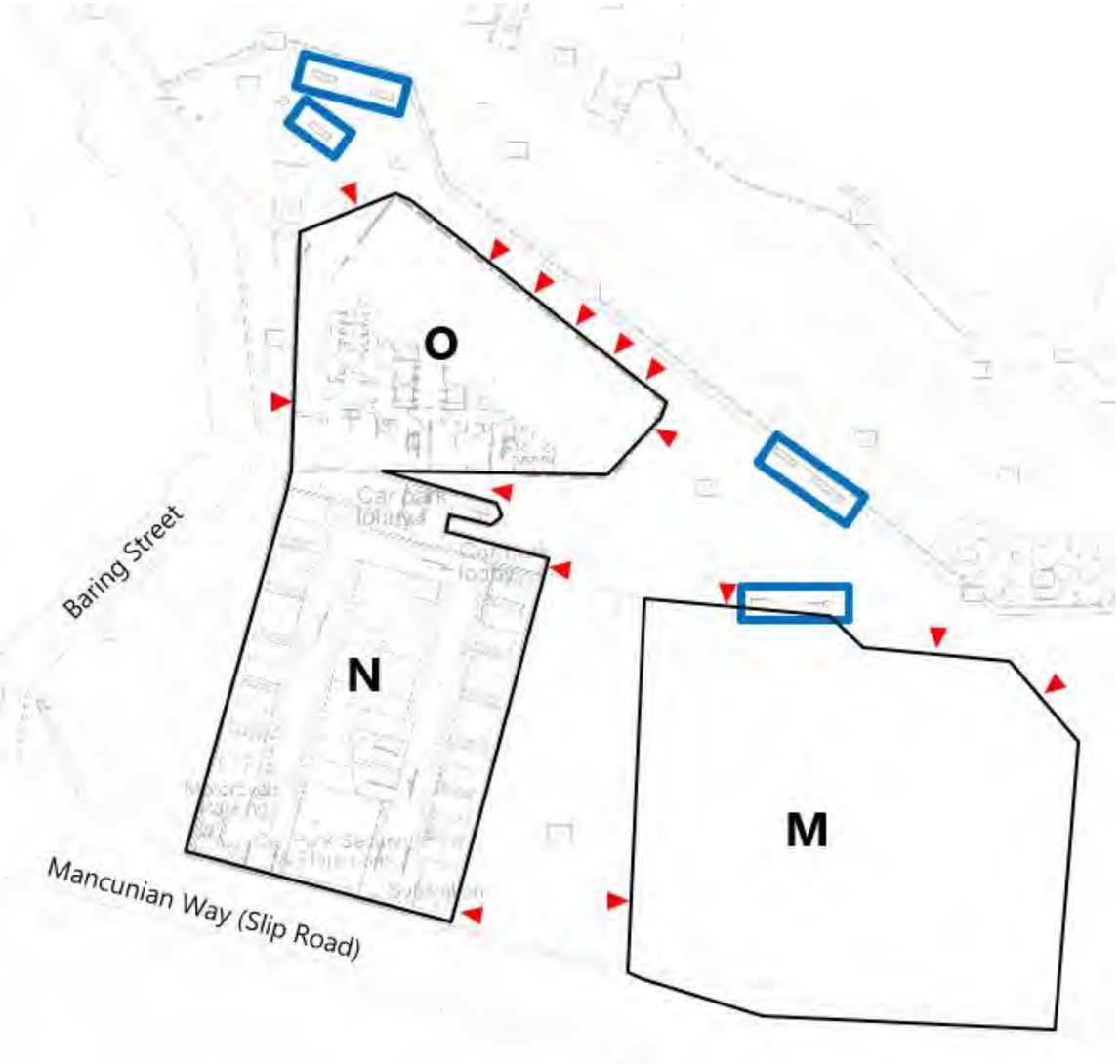
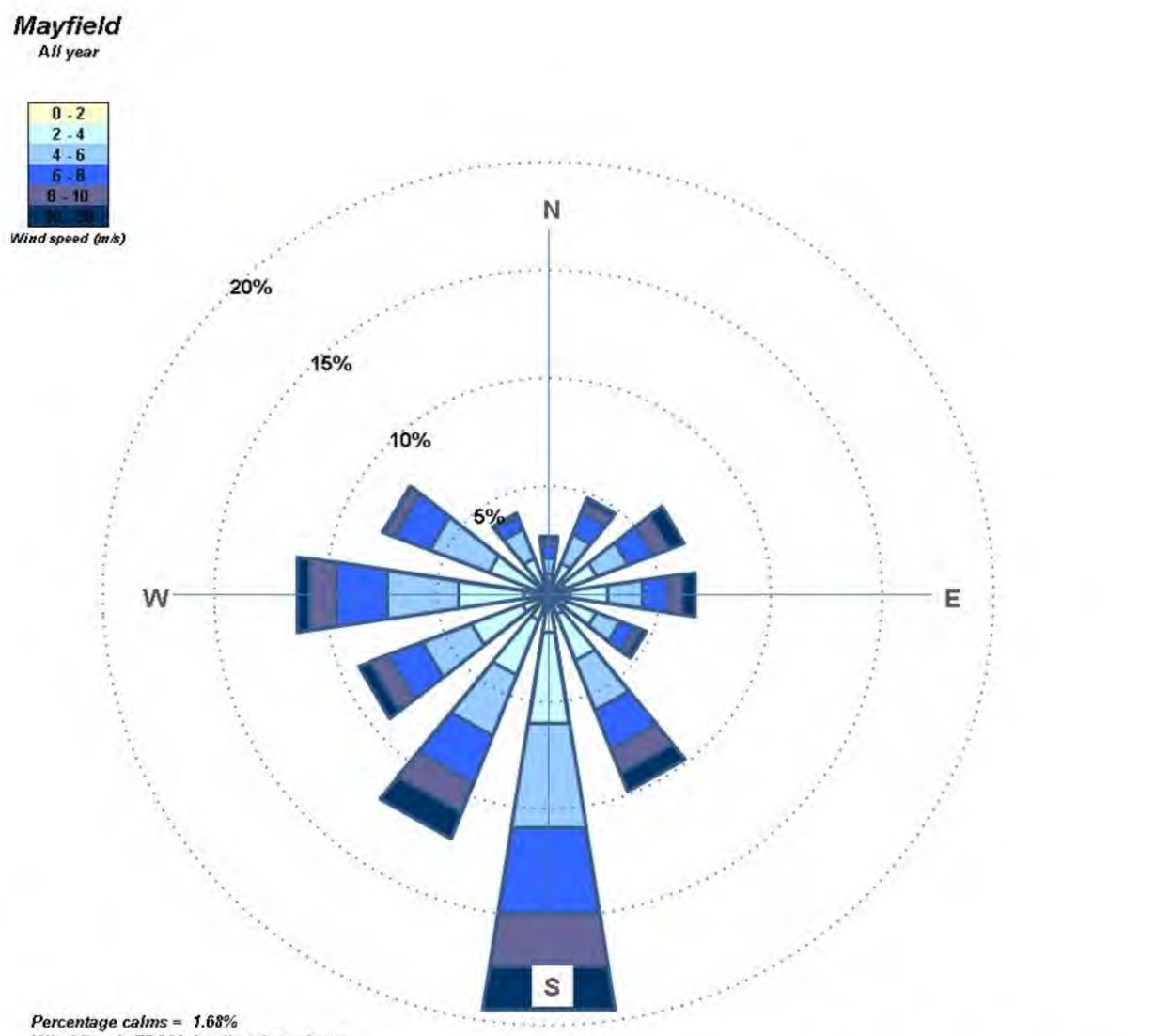
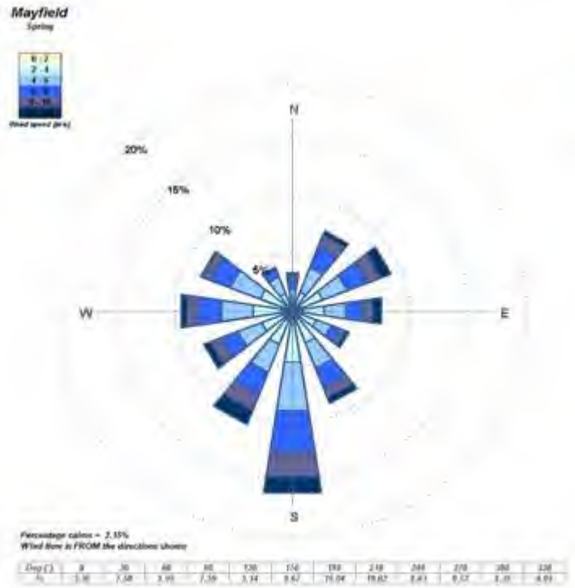


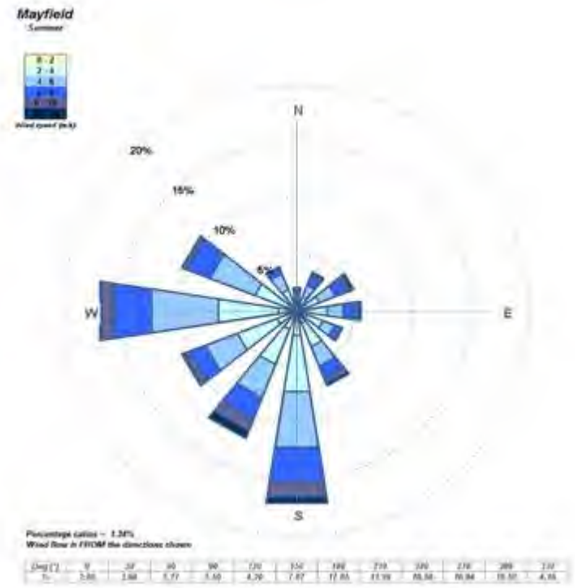
	Figure:	**12-5**		
	Title:	**Activities at the site**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

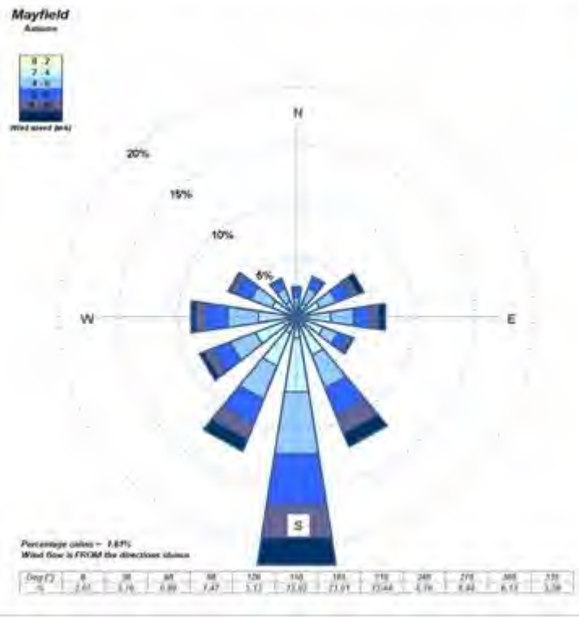


Deg (°)	0	30	60	90	120	150	180	210	240	270	300	330
%	2.66	4.73	6.43	6.59	4.65	9.70	19.25	12.00	9.09	11.33	7.91	3.97

Figure:	**12-6**			
Title:	**Annual wind rose for the development site**			
Project:	**Mayfield Phase 1**			
Date:	**19/06/16**	**Scale:**	**Without Scale**	







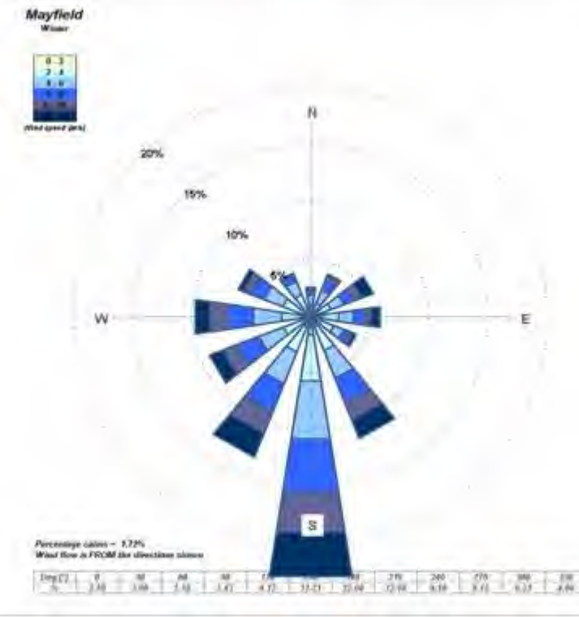


	Figure:	**12-7**		
	Title:	**Seasonal wind roses for the development site**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

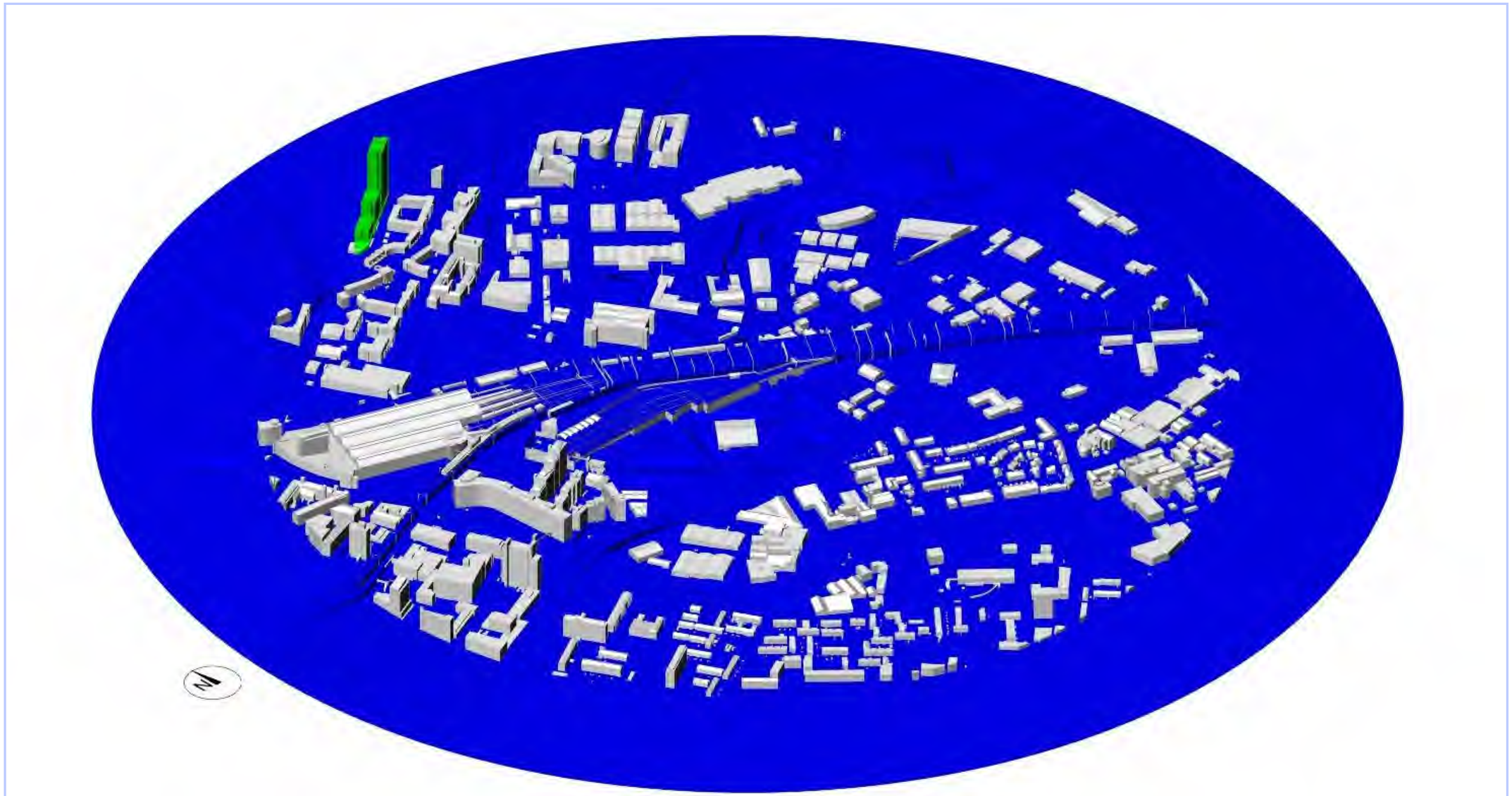


	Figure:	**12-8**		
	Title:	**Current baseline scenario (configuration 1): Modelled Geometry Baseline, existing site in existing surroundings (current baseline)**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

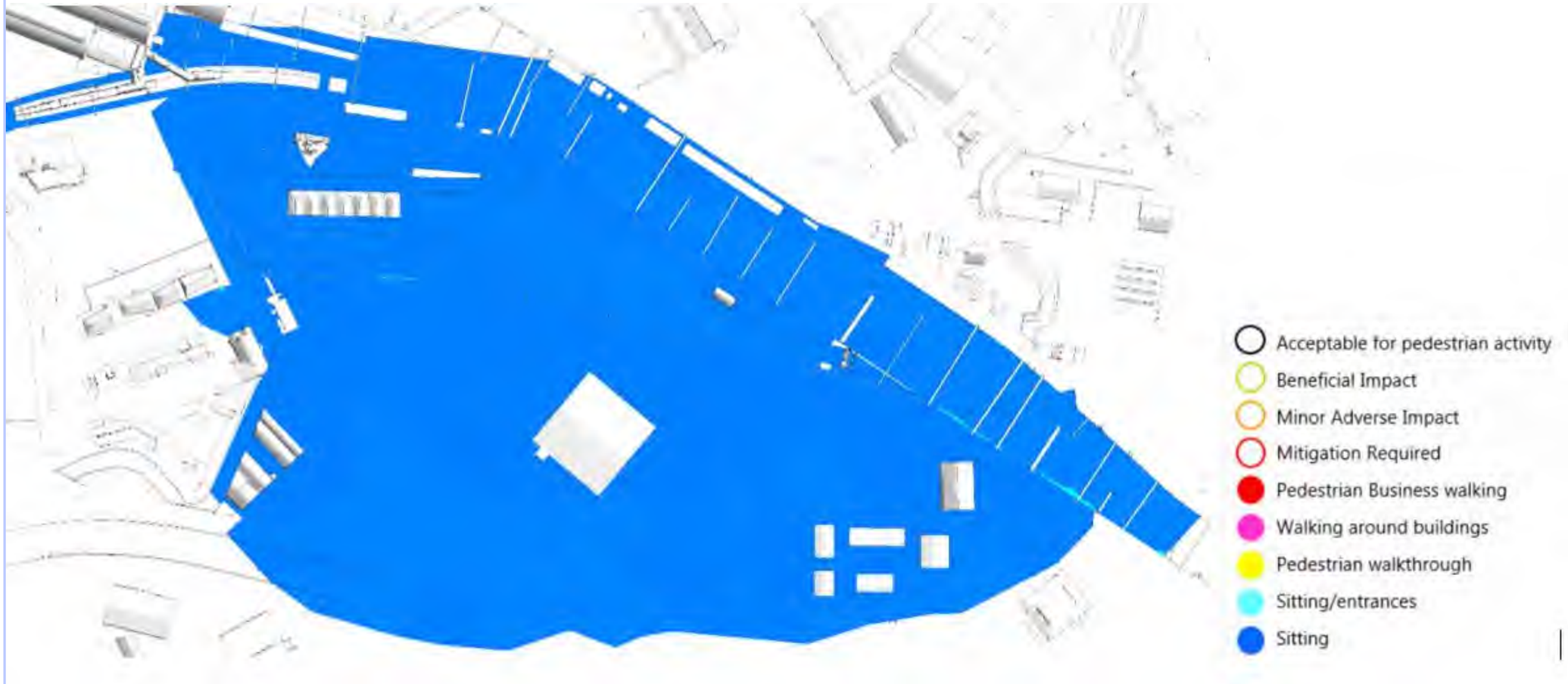


	Figure:	**12-9**		
	Title:	**Current baseline scenario: Existing site with existing surroundings - summer composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

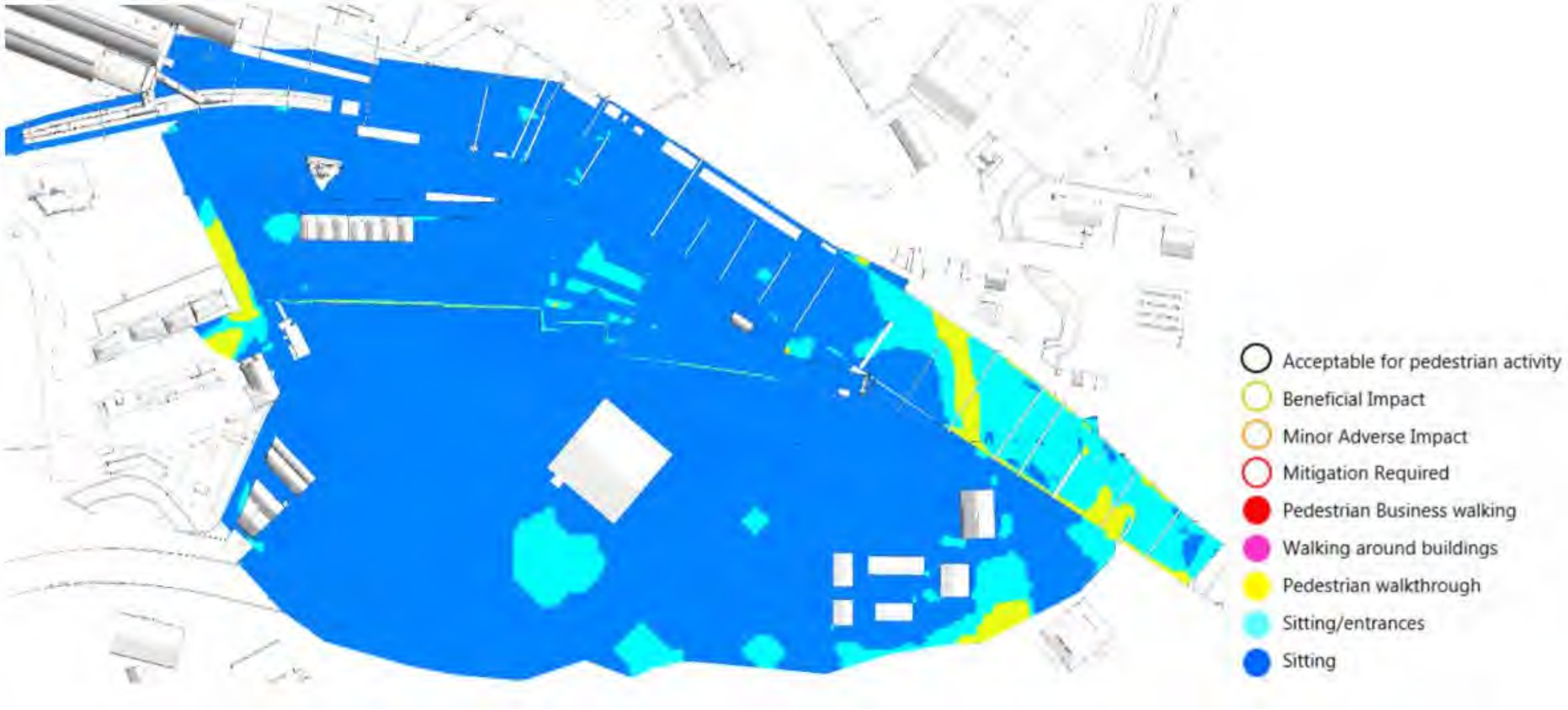


	Figure:	**12-10**		
	Title:	**Current baseline scenario: Existing site with existing surroundings - winter composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
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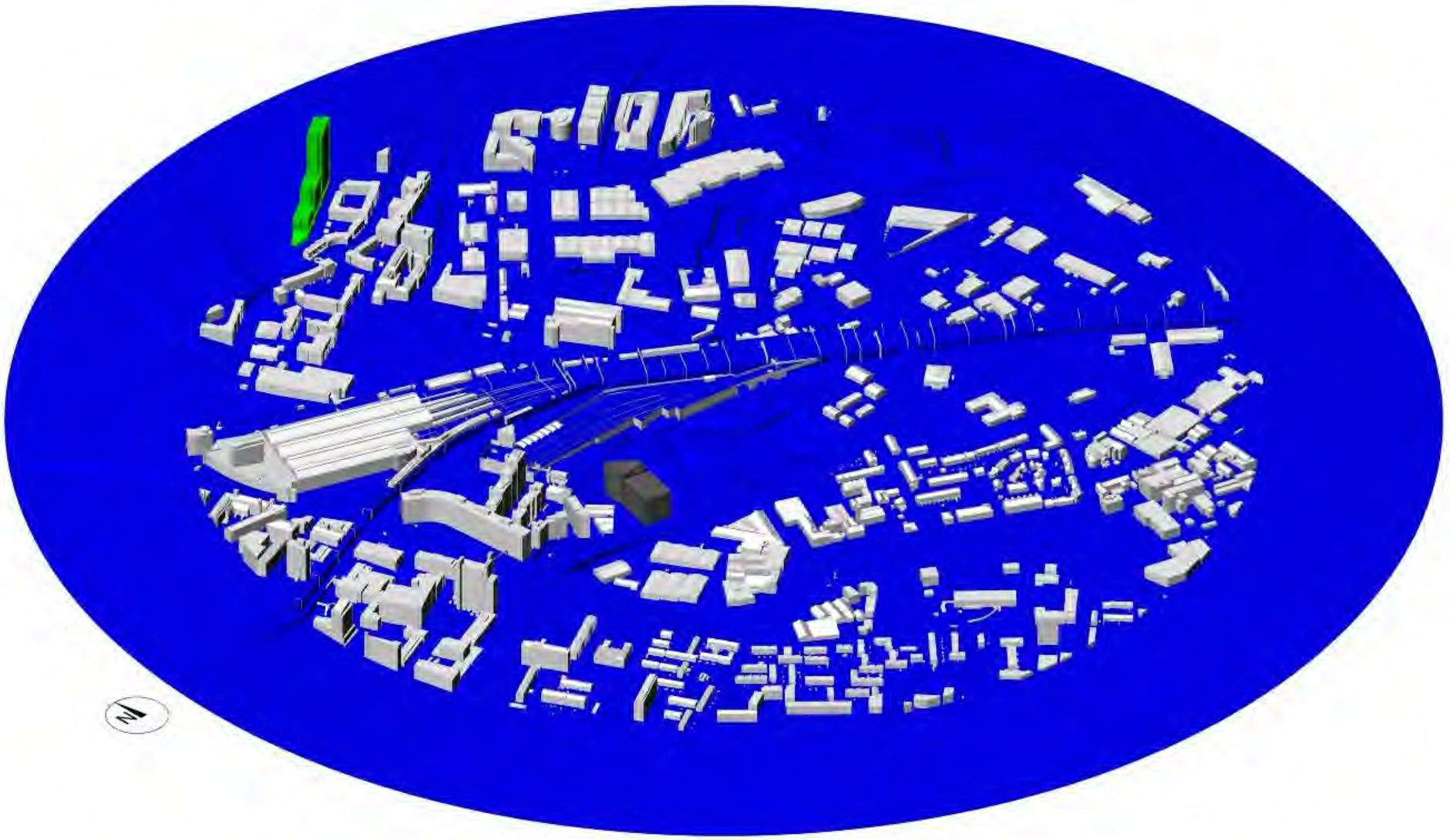


	Figure:	**12-11**		
	Title:	**Proposed scenario 1 (configuration 2): Modelled Geometry Phase 1 Application 1 in existing surroundings**		
	Project:	**Mayfield Phase 1**		
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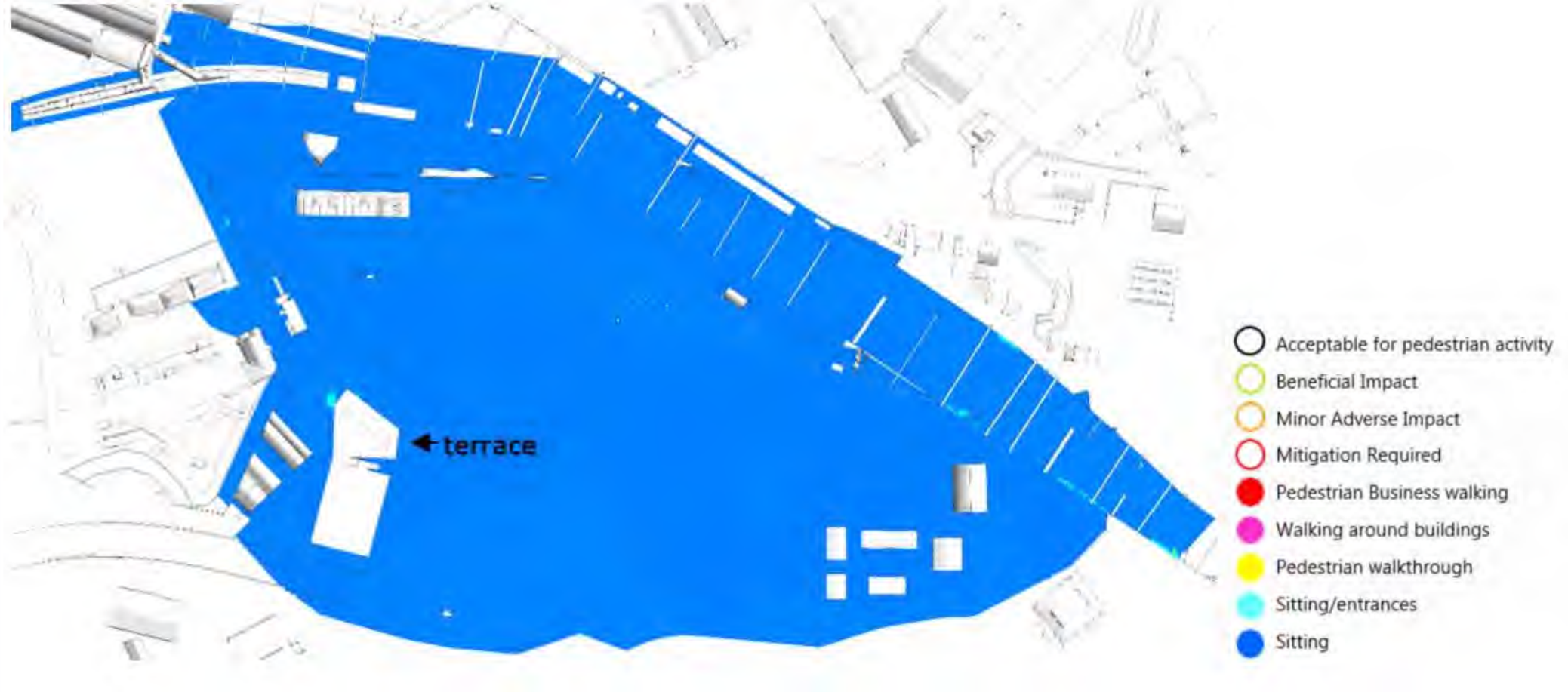


	Figure:	**12-12**		
	Title:	**Phase 1 Application 1 in existing surroundings - summer composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
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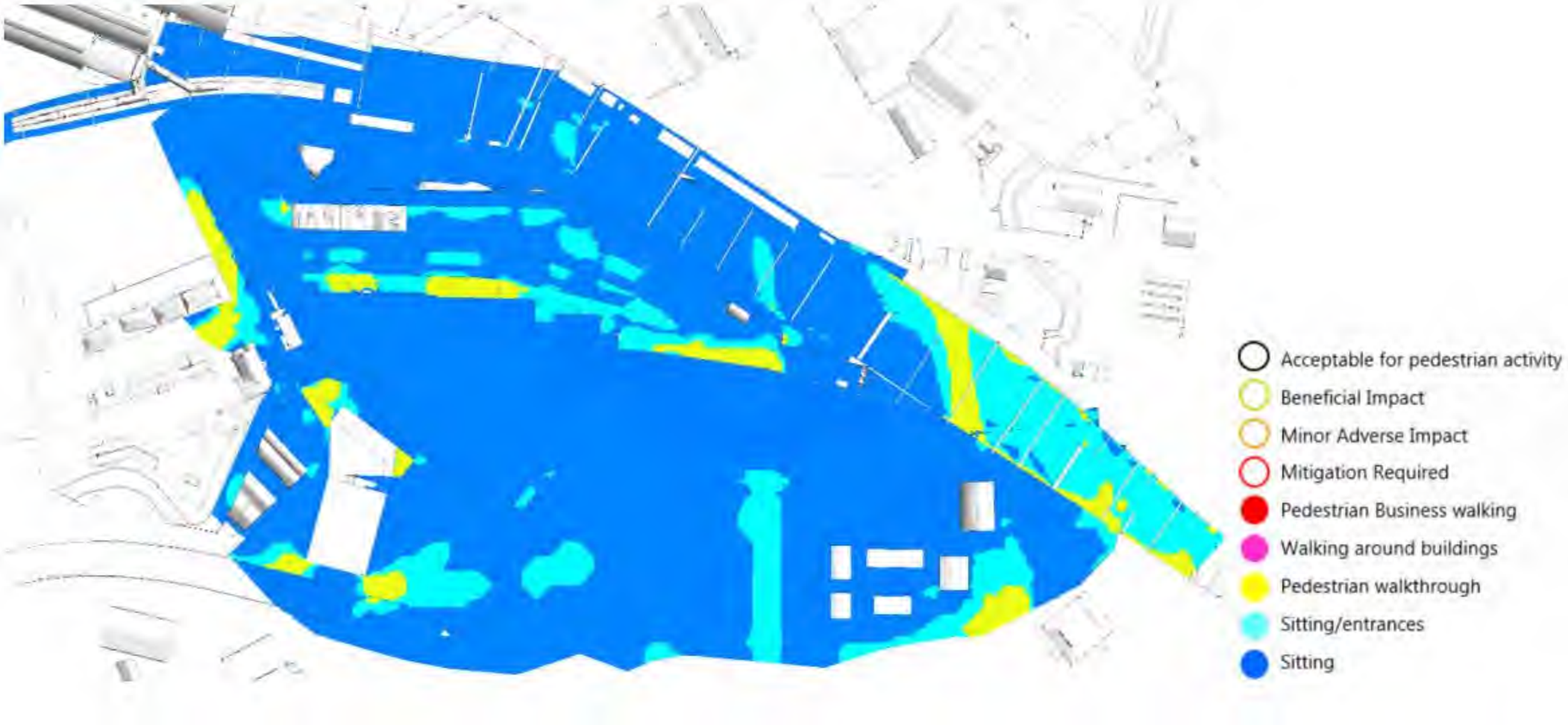


	Figure:	**12-13**		
	Title:	**Phase 1 Application 1 in existing surroundings - winter composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
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	Figure:	**12-14**		
	Title:	**Phase 1 Application 1 in existing surroundings - annual composite safety map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
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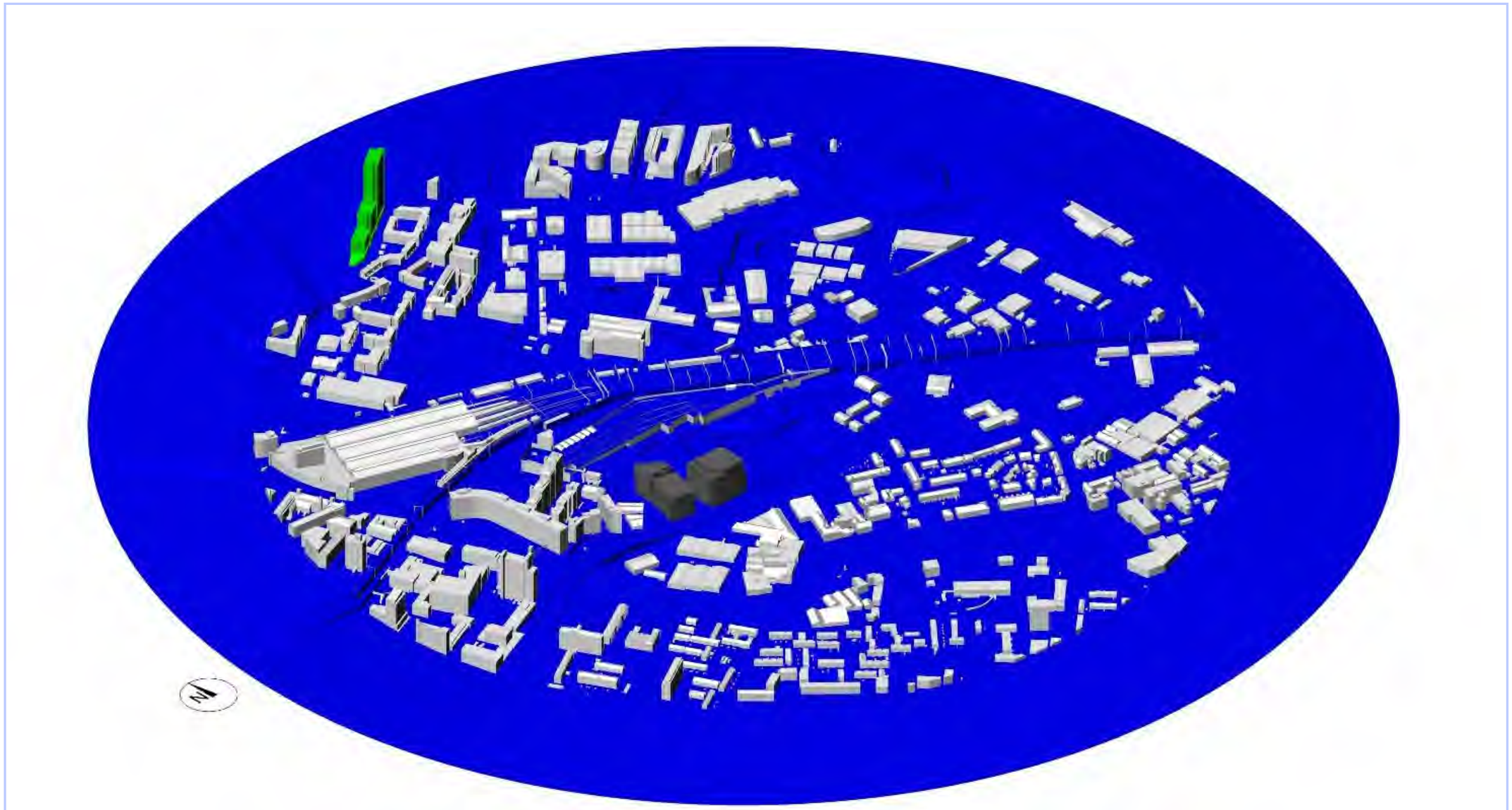


	Figure:	**12-16**		
	Title:	**Proposed scenario 2 (configuration 3): Modelled Geometry Phase 1 Application 1 + Application 2 in existing surroundings**		
	Project:	**Mayfield Phase 1**		
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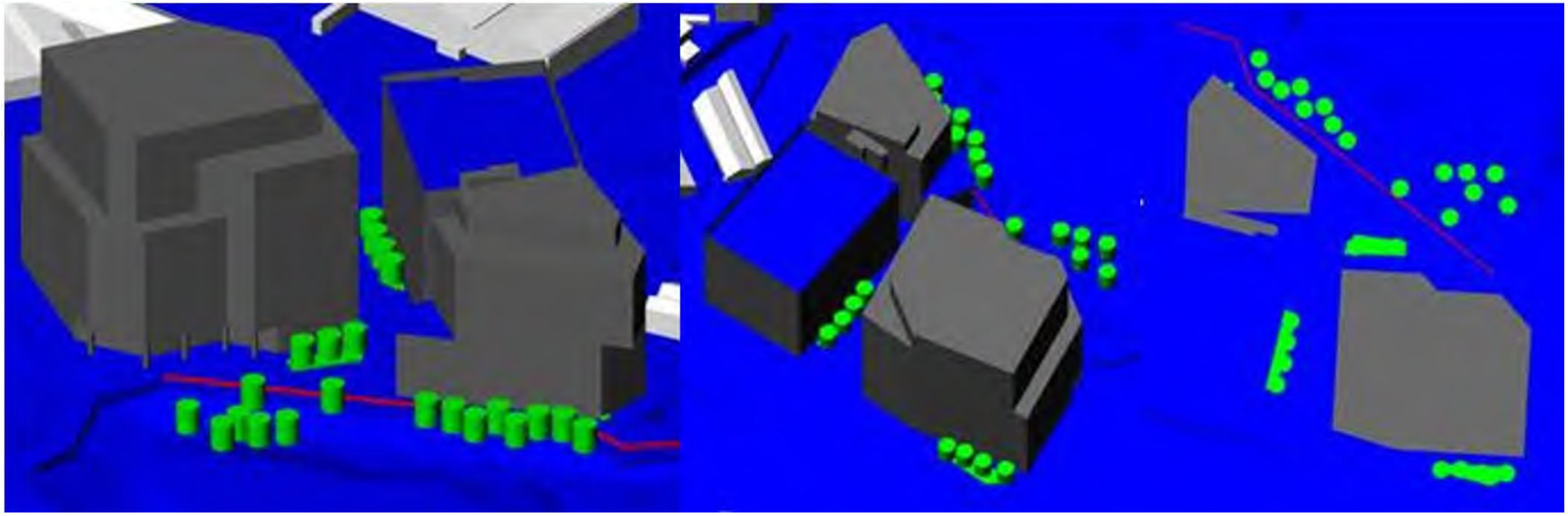


	Figure:	**12-18**		
	Title:	**Modelled Geometry Phase 1 Application 1 + Application 2 in existing surroundings mitigation**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**



	Figure:	**12-19**		
	Title:	**Phase 1 Application 1 + Application 2 in existing surroundings - summer composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
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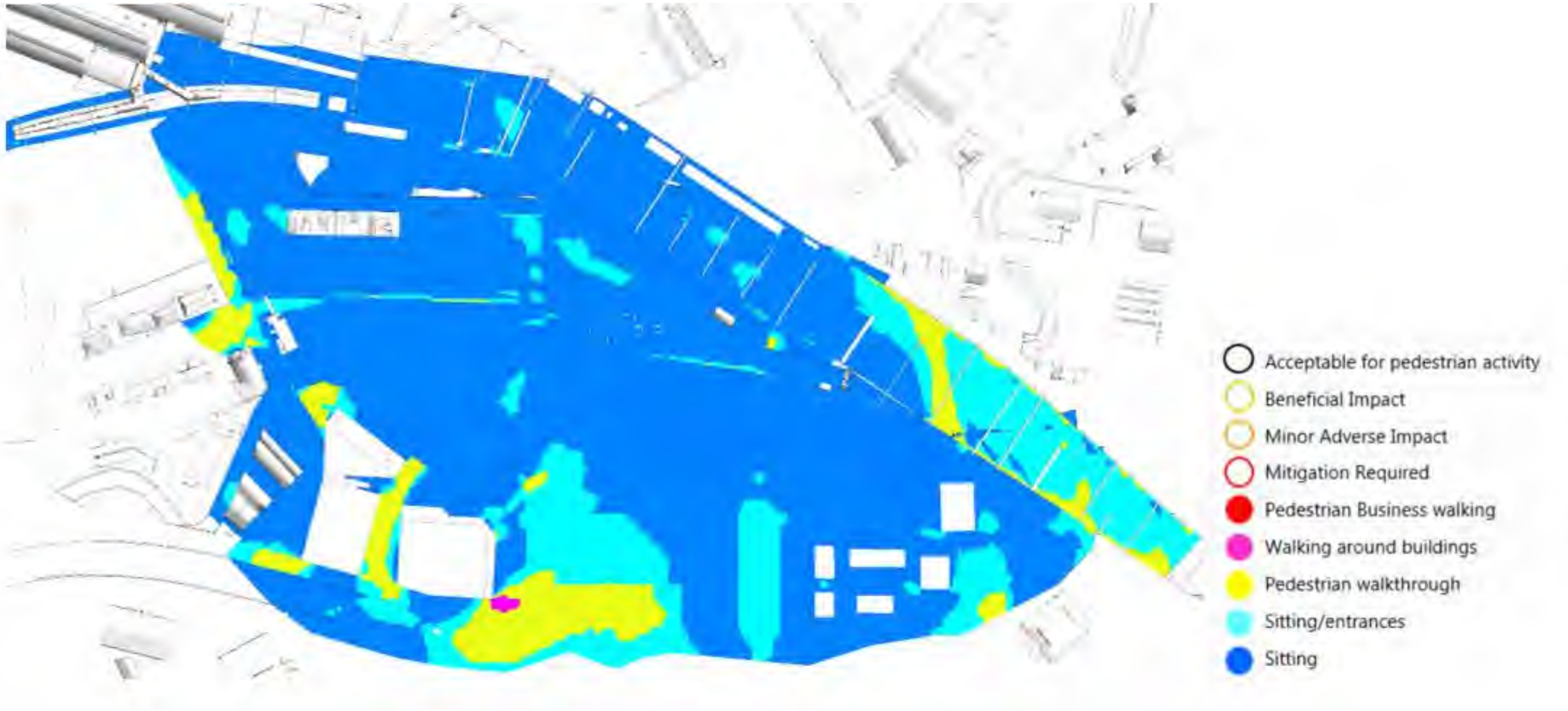
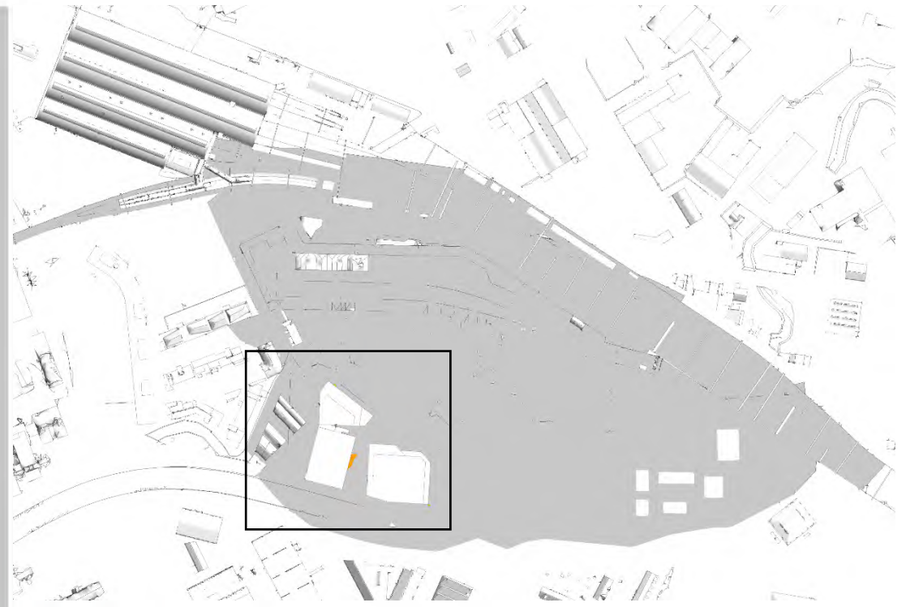


	Figure:	**12-20**		
	Title:	**Phase 1 Application 1 + Application 2 in existing surroundings - winter composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**





Safety Criteria

- Acceptable for pedestrian activity
- Safety concern

	Figure:	**12-21**		
	Title:	**Phase 1 Application 1 + Application 2 in existing surroundings - annual composite safety map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

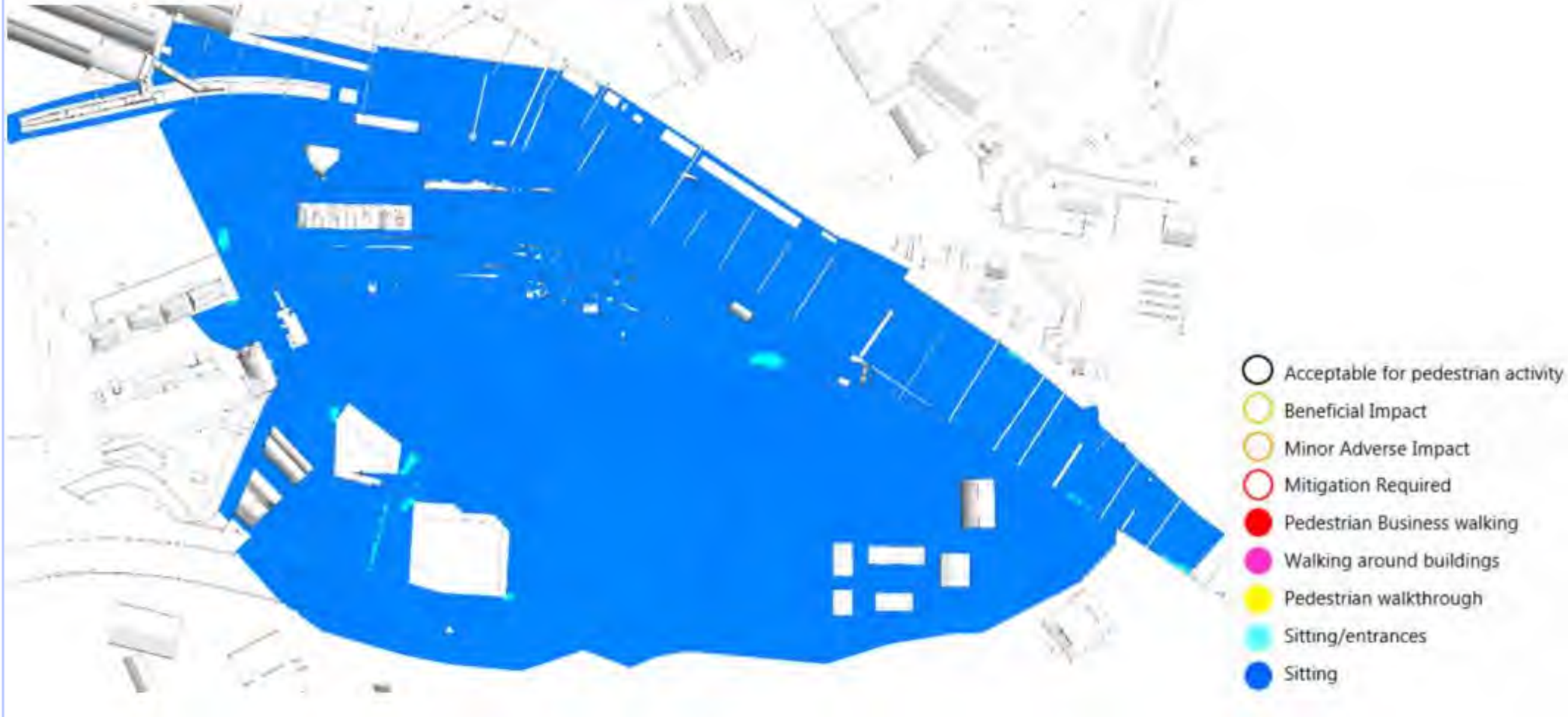


	Figure:	**12-22**		
	Title:	**Mitigated Phase 1 Application 1 + Application 2 in existing surroundings - summer composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
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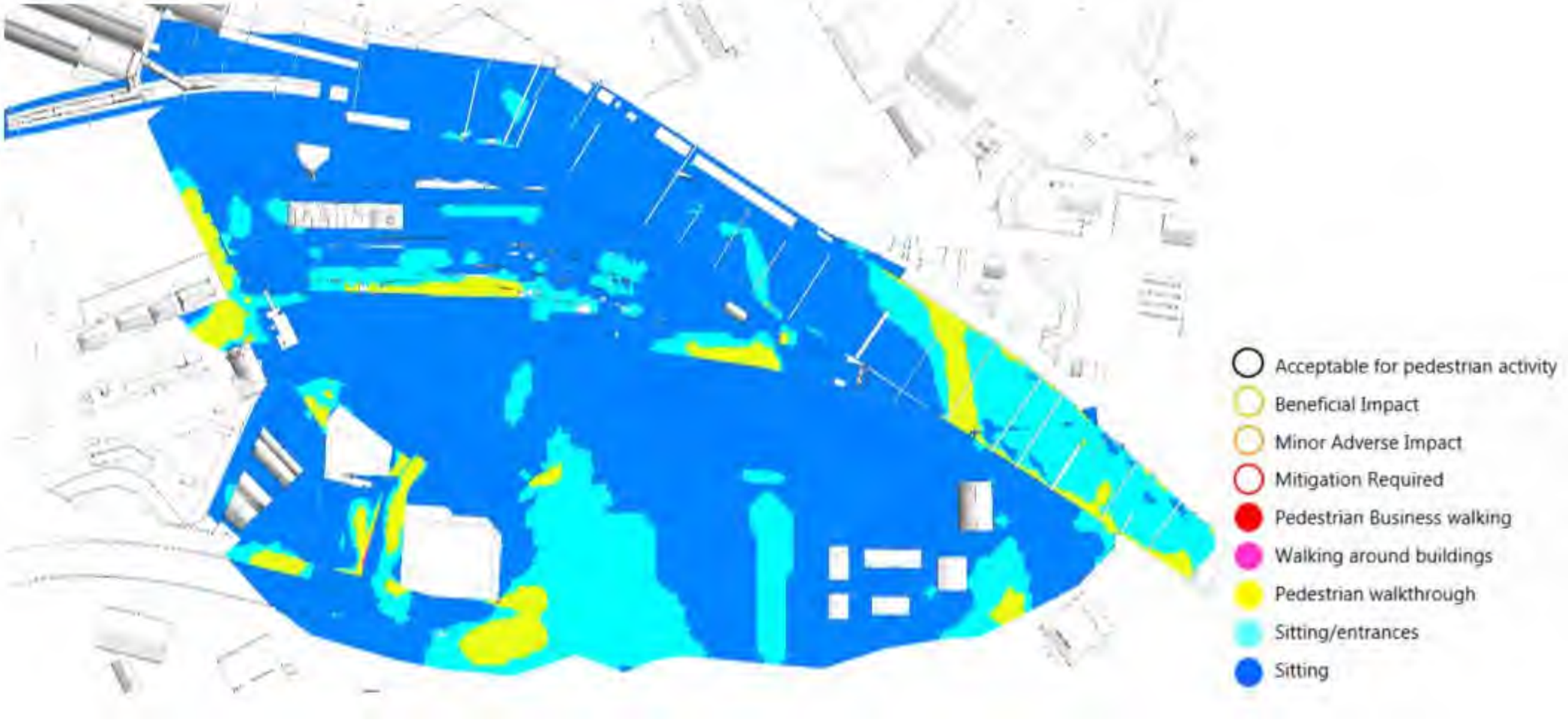


Figure:	**12-23**			
Title:	**Mitigated Phase 1 Application 1 + Application 2 in existing surroundings - winter composite comfort map (12 wind directions)**			
Project:	**Mayfield Phase 1**			
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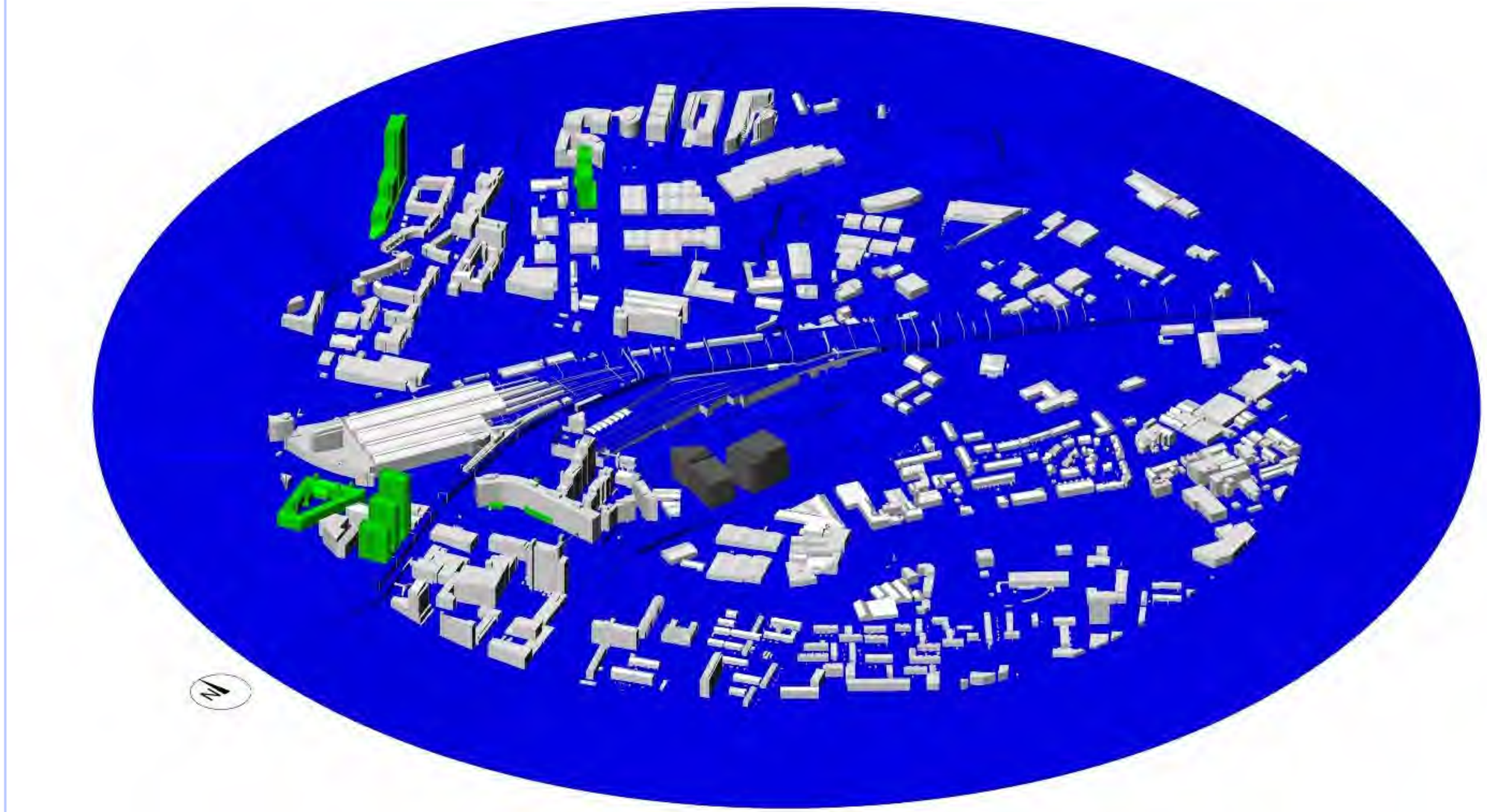


	Figure:	**12-24**		
	Title:	**Cumulative scenario 1 (configuration 4): Modelled Geometry Cumulative Scenario 1 Phase 1 Application 1 + Application 2 in future surroundings**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**



	Figure:	**12-25**		
	Title:	**Cumulative scenario 1: Phase 1 Application 1 + Application 2 in future surroundings - summer composite comfort map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
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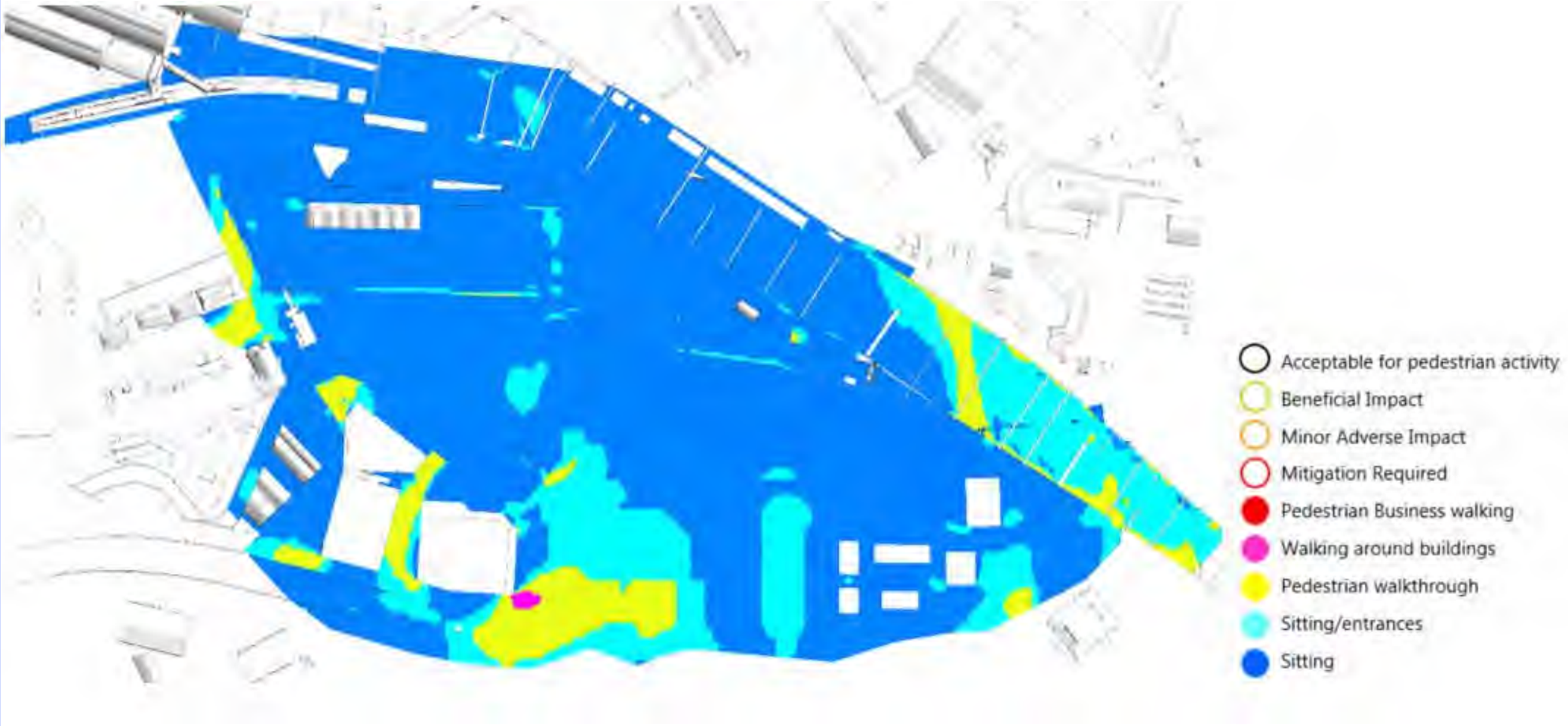


	Figure:	**12-26**		
	Title:	**Cumulative scenario 1: Phase 1 Application 1 + Application 2 in future surroundings - winter composite comfort map (12 wind directions)**		
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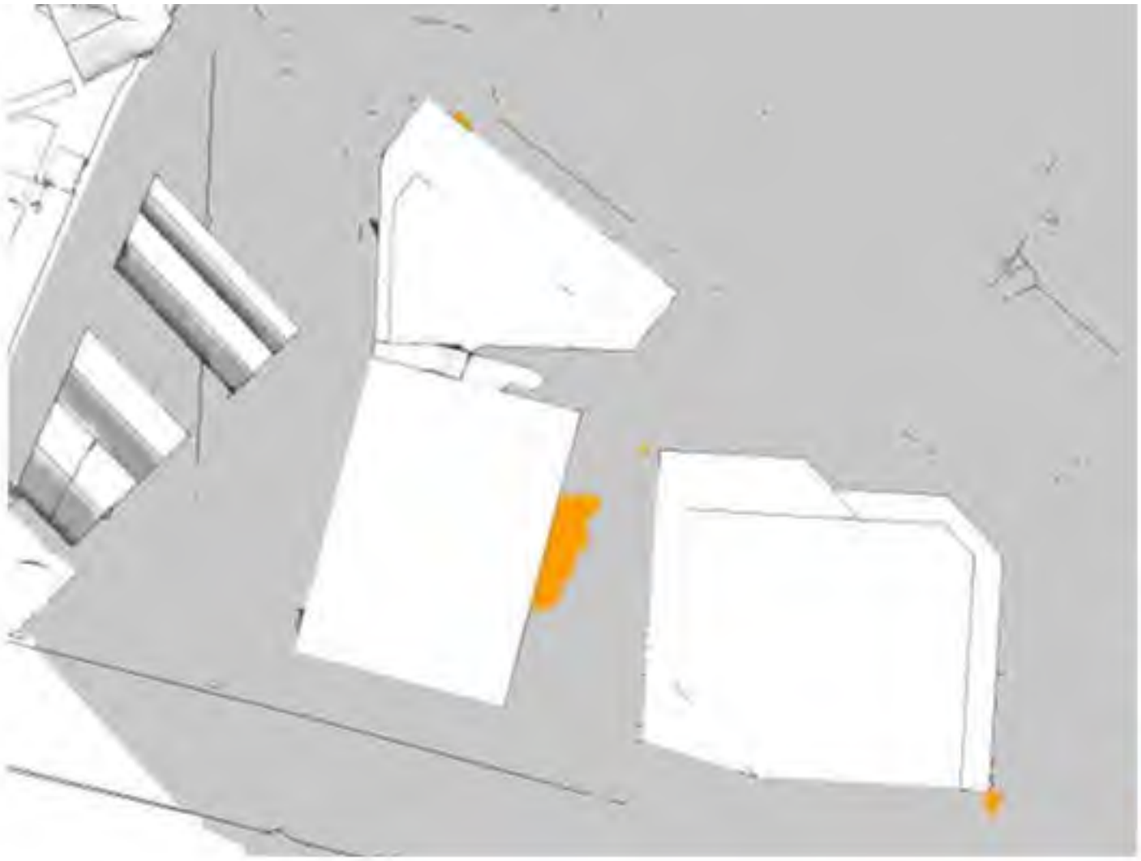




	Figure:	**12-27**		
	Title:	**Cumulative scenario 1: Phase 1 Application 1 + Application 2 in future surroundings – annual composite safety map (12 wind directions)**		
	Project:	**Mayfield Phase 1**		
	Date:	**19/06/16**	**Scale:**	**Without Scale**

13 Daylight, Sunlight and Overshadowing

Introduction

13.1 This chapter of the Environmental Statement (ES) assesses the likely environmental effects of the Proposed Development with respect to daylight, sunlight and overshadowing. This chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures incorporated to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.

13.2 The following pages review the impact in terms of access to daylight and sunlight for existing adjacent buildings affected by the Proposed Development and outlines measures where feasible that are already implemented within the development of the proposals to minimise overshadowing and optimise access to daylight. Daylight and sunlight access within the Proposed Development is also considered.

13.3 The information should be read in conjunction with the full details of the development in the Design and Access Statements and relevant drawing information.

13.4 The information within this Chapter is supported by a full analysis which has been carried out using modelling software to determine any overshadowing to existing adjacent buildings, comparing the current pre-development baseline conditions to the post-development condition. The results of this analysis can be found in the supporting Appendix 13-1 Mayfield Phase 1 Daylight and Sunlight Analysis Results Tables.

13.5 The author of this Chapter holds a B.Eng. in Mechanical Engineering with Energy Studies and a PhD in heat pump systems. He is a Chartered Engineer, with membership of the Chartered Institution of Building Services Engineers, and has 14 years consulting experience in the environmental design and analysis of buildings, including numerous daylight, sunlight and overshadowing assessments for planning applications and Environmental Statement Chapters.

Policy Context

13.6 A study was undertaken using BR209 "Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice" (2011) (BR209) with national planning policy and local policy being taken into account.

13.7 There is no legislation that directly affects the assessment contained within this chapter.

13.8 There is no specific guidance on daylight access to new buildings within the National Planning Policy Framework (NPPF), however, it is suggested that designers should consider using design codes to achieve well-designed places. In this instance, BR209 (2011) and BS 8206-02 are the relevant guides for reference.

13.9 The NPPF (February, 2019) section 12, 'Achieving well-designed places', paragraph 126, advises that, with respect to the use of design guides and codes, '…their level of detail and degree of prescription should be tailored to the circumstances in each place, and should allow a suitable degree of variety where this would be justified.'

13.10 Local Policy from the Manchester City Council Core Strategy (2012 to 2027) states as part of policy CC 6 regarding City Centre High Density Development that "City Centre development

will general be high-density. It is a location where land should be used to maximise its efficiency." This has been considered when assessing the daylight and sunlight impact of the Proposed Development. Policy DM 1 regarding Development Management also states that "All development should have regard to…effects on amenity, including privacy, light…" and "…adequacy of internal accommodation and external amenity space.'

Assessment Methodology and Significance Criteria

13.11 Baseline conditions across the site were determined through drawing and model information provided by Studio Egret West architects (SEW).

13.12 The following were used in the baseline study:

- 3D model of the Proposed Development and its surrounds provided by SEW;
- Modelling analysis carried out using Rhino and Grasshopper using BR209 methodology; and
- The criteria set out in this document, to indicate any potential areas of risk.

13.13 In order to test the impact of the Proposed Development in the context of existing, proposed and future phases of development, the following scenarios were tested for the ES:

- Baseline, including schemes currently under construction;
- Baseline and Phase 1, to include:
  - Application 1 alone;
  - Application 1 with Application 2;
- Baseline, Phase 1 (Applications 1 and 2) and Cumulative (i.e. nearby schemes with Planning Permission); and
- Baseline, Phase 1, Cumulative and wider Strategic Regeneration Framework (SRF) massing.

13.14 The impact of each of these scenarios in comparison with the baseline condition, on the existing nearby residential receptors, the existing amenity spaces and the proposed onsite amenity spaces (including Mayfield Park) will be assessed. Existing and future sensitive receptors are identified as residential windows and open amenity spaces having a requirement for daylight or sunlight, as defined in BR209.

13.15 Analysis of these scenarios has been carried out through software modelling in the context of guidance provided in BR209. This chapter highlights the sensitivity of receptors adjacent to the Site and gives an indication of the level of impact these receptors are likely to receive. Designed-in mitigation has been factored into the scheme where possible to minimise the impact, including consideration of the massing, orientation and layout which was informed by previous high level daylight and sunlight testing of the full Strategic Regeneration Framework (SRF).

Assessment Approach

13.16 The issues considered as part of the assessment include the following:

- Identification of any existing buildings and open spaces likely to be impacted by the Proposed Development with respect to a loss of daylight or sunlight;
- If there is overshadowing and therefore a reduction of sunlight and daylight to existing residential properties or open spaces, detailed modelling has been undertaken to determine the level of reduction due to the Proposed Development and compare post-development daylight and sunlight access against numerical targets;

- Calculation of levels of daylight and sunlight access within the Proposed Development, including open spaces created within the Site;
- Assessment of the cumulative impact of the Proposed Development and committed developments on existing adjacent buildings and open spaces; and
- Assessment of the impact of planned developments on the Proposed Development.

13.17 The following assessments were conducted for the Site to better understand in numerical terms the significance of the impact to receptors across the Site. An initial study was undertaken to review the proximity of property to the Proposed Development and apply the 25° rule described in section 13.22 where appropriate. Where the 25° rule was not met, Vertical Sky Component (VSC) and Probable Sunlight Hours (PSH) analyses were carried out, as described in section 13.24 and 13.28. These analyses consider overall levels of both daylight and direct sunlight available to elevations and open spaces.

Daylight assessments

13.18 The following assessments were conducted in order to assess the impact of the Proposed Development on access to daylight at receptors:

- 25° rule assessment of facades on existing adjacent buildings and within the Proposed Development (see section 13.22); and
- VSC assessment of facades on existing adjacent buildings and within the Proposed Development (see section 13.23).

13.19 Published guidance in BR209 advises that in urban areas the VSC test may not be the most appropriate for assessment due to the relationship between buildings and the fact that VSC is based on the existing and proposed condition. Therefore, where there is a clear site, or there are particularly low rise buildings existing on the Site, as is the case here, results are skewed. Where VSC values fall considerably short of BR209 guidance, analysis results have been considered against an alternative target (see section 13.39) consistent with the Site's urban location, considering, e.g. massing and obstruction angles existing in the Site's surroundings or existing buildings that are particularly close to a site's boundary.

Sunlight assessments

13.20 The following assessments were conducted in order to assess the impact of the Proposed Development on direct sunlight at receptors:

- Sunlight availability analysis at facades on existing adjacent buildings and within the Proposed Development based on Annual Probable Sunlight Hours (APSH) (see section 13.30);
- Sunlight availability analysis at facades on existing adjacent buildings and within the Proposed Development based on the probability of APSH occurring during winter (WPSH) (see section 13.30);
- Overshadowing analysis to assess sunlight on open spaces at existing properties and within the Proposed Development (see section 13.38);
- As with the daylight assessments, alternative targets consistent with the site's urban location have been adopted to assess sunlight access at existing buildings.

Daylight to surrounding windows

13.21 The following describes each assessment and criteria used for software analysis to determine the predicted overshadowing to existing adjacent buildings and to identify the potential to design-in mitigation.

13.22 A plane is drawn at 25° from the horizontal, at the centre of an existing window. Figure 13-1 shows the implementation of the basic 25° line to determine visible sky. If a new

development intersects with this plane, the internal daylight levels of the surrounding windows may be reduced. When an obstruction of the 25° line occurs, a more detailed assessment involving the Vertical Sky Component of the affected window is required.

Vertical Sky Component (VSC)

13.23 The Vertical Sky Component is the ratio of the direct sky illuminance falling on a vertical wall at a reference point, to the simultaneous horizontal illuminance under an unobstructed sky. The VSC does not include reflected light, either from the ground or from other buildings.

13.24 To maintain good levels of daylight, the VSC of a window is recommended in BR209 at 27% or greater, however within urban environments it is recognised that a lower VSC is acceptable given site constraints and a figure of 15% is typically considered to provide acceptable daylight in an urban setting (see section 13.39).

13.25 Where windows are affected by the Proposed Development or cumulative effects of the Proposed Development and other committed developments and a VSC of less than 15% is calculated at affected windows, a comparison of existing and proposed levels of VSC level should be made. Where possible, the post-development VSC should not be less than 80% of the pre-development VSC.

13.26 Figure 13-2 demonstrates visually the Vertical Sky Component as a measure of light received on a vertical surface with external obstructions considered.

Sunlight analysis

13.27 The following methodology was used to carry out the sunlight assessments. The methodology is based on the guidelines set out in the BRE report (BR209) "Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice" (Littlefair, 2011).

Probable Sunlight Hours (PSH)

13.28 Probable Sunlight Hours relates to the long term average of the total number of hours during year in which direct sunlight reaches the unobstructed ground (when cloud cover is considered). A Probable Sunlight Hours (PSH) assessment is carried out when:

- There is an obstruction within the 25° line, calculated from the centre of the window; and
- The Proposed Development is situated within 90° of south of the window.

13.29 The BRE guidance relates to existing living room and conservatory windows, although care should be taken to ensure kitchens with windows, and bedrooms receive reasonable amounts of sunlight as well.

Summary of Probable Sunlight Hours analysis for windows

13.30 As noted in the BR209 guide - If a living room of an existing dwelling has a main window which faces within 90°of due south, and any part of a new development subtends an angle of 25° to the horizontal (measured from the centre of the window in a vertical section perpendicular to the window) then the sun lighting of the existing dwelling may be adversely affected if the centre of the window:

- Receives less than the 25% of Annual Probable Sunlight Hours (APSH);
- Or less than 5% of the APSH during winter (21st September and the 21st March) (WPSH);
- Receives less than 0.8 times its former sunlight hours during either period; and
- Has a reduction in sunlight received over the whole year greater than 4% of APSH.

Sunlight to open spaces

13.31 Open spaces should retain a reasonable amount of sunlight throughout the year. The BR209 guide recommends that to appear adequately sunlit throughout the year, at least 50% of a garden or amenity area should receive at least two hours of sunlight on the 21st March.

13.32 If a detailed calculation cannot be carried out it is recommended that the centre of the area should receive at least two hours of sunlight on the 21st March. Existing open spaces should receive at least two hours of sunlight on the 21st March on at least 50% of their area or at least 0.8 times the former area receiving two hours of sunlight.

Receptor sensitivity

13.33 The criteria used to assess receptor sensitivity is described in Table 13-1.

Table 13-1 Criteria for determining receptor sensitivity

Sensitivity	Criteria
High	Viewers likely to feel the immediate impact to their surroundings and notice a significant reduction in the amount of natural light to their environment. Such receptors would include areas where viewers spend a long amount of time and expect access to high levels of daylight such as living areas of residential properties.
Moderate	Viewers with every day access to this environment but perhaps with less expectations as they are spending shorter periods of time in the space or are within an office environment. They may have previously used the space and therefore will be aware of the change but it would affect them less. Areas of residential properties that are not main living rooms and therefore less time is spent in these spaces.
Low	Small number or low sensitivity of viewers assumed. Viewers with a passing interest in their surroundings and momentary viewing periods. Infrequent users of open spaces around the Proposed Development.

Magnitude of change / impact

13.34 The criteria used to assess the impact of the Proposed Development on its surroundings, in terms of daylight and sunlight availability and magnitude of change from the baseline condition, are described in Table 13—2.

Table 13—2 Criteria for determining effect magnitude

Magnitude	Criteria
Negligible	BR209 numerical targets for daylight and sunlight met and a change in condition of no more than 20%
Small	Daylight and sunlight numerical values greater or less than BR209 targets by no more than 20% and a change in condition of between 20% and 36% (equivalent to a 20% change from a negligible magnitude). In accordance with BR209, dual aspect rooms experiencing a reduction in daylight to one window are assigned a small effect magnitude.
Medium	Daylight and sunlight numerical values greater or less than BR209 targets by no more than 50% and a change in condition of between 36% and 50%
Large	Daylight and sunlight numerical values greater or less than BR209 targets by more than 50% and a change in condition of more than 50%

Effect significance

13.35 The significance of a potential effect is derived by considering both the sensitivity of the feature and the magnitude of change, as demonstrated in Table 13—3.

Table 13—3 Matrix for determining effect significance

		Receptor Sensitivity		
		High	**Moderate**	**Low**
Effect magnitude	**Large**	Major	Moderate	Minor
	Medium	Moderate	Moderate	Minor
	Small	Minor	Minor	Negligible

13.36 Applying professional judgement based on experience of similar types of assessment and knowledge of the various assessment criteria, only a Major effect significance is considered to be 'significant' as a Moderate effect significance is considered to result in levels of daylight and sunlight access that are in keeping with the urban nature of the site's surroundings, e.g. a VSC threshold of 15% and shading from new developments that are consistent in scale and massing with existing surroundings.

13.37 Effects can also be described as:

- Beneficial or adverse;
- Permanent or reversible; or
- Short, medium or long term.

Assessment of daylight and sunlight access within the Proposed Development

13.38 The effect significance matrix shown in Table 13—3 is not applicable to the Proposed Development, for which there is no existing baseline condition (i.e. this is not a comparative assessment against a baseline, but rather an assessment against guidelines). The assessment of daylight and sunlight access within the Proposed Development where there is no pre-construction condition is therefore based on numerical guidance contained in BR209, paragraph 2.1.21 of which categorises the effect of obstructions as follows:

'If VSC is:

- **at least 27% conventional window design will usually give reasonable results between 15% and 27% special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight between 5% and 15% it is very difficult to provide adequate daylight unless very large windows are used less than 5% it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed.'**

13.39 The use of the above numerical values are supported by the Greater London Authority (GLA) representation hearing report D&P/3067/03 – Appendix 1, which states that, 'in an inner city urban environment, VSC values in excess of 20% should be considered as reasonably good and that VSC in the mid-teens should be acceptable. However, where the VSC value falls below 10% (so as to be in single figures), the availability of direct light from the sky will be poor.' As the opportunity exists to pay attention to window design and room layouts in new

developments, a VSC value of 15% has been adopted as a threshold for acceptable daylight access in this assessment.

13.40 Daylight access criteria used to assess the Proposed Development are summarised in Table 13-4.

13.41 As BR209 does not provide guidance on different values of probable sunlight hours, sunlight access is assessed on a pass or fail basis.

Table 13-4 Daylight access criteria

Daylight access	Criterion: Vertical Sky Component
Acceptable daylight in urban setting	≥15%
Poor daylight	≥5% and <15%
Inadequate daylight	<5%

Limitations and assumptions

13.42 The scheme assessed in this chapter is based on design-freeze information provided by SEW consisting of 3D geometry of the Proposed Development, its existing surrounds and adjacent planned developments.

13.43 The guidance contained in BR209 is not mandatory and is intended to be interpreted flexibly, with consideration for a site's location and other factors that influence a site's layout. Of particular relevance to the Proposed Development under consideration is BR209's recognition that breaches of its recommendations may be unavoidable in urban settings where new developments are consistent with existing building heights and proportions. Additional factors resulting in breaches of BR209 guidance being considered acceptable include the expectation that levels of daylight and sunlight will be restricted within a densely built urban environment due to typical building heights and separations and that target housing densities imposed on developments will constrain designers' ability to minimise new developments' impact on their surroundings and maximise daylight and sunlight access within new developments.

Baseline Conditions

Current baseline (2019)

13.44 The baseline is pre-demolition of the existing buildings. The existing site condition as of 2019 consists of warehouse Unit 5, low-lying warehouses in the southeast corner and southwest corner of the site. Walls of the depot on the northern half of the site are also included in the baseline. All other buildings on the site have been demolished prior to this study and are not included in the baseline. This provides a baseline condition which is not typical of a city location nor in keeping with some of the surrounding developments. Understandably these results will produce more extreme differences between the existing and proposed conditions than if the Proposed Development was replacing existing buildings at a density that would be expected of a city location.

13.45 The baseline scenario for Mayfield Park is considered as a cleared site with everything in the boundary of Mayfield Park having been demolished. This is representative of Mayfield Park in its operational phase.

Identified receptors and their sensitivity

13.46 The identified receptors and their sensitivity are listed in Table 13-5. These were identified by applying the BR209 25o obstruction rule to determine the extents of existing surrounding

window walls and open spaces that would potentially experience a noticeable loss of daylight and sunlight due to the presence of the Proposed Development.

13.47 On reviewing 25° obstruction angles between the surrounding buildings and the Proposed Development (Figure 13-3), the only sensitive receptor identified with potential impact from the Proposed Development is the eastern building of Liberty Point. Other nearby receptors to the west of the site including Macdonald Manchester Hotel, Unite Students and dwellings to the south were identified as sensitive, but on review of the 25o obstruction angle these receptors will not receive any impact from the Proposed Development.

13.48 Receptors further from the development, such as Piccadilly Village, Comet Street, Albion Works and The Cube, X1 The Plaza were identified as sensitive offsite receptors, but they were considered too far away (as the distance is more than three times the height of the highest building within the Proposed Development, or 25o line of sight plane does not intersect any part of the Proposed Development).

13.49 Open spaces providing amenity areas associated with the existing surrounding properties consist of landscaped areas within Liberty Point, amenity space north of Macdonald Manchester hotel and amenity space adjacent to London Road, identified in Figure 13-5. Other open spaces associated with existing adjacent properties are either to the south of the Site and are therefore unaffected by the Proposed Development on the March equinox, or to the north are too far away to be impacted by the Proposed Development.

Table 13-5 Identified receptors and their sensitivity

Existing Receptor	**Sensitivity**	**Justification**
Liberty Point – student residential	Moderate	Main habitable areas in relative proximity to the Proposed Development. Likely to perceive a reduction of light to living areas. Student residences mostly have short-term occupants (yearly), therefore impact is often temporary.
Amenity space 1 (Liberty Point)	High	Main amenity space within Liberty Point. Likely to perceive a reduction of light with Proposed Development.
Amenity space 2 (London Road)	Low	Amenity space adjacent to London Road. Unlikely to be used for extended periods of time.
Amenity space 3 (Macdonald Manchester)	Low	Amenity space adjacent to Macdonald Manchester Hotel. Unlikely to be used for extended periods of time.
Future Receptor	**Sensitivity**	**Justification**
Mayfield Park	High	Main amenity space proposed within the committed development. Large areas with intended usage as recreational area and therefore likely to be used for extended periods of time.

Identification and Evaluation of Likely Significant Effects

Demolition and construction effects for Application 1 (Baring Street Office 1, Baring Street Multi Storey Car Park, and Mayfield Park)

Relevant aspects of the scheme

13.50 During demolition and construction of the Proposed Developments, there is likely to be a gradual transition to the new conditions. These effects will be negligible in comparison to the operational effects.

Potential effects of the development and their significance

13.51 During demolition of the current buildings, there is likely to be a progressive reduction in the bulk and massing on the sSite. However, due to the low-rise nature of the current buildings and their separation distance from sensitive receptors, the effect of demolition on daylight and sunlight at sensitive receptors is considered to be negligible.

Summary of effects during construction

13.52 The level of daylight and sunlight will evolve during the construction phases. Therefore, it is not possible to determine what the effect of this will be on the receptors at any given time. The use of scaffolding, hoardings and site plant, will temporarily increase the obstruction to daylight and beyond the baseline conditions. During construction, the scheme will transition from the baseline to the fully operational state; the fully-built scenario represents the worst case, so construction effects have been scoped out of this assessment.

Demolition and construction effects for Application 1 + Application 2 (Baring Street Office 1, Baring Street Multi Storey Car Park, Baring Street Office 2 and Mayfield Park)

Relevant aspects of the scheme

13.53 During demolition and construction of the Proposed Developments, there is likely to be a gradual transition to the new conditions. These effects will be negligible in comparison to the operational effects.

Potential effects of the development and their significance

13.54 During demolition of the current buildings, there is likely to be a progressive reduction in the bulk and massing on the site. However, due to the low-rise nature of the current buildings and their separation distance from sensitive receptors, the effect of demolition on daylight and sunlight at sensitive receptors is considered to be negligible.

Summary of effects during construction

13.55 The level of daylight and sunlight will evolve during the construction phases. Therefore, it is not possible to determine what the effect of this will be on the receptors at any given time. The use of scaffolding, hoardings and site plant, will temporarily increase the obstruction to daylight and beyond the baseline conditions. During construction, the scheme will transition from the baseline to the fully operational state; the fully-built scenario represents the worst case, so construction effects have been scoped out of this assessment.

Operational effects for Application 1 (Baring Street Office 1, Baring Street Multi Storey Car Park, and Mayfield Park)

Relevant aspects of the scheme and designed-in mitigation

13.56 13.56The Proposed Development aims to minimise effects on the current daylight and sunlight availability to the existing residential buildings (including hotel and student residential), whilst seeking to maximise the availability to the future neighbouring sensitive receptors and the occupiers of the Proposed Development itself. This has been achieved by reviewing the

Proposed Development options and providing feedback on the effects during the design process.

Potential effects of the development and their significance

Daylight to current sensitive receptors

13.57 Full details of the VSC analyses are provided in Appendices 13.1 and the Figures that support this chapter.

13.58 The easterly building of Liberty Point residences was identified as the only sensitive receptor for Application 1. Other nearby receptors including the other blocks within Liberty Point, Unite Students, Macdonald Manchester and dwellings to the south will not receive impacts on daylight, on reviewing the 25o obstruction angles between the receptors and Baring Street Office 1 and Baring Street Multi Storey Car Park (MSCP).

Table 13-5 Impact assessment of Phase 1 Application 1 on access to daylight at existing sensitive receptors

Receptor	Number of windows	Negligible		Minor adverse		Moderate adverse		Major adverse	
		No.	%	No.	%	No.	%	No.	%
Liberty Point E	120	110	91.7	10	8.3	0	0	0	0

13.59 The VSC results shows that 110 (91.7%) of the 120 windows on Liberty Point, tested for VSC will satisfy the BRE guidelines by either retaining a VSC of at least 27% or at least 0.8 times their factor of former values. The remaining 10 windows will achieve a factor of former values of between 0.6 and 0.8. Assessment results are shown graphically in Figure 13-9.

13.60 13.60It is considered that the overall effect of Application 1 on this receptor will be of minor adverse significance with respect to BRE guidelines, however in the context of an urban environment, all windows achieve the alternative target of 15% VSC. The effect may, therefore, be considered negligible.

Sunlight to current sensitive receptors

13.61 Full details of APSH and WPSH are provided in Appendix 13-1.

Table 13-6 Impact assessment of Phase 1 Application 1 on direct sunlight at existing sensitive receptors

Receptor	Number of windows	Negligible		Minor adverse		Moderate adverse		Major adverse	
		No.	%	No.	%	No.	%	No.	%
Liberty Point E	120	119	99.2	1	0.8	0	0	0	0

13.62 The sunlight results show that 119 (99.2%) of the 120 windows tested on Liberty Point, will satisfy the BRE criteria for annual and winter sunlight criteria. The remaining 1 window will achieve factor of former values between 0.6 and 0.8. It is considered that the overall effect of

Application 1 on this receptor will be of minor adverse significance. Assessment results are shown graphically in Figure 13-10.

Daylight/Sunlight to future sensitive receptors

13.63 Surrounding cumulative schemes identified are too far away to be impacted by the Proposed Development.

Sunlight on existing amenity spaces and Mayfield Park

13.64 Open spaces identified as potentially affected by the Proposed Development, Application 1 Open spaces identified as potentially affected by the Proposed Development, Application 1 were landscaped areas within or adjacent to Liberty Point (1), Macdonald Manchester (2) and London Road (3). Figures 13-5 and 13-9 identify the assessed open spaces and illustrates the distribution of sunlight received on the March equinox in the pre-development and post-development conditions, with numerical results presented in Table 13-8. All amenity spaces achieve the BR209 target of 50% of each area receiving 2 hours sunlight on March equinox. The addition of Phase 1 Application 1 causes a slight reduction in sunlight on amenity space 1; this is considered negligible when viewed with respect to the baseline condition.

13.65 The impact of the Proposed Development of Phase 1 Application 1 to Mayfield Park has been assessed by considering the area as a whole, because the Park in its maximum extent shows its worst case scenario. This allows the assessment to determine if Mayfield Park will serve as a good amenity space with adequate sunlight.

13.66 The baseline scenario for Mayfield Park is considered as a clear site with everything in the boundary of Mayfield Park having been demolished. This is representative of Mayfield Park in its operational phase. With Phase 1 Application 1 in place, Mayfield Park is expected to receive 2 hours of sunlight over 98% of the area on 21st March equinox, hence it achieves BR209 targets. The expected sunlight hours on Mayfield Park on 21st March are shown in Figure 13-10.

Table 13-7 Assessment of existing amenity spaces and Mayfield Park in accordance with BR209 criteria

Open space	**Area receiving at least two hours of sunlight on March equinox**		**Ratio proposed / existing (effect magnitude)**	**BR209 guidance met**	**Effect significance of Proposed Development on existing open space**
	Baseline	Proposed			
1	69%	61%	0.88	YES	Negligible
2	99%	99%	1.00	YES	Negligible
3	93%	93%	1.00	YES	Negligible
Mayfield Park	98%	98%	1.00	YES	Negligible

Summary of effects during operation

Table 13-8 Summary of effects during operation of Application 1

Receptor	**Sensitivity**	**Description of effect**	**Magnitude of change/impact**	**Effect significance**
Liberty Point	Moderate	Reduction in daylight hours received at 8% of windows (ground,	Minor adverse (or negligible when compared against the alternative	Minor adverse (or negligible when compared against the alternative

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
		first and second floor windows)	target for an urban environment)	target for an urban environment)
		Reduction in sunlight hours received at ~1% of windows (ground, first and second floor windows)	Minor adverse	Minor adverse
Amenity space 1 (Liberty Point)	High	Reduction by 8% of percentage area of Park receiving >2hrs sunlight on March equinox	Negligible	Negligible
Amenity space 2 (London Road)	Low	No impact	Negligible	Negligible
Amenity space 3 (Macdonald Manchester)	Low	No impact	Negligible	Negligible
Mayfield Park	High	Reduction in sunlight hours received by area of Park adjacent to the Proposed Development	Negligible	Negligible

Operational effects for Application 1 + Application 2 (Baring Street Office 1, Baring Street Multi Storey Car Park, Baring Street Office 2 and Mayfield Park)

Relevant aspects of the scheme and designed-in mitigation

13.67 The Proposed Development aims to minimise effects on the current daylight and sunlight availability to the existing residential buildings (including hotels and student residences), whilst seeking to maximise the availability to the future neighbouring sensitive receptors and the occupiers of the Proposed Development itself. This has been achieved by reviewing the Proposed Development options and providing feedback on the effects during the design process.

Potential effects of the development and their significance

Daylight/Sunlight to current sensitive receptors

13.68 On reviewing the 25o obstruction angles between the surrounding buildings and the Proposed Development, there are no existing receptors that are likely to be impacted by the addition of Baring Street Office 2, therefore the potential effects on existing surroundings caused by the

development of Phase 1 Application 1 + 2 is the same as Phase 1 Application 1 outlined in section 13.56.

Daylight/Sunlight to future receptors

13.69 Surrounding cumulative schemes identified are too far away to be impacted by the Proposed Development.

Sunlight on existing amenity spaces and Mayfield Park

13.70 The results shown in Table 13-10 show that all amenity areas achieve 2hrs of sunlight on 21st March on more than 50% of the space, in accordance with BR209 guidance. The expected sunlight hours on existing amenity spaces on 21st March are shown in Figure 13-11.

13.71 With Phase 1 (Applications 1&2) in place, Mayfield Park is expected to receive 2 hours of sunlight over 97% of the area on 21st March equinox, hence it achieves BR209 targets. The expected sunlight hours on Mayfield Park on 21St March are shown in Figure 13-12.

Table 13-9 Assessment of existing amenity spaces and Mayfield Park in accordance with BR209 criteria

Open space	Area receiving at least two hours of sunlight on March equinox		Ratio proposed / existing (effect magnitude)	BR209 guidance met	Effect significance of Proposed Development on existing open space
	Baseline	Proposed			
1	69%	61%	0.88	YES	Negligible
2	99%	99%	1.00	YES	Negligible
3	93%	93%	1.00	YES	Negligible
Mayfield Park	98%	97%	1.00	YES	Negligible

Summary of effects during operation

13.72 A summary of the effects identified during operation can be found in Table 13-10.

Table 13-10 Summary of effects during operation of Application 1 with Application 2

Receptor	Sensitivity	Description of effect	Magnitude of change/impact	Effect significance
Liberty Point	Moderate	Reduction in daylight hours received at 8% of windows (ground, first and second floor windows)	Minor adverse	Minor adverse
		Reduction in sunlight hours received at ~1% of windows (ground, first and second floor windows)	Minor adverse	Minor adverse
Amenity space 1 (Liberty Point)	High	Reduction by 8% of percentage area of Park receiving >2hrs sunlight on March equinox	Negligible	Negligible
Amenity space 2 (London Road)	Low	No impact	Negligible	Negligible

Amenity space 3 (Macdonald Manchester)	Low	No impact	Negligible	Negligible
Mayfield Park	High	Reduction by 1% of percentage area of Park receiving >2hrs sunlight on March equinox	Negligible	Negligible

Mitigation Measures

Supplementary mitigation measures during demolition and construction

13.73 The impact of the Proposed Development to existing receptors is only to one elevation of student residential block, Liberty Point, so no further mitigation is considered necessary. Further supplementary mitigation measures beyond those included and embedded within the scheme design would involve considerable changes to massing, e.g. reduced block heights and setbacks from existing surroundings, which are not considered appropriate to meet the accommodation brief for the development.

Cumulative Effects

13.74 The surrounding committed developments, located predominantly to the North and West are such that the effects from the Phase 1 development with nearby approved developments are independent of each other; the impact will be to different facades of the receptors. The effects of the Proposed Development with other nearby approved developments is therefore not a combined effect in the context of daylight and sunlight.

13.75 It should be noted that the future plots of the Mayfield SRF will be subject to further sunlight, daylight and overshadowing assessments when those plots come forward in their own future planning applications, which will analyse quantitatively the massing that is proposed as final.

Residual Effects

13.76 A summary of the daylight and sunlight effects on the existing sensitive receptors as a results of the Proposed Development once completed and occupied is provided in Table 13—12.

Table 13—11 Residual effects table

Receptor/Impact	Description of effect	Pre-mitigation significance	Post-mitigation significance
Operational effects – Proposed Development, Application 1			
Existing receptors			
Liberty Point E	Daylight/Sunlight	Minor adverse	Minor adverse
Amenity space 1 (Liberty Point)	Sunlight	Negligible	Negligible
Amenity space 2 (London Road)	Sunlight	Negligible	Negligible
Amenity space 3 (Macdonald Manchester)	Sunlight	Negligible	Negligible
Future receptors			
Mayfield Park	Sunlight	Negligible	Negligible

Receptor/Impact	Description of effect	Pre-mitigation significance	Post-mitigation significance
Operational effects – Proposed Development, Applications 1 & 2			
Existing receptors			
Liberty Point E	Daylight/Sunlight	Minor adverse	Minor adverse
Amenity space 1 (Liberty Point)	Sunlight	Negligible	Negligible
Amenity space 2 (London Road)	Sunlight	Negligible	Negligible
Amenity space 3 (Macdonald Manchester)	Sunlight	Negligible	Negligible
Future receptors			
Mayfield Park	Sunlight	Negligible	Negligible

13.77 The majority of nearby existing receptors will not receive any daylight and sunlight impact from the Proposed Development, on initial review of the 25o plane from the receptors. The only expected adverse residual effect to existing receptors is a minor adverse effect to the access to daylight and direct sunlight to Liberty Point (East building) to approximately 8% of windows on the lower floors.

13.78 The existing amenity spaces identified to the east of the Proposed Development all adhere to BR209 guidance. Mayfield Park will also adhere to the BR209 guidance for sunlight hours on ground.

13.79 The rigid application of the BRE Report's standard numerical guidelines may be inappropriate in this urban environment, where higher density affordable development may be desirable and where there simply cannot be the same expectation of light as in a suburban or rural context. The guidelines suggest flexibility should be applied in such circumstances.

13.80 The baseline for this development is unusually unobstructed in this urban environment, with there being very little in the way of vertical sky obstructions to the existing surrounding buildings to the east of the Site. This will make the impacts appear greater than would be if the baseline was more typical of an urban environment.



	Figure:	**11.1**		
	Title:	**Environment Agency Flood Map for Planning – Risk of flooding from rivers (from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 08/09/19)**		
	Project:	**Mayfield Phase 1**		
	Date:	**09/09/19**	**Scale:**	**NTS**



	Figure:	**11.2**		
	Title:	**Environment Agency Flood Map for Planning – Risk of flooding from surface water (from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 08/09/19)**		
	Project:	**Mayfield Phase 1**		
	Date:	**09/09/19**	**Scale:**	**NTS**



	Figure:	**11.3**		
	Title:	**Environment Agency Flood Map for Planning – Risk of flooding from reservoirs or artificial sources (from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 08/09/19)**		
	Project:	**Mayfield Phase 1**		
	Date:	**09/09/19**	**Scale:**	**NTS**

14 Townscape and Visual Impact

Introduction

14.1 This Chapter of the ES has been prepared by Chris Burnett Associates and assesses the likely significant effects of the Proposed Development with respect to Townscape and Visual amenity. This Chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant adverse effects; cumulative effects and the likely residual effects. The Proposed Development will be constructed in a number of Phases, Phases A to E. in two applications. This chapter's main focus is on the Proposed Development when complete. The phases are set out in more detail in Chapter 5 Construction Management and Phasing. The Proposed Development, which is the subject of these phases consists of: Baring Street MSCP, Baring Street Office 1, Baring Street Office 2 and the park. Technical appendices also support this assessment and consist of the following:

- Appendix 14.1: Maps
- Appendix 14.2: Viewpoint and townscape photographs including AVR and block images.

Legislative and Policy Context

Legislation

14.2 The European Landscape Convention (ELC, 2000)[48] provides a foundation for closer co-operation on landscape issues across Europe and was ratified in the UK on the 21 November 2006 and became binding on 1 March 2007. The convention identifies the need to recognise landscape in law, to develop and promote landscape policies dedicated to the protection, management and creation of landscapes, and to establish procedures for the participation of the general public and other stakeholders in the evolution and implementation of landscape policies. It also encourages the integration of landscape into all relevant areas of policy, including cultural, economic and social policies.

14.3 The ELC defines landscape under Article 1 as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. It recognises that landscape has important cultural, ecological, environmental and social dimensions and is a key element of achieving sustainable development. Article 3 states that the aims of the Convention are to promote landscape protection, management and planning and to organize European co-operation on landscape issues.

National Planning Policy

14.4 The National Planning Policy Framework[49] sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

[48] Ref 8.1 The European Landscape Convention (ELC 2000)
[49] Ref 8.2 National Planning Policy Framework 2019 Dept Communities and Local Government

14.5 Key aspects of the NPPF, revised in 2019, which apply to the Townscape and Heritage Assessment are the paragraphs 124 and 127 below*:*

Para.124 *The creation of high quality buildings and places is fundamental to what the planning and development process should achieve. Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process.*

Para. 127 Planning policies and decisions should ensure that developments:

a) will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development;

b) are visually attractive as a result of good architecture, layout and appropriate and effective landscaping;

c) are sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities);

d) establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit;

e) optimise the potential of the site to accommodate and sustain an appropriate amount and mix of development (including green and other public space) and support local facilities and transport networks; and

f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users46; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.

Local planning policy

14.6 The following relevant policies are set out below as extracts from Manchester City Council's Core Strategy[50]*:*

Policy EN 1 - Design Principles and Strategic Character Areas

All development in Manchester will be expected to follow the seven principles of urban design, as identified in national planning guidance and listed above and have regard to the strategic character area in which the development is located. Opportunities for good design to enhance the overall image of the City should be fully realised, particularly on major radial and orbital road and rail routes. Design and Access Statements submitted with proposals for new development must clearly detail how the Proposed Development addresses the design principles, reinforces and enhances the local character of that part of the City and supports the achievement of the Core Strategy Strategic Objectives.

Policy CC6 High Density Development

City Centre High Density Development City Centre development will generally be high-density. It is a location where land should be used to maximise its efficiency. The appropriate scale, massing and height of development in the City Centre will significantly exceed what is appropriate elsewhere in the City. Development will need to have regard to the Council's approach to tall buildings (policy EN2), but any proposals which do not

[50] Manchester City Council Core Strategy 2012

reflect the importance of maximising the development opportunities in the City Centre will only be supported where this accords with wider Core Strategy objectives

Policy CC 9 Design and Heritage

Design of new buildings will need to be of the highest standard in terms of appearance and function. The standards and guidance explained in other LDF policies should be the basis for the approach to design, with particular attention to be given to the City Centre context and character. Development in Manchester City Centre should preserve or enhance the heritage assets that have been identified, including listed buildings, conservation areas and scheduled ancient monuments. The Council will support high density and mixed use development in the City Centre, but developers must recognise the specific design challenges that must be overcome to ensure complementarity of function and form. New development must support the range of uses the Council expects in the City Centre and contribute to a coherent and integrated physical environment"

14.7 The City Centre Character Area is of relevance to the Proposed Development. This area has been broken down into distinct townscape character zones by Manchester City Council and the extent and nature of the impact of the Proposed Development on these zones is described in more detail later in this chapter. The Core Strategy also refers to tall buildings:

Policy EN2 - Tall Buildings

Tall buildings are defined as buildings which are substantially taller than their neighbourhoods and/or which significantly change the skyline.

Proposals for tall buildings will be supported where it can be demonstrated that they

- *Are of excellent design quality,*
- *Are appropriately located,*
- *Contribute positively to sustainability,*
- *Contribute positively to place making, for example as a landmark, by terminating a view, or by signposting a facility of significance, and*
- *Will* bring significant regeneration benefits.

A fundamental design objective will be to ensure that tall buildings complement the City's key existing building assets and make a positive contribution to the evolution of a unique, attractive and distinctive Manchester, including to its skyline and approach views.

Suitable locations will include sites within and immediately adjacent to the City Centre with particular encouragement given to non-conservation areas and sites which can easily be served by public transport nodes.

Elsewhere within Manchester tall building development will only be supported where, in addition to the requirements listed above, it can be shown to play a positive role in a coordinated place-making approach to a wider area. Suitable locations are likely to relate to existing district centres. The height of tall buildings in such locations should relate more to the local, rather than the City Centre, urban context.

By their very size tall buildings can have a significant impact on the local environment and its micro-climate. It is therefore expected that this impact be modelled and that submissions for tall buildings also include appropriate measures to create an attractive, pedestrian friendly local environment.

It will be necessary for the applicant/developer to demonstrate that proposals for tall buildings are viable and deliverable"

14.8 Significantly, the Core Strategy offers further guidance in relation to the development of tall buildings as follows:-

Tall Buildings can provide a sense of place and distinctiveness, however as high development can have a substantial impact on an area careful consideration should be given to each proposal.

The NPPF requires local authorities to have regard to best practice in design, such as "By Design - Urban Design in the Planning System: Towards better practice" and "By Design – Better places to live". Policies are not to be overly prescriptive but, amongst other things, should concentrate on guiding height in relation to neighbouring buildings and the local area in general. Innovation should not be stifled but local distinctiveness should be reinforced. PPS4 directs planning authorities to set flexible policies for their centres which can respond to changing economic circumstances and encourage where appropriate high density development accessible by public transport, walking and cycling.

In the context of ensuring sustainable development, the City Centre is clearly a location that requires the prudent use of scarce land resources. It is generally well served by public transport and one where a high density of development is consistent with its distinctive character. The City Centre is, in general, considered an appropriate area for tall buildings. The growth of the City Centre is still evolving, particularly in relation to the development of fringe sites, and proposals need to be considered having regard to the character of the places in which they are proposed. Therefore, whilst some parts of the City Centre are more or less likely to be suitable for tall buildings, the Council does not consider a site specific policy that identifies detailed locations for a tall building to be appropriate. The Council is aware that over the 15 year plan period there is a need to be flexible and to be able to respond to changing economic conditions. The above criteria based policy is therefore set out, which will together with other design policies, form the policy context against which all proposals for tall buildings will be considered.

Elsewhere across the City, District Centres may be appropriate locations for "tall" buildings. Being generally accessible to the local population and well served by public transport, they are natural foci for developments that attract a larger number of people. The definition of tall as being in relation to neighbouring buildings should be noted, however, as the scale of development acceptable within a District Centre is unlikely ever to match that within the City Centre.

Tall buildings by their very nature can dominate the street scene and be highly visible over long distances. They can also have an impact on the local micro-climatic conditions, for example, by creating wind tunnels. It is for these reasons that it is considered particularly important that they are designed to the highest quality, both in terms of appearance and their impact on the functioning of surrounding space."

Policy EN3 - Heritage

Throughout the City, the Council will encourage development that complements and takes advantage of the distinct historic and heritage features of its districts and neighbourhoods, including those of the City Centre.

New developments must be designed so as to support the Council in preserving or, where possible, enhancing the historic environment, the character, setting and accessibility of areas and buildings of acknowledged importance, including scheduled ancient monuments, listed buildings, registered parks and gardens, conservation areas and archaeological remains.

Proposals which enable the re-use of heritage assets will be encouraged where they are considered consistent with the significance of the heritage asset."

Assessment Methodology and Significance Criteria

14.9 This section of the ES chapter describes how baseline information has been gathered and the method of assessing the significance of effects.

Study Area

14.10 The study area for this assessment comprises an area of approximately 1km in radius focussed on the Proposed Development Site which is an appropriate area in these circumstances.

Baseline Surveys

Desk Based Research

14.11 14.11Research included establishing a Zone of Theoretical Visibility (ZTV) (Fig 14.1 Maps in Appendix 14.1) and examining appropriate guidance and policies on tall buildings issued by Manchester City Council (MCC) and relevant authorities such as Historic England.

Field Surveys

14.12 Field surveys were undertaken to explore the current baseline of Manchester City Centre. The survey was based on zones using the template set out in Manchester Residential Quality Guidance. Broad Townscape Character Zones were also defined which lie outside the City Centre. During the field survey the ZTV was confirmed and a series of Representative Viewpoints established for assessment, all subsequently subject to Accurate Visual Representation (AVR).

Consultations

14.13 MCC were consulted on the initial selection of viewpoints and agreed their scope in August 2019.

Method of Assessing Significance

14.14 The Townscape and Visual Impact Assessment (TVIA) was undertaken in accordance with the methodology and approach set out in the 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA) Third Edition' (2013) – produced by the Landscape Institute (LI) and IEMA.[51]

"The GLVIA requires that a clear distinction is drawn between landscape (which includes the urban townscape) and visual effects:

- **Townscape effects relate to the degree of change to characteristics or physical components of an urban area, which together form the character of that townscape, e.g. topography, buildings and vegetation.**
- **Visual effects relate to the degree of change to an individual receptor's or a receptor group's view of that townscape, e.g. local residents, users of public footpaths or motorists passing through the area."**
- **The relationship between the effects of the Proposed Development on Townscape and Visual Issues are interdependent but not exclusively so. The effects will therefore be examined in terms of:**
- **Effects on Townscape character. For the purposes of this study the area immediately around the Proposed Development is examined on a character area basis based on the zonal template used by Manchester City Council. Character areas are shown on Fig 14.2, which is located at Appendix 14.1.**

[51] Ref 8.4 Guidelines for Landscape and Visual Impact Assessment 3rd Edition 2013 landscape Institute and Institute of Environmental Management and Assessment

- **Effects on visual receptors. This is examined through the Representative Viewpoint Approach in which the effects of the Proposed Development are assessed in short, medium and long distance views from variety of key locations.**

14.15 In addition the following guidance documents have been also been consulted:

- Guidance on tall buildings published by Historic England: Advice Note 452
- History in the View prepared for English Heritage by LUC in 2011
- Manchester Residential Quality Guidance [53]

14.16 The guidance contained in Historic England's advice note on Tall Buildings is particularly relevant:

"Tall buildings need to set exemplary standards in design because of their scale, mass, wide impact and likely longevity. Good design will take the opportunities available for improving the character and quality of an area and respond to local character and history (NPPF paragraphs 58 and 64). It is important that the required high standard of architectural quality is maintained throughout the process of procurement, detailed design, and construction, through the use of conditions and reserved matters.

Given their likely impact on a wide area, it is important that social and environmental effects are also assessed. Consideration needs to be given to a tall building's contribution to public space and facilities. This applies both internally and externally, including the provision of a mix of uses (especially on the ground floor of towers), as part of a well-designed public realm. Consideration of the impact on the local environment is also important, including microclimate, overshadowing, night-time appearance, light pollution, vehicle movements, the environment and amenity of those in the vicinity of the building, and the impact on the pedestrian experience. Well-designed tall buildings provide an inclusive environment, both internally and externally, taking opportunities to offer improved permeability, accessibility and, where appropriate, the opening up or effective closure of views to improve the legibility of the wider townscape."

Townscape Character effects

14.17 The assessment of the Proposed Development on Townscape Character has been based on Manchester City Centre Zones, revised in Manchester Residential Quality Guidance as Neighbourhood Zones, and supplemented by those which lie outside the City Centre. It includes an assessment of the elements which comprise it such as built form and styles, urban grain and street pattern, soft elements such as green spaces and trees and a sense of place and effect that the Proposed Development is judged to have on them. The zones which could be potentially affected by the Proposed Development include Mayfield Zone itself and those that surround the Proposed Development:

Manchester City Centre Neighbourhood and Townscape Character Zones

- Mayfield
- Piccadilly
- North Campus
- Ardwick and Longsight
- Medlock valley
- New Islington

14.18 Their extent is defined on Figure 14.2: City Neighbourhood Zones and Viewpoints (**Appendix 14.1**) and they are described in more detail in the corresponding baseline condition section.

[52] Ref 8.5 Historic England note on Tall Buildings 2015
[53] Ref 6.6 Manchester Residential Quality Guidance MCC 2017

14.19 Townscape effects can be characterised as the changes in the urban grain, character and condition of the townscape as a result of the impact of a development. Specifically, the assessment will examine:

- Direct effects on specific townscape elements
- Effects that are more subtle in nature which affect the character of the townscape
- Effects on a designated asset such as a World Heritage Site, Listed Building or Conservation Area or tourist landmark.

Visual Effects

14.20 The Zone of Theoretical Visibility (ZTV), in the context of the surrounding topography and the height of the Proposed Development, has been established initially through 3D modelling using Lidar DSM data combined with 10K base mapping to produce a Zone of Theoretical Visibility (ZTV) or Viewshed map, Fig 14.1 **Appendix 14.1**, and then confirmed as part of the field work exercise. Taking into account the scale and height of the Proposed Development, it covers the area around it to a radius of approximately 0.5km with a focus on the city centre and provides a quick guide as to the Proposed Development's visibility. The Proposed Development consists of Baring Street Office 1 a 9 storey office block height 74.8m AOD; Baring Street MSCP, a 10 storey multi-storey car park, at 65.7m AOD and Baring Street Office 2, a 13 storey office block and a new park.

14.21 As with other Townscape and Visual Impact Assessments, and in accordance with guidance issued in GLVIA, the usual, and accepted, practice of selecting and assessing of a range of "Representative Viewpoints", all publicly accessible, has been adopted as being the most appropriate and practical method of assessing and understanding the visual impact of the Proposed Development from a range of viewpoints surrounding the Proposed Development Site. These viewpoint locations are marked in **Appendix 14.1** on Fig 14.1 ZTV and viewpoints and Fig. 14.2 City Neighbourhood Areas and Viewpoints and are illustrated by way of photographs taken from these viewpoints, represented in **Appendix 14.2.**

14.22 Representative Viewpoints are, by their very nature, representative and not necessarily site specific, unless a townscape or visual effect from an important regional landmark i.e. Albert Square, is predicted. In each a case a view was sought where the Proposed Development was visible, guided by the results of the ZVT. Viewpoints were selected to cover a number of different locations to reflect the experience of different types of visual receptor and viewing distance. Accordingly, viewpoints ranged from immediate proximity to the Proposed Development to surrounding neighbourhoods. Viewpoints included: streets, public parks, footpaths and main approach roads.

14.23 During the main field assessment process which occurred in August 2019, baseline viewpoint photographs were taken using a Canon E500 DSLR camera in accordance with the Landscape Institutes Advice note L1/11[54]. The advice note also offers the following guidance on field of view:

"While a standard lens giving a horizontal field of view of about 40 degrees may be suitable for some purposes, a single-frame photograph based on this field of view is unlikely to convey the breadth of visual information required to represent a Proposed Development and relevant context. If the required field of view is only slightly greater than 40 degrees, a wide-angle lens or wide-angle setting on a zoom lens may be appropriate."

14.24 This guidance has been taken into account in and in order to illustrate as much of the surrounding context as possible photographs were taken at 1.7m height, with a lens set to 24mm which provided a field of view of around 73.6 degrees. The details of each photograph

[54] Ref 6.7 Landscape Institute Advice Note L1/11 2011 , Landscape Institute

are also recorded and include location coordinates, focal length of lens and corresponding field of view. The viewing distance for all photographs when printed at A4 is 300mm.

14.25 The effect of the Proposed Development is then assessed from each of the viewpoints using the information on the height of the buildings provided by Bennetts Associates architects and Studio Egret West architects and the accurate interpretation of this information by Assembly Studios in the form of Accurate Verified Rendered (AVR) images.

Defining Significance of Effect

14.26 The significance of townscape and visual effects can broadly be determined by the interaction of the sensitivity of the receptor and the magnitude of effect with professional judgement playing an important part in identifying the overall significance values for each receptor.

Townscape: Sensitivity of Receptor

14.27 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, as set out below.

14.28 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). A description of how susceptibility would be evaluated for each receptor type is included below:

Table 14.1 Susceptibility of Townscape Receptor

Susceptibility	Criteria
High	Little ability to accommodate the Proposed Development without undue harm.
Medium	Some ability to accommodate the Proposed Development without undue harm.
Low	Substantial ability to accommodate the Proposed Development without undue harm.

14.29 Townscape Value is "*the relative value that is attached to different landscapes by society*". It is assessed on the following scale along with assessment of various undesignated townscape attributes:

Table 14.2 Townscape Value

Value	Description
High	Sites, features or areas of national or international importance with settings of high quality such as World Heritage Site, AONB, National Parks, Grade I and Grade II* Listed buildings or Registered Parks and Gardens.
Medium	Sites, features or areas of local or regional importance with intact character such as Grade II* and Grade II Listed Buildings or Registered Parks and Gardens, Conservation Areas, Scheduled Monuments, local nature site, long distance recreational routes. Tree Preservation Orders (TPO) and local designations that exhibit wider geographic, cultural or townscape significance.
Low	Areas or features of local importance such as Tree Preservation Orders (TPO), Public Right of Way (PROW) and locally listed buildings.

14.30 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 value as described above.

Townscape: Magnitude of Effect

14.31 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 set out below:

Table 14.3 Magnitude of Townscape Effect

Category	Criteria
Major adverse townscape effect	The proposals will result in a total change in the key characteristics of townscape character; will introduce elements totally uncharacteristic to the attributes of the receiving townscape; and/or will result in a substantial or total loss, alteration or addition of key elements/features/characteristics.
Moderate adverse townscape effect	The proposals will result in a partial change in the key characteristics of townscape character; will introduce elements partially uncharacteristic to the attributes of the receiving townscape; and/or will result in partial loss, alteration or addition of key elements/features/characteristics.
Minor adverse townscape effect	The proposals will result in a small change in the key characteristics of townscape character; will introduce elements that are not uncharacteristic to the attributes of the receiving townscape; and/or will result in a minor loss, alteration or addition of elements/features/characteristics.
Negligible townscape effect	The proposals will result in a just discernible change to townscape character/elements/features/characteristics.
Negligible townscape benefit	The proposals will result in a just discernible improvement to the townscape character/elements/features/characteristics.
Minor townscape benefit	The proposals will achieve a degree of fit with the townscape character/elements/features/characteristics and go some way towards improving the condition or character of the townscape.
Moderate townscape benefit	The proposals will achieve a good fit with the townscape character/elements/features/characteristics, or would noticeably improve the condition or character of the townscape.
Major townscape benefit	The proposals will totally accord with the townscape character/elements/features/characteristics, or would restore, recreate or permanently benefit the condition or character of the townscape.
No Change	The proposals will not cause any change to the townscape character/ elements/ features/ characteristics.

14.32 The size and/or scale of change in the townscape takes into consideration the following factors:

- the extent/proportion of townscape elements lost or added;
- the contribution of that element to townscape character and the degree to which aesthetic/perceptual aspects are altered; and
- whether the effect is likely to change the key characteristics of the townscape, which are critical to its distinctive character.

14.33 The geographical extent of effects relates to:

- the area over which townscape effects are likely to be experienced, i.e. this could be at the site level, the immediate setting of the site, or townscape character type or area;
- the area over which visual effects are likely to be visible; and duration.

Visual receptors: Sensitivity of Receptor

14.34 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

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.

14.35 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.

14.36 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, determined from the criteria below.

Table 14.4 Visual Receptor Susceptibility

Susceptibility	Type of Receptor
High	• Users of public space, including users of public rights of way, whose attention is likely to be focused on the townscape and on particular views; • Visitors to heritage assets or other attractions where views of the surroundings are an important part of the experience; • Communities where views contribute to the townscape setting enjoyed by residents; and • Travellers on scenic routes.
Medium	• Travellers on road, rail or other transport routes, where the view is moderately important to the quality of the journey; and

Susceptibility	Type of Receptor
	• Users of public space, where the view is part of the wider experience of the place.
Low	• People at their place of work, where the setting is not important to the quality of working life; • Travellers on road, rail or other transport routes, where the view is fleeting and incidental to the journey; and • People engaged in outdoor sport or recreation, or users of a public space, which does not involve appreciation of views.

Table 14.5 Visual Receptor value

Value	Criteria
High	Views from townscapes/viewpoints of national importance, or highly popular visitor attractions where the view forms an important part of the experience, or with important cultural associations. An example may be where the viewpoint features a nationally important designated asset as the main focus of the view.
Medium	Views from townscapes/viewpoints of regional/district importance or moderately popular visitor attractions where the view forms part of the experience, or with local cultural associations. The viewpoint may be a good location to view a designated asset of regional/ local importance, or where a nationally important designated asset is not the main focus of the view.
Low	Views from townscapes/viewpoints with limited designations, not particularly popular as a viewpoint and with minimal or no cultural associations. The viewpoint may include designated assets of regional/local importance which do not form the main focus of the view.

Visual: Magnitude of Effect

14.37 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 set out below.

Table 14 .6 Magnitude of visual effect

Category	Criteria
Major adverse or beneficial visual effect	The proposals will cause a dominant or complete change or contrast to the view, resulting from the loss or addition of substantial features in the view and will substantially alter the appreciation of the view.
Moderate adverse or beneficial visual effect	The proposals will cause a clearly noticeable change or contrast to the view, which would have some effect on the composition, resulting from the loss or addition of features in the view and will noticeably alter the appreciation of the view.
Minor adverse or beneficial visual effect	The proposals will cause a perceptible change or contrast to the view, but which would not materially affect the composition or the appreciation of the view.
Negligible adverse or beneficial visual effect	The proposals will cause a barely perceptible change or contrast to the view, which would not affect the composition or the appreciation of the view.
No change	The proposals will cause no change to the view.

14.37 The size or scale of change in the view relates to the degree of contrast or integration likely to result from the Proposed Development and is influenced by the relative time over which a view is experienced and whether it is a full, partial or glimpsed view.

Duration of Effect

14.38 Both Townscape and Visual effects may be experienced over a range of timescales. For this assessment, the following timescales are considered appropriate:

Short-term: 1 year or below

Medium-term: Between 1 and 10 years in duration

Long-term: Greater than 10 years in duration

Significance of Effect

14.39 The objective of the assessment process is to identify and evaluate the likely significant effects arising from the Proposed Development for both Townscape and Visual Receptors. Significance indicates the importance or gravity of the effect. The table below, Table 14.7 is offered in support of professional judgement in determining the Significance of effect and is used as a guide to the narrative explanation of the nature and significance of both townscape and visual effects brought about by the Proposed Development.

Table 14.7: Significance of Effect

		Magnitude of Effect				
		Major Effect	**Moderate Effect**	**Minor Effect**	**Negligible Effect**	**No Change**
Sensitivity of Receptor	**High**	Major Significance	Moderate Significance	Moderate Significance	Minor Significance	Negligible
	Medium	Moderate Significance	Moderate Significance	Minor Significance	Negligible	Negligible
	Low	Moderate Significance	Minor Significance	Negligible	Negligible	Negligible

14.40 The effects on both townscape and visual receptors is examined in each case. All viewpoints have been subjected to the insertion of an Accurate Verified Representation (AVR) into a baseline photograph so that the extent of both townscape and visual effects can be judged more accurately. In each case the effect of the Proposed Development is compared with the baseline condition or view and an assessment made in terms of receptor susceptibility, value of townscape setting or view, receptor sensitivity and magnitude of effect. A judgement is then made as to whether the effect is of major to negligible significance of effect using the Effect Significance Matrix in Table 14.7 and then a judgement made as to whether the effect is **significant** or **not significant** in EIA terms. For the purposes of this Townscape and Visual Impact Assessment, effects of **Moderate Significance** and above are considered to be **Significant**. Those values of Minor and below are therefore deemed to be **Not Significant**. A professional judgement is then made as to whether the effect is of an adverse or beneficial

nature. The effects below are primarily concerned with the effects on townscape character and visual receptors.

14.41 This process has been applied to provide a robust assessment in similar townscape settings, including Manchester City Centre, and is considered to be the most suitable approach in this context.

14.42 The visual impact of the Proposed Development will demonstrably change as it is constructed. As the construction phase is likely to be a very short period in relative terms in the context of its lifecycle, the impact of the building upon completion, or operational phase, is the principal focus of this study although the construction effects are also examined below. Similarly, the impact pathway is direct. The building is either visible or it is not.

Mitigation Methodology

14.43 In terms of mitigation for the Proposed Development this has been derived by the architects Bennetts and Studio Egret West as the design of the building has developed in consultation with interested parties. Mitigation for the Construction Phase Effects is described in the relevant section below

Residual Impact Methodology

14.44 Residual Impacts are described based on the assumption that all mitigation measures have been fully deployed.

Baseline Conditions

Townscape Baseline

14.45 A summary set out below describes the main attributes and characteristics of each of the Townscape Zones and Representative Viewpoints that may be potentially affected by the Proposed Development as existing at the time of this assessment in August 2019. Each character area is referenced on Fig 14.2: City Neighbourhood Areas and Viewpoint Locations (Appendix 14.1). Only those areas which have the potential to be affected by the Proposed Development are included.

14.46 There is no doubt that Manchester is currently going through a major phase of development with construction of many tall buildings which affect most of the townscape character zones in some form or other. Some development, but not all, will have the capacity to alter the visual and townscape baseline more significantly than others. In terms of the baseline assessment the GLVIA advises that '*existing schemes and those under construction should be included in the baseline for both landscape* (townscape in this case) *and visual effects baseline* 'and that '*the baseline for assessing cumulative landscape (townscape) effects should include those schemes, and in addition potential schemes, that are not yet present in the landscape but are at various stages in the development and consenting process*.'.

14.47 For the purposes of this assessment therefore, the baseline conditions that prevail at the current time (August 2019) in terms of townscape character and views are described below and include relevant schemes under construction, which are predicted to be complete when the Proposed Development is due to have been completed. The effects on the baseline together with the Proposed Development and any committed development is dealt with in the Cumulative Effects section.

Mayfield

14.48 This is the zone in which the Proposed Development is located and also lies within the Mayfield Strategic Regeneration Framework (SRF). Mayfield comprises an array of former industrial buildings with the River Medlock at their heart. These existing buildings are diverse in their palette of materials and colour, which have produced a rich tapestry throughout the site. The

Site is currently dominated by flattened land which is inaccessible to the public and sits like an island surrounded by the infrastructure that services the rest of the city. 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. 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. 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. Much of the area is in a degenerative state with vacant buildings in poor states of repair.

Piccadilly

14.49 One of the principal railway stations for Manchester, Piccadilly lies within this zone which is situated in an elevated position above the Site. As such this is one of the region's primary gateways and often forms the first impression of the city for visitors arriving by rail. In recent years it has seen improvements to Piccadilly railway station and Piccadilly Gardens and development has continued around the Piccadilly Canal Basin. The area in front of the railway station has been redeveloped to create a mixed use primarily office development with hotels and residential uses and a bridge link to the upper levels of Station Approach.

14.50 The zone contains a number of distinct sub character areas. The area to the west of Piccadilly is a mix of civic and commercial buildings and formal open spaces. The Metrolink connecting Piccadilly station and the main interchange in Piccadilly Gardens bisects the area. But to the north commercial warehouse type buildings and industrial premises prevail within which pockets of residential dwellings such as Piccadilly Village occur. The two canals Ashton canal and Rochdale canal run north from this zone.

North Campus

14.51 This zone is occupied by substantial buildings owned and operated by the University of Manchester and include the Barnes Wallis building, the Ferranti Building, MSS tower and the Manchester Institute of Biotechnology. Small green spaces and squares fill the urban interstices and the M 57 Mancunian Way raised to first floor level defines the southern limit of this zone.

Ardwick and Longsight

14.52 This area lies to the south of Mancunian Way and consists of a number of 19th century warehouses, residential terraces of housing and a rich collection of buildings ranging from the art deco Manchester Apollo to Victorian terraces around Ardwick Green. It is primarily a residential zone but has pockets of light industry and offices. Most development, other than the occasional tower block is two storeys high. In recent years it has witnessed much regeneration and is also home to many of Manchester's growing student population.

Medlock Valley

14.53 Townscape character is shaped by the river Medlock which flows in shallow valley through the centre of this zone. Much of it is heavily wooded or green open space. Development is largely` restricted to semi-detached and terraced residential dwellings of recent post war origin arranged on the shallow valley slopes.

New Islington

14.54 This is an area that has been the focus of a considerable amount of regeneration since funding was secured in 2002. It includes Will Allsop's Chips building, amongst other multi storey developments. Typically, the flat or apartment blocks are 8 storeys high and combine well

with large open areas of green space and canal basins such as Cotton Field Park. Views of Manchester City Centre to the south can be obtained from these more open areas. In comparison to the city centre it sits on relatively elevated ground.Two canals , the Rochdale canal and the Ashton canal flow through this zone.

Assessment of Effects

Limitations and Assumptions

14.55 The principal limitation as far as the field survey work was concerned has been that photography was undertaken in the summer months when the extent of foliage on trees is at the maximum. This does not represent therefore, a worst case scenario when leaves have fallen but this issue should be viewed in the context of the mature street tree population in Manchester as a whole which is not especially high.

Embedded Mitigation

14.56 Mitigation in terms of visual and townscape effects has been incorporated into the Proposed Development as part of the design process by the scheme architects Bennetts Associates and Studio Egret West and has evolved through consultation with the Local Planning Authority and others.

Sources of Effect

Demolition and construction phases

14.57 The construction of this building on a site on the outskirts of Manchester City Centre will clearly involve procedures and processes that are unsightly and intrusive consistent with operations on most large scale construction sites. However, this process is comparatively short lived in nature when considered in the context of the lifespan of the Proposed Development concerned. The demolition and construction programme will commence in a sequence of operations as outlined in Chapter 5 Construction Management and Phasing. The key physical activities will include:

- Site clearance.
- Construction plant such as cranes etc.
- Mobile construction plant.
- Delivery and stockpiling of materials.
- Protective fencing and hoardings.
- Unfinished appearance of the Proposed Development and its core for the majority of the construction period.
- Traffic movements associated with the above.

Assessment of Construction Phase Effects

14.58 The construction phase effects, as with the Operational Phase effects are assessed against the Baseline. The townscape character area most affected by the demolition and construction operations are the Townscape Character Zones in and around the Site namely: Piccadilly, and Ardwick and Longsight. The effects of such construction activity on the character of this zone in the immediate vicinity is predicted to **be minor adverse** for the duration of the construction period due to the demolition of existing structures, stockpiling of demolition and construction materials, the use of construction equipment such as cranes and temporary fencing. The effects, however, should be relatively localised, temporary in nature, extend over the short to medium term and will not affect other Townscape character zones in any measurable way.

Effects of demolition, clearance and construction on Views

14.59 The effects of demolition and clearance on the Representative Viewpoints will also be readily visible in the immediate area surrounding the Proposed Development, as the ZVT demonstrates, but less so within the core of the city centre. Nonetheless, there is little doubt that the construction phase of any building of any scale, until it is fully clad, will involve processes that are visually unsightly and are likely, in visual effect terms to be largely adverse in nature. This period, however, is only likely to be transitional and will be of short duration in relation to the lifespan of the Proposed Development itself. In view of the scale of the Proposed Development, the impact magnitude, and significance of effect is therefore judged to be **minor adverse** in the following Zones: Piccadilly, and Ardwick and Longsight but **negligible** in other zones such as North Campus and New Islington where views are limited.

Operational phases

14.60 The source of the effect during the operation phase is concerned with the physical impact that the Proposed Development will have on views, visual and townscape receptors. The Proposed Development in this case is an aggregated cluster of buildings consisting of Baring Street MSCP, Baring Street Office 1, Baring Street Office 2 and the new park. The relationship each plot has with each other, on the townscape character and on the view is described in detail in the narrative descriptions below.

Assessment of Operational Phase Effects

Effects of completed Development on Townscape Character and Views

14.61 The visual and townscape effects of the Proposed Development are now summarised with respect to the effects of the Proposed Development on the Townscape Character through a narrative description of the nature of the effect on each of the Representative Viewpoints, which lie within each character area.

14.62 The ZTV confirms that the Proposed Development will have a relatively limited effect in the core residential neighbourhood areas largely because of topography and the scale of the Proposed Development itself.

Piccadilly

Representative viewpoint 1 London Road

14.63 This viewpoint is situated close to the entrance to Piccadilly Station, a busy transport hub attracting thousands of people each day. This view looks south down London Road. The susceptibility of the townscape receptor at this location is judged to be low as the Proposed Development, if visible, will have a limited affect on it and is unlikely to alter the baseline character which consists wholly of recent buildings and structures in any material way. Townscape value is judged to be low here as well as the viewpoint and surrounding area lie outside any conservation area and there are no listed buildings or designated sites nearby. Overall then Townscape sensitivity is judged to be low. Receptor sensitivity is similarly low as this is a niche view framed by buildings on both sides of the A6 London Road and frequently largely by travellers a large proportion of whom are either en route or exiting Piccadilly railway station. The results of the AVR demonstrate that views of the Proposed Development are blocked by trees. The magnitude of change for both townscape and visual receptors is recorded as no change. Significance of effect is therefore negligible which is **not significant** in EIA terms.

Representative viewpoint 2 London Road

14.64 This viewpoint is situated at the intersection of London Road with Baring Street just below Piccadilly railway station on one of the important approach roads into the city centre. The focus of the view is platform 13 and 14 which are located on a raised viaduct above Fairfield

Street. Townscape susceptibility is low as the baseline character, is heavily influenced by the enclosing nature of the viaduct and the station infrastructure above which will limit the effects of any development beyond. Townscape value is low also as the character is incoherent and associated with a constantly busy travel hub. Altogether Townscape sensitivity is therefore judged to be low. The majority of visual receptors are also in the low susceptibility category as the majority of receptors will be travellers and in transit. Receptor sensitivity is therefore judged to be low also. The AVR demonstrates that the viaduct in fact obscures all of the Proposed Development from view. The magnitude of change for both townscape and visual receptors is recorded as no change. Significance of effect is therefore negligible which is **not significant** in EIA terms.

Mayfield

Representative viewpoint 3 Fairfield Street

14.65 This viewpoint is located on Baring Street and provides a close up view of the old warehouses on the Site some of which are now boarded up, but some of which remain in use, and most of which is dilapidated in appearance and condition. The state of transition is reinforced by the temporary hoardings which define the site boundary and indicate that the regenerative processes have already started, enhanced by its status within the SRF. Townscape susceptibility is low for this reason and townscape value can only be raised through regeneration from a low base at present. Townscape sensitivity is therefore judged to be low for this viewpoint. In terms of visual receptors most fall in the low category. This street is frequented by numerous taxis and is a cul de sac for pedestrians as the M57 Mancunian Way blocks routes south and minimal activity results. Visual receptor is therefore also judged to be low. The Proposed Development, in this case Baring Street Office 1 and the new park are both clearly visible. In the case of at Baring Street Office 1 the building deflects the view at an angle successfully concealing the M57 Mancunian way and addresses the main pedestrian approach from Manchester Piccadilly. The lower levels will be carved away to reveal a contrasting warm and lightweight curtain wall façade treatment. The overall height of the Proposed Development is defined by the site-wide massing approach established by Mayfield 2018 SRF with heights sufficiently low at this point to allow light access to the planned new park which is to be situated in the centre of the Site. As a result, the building is not overly dominant and is consistent in terms of scale and height so that it fits in well with the surrounding townscape. The park adds an improved, soft setting to the building and can be considered as an enhancement to both townscape and view. The magnitude of effect is therefore judged to be minor beneficial for both townscape and visual receptors. As a consequence, the significance of effect is judged to be negligible which is **not significant** in EIA terms.

Representative viewpoint 4 Baring Street

14.66 The townscape character is similar in character for this viewpoint to that described in Viewpoint 3. The site construction huts are more prominent here and temporary site hoardings are a once again a feature of the view. Both townscape and visual receptor sensitivity are judged to be low. Both Baring Street Office 1 and the Baring Street MSCP are visible here with the office building more prominent. The profile of the two buildings steps down and away in a positive, logical fashion with the metal cladding of the car parking adding another visual and textural dimension and obscuring the unappealing view of light industrial units across the M57 in the process. Townscape quality is markedly improved as a result and the magnitude of effect for both townscape and visual receptors is judged to be moderate beneficial. Significance of effect value is therefore recorded as being minor beneficial which is **not significant** in EIA terms.

Representative viewpoint 5 Baring Street

14.67 This viewpoint provides a view into the Site from the intersection of Baring Street with the Mancunian Way. The susceptibility of the townscape receptor at this location is judged to be low as the area is judged to have the ability to accommodate the Proposed Development without undue harm. Townscape value is judged to be low here as well as the viewpoint and surrounding area lie outside any conservation area and there are no listed buildings or designated sites nearby and the Site is currently in the process of being cleared with only remnant warehousing remaining. The urban grain is very open at this point. Similarly, visual receptor sensitivity is low as most receptors are car borne travellers whose view is fleeting at best. This is a close up view of both Baring Street Office 1 and Baring Street MSCP and illustrates the radical transformation of townscape character that will result as a result of this development. The proximity and change in direction means that these two buildings read as one and relate well together in terms of their materiality. Also, the evident split of the MSCP into upper and lower datums reduces the apparent scale of the 10 storey building and is in keeping with the spirit of Mayfield lifting references from the datum lines set out in the Mayfield Depots. Magnitude of effect for both townscape and visual receptors is judged to be moderate beneficial here as the Proposed Development is judged to improve the condition and character of both townscape and view noticeably. The significance of effect is therefore judged to be minor beneficial significance which is **not significant** in EIA terms.

Representative Viewpoint Mayfield Park

14.68 A new park, Mayfield Park, will be constructed as part of Phases A to E in the centre of the Proposed Development. This will have a radical and beneficial effect on townscape character, townscape receptors and visual receptors alike. This includes the river Medlock which flows through the Site. As both townscape and receptor sensitivity are judged to be low at this point and the magnitude of change judged to be of major townscape benefit, the significance of effect for the park is judged to be of major significance which is significant in EIA terms

North Campus

Representative Viewpoint 10 Footway through campus

14.69 This is one of the main pedestrian routes connecting the Sackville Street/ Princess Street area of the University of Manchester campus with the Upper Brook Street / Oxford Road area. Although the Mancunian Way lies close to the viewpoint, and the slip road off, townscape character is influenced considerably by adjacent tree planting which combines to make this a niche view. It is not a particularly sensitive area however and is judged to have low susceptibility but medium townscape value with a medium low townscape sensitivity as a result. Visual receptors are generally in transit and although this viewpoint offers a rare but potential glimpse of the Proposed Development, receptor sensitivity is judged to be low overall. The AVR demonstrates that dense tree planting, in fact obscures all of the Proposed Development from view although in the winter months the top of Proposed Development may become visible. The magnitude of change for both townscape and visual receptors is therefore recorded as no change. Significance of effect is therefore negligible which is **not significant** in EIA terms.

Kinetic View

14.70 Kinetic views have been modelled (Appendix 14.2) which illustrate how the Proposed Development would appear, crudely, from the elevated railway line as it approaches Piccadilly Station. Although these views cannot be verified, for obvious reasons, they nonetheless convey an indication of how the buildings would fit in the townscape of Mayfield. In doing so it is notable that all buildings of the Proposed Development fit and complement each other well. None appear isolated, each are of a sufficient different height and form to provide a varied horizon. The profile of each of the buildings are also identifiable and multifaceted all of which contributes positively to both townscape character and view.

Ardwick and Longsight

Representative Viewpoint 6 Braley Street

14.71 This viewpoint provides a panoramic view across the Mancunian Way with remnant warehousing defining the adjacent skyline. Once again, the urban grain is very open. The susceptibility of the townscape receptor at this location is judged to be low as the area is judged to have the ability to accommodate the Proposed Development without undue harm reflecting a townscape character of incoherent and low quality. Townscape value is judged to be low here as well as the viewpoint and surrounding area lie outside any conservation area, there are no listed buildings and the built fabric consists, in part, of derelict, remnant warehousing. The busy M57 lies also immediately adjacent to the viewpoint. Similarly, visual receptor sensitivity is low as most receptors are either car borne travellers in transit whose views are fleeting at best or at their place of work in the light industrial units which characterize this area. Baring Street Office 1 and Baring Street MSCP now completely block any view north and define the edge here of the Mayfield SRF. However, the high quality detailing of the metal panels and split datum of Baring Street Office 1 together with the varied profile of Baring Street Office 2 provide sufficient visual interest of texture and form to make a positive contribution to the townscape setting at this juncture. No notable landmarks or panoramic views will be lost as a result. Magnitude of effect is therefore judged to be moderate beneficial in both cases. Significance of effect is judged to be minor beneficial which is **not significant** in EIA terms.

Representative Viewpoint 7 Thirsk Street

14.72 This viewpoint is on the edge of a residential area close to the A57 with clear views across the Site to the fringes of North Campus zone and the student residential buildings that line Baring Street. Once again the susceptibility of the townscape receptor at this location is judged to be low as the area has an ability to accommodate the Proposed Development without undue harm reflecting a townscape character that is weak sharing characteristics in common with most vacant sites. Townscape sensitivity is judged to be low as a result. Visual receptor sensitivity is mixed, high because residential receptors are in close proximity to this viewpoint and low where receptors are in transit on the A57 Mancunian Way, so medium overall. The scale and form of the Proposed Development, Baring Street Office 2 and Baring Street MSCP in this case, are clearly evident here and articulate well to ensure that the building façade remains varied and visually coherent. The change in height and step in form to Baring Street Office 2 also ensure that variety and interest is maintained to improve the quality of townscape at this point. Magnitude of effect is judged to be moderate beneficial for both categories of receptor which equates to negligible significance for townscape but minor beneficial for visual receptors both of which are **not significant** in EIA terms.

Representative Viewpoint 8 Ardwick Green North

14.73 This viewpoint is located at the entrance to Ardwick Green Park in the middle of a residential district. Townscape character is coherent and of reasonable quality and, despite an absence of listed buildings and conservation areas, the area is judged to have medium susceptibility to change and be of medium townscape value. Townscape sensitivity is judged to be medium as a result. Visual receptor sensitivity is judged to be high here in this primarily residential area with a local park adjacent of high community value. The AVR demonstrates that dense tree planting, in fact, obscures all of the Proposed Development from view. This situation may change subtly in the winter months but the only a negligible change in the view is predicted as the canopy, and network of branches, are relatively dense. The magnitude of change for both townscape and visual receptors is therefore recorded as no change. Significance of effect is therefore negligible which is **not significant** in EIA terms.

Representative Viewpoint 9 Kincardine Street / Grosvenor Street

14.74 This view is established on a street which is representative example of a typical street in Ardwick. It is primarily residential in character, mostly low rise 2 storey houses but with occasion high rise, 8 to 10 storeys, blocks interspersed. Office and charitable organisation buildings bring variety and a change of use to the townscape character which remains predominantly red brick and trees soften the view. Although there are no protective designations such as Conservation Areas or Listed buildings in this view, the townscape character is judged to be of reasonable quality with a coherent and well maintained street pattern. consistent urban grain with a medium susceptibility and medium townscape sensitivity. Visual receptor sensitivity is of a similar value as most receptors occupy residential dwellings or quiet residential streets where the view is part of the wider experience of the place. Visual receptor sensitivity is therefore judged to be medium also. The Proposed Development, mostly Baring Street Office 2 but a small amount of Baring Street MSCP forms a distant backdrop in this view and reflects, and compliments, the form and profile of the foreground buildings to some degree. As a result, the magnitude of effect is judged to be minor beneficial for both visual and townscape receptors as the Proposed Development fits well with the townscape character and will not materially alter the composition or appreciation of the view in any appreciable way from this residential area. Significance of effect is judged to be minor beneficial which is **not significant** in EIA terms.

Representative Viewpoint 11 Union Street

14.75 This view offers a niche view from a corner of Ardwick below the Mancunian Way that is representative of commercial office use, associated car parking and recreational facilities in the Ardwick and Longsight Townscape Character Zone. Trees, however, play an important part here in providing enclosure and limiting views. The buildings are recent in origin and the area is judged to have low susceptibility and low townscape sensitivity as a result in the absence of any designations reflecting its status as a workplace environment. Most visual receptors also reflect this category and value of low receptor sensitivity is registered for this viewpoint as a result. The AVR demonstrates that the distance from the Proposed Development, the height of the line of trees, in conjunction with the proximity of the foreground office building, in fact obscures much of the Proposed Development, Baring Street Office 1 and Baring Street 2 in this case, from view. The magnitude of change for both townscape and visual receptors is therefore recorded as no change. Significance of effect is therefore negligible which is **not significant** in EIA terms.

Representative Viewpoint 12 Ashton Old Road

14.76 A representative viewpoint which is orientated towards the site and explores the effect the Proposed Development will have on the inner ring road at the eastern most extremity. The townscape character at this point is heavily influenced by transport infrastructure with the constantly busy inner road dominating the foreground supplemented by the raised railway viaduct which take trains into Manchester Piccadilly from the east. Giant advertising hoardings, overhead gantries and pedestrian railings consolidate the dynamic and harsh nature of this view which is only partially softened by trees. Townscape susceptibility, value and sensitivity are all judged to be low as a result. A similar situation is registered in terms of visual receptor sensitivity which is also judged to be low as most receptors are in transit. The Proposed Development, principally Block M, will occupy a pivotal if distant position in this view, rising above the railway viaduct. A broken ridge profile combined with faceted corners add visual interest and provide a complimentary fit in terms of townscape character and rectilinear form. Magnitude of effect is judged to be minor beneficial for both receptor categories. Significance of effect is therefore judged to be negligible as a result which is **not significant** in EIA terms.

Medlock Valley

Representative Viewpoint 13 Ashton Old Road

14.77 A similar situation in terms of townscape character to viewpoint 12 above is relevant to this viewpoint which represents a view on one of the major approach roads into Manchester from the east, the A635 Ashton Old Road. This is directed more toward the centre of Manchester but the open skyline to the south of the road, beyond the railway viaduct will be affected and consolidate long distance horizon now being increasingly populated by tall buildings which, in this view, include Beetham Tower and Deansgate Square. Once again, townscape susceptibility, value and commensurately, sensitivity are judged to be low at this location. Equally, visual receptor sensitivity is judged to be low as most receptors are in transit in a situation where the view does not make a valued contribution to townscape character. In similar fashion to Viewpoint 12, the Proposed Development, Baring Street 2 in this case, occupies a prominent position on the horizon. The broken profile and faceted corners allow the development to integrate successfully and positively into its surroundings and it relates well to the towers on the horizon, also, ensuring a complementary fit in terms of townscape character and view. The scale of the Proposed Development is also balanced and its does not overwhelm. Consequently, the magnitude of effect is judged to be minor beneficial for both townscape and visual receptors leading to a negligible significance of effect which is **not significant**.

New Islington

Representative Viewpoint 14 Ashton Canal Tow path

14.78 Situated on a quiet residential backwater overlooking the Ashton Canal a representative viewpoint that offers a potential niche skyline and distant view of the Proposed Development Site to the south in an area where urban grain is tight and long distance views out are rare. In terms of Townscape susceptibility where a heritage feature, the Ashton canal dominates to a large degree but where existing recent development, the Ibis hotel on the horizon, is equally dominant, then the townscape receptor is judged to be medium or have some ability to accommodate the Proposed Development without undue harm and medium townscape sensitivity overall in the context of an asset of regional value, the Ashton canal. Visual receptor sensitivity is judged to be high here as most receptors are either residential or travellers on a scenic route with high townscape quality, namely the Ashton canal towpath. The AVR demonstrates that a relic brick canal structure coincides with the top of Baring Street 2 and completely obscures all of the Proposed Development from view. The magnitude of change for both townscape and visual receptors is therefore recorded as no change. Significance of effect is therefore negligible which is **not significant** in EIA terms.

Assessment of Cumulative Effects

14.79 The cumulative effect of the Proposed Development is now examined in relation to intra-project and inter-project cumulative effects.

Intra- project cumulative effects

14.80 It is judged that there are no intra- project cumulative effects arising in relation to other environmental topics under consideration in this assessment.

Inter-project cumulative effects

14.81 In terms of inter- project cumulative effects, or effects arising from similar developments that are either consented or are coming forward in the planning process in close proximity, there are developments that, cumulatively, are considered to affect the significance values for townscape and views. The most significant one is the subsequent, phased, development of the Mayfield SRF. In this regard it should be noted that detailed designs for these later SRF plots will be re-assessed as detailed plots come forward. It is anticipated that some of the

component parts of this project will be a series of tall buildings which will be of sufficient scale to have a cumulative effect on the scheme on some of the representative views particularly in views from the south and east. This applies to phases F, G and H.

14.82 Apart from this there is one committed development, of all the committed developments taken into account which are coming forwards in the surrounding areas, which is judged to be of sufficient scale to have a cumulative effect. This is Granby Row, which is judged to have a negligible effect on several views. The remaining committed developments are judged to be of insufficient scale or located at too great a distance to have any cumulative effect.

Table 14.9 Cumulative schemes

Planning reference	Cumulative Scheme	No of storeys
118267/FO/2017	Granby row	20 - 25

14.83 **Table 14.10** has been compiled to summarise the effect of the Proposed Development on its own and then in taking into account the effect of the relevant committed development, on a viewpoint by viewpoint basis. Where a committed development is predicted to have an effect on a particular viewpoint, or townscape character, then the effect values are reassessed and and an adjustment is made to the significance of effect value accordingly and recorded in the Cumulative Effect column. Where there is no effect the values remain the same.

14.84 Of course as the committed developments come forward then, in certain cases, visual receptor sensitivity is likely to increase as many of the developments contain apartments. However, by the same token, the magnitude of effect is likely to decline as the Proposed Development will now be seen in the context of a greater number of similar developments of equivalent scale. As a result, the net effect, where the effect is deemed to be significant, is generally a lowering of the significance of effect value in cumulative terms. This is exacerbated to a value of not significant if the committed development obscures the view of the Proposed Development completely which occurs in a few cases.

Table 14.10 TVIA Cumulative Impact Assessment summary table

Location	**Development Only**	**Relevant Cumulative Scheme**	**Cumulative Effect**
1 London Road Sensitivity (VR) Sensitivity (T) Magnitude (VR) Magnitude (T) Significance of effect	 Low Low No change No change Negligible	Mayfield SRF	Negligible
2 London Road Sensitivity (VR) Sensitivity (T) Magnitude (VR) Magnitude (T) Significance of effect	 Low Low No change No change Negligible	Mayfield SRF	Negligible
3 Fairfield Street Sensitivity (VR) Sensitivity (T) Magnitude (VR) Magnitude (T) Significance of effect	 Low Low Minor beneficial Minor beneficial Negligible	Mayfield SRF	Negligible

Location	Development Only	Relevant Cumulative Scheme	Cumulative Effect
4 Baring Street			
Sensitivity (VR)	Low		
Sensitivity (T)	Low	Mayfield SRF	Negligible
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		
Significance of effect	Minor beneficial		
5 Baring Street			
Sensitivity (VR)	Low		
Sensitivity (T)	Low	Mayfield SRF	Negligible
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		
Significance of effect	Minor beneficial		
6 Braley Street			
Sensitivity (VR)	Low		
Sensitivity (T)	Low	Mayfield SRF	Negligible
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		
Significance of effect	Minor beneficial		
7 Thirsk Street		Mayfield SRF	
Sensitivity (VR)	Medium		
Sensitivity (T)	Low		
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		
Significance of effect (VR)	Minor beneficial		Minor beneficial
Significance of effect (T)	Negligible		Negligible
8 Ardwick Green North			
Sensitivity VR	High		
Sensitivity T	Medium	Mayfield SRF	
Magnitude VR	No change		
Magnitude T	No change		
Significance of effect	Negligible		Negligible
9 Kincardine Street/ Grosvenor Street			
Sensitivity (VR	Medium	Mayfield SRF	
Sensitivity (T)	Medium		
Magnitude (VR)	Minor beneficial		
Magnitude (T)	Minor beneficial		
Significance of effect	Minor beneficial		Minor beneficial
10 Footway			
Sensitivity (VR)	Low		
Sensitivity (T)	Medium low	Mayfield SRF	
Magnitude (VR)	No change		
Magnitude (T)	No change		
Significance of effect	Negligible		Negligible
11 Union Street			
Sensitivity (VR)	Low		
Sensitivity (T)	Low	Mayfield SRF	
Magnitude (VR)	No change		
Magnitude (T)	No change		
Significance of effect	Negligible		Negligible
12 Ashton Old Road			
Sensitivity (VR)	Low		
Sensitivity (T)	Low	Mayfield SRF	
Magnitude (VR)	Minor beneficial	Granby Row (16)	
Magnitude (T)	Minor beneficial		
Significance of effect	Negligible		Negligible

Location	Development Only	Relevant Cumulative Scheme	Cumulative Effect
13 Ashton Old Road			
Sensitivity (VR)	Low		
Sensitivity (T)	Low	Mayfield SRF	
Magnitude (VR)	Minor beneficial	Granby Row (16)	
Magnitude (T)	Minor beneficial		
Significance of effect	Negligible		Negligible
14 Ashton Canal Tow Path			
Sensitivity (VR)	High		
Sensitivity (T)	Medium	Mayfield SRF	
Magnitude (VR)	No change		
Magnitude (T)	No change		
Significance of effect	Negligible		Negligible

(Note. Where townscape (T) and visual receptor (VR) significance of effect values are the same, one, shared, value is provided. Where they are different, a value is provided for both categories)

Mitigation Measures

Mitigation of effects during the construction phase

14.85 Mitigating the effects of the construction phase will involve high quality hoardings that will be used to limit unsightly visual impacts during the construction phase at street level. These will secure and protect the Site and prevent views of an unsightly construction site.

Mitigation of effects during operational phase

14.86 Mitigation measures for the operational phase are focussed on embedded mitigation measures which are an integral part of the design of the Proposed Development and fully described in the Design and Access Statements which accompany the planning application. These mitigation measures deal with the Proposed Development's relationship to neighbouring buildings and its location.

Residual Effects

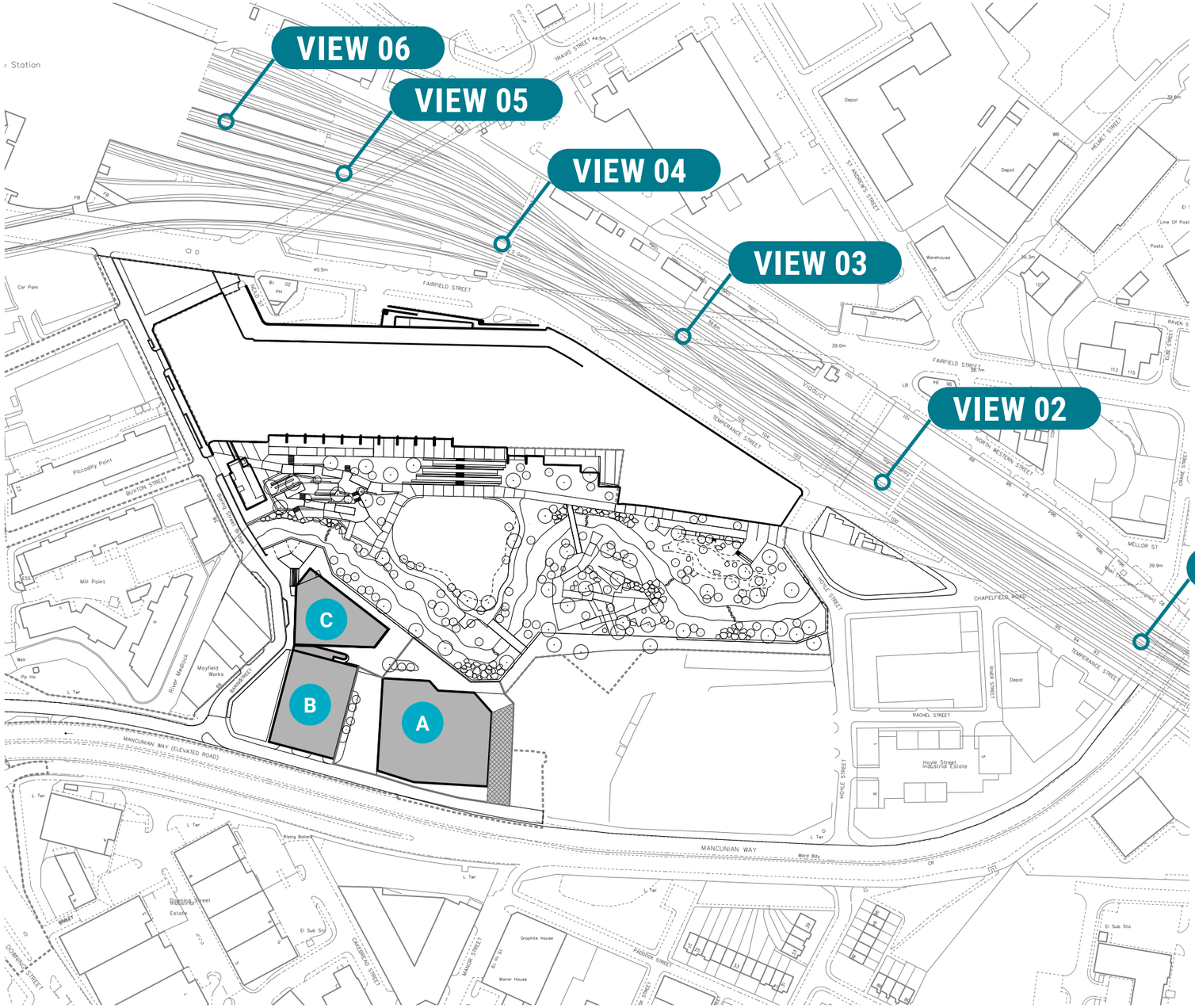
14.87 The Townscape and Visual impact assessment has been carried out based on the assumption that all the necessary mitigation measures have been accounted for in the design process. The images for selected viewpoints illustrated in **Appendix 14.2** represent the accurate definition of the location and mass of the component parts of the Proposed Development. The predicted significance of effect values are therefore the same for each representative viewpoint and Townscape Character Area as the residual effect values and are illustrated in Table 14.10 above.

Ref. No.	Reference
14.1	The European Landscape Convention (ELC, 2000)
14.2	National Planning Policy Framework 2019 Dept Communities and Local Government
14.3	Manchester City Council Core Strategy 2012
14.4	Guidelines for Landscape and Visual Impact Assessment 3rd Edition 2013 landscape Institute and Institute of Environmental Management and Assessment
14.5	Historic England note on tall building 2014
14.6	Manchester Residential Quality Guidance MCC 2017
14.7	Landscape Institute Advice Note L1/11 2011 , Landscape Institute

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 surveyable.

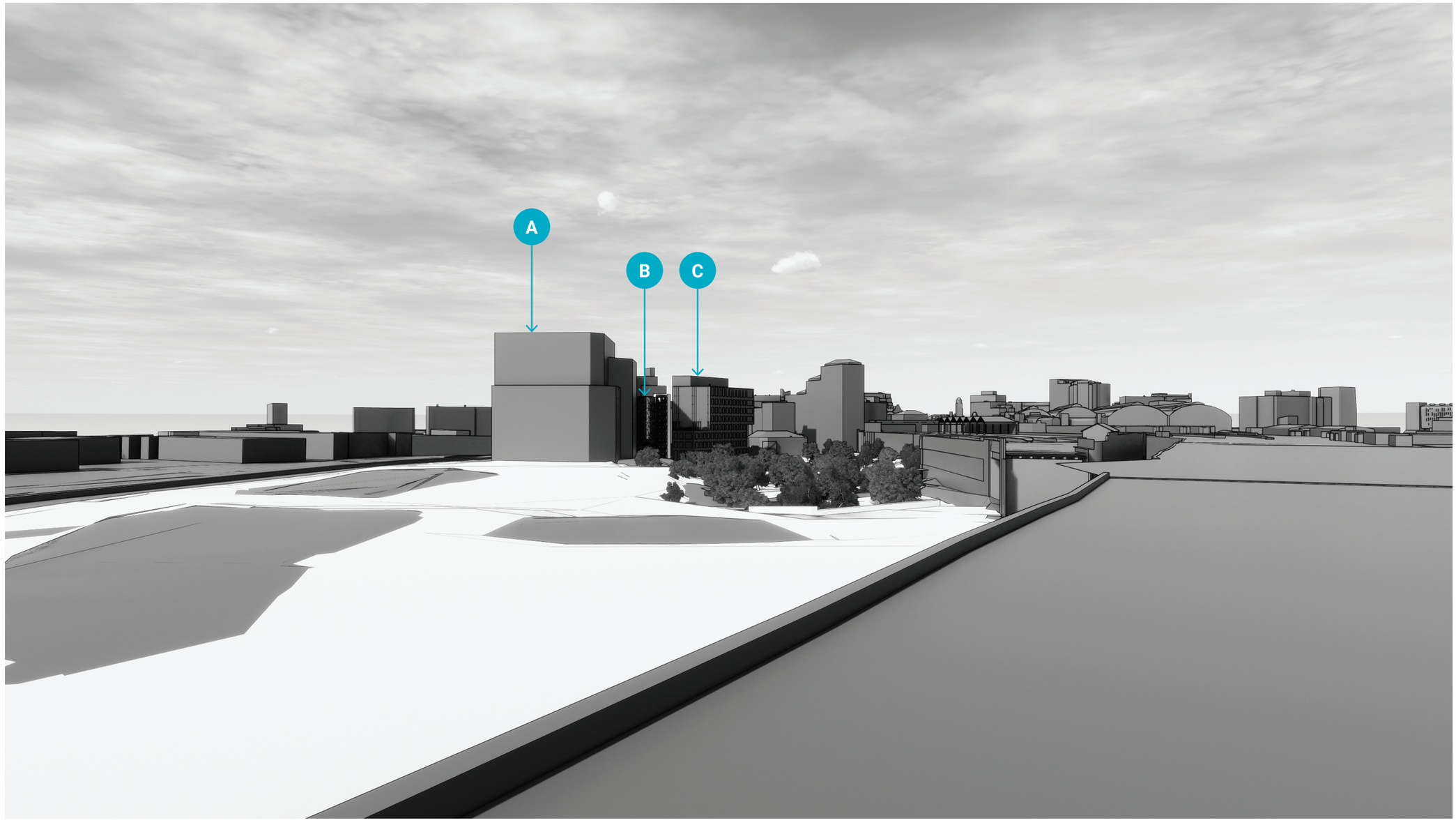
These fviews are indicaive only and provide a guide to the possible views. These are not Verified Views. The locations shown opposite are approximate.



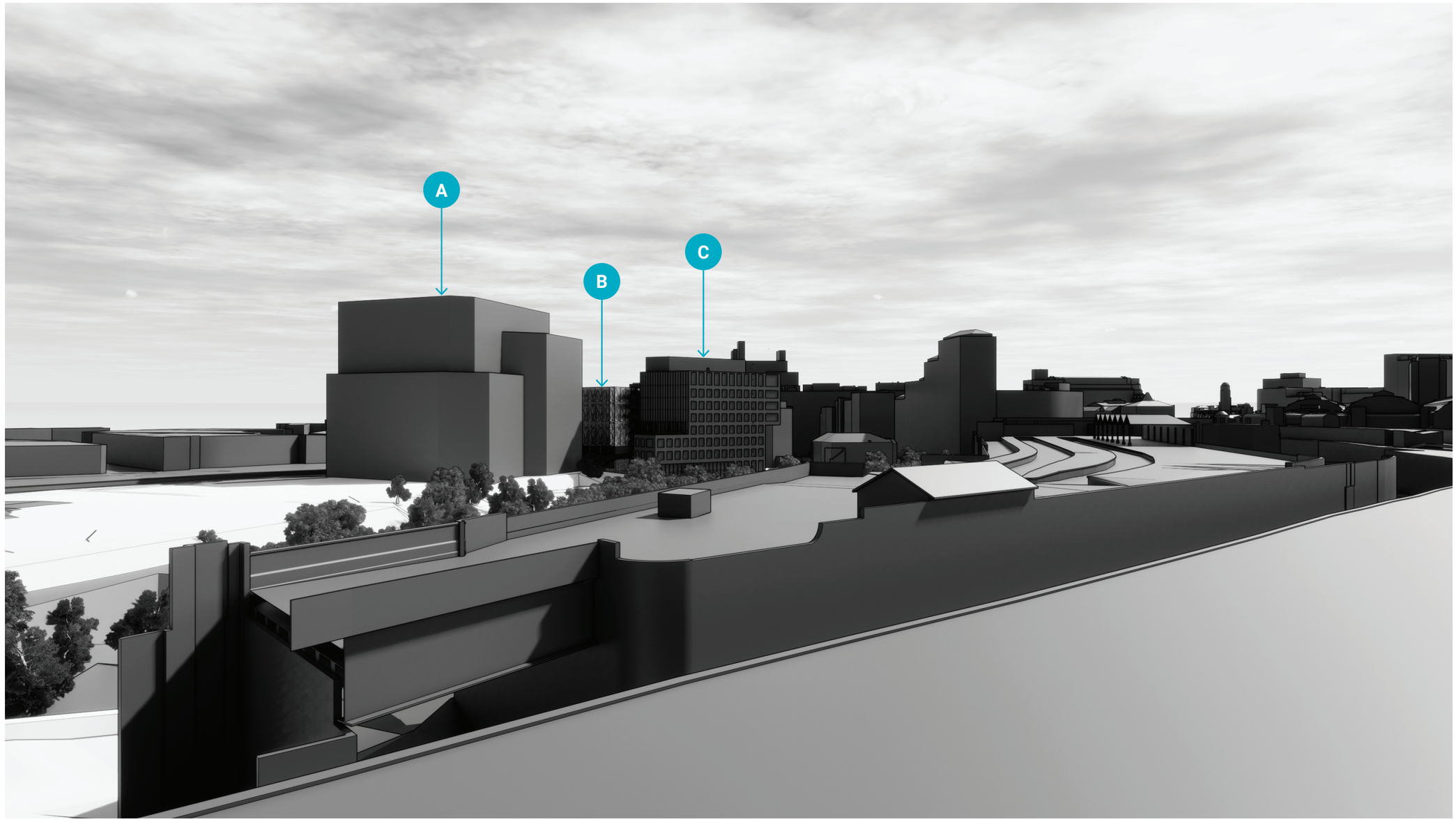
VIEW 06 Approximate View Location

B Building Identifier

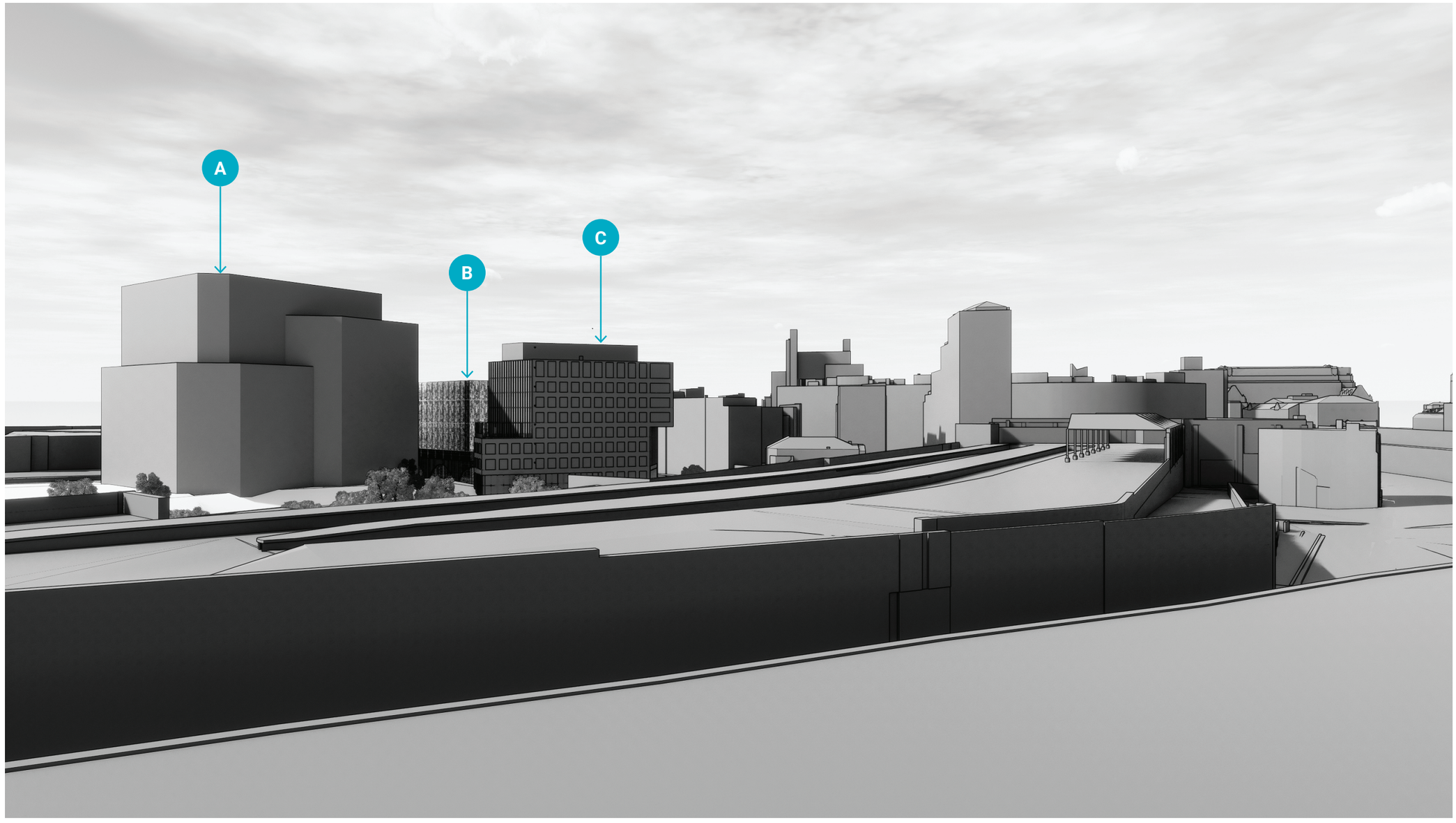
VIEW 01



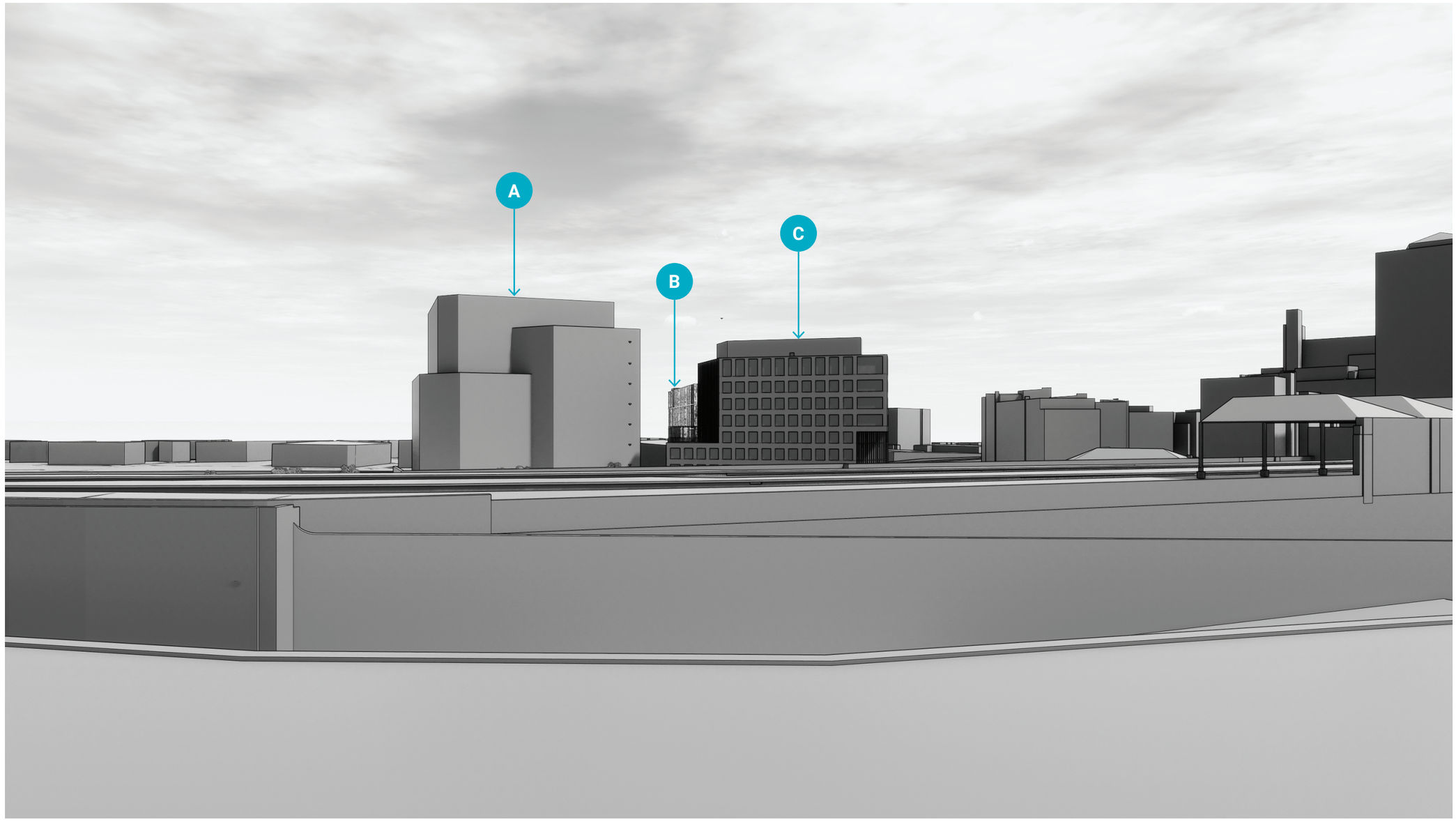
VIEW 02



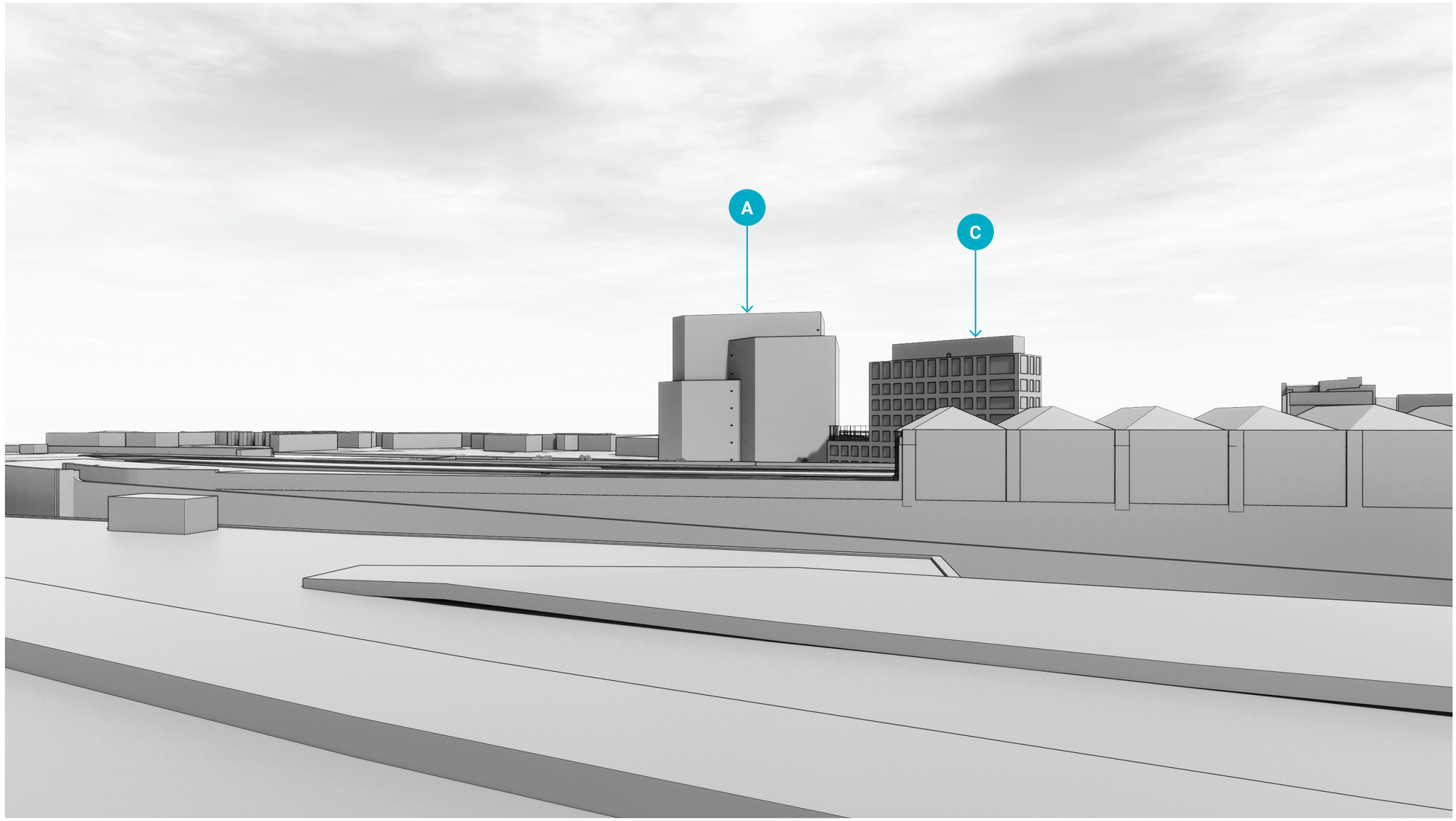
VIEW 03



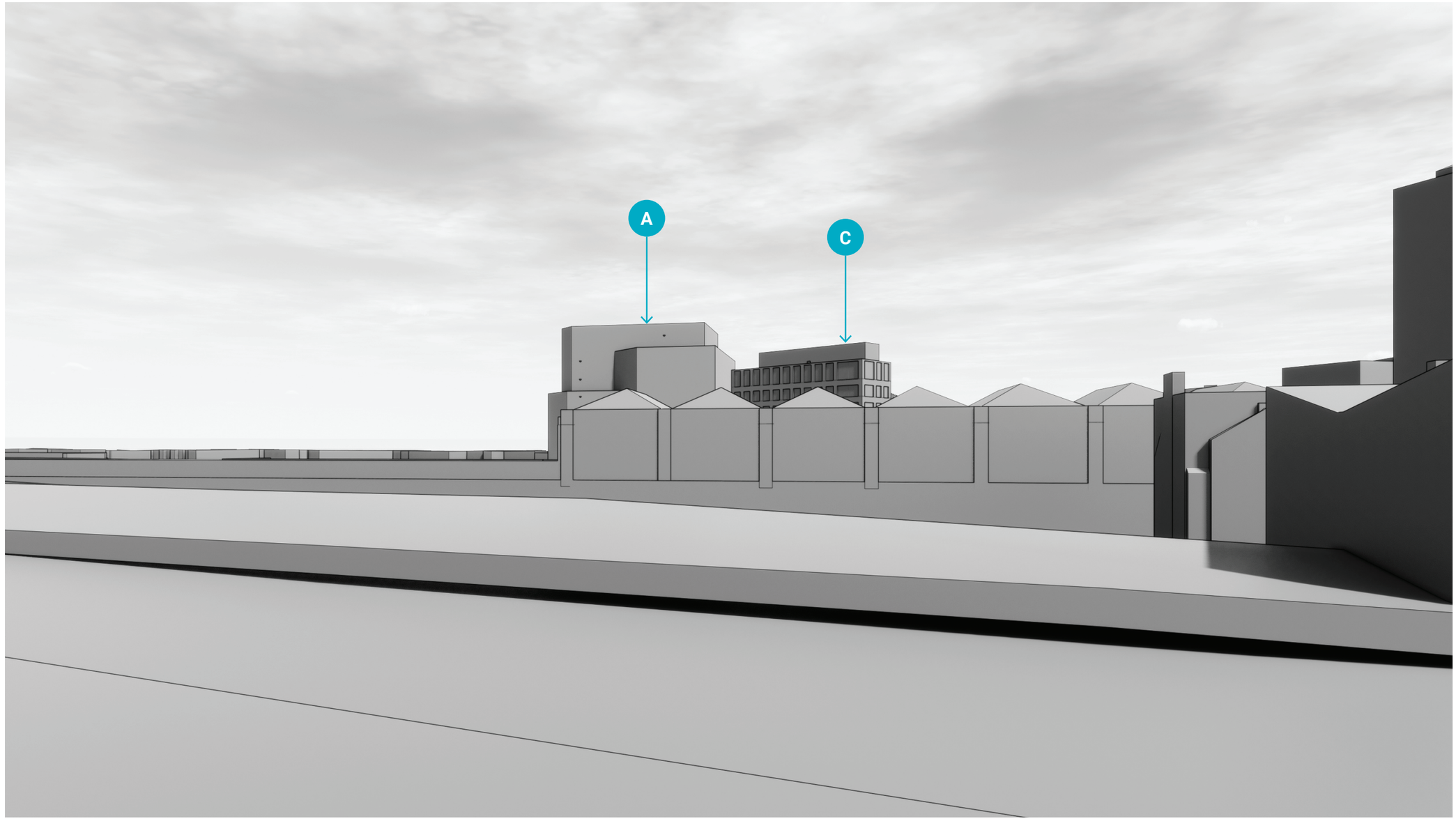
VIEW 04



VIEW 05



VIEW 06



15 Socio-Economic Impact

Introduction

15.1 This chapter, prepared by ekosgen, assesses the likely significant effects of the Proposed Development on the environment with respect to socio-economic impact.

15.2 It includes an assessment of the policy context in which investment will be delivered, consideration of baseline conditions, methods used to assess the effects, review of local service provision and the potential effects of the Proposed Development during both its construction and operational phases.

15.3 Appendix 15.1 provides the baseline data which underpins this assessment.

Policy Context

National Planning Policy

National Planning Policy Framework (NPPF)

15.4 Published by Government in February 2019, the NPPF acknowledges that there are three components to sustainable development: economic, social and environmental:

- **Economic**: "help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure"
- **Social**: "to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being"
- **Environmental**: "contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

15.5 The document recommends supporting the re-use of brownfield and underutilised land as well as recognising that multiple benefits can be secured through mixed-use schemes which can promote social interaction and help to establish safe and inclusive neighbourhoods.

Local Policy

Manchester Core Strategy (2012)

15.6 Manchester's Core Strategy supports the sustainability credentials of large scale development planned at high density and on exceptionally well-connected brownfield sites where population growth is most intense - e.g. the high density housing market within the conurbation core.

15.7 Mayfield is located within the City Centre. The Core Strategy recognises the key role the City Centre plays as an economic driver for the City Region and names it as the area of primary economic focus in terms of development. The Strategy sets out eight key development principles for the City Centre, supporting high density buildings and commercially-led mixed use schemes aligning with the Proposed Development, specifically supporting:

- High density development of employment space, identifying Mayfield as one of five key

city centre locations for this scale of development.

- Apartment-led residential schemes of high quality, which provide for a range of household types.
- Hotel development in the city centre, supporting the growing tourism industry.
- Growth of the independent retail sector.
- Large scale schemes which make significant contributions to the employment and retail growth, while supporting accessibility and retention and enhancement of the City's heritage and character.
- New buildings with the highest standard design in terms of appearance and function.
- Preservation or enhancement of heritage assets.
- Accessible, diverse developments and public spaces which appeal to a wide range of people.

Sub-regional Policy

Greater Manchester Spatial Framework 2019 Draft (GMSF)

15.8 The revised draft of the GMSF sets out how the development of Greater Manchester should be delivered up until 2037, and highlights the need for new housing, employment, facilities and infrastructure, while protecting the environment, green spaces and identity of places.

15.9 The document highlights Manchester city centre as one of the core growth areas which provides a huge scale and diversity of economic opportunity to accommodate significant employment growth and further residential development. Policy G-Stat 2 states "*The City Centre will continue to provide the primary focus for business, retail, leisure, culture and tourism activity in Greater Manchester, and will be a priority for investment in development and infrastructure", "A broad range of commercial accommodation will be delivered, helping the City Centre to capture growth across key economic sectors. The increasingly important residential role of the City Centre will be expanded considerably, whilst ensuring that this complements rather than displaces the area's non-residential functions."*

15.10 The draft GMSF identifies land to accommodate around 1,500,000m^2 of office floorspace and around 50,000 new dwellings within Manchester city centre over the period 2018-2037.

15.11 The use of brownfield land is identified as a key method to delivering the scale of activity - proposed while protecting the green belt. The document states: *"An essential aspect of the efficient and effective use of land will be to prioritise the reuse of previously-developed (brownfield) land when meeting development needs. This will help to address dereliction and bring investment into existing urban areas, supporting their regeneration and enhancement."*

Assessment Methodology and Significance Criteria

Overarching Approach

15.12 The assessment has determined the baseline position for intervention, taking account of demographic, economic and key social characteristics of the area. It then moves on to consider the potential effects of the Proposed Development and the significance from a socio-economic perspective.

15.13 The assessment is based on the description of the Proposed Development set out in Chapters 1 and 3. It has been prepared to provide an understanding of the overarching impacts of development in the stated location.

15.14 This assessment evaluates the potential impacts on identified socio-economic indicators of Mayfield Phase 1 which is made up of Application 1 and Application 2. This chapter considers the potential socio-economic impacts of Application 1 and Application 1 and 2 together, before

moving onto the cumulative effects of Application 1, 2 plus the delivery of the Mayfield masterplan as laid out in the SRF as well as other committed developments, as set out in Appendix 2.1, going ahead with in close proximity to the Mayfield Site.

15.15 Application 1 compromises the office block (Baring Street Office 1) providing 9,350m^2 of gross internal area (GIA); a 543 space multi storey car park; phased delivery of the park; associated public realm; and highways and enabling works.

15.16 Application 2 includes the 28,375m^2 (GIA) office block (Baring Street Office 2), and associated public realm.

15.17 The endorsed Mayfield Masterplan includes a further 145,400m^2 gross external area of employment space, 650 hotel rooms and 1,500 residential units.

15.18 The baseline assessment draws on a series of widely recognised, published data sources, including the Office for National Statistics (ONS) Census of Population 2011, Annual Population Survey, Business Register and Employment Survey (BRES), and the Claimant Count.

Significance Criteria

15.19 A staged assessment against set criteria has been completed to allow the significance of effects to be accurately and consistently tested. The process gave consideration to:

- The value of the resource (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

15.20 The criteria applied in each case are outlined below.

15.21 The magnitude of the impact was assessed to fall under one of four categories, as outlined in Table 15.1 below:

Table 15.1 Methodology for Determining Impact Magnitude

Magnitude of Impact	Criteria for assessing 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.

15.22 The sensitivity of a receptor is based on the relative importance of the receptor using the scale in Table 15.2 overleaf.

Table 15.2 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.

15.23 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. The Impact Significance Matrix is set out in Table 15.3.

Table 15.3 Impact 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

Limitations

15.24 As there are no recognised definitive criteria for the assessment of socio-economic effects, ekosgen has taken a structured approach to quantifying and assessing the scale and nature of potential effects (relative to baseline conditions) based on their knowledge of overarching guidance and experience of working in the subject area. In cases where effects could not be quantified, a qualitative judgement has been made, drawing on professional experience.

15.25 There are also some limitations in the baseline data due to ward boundary changes and the availability of ward level data. Where this is the case, ekosgen have gathered data most closely aligning to the chosen assessment area and clearly stated what geography the data collected refers to.

Baseline Conditions

15.26 The purpose of this section is to establish an understanding of the baseline conditions to inform the context for intervention and therefore the potential impact of the Proposed Development on local characteristics. A range of published data sources have been considered to understand both the social and economic characteristics of the area as a starting point for the assessment.

15.27 For baselining purposes, the local assessment area has been defined to reflect the anticipated catchment area of the Proposed Development, and is defined using ward level data due to varied data availability for different indicators. This section sets out the current socio-economic conditions using ward level data to define the local assessment area, as well as covering Manchester as a whole and Greater Manchester.

15.28 The local assessment area contains the City Centre Ward (which the proposed site sits within – close to the periphery) as well as the closest wards surrounding the site compromising of: Ardwick, Bradford and the Ancoats & Clayton ward.[55]

15.29 All the relevant socio-economic data is in Appendix 15.1.

Population

15.30 As of 2017, according to ONS population estimates, there were 85,091 people living in the assessment area, 15.6% of Manchester's population. Between 2011 and 2017 the population of the assessment area grew by of 23.3%, compared to 5% nationally, representing an uplift of 16,079 people.

15.31 In terms of the age structure of the population, 80.5% of the assessment area is of working age (16-64) compared 70.5% across Manchester and 63.8% in the wider sub-region. The assessment area also has a relatively young adult population; the mean age of residents was 30, three years younger than the Manchester average and eight years below the Greater Manchester average.

Housing Tenure

15.32 Census data for 2011[56], reveals home ownership in the area was 22.5%, a rate significantly lower than typical levels for Manchester (37.8%) and Greater Manchester (60.1%). The most common tenure of housing was private renting at 42.3% followed by social renting at 32.5% with both private and social rented stock levels above local authority and sub-regional averages.

15.33 Although more up to date definitive housing tenure information is not available, the increase in population since 2011 has been primarily a result of the growth in the city centre apartment market, and in particular, an increase in Private Rented Sector residential accommodation.

15.34 The average household size in the assessment area was 2 compared to 2.3 for both Manchester and the wider sub-region.[57]

Employment

15.35 Total employment in the assessment area, using the latest BRES data from ONS, was 224,500 in 2017, representing 57.2% of total employment in Manchester and 16.9% of jobs in Greater Manchester. This reflects the role of the city centre, in particular, as the key employment hub for Greater Manchester.

15.36 The four sectors that constituted over half (52.3%) of total employment in the assessment area are:

- professional, scientific and technical activities (16.3%);
- administrative and support services (14.9%)
- wholesale and retail trade (12.3%); and
- accommodation and food services (8.8%).

15.37 The large employment base provides a broad range of jobs in terms of skills levels and occupation. This includes high skilled and higher paid employment, as well as lower skilled and entry level employment, as well as significant part time employment.

Local Expenditure

15.38 While significant local income expenditure is incurred on mortgage and rents, expenditure

[55] 2011 census ward boundaries have been chosen where possible for consistency
[56] Census, 2011
[57] Census, 2011

relating to food and drink, recreation and leisure and other expenditure likely to be spent locally, is estimated to be around £11,500 per household each year based on the average weekly household expenditure on goods and services in the UK from the ONS Family spending survey.

15.39 Based on the number of households in the 2018 wards (data was not available for 2011 ward boundaries which has been used for the collection of population, employment, housing tenure, for other assessments) Piccadilly, Deansgate, Ardwick and Ancoats and Beswick, local expenditure per annum by households totals £334.7m.

Healthcare Facilities

15.40 GP surgeries and dental practice data was found on the NHS Choices website in August 2019. A one mile radius was considered appropriate for GP's while a two mile radius was considered appropriate for dental practices (reflecting the preposition that visits to a dental practice are less medically urgent than a GP and therefore a wider radius was chosen).

15.41 There are eight GP's within 1 mile of the Site, all of which are accepting new NHS patients. In terms of dental practices there are 32 within 2 miles of the Site, five of which are accepting new patients, and 14 where no data was available.

Education and Training

15.42 Manchester City Council provides information of childcare services. It provides details of 41 Children Centres, 100 day nurseries and 7 crèches in the city. There are also a considerable number of childminders offering services in the city. There are a number of day nurseries in the City Centre and a number nearby in Ancoats, Hulme and neighbouring wards. Based on this information there are 10 day nurseries within 1.2 miles from the Site which state they have available places, and between the three which state the number of places that are available there are 158 nursery places.

15.43 There are 15 primary schools within a 1.2 mile radius of the Site[58]. Using the latest data from the Department for Education (DfE) on school capacity for the academic year 2017/18, of the schools which are not at or over capacity (13 out of the 15) there is a total of 408 school places available. There are 17 secondary schools within a 3 mile radius of the Site[59]. Using the same dataset from DfE, of the secondary schools which are under capacity (15), there are over 4,000 available places.

15.44 Note, private fee-paying schools are not included in this assessment as they are not accessible to all and information on pupil numbers and capacity is not readily available.

15.45 As of 2018, in Manchester 5,200 residents, 1.4% of the working age population, are qualified at a Trade Apprenticeship level according to the Annual Population survey, compared to 3.1% of the working age population in Greater Manchester and 2.8% nationally.

15.46 DfE data shows that in 2017/18 there were 3,720 apprenticeship starts in Manchester, a number which has declined in recent years. Between 2014/15 and 2017/18 the number of apprenticeship starts has fallen by 23% in Manchester, compared to decline of 25% nationally.

Crime

15.47 Greater Manchester Police produced a Site wide Crime Impact Statement to assess the development against 'Crime Prevention Through Environmental Design' principles. This document presents data statistics on crime rates within 500m of the Site, and finds that the

[58] https://secure.manchester.gov.uk/directory/84/school_finder and https://www.mapdevelopers.com/distance_finder.php
[59] https://secure.manchester.gov.uk/directory/84/school_finder and https://www.mapdevelopers.com/distance_finder.php

crime rate in the area is average except for the high vehicle crime.

15.48 Considering the area within 500m of the Site, compared to Manchester, Greater Manchester and England and Wales for January 2017 – December 2017, the impact statement reports:

- The rate of domestic burglaries per 1000 dwellings is 51% lower than Manchester as a whole, 29% lower than Greater Manchester and 22% higher than England and Wales.
- The rate of wounding's per 1000 dwellings is 1% higher than Manchester as a whole, 68% higher than Greater Manchester and 175% higher than England and Wales.
- The rate of incidents of criminal damage per 1000 dwellings is 4% lower than Manchester as a whole, 38% higher than Greater Manchester and 109% higher than England and Wales.
- The rate of incidents of vehicle crime per 1000 dwellings is 652% higher than Manchester as a whole, 1115% higher than Greater Manchester and 1042% higher than England and Wales.

15.49 Recent data for June 2019[60] shows nine crimes were recorded on the Site: four vehicle; one anti-social behaviour; one burglary; one robbery; and two other theft type crimes.

15.50 In June 2019[61], 2,519 crimes were reported within a one mile radius from the Site. Violent or sexual offences, anti-social behaviour and theft from the person accounted for over half (51%) of all crimes reported in this area in June 2019.

Open Space, Recreation and Amenity

15.51 The following public open spaces within 1km radius of the Site[62] have been identified:

- Ardwick Green Park sits within 0.4km of the Site;
- Vimto Park sits within 0.45km of the Site;
- Sackville Gardens are within 0.56km;
- Gartside Gardens are 0.61km away from the Site;
- Picadilly Gardens are 0.88km away; and
- All Saints Park is 0.89km from the Site.

15.52 The following leisure/ sports centres are within 1.5km of the Site:

- Frontline Fit Performance Centre (Gym) 0.3km
- Power league Manchester Central (outdoor football pitches and organised league facilities) 0.5km
- Bannatyne Health Club 0.6km
- Sudgen Sports Centre 0.79 km
- Manchester Aquatics Centre is 0.86km
- Manchester Climbing Centre (indoor climbing facilities)1.5km

15.53 Given the urban city-centre context, it is considered that existing open space for amenity and recreation within the local area is adequately provided for.

[60] https://www.police.uk/greater-manchester/AC28/crime/+QlLGKe/ crimes in June 2019 accessed 06/08/19
[61] https://www.police.uk/greater-manchester/AC28/crime/+47Smv8/ crimes in June 2019 accessed 06/08/19
[62] Considered an accessible walking distance

Identification and Evaluation of Likely Significant Effects

Construction Phase

Population

15.54 The creation of jobs during the construction phase would increase the number of people present on-site during working hours over the construction programme. The workforce is expected to be made up of local unspecialised labourers and specialised tradesmen who are more likely to travel from further afield.

15.55 A Local Labour Agreement, requiring a commitment to source from Manchester, will mean that vast majority of the construction workforce are likely to be local residents, travelling from their permanent residence.

15.56 The duration of the construction phase is unlikely to lead to construction workers moving from their current place of residence. There may be a number of construction workers travelling from further afield who may utilise temporary local accommodation, however this figure is anticipated to be low and temporary in nature.

15.57 Effects relating to the residential population during the construction phase are therefore anticipated to be short term and temporary and of **negligible** significance.

Employment

15.58 Based on a construction cost in the region of £44.5m for Application 1 and £89.5m for Application 1 and 2, temporary employment benefits arising from the construction programme have been forecast to reflect the average amount of expenditure required to support one job in the construction industry.

15.59 On this basis, it is anticipated that 419 construction job years would be supported by the construction of Application 1, i.e. 140 jobs for three years. The construction of Application 1 and 2 together would generate 843 construction job years, 281 jobs for three years. This scale of construction employment would support a temporary GVA impact of £25.0m for Application 1 and £50.4m for both Application 1 and 2 within the construction period.

15.60 Across the course of the construction period, the number of construction workers will rise and fall to reflect the stage of development reached and associated workforce requirements. Although regional and national construction firms will often use their own workers on development schemes, it is common for at least some contractors to be drawn from the immediate local area. The Local Labour Agreement will support the capture of local benefits.

15.61 Delivery of the construction works will require the purchase of materials from a range of suppliers. In this way, the construction programme will generate multiplier effects throughout the economy as funds are spent with suppliers and construction workers spend their wages, allowing funds to be re-circulated through the economy. Local businesses would be expected to benefit from an element of this spend although, as with employment levels, it is difficult to quantify the scale.

15.62 Across the UK, research by the National Housing Federation suggests that the construction industry has an indirect and induced employment multiplier of 1.51. Applying this to the forecast construction jobs level for Application 1 above, this would suggest an additional 633 jobs would be supported in the economy during the construction period, i.e. 210 jobs for three years, with the posts generating GVA of £37.8m over the construction period. While both Application 1 and 2 would lead to 1,273 indirect and induced jobs being supported, 424 jobs for three years, with the posts supporting a GVA impact of £76m during the course of the construction period.

15.63 Based on the assessment above, the construction employment (and therefore construction

GVA) is considered to have a temporary short term, **moderate beneficial** effect at the local authority level.

Local Expenditure

15.64 The Site is located at the eastern edge of the City Centre, next to Piccadilly Station with a variety of retail, food and drink offers nearby, which construction workers are likely to utilise during the construction period.

15.65 Assuming expenditure of £3 per day, 419 construction job years for the delivery of Application 1 and 230 working days for each construction worker, lunchtime/food and drink expenditure is estimated at £0.29m. Based on 843 construction job years for the delivery of Application 1 and 2, lunchtime/food and drink expenditure is estimated at £0.58m.

15.66 Based on this assessment, the expected impact is considered to be of **minor beneficial** significance and temporary in nature.

Education and Training

15.67 There will be no impact upon local schools from the construction phase.

15.68 Targets for the number of local apprenticeships, as a proportion of the construction workforce, would support the upskilling of the local labour force, providing employment and training opportunities for local people.

15.69 On this basis 140 jobs for three years for Application 1 and 281 jobs for three years for Application 1 and 2 some five to nine construction apprenticeship places could be supported. This is expected to have a **minor beneficial** impact.

Healthcare Facilities

15.70 Given the temporary nature of the construction phase and the workforce, which is expected to be made up of local residents due to nature of industry and the Local Labour Agreement, there is no expected impact upon healthcare facilities.

Crime

15.71 Parts of the Site undergoing construction would be enclosed with fences and hoardings for security and public safety, this may reduce the crimes occurring in that particular area – but it is not anticipated that there will any significant impact upon crime in the local area, crime effects are therefore considered to be short term, temporary and of **negligible** significance.

Open Space, Recreation and Amenity

15.72 Construction workers may make use of open public space during breaks. Areas of public open space accessible to the Site have been identified in paragraph 15.48. It is anticipated that there is sufficient public open space to accommodate construction workers. There is not expected to be any impact upon recreation and amenities, therefore the impact on open space, recreation and amenities is considered to be **negligible**.

Operational Phase

Population

15.73 The Operation of Phase 1, in particular the new office and commercial developments could attract more people to live within the assessment area, who want to live close to their place of work. However the majority of workforce are expected to already be residents within the city region, travelling from their permanent residence. Overall, effects on population of the assessment area or across the city as a whole are considered to be **negligible**.

Employment

15.74 Application 1 includes a 9,350m^2 (GIA) high quality office development, Baring Street Office 1, of B1 use with active ground floor uses (A1, A3, A4 and/or D2) which will support the creation of a series of permanent posts, as well as a multi-storey carpark (MSCP) of 543 spaces which will support the new employment space providing accessible parking for those employed within the Proposed development.

15.75 Application 2 is for Baring Street Office 2, compromising 28,325m^2 (GIA) for B1 use with active ground floor uses (A1, A3, A4 and/or D2).

15.76 The range of commercial uses allows for future flexibility of the office developments. The nature of premises to be provided mean that a mix of employment opportunities could be accommodated, including entry level and part-time employment that would be accessible to Manchester residents. A number of higher paid employment opportunities are also anticipated, helping to diversify the local employment base.

15.77 The assessment takes an average of the employment density assumptions for each use outlined in the Housing & Communities Agency guidance[63]. This gives relevant employment densities, using:

- One FTE for every 11.6m^2 of B1 (office) use using net internal area (NIA);
- One FTE for every 17.5m^2 of A1 and A3 uses using NIA (also applied to A4 use); and
- One FTE for every 85m^2 of D2 use (fitness centre) using gross internal area (GIA).

15.78 First considering Application 1, assuming the office space is fully occupied, based on the scale of office accommodation to be provided and the employment densities for B1 use, the office space would generate 615 direct FTE jobs at the Site.

15.79 Due to the potential range of retail and leisure uses occupying the ground floor space, for the purpose of this assessment three calculations have been carried out to consider the range of potential employment densities. These scenarios are as follows:

- Scenario 1: 50:50 split of A1 (Retail) and A3/A4 (Restaurants/Cafés/Drinking establishment), would generate 33 direct FTE jobs.
- Scenario 2: 100% Occupation of D2 use (Fitness Centre), would generate 9 direct FTE's.
- Scenario 3: 50:25:25 split of D2, A1 and A3 uses would generate 21 direct FTE's.

15.80 Therefore, assuming full occupation, Application 1 could support between 624 and 648 direct FTE's.

15.81 For both Application 1 and Application 2, assuming full occupation, 2,482 direct FTE jobs could be accommodated onsite in the office space. Additional jobs would be supported by the ground floor retail and leisure space, using the above scenario's:

- Scenario 1 would generate 133 direct FTE's
- Scenario 2 would accommodate 34 FTE jobs.
- Scenario 3 would generate 84 direct FTE's.

15.82 Therefore Phase 1 (Application 1 and 2) assuming full occupation, is anticipated to support between 2,516 and 2,615 direct FTE's.

15.83 This scale of employment would be a 1.3% to 1.4% uplift on the 2017 local employment level

[63] Homes & Communities Agency Employment Density Guide 3rd edition, 2015

presented in the baseline assessment area. The Proposed Development would also provide opportunities for local residents to access local employment opportunities, potentially reducing the average distance travelled to work.

15.84 It is estimated that the office employment will generate a direct GVA impact of £96m per annum and the retail/leisure employment an impact of between £1m and £4.7m per annum depending on the final use.

15.85 The operational employment and GVA benefits are considered to represent a permanent, **moderate beneficial** effect.

Local Expenditure

15.86 Local retail expenditure is anticipated to increase due to spending by employees and visitors at the Proposed Development. Therefore, permanent beneficial effects on shoppers and surrounding retail businesses in the local area are anticipated.

15.87 The Proposed Development is likely to increase the overall retail expenditure within the local area. This would be twofold, from both money being spent at the Proposed Development's retail and or leisure offerings, and expenditure generated by the Proposed Development's employees.

15.88 Application 1 could support around 642 FTE's (given that Scenario 1 is best aligned with the proposed commercial strategy), with annual wages estimated to be £13.0m based on the North West median income for the relevant sectors from the Annual Survey of Hours and Earnings (ASHE). Application 1 and 2 together have the potential to support around 2,615 FTE employees, which are expected to earn around £52.4m in wages each year. This would increase expenditure in the local area and benefit local businesses, as well as bringing positive supply chain effects.

15.89 The combined local expenditure of those employed in new commercial space would be of **minor beneficial** significance to the local economy, and permanent in nature.

Education and Training

15.90 Additional demand for school places from the families of those working at the Site is expected to be minimal as it is anticipated that most employees will not be new to the city and their children will be attending schools close to their place of residence. There may be some new households in the city as a result of the employment in the Proposed Development, but the availability of school places, as identified in paragraph 15.43, means that there is sufficient capacity meaning there will be no significant or negative impacts upon local schools.

15.91 It is not possible to determine whether future occupiers of the commercial space Phase 1 will have an impact upon skill levels of local residents, therefore the impact is considered to be of **negligible** significance.

Healthcare Facilities

15.92 Additional demand for healthcare facilities from those working at the Site, is expected to be minimal as it is anticipated that most employees will not be new to the city and will already be registered at facilities close to their place of residence. There may be scope for some additional demand for employees who may wish for facilities close to their place of work who did not previously work nearby although this impact is expected to be minimal.

15.93 There are eight GP practices within one mile of the area and several more within traveling distance. These eight practices have 89,356 patients and all eight continue to accept new patients. There are 32 dental practices within 2 miles of the Proposed Development location, five of which are accepting new patients and many of which where this information was not

available.

15.94 It is anticipated that potential, albeit minimal, demand could be absorbed by the existing healthcare facilities. Based on this assessment impacts are considered to be of **negligible**.

Crime

15.95 The GMP Crime Impact Statement considers how the Proposed Development takes into account public safety and security measures in its design and recognises that the Proposed Development 'will remove disused structures which have been a generator of criminal activity'. The statement also notes that the introduction of ground floor uses in the new developments would provide natural surveillance of the community space and public realm, providing a greater sense of safety.

15.96 The MSCP will provide more secure parking, while the Proposed Development will also remove a lot of the current unrestricted parking via TROs. Together this will help to reduce vehicular crime, of which the baseline assessment revealed a concentration of this type of crime covering the area within 500m of the Site.

15.97 The Proposed Development will be of high quality, with ground floor commercial uses helping to animate the area, increase footfall and visibility, reduce the sense of isolation and create a better sense of place and community, which in turn can help to reduce criminal activity. While the management company for the operation of the Park will undertake patrols – providing further surveillance to minimise criminal activity taking place.

15.98 Based on this assessment the Proposed Development would have a **minor beneficial** permanent effect on crime at the local scale.

Open Space, Recreation and Amenity

15.99 The baseline assessment identified six open green spaces within 1km of the Site, which may see an increase in usage as a result of the new employment space at the Site. However Application 1 will deliver the new six acre (2.4 ha) Mayfield Park with new bridge across the River Medlock, as well as a number of public realm improvements which will provide greater public access to green space as well as improving connectivity - particularly between Ardwick and the remainder of the City Centre.

15.100 The new park and public realm will provide opportunities for recreation and improve health and wellbeing for those employed at the site and people living and working nearby. The new park will deliver health benefits in terms of well-being, with research indicating that benefits of parks include reduced stress, better mental health and increased fitness and activity levels.

15.101 To assess the welfare value of the proposed public park this assessment has used the ORVal Tool (developed by the Land, Environment, Economics and Policy (LEEP) Institute at the University of Exeter with support from DEFRA). ORVal provides information that might be useful in understanding the benefits that are derived from accessible greenspace in England and Wales. A number of locations located within the assessment area were identified to provide a range of welfare values of greenspace.

15.102 After review, and taking account of the Proposed Development and location of the park, an average value of £120,000 per hectare was applied to the new green space. Using this value the Proposed Mayfield Park will provide £288,000 welfare benefits per annum (which are accrued to those who using the Park).

15.103 Due to the city centre location, there is a good supply of leisure facilities close to the Proposed Development to meet the needs of people working at the Site. There is also the potential for a fitness centre to be included in the ground floor use of the office development providing a convenient offer as well as adding to the leisure offer of the city.

15.104 The operation of the Proposed Development may increase the use of the existing facilities and greenspace within close proximity to the Site, although the range of options, in part due to the city centre location, means the effect is expected to be minimal. In addition, Application 1 will deliver the six acre Mayfield Park generating welfare benefits for those using it, while there is a potential for the office development to include a fitness centre, therefore limiting any negative impacts upon existing greenspace and facilities. The addition of new greenspace and associated welfare benefits and based on this assessment the Proposed Development is considered to be of **minor beneficial** significance, of a permanent nature at a City-wide level.

Mitigation Measures

15.105 During construction of the Proposed Development, effects have been identified from **negligible** to **moderate beneficial**.

15.106 While mitigation measures are certain to be required for the construction phase, they are contained within the other chapters of this EIA including Construction Management and Phasing, Noise and Vibration, Traffic and Transport, Air Quality, and Ecology. There are no anticipated significant adverse effects arising in the Construction Phase in terms of the socio-economic assessment requiring mitigation measures.

15.107 A Local Labour Agreement will help to make use of the local labour force while opportunities will explored for construction contracts to use local contractors/suppliers, which will help to capture economic benefit within the Manchester economy.

15.108 The effects of the operation of the Proposed Development on socio-economic indicators that have been identified range between **negligible** and **moderate beneficial**, therefore, as no adverse effects are predicted, no mitigation should be required.

Cumulative Effects

15.109 Delivery of the Mayfield Masterplan would accommodate additional employment with a further 116,000 sqm GEA of office space, 29,400 sqm GEA of retail and leisure space and 650 hotel rooms. Based on the likely mix of space this is estimated to accommodate circa. 9,000 FTE jobs, generating GVA worth £350m per annum.

15.110 The SRF also includes plans for an additional 1,500 homes, of tenure and mix. Based on the proposed unit mix and assuming full occupancy, it is estimated that 3,225 residents would be accommodated in the development. Given that there are no residents on site at present; the net increase in population is projected to be 3,225. This represents a 3.7% population uplift in the assessment area, and a 0.6% uplift in Manchester's population. An estimated 1,257 residents would be in employment, increasing the city's workforce and supporting forecast economic growth.

15.111 In addition there are six committed developments which will contribute to the cumulative effect of Proposed Development. These include three mixed use developments, and a major development with three towers, ranging from 14-25 storeys.

15.112 The proposed new commercial uses, including a new hotel, will provide additional employment space, reflecting forecast demand for additional employment space in the city centre. The additional residential development reflects high levels of demand for urban/city centre living. For both commercial and residential development, these new proposals reflect feedback from property agents that the city continues to provide too little new development to meet underlying demand.

15.113 The additional demand on local services from both the delivery of the Mayfield Masterplan and other committed developments within close proximity, including healthcare education, may put a strain on existing facilities/institutions. However the existing capacity as explored in this assessment and potential for Mayfield to deliver social infrastructure including 'health and

wellbeing; nursery school provision; local services such as banks and post offices; and retail requirements' means that the cumulative impact on healthcare and education is negligible.

15.114 Cumulative effects, given the additional employment space and residential development providing a boost to employment and local expenditure, range from negligible to major beneficial. The cumulative effects for each indicator is detailed in the summary below.

Residual Effects

15.115 The impact of the construction and operation of the Proposed Development on the socio-economic indicators range between minor beneficial and major to moderate beneficial. There are no anticipated significant adverse effects on the socio-economic indicators requiring mitigation measures, therefore the residual effects are consistent with the identified impacts set out in the previous sections.

Summary

15.116 The socio-economic assessment has assessed the likely significant effects of the Proposed Development with respect to the following issues:

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

15.117 The assessment considered the impacts of the Proposed Development during the construction and operational phases to ascertain any requirement or opportunities for incorporating mitigation measures.

15.118 Data has been collected from a range of recognised sources including BRES, ONS, to establish the baseline conditions.

15.119 Table 15.4 summarises the effected of the Proposed Development following mitigation measures and taking residual effects into account.

Table 15.4 Impact Assessment

Receptor	Phase	Residual Effect	Cumulative Effect
Population	*Construction*	Negligible	Negligible
	Operation	Negligible	Minor beneficial
Employment	*Construction*	Moderate beneficial	Moderate beneficial
	Operation	Moderate beneficial	Major beneficial
Local Expenditure	*Construction*	Minor beneficial	Minor beneficial
	Operation	Minor beneficial	Moderate beneficial
Education and training	*Construction*	Minor beneficial	Moderate beneficial
	Operation	Negligible	Negligible

Receptor	Phase	Residual Effect	Cumulative Effect
Healthcare	*Construction*	N/A	N/A
	Operation	Negligible	Negligible
Crime	*Construction*	Negligible	Negligible
	Operation	Minor beneficial	Minor beneficial
Open space, recreation and amenity	*Construction*	Negligible	Negligible
	Operation	Minor beneficial	Moderate beneficial

16 Type 1 Cumulative Effects

Introduction

16.1 This section gives further consideration to 'Type 1' cumulative effects, in response to Mayfield Phase 1.

16.2 The assessment is informed by the results of the technical assessments as set out in Chapters 6-15 of the Environmental Statement.

16.3 Type 1 cumulative effects are also known as 'inter-project' effects, which are the combined effects arising from the development upon a set of defined sensitive receptors.

16.4 Type 2 cumulative effects are considered within the Environmental Statement technical chapters. The technical chapters also had regard to the potential for Type 1 cumulative effects, however for robustness the results of a standalone assessment of these is provided below.

Legislation, Policy and Guidance

Legislation

16.5 There is no legislation outlining how cumulative effects should be assessed or determined as significant. However, there is a requirement in Part 1, Schedule 4 of the EIA Regulations to consider cumulative effects. Cumulative is not defined in the EIA Directive or Regulations however a dictionary definition is *'increasing by one addition after another'.*

16.6 The EIA Regulations require *'a description of the likely significant effects'*, including cumulative effects.

16.7 In the context of this assessment, 'cumulative effects' refers to the interactions between different likely residual effects resulting from the Proposed Development (Type 1). Both positive and negative effects are considered across the construction and operational phases.

Policy

16.8 As this chapter considers the cumulative effects of the technical areas within the Environmental Statement, all relevant policy has already been reviewed within the individual technical chapters.

Guidance

16.9 A number of guidance documents which relate to assessing cumulative effects have been used to inform the assessment and include:

- European Commission (EC) Environment DG (May 1999), 'Study on the Assessment of Indirect and Cumulative Impacts as well as Impact Interaction', Hyder Consulting; and
- Institute of Environmental Management and Assessment (1992), Guidelines for the Environmental Assessment of Road Traffic.

16.10 The EC guidelines *'are not intended to be formal or prescriptive, but are designed to assist EIA practitioners in developing an approach which is appropriate to a project'*.

16.11 Paragraph 24 of the National Planning Practice Guidance (NPPG) (Reference ID: 4-024-20170728) outlines the consideration to be given to cumulative effects in the context of EIA:

"Each application (or request for a screening opinion) should be considered on its own merits. There are occasions, however, when other existing or approved development may be relevant in determining whether significant effects are likely as a consequence of a Proposed Development. The local planning authorities should always have regard to the possible cumulative effects arising from any existing or approved development."

Assessment Methodology and Significance Criteria

Methodology

16.12 This assessment is primarily concerned with where there is a likelihood of significant Type 1 cumulative effects occurring, in accordance with EIA practice and the NPPG guidance.

16.13 The assessment is based on experience and professional judgement, drawing upon relevant guidance set out above and the residual environmental effects identified within the results of the EIA technical assessments. The assessment has been undertaken by suitably qualified and experienced EIA practitioners.

16.14 The assessment has primarily focused on sensitive receptors identified within close proximity to the Site (e.g. local residents and businesses located in close proximity to the Site), likely cumulative effects, and their capacity to accommodate changes that will occur as a result of the combined residual environmental effects.

16.15 Relevant guidance has been reviewed, and an approach has been developed which uses the residual environmental effects identified within the Environmental Statement and this ES Addendum. An exercise which tabulates the residual effects against receptors or receptor groups has then been carried out in order to identify the potential for Type 1 cumulative effects.

16.16 Negligible or neutral residual effects have been excluded from the assessment as, by their nature, they are considered to be imperceptible. Therefore, only minor, moderate or major effects have been given consideration during the assessment.

16.17 For the purposes of the assessment, receptor groups have been identified as those surrounding the Site and those identified within the individual technical assessments.

Significance Criteria

16.18 The following terms have been used to define the significance of the effects identified:

- **Major effect**: where the Proposed Development could be expected to have a very significant effect (either positive or negative) cumulatively;
- **Moderate effect:** where the Proposed Development could be expected to have a noticeable effect (either positive or negative) cumulatively;
- **Minor effect**: where the Proposed Development could be expected to result in a small, barely noticeable effect (either positive or negative) cumulatively; and
- **Negligible**: where no discernible effect is expected as a result of the Proposed Development cumulatively.

16.19 The significance level attributed to each effect has been assessed based on the magnitude of change due to the combination of residual effects and the sensitivity of the affected receptor/receiving environment to change, as outlined in Chapter 2 of the Environmental Statement. Magnitude of change is assessed on a scale of major, moderate, minor and negligible and the sensitivity of the affected receptor/receiving environment is assessed on a scale of high, moderate, low and negligible.

Limitations and Assumptions

16.20 Due to the reliance on qualitative data and subjective opinion, there are limitations related to the range and depth in which the cumulative effects have been investigated. It must be realised that analysing the cumulative effects of developments is often speculative and cannot be predicted as clearly as individual effects such as the effects upon traffic of a development, which relies heavily upon quantitative data to inform the assessment.

16.21 As a result, a number of assumptions have been made throughout in terms of the outcome of the accumulation of effects and based upon professional judgement. This section and the assessment process of identifying the likely significant Type 1 cumulative effects have, however, provided a reasoned consideration of and insight into the potentially significant Type 1 cumulative effects of the Proposed Development.

Identification of Likely Significant Type 1 Cumulative Effects

16.22 Based on the methodology detailed above, Table 16.1 presents the results of the review of the potential for interactions of individual effects during the construction and operational phases of development. The potential effect interactions are then discussed further. As there are a limited amount of cumulative developments that could create Type 1 Cumulative Effects, many of the effects are generated by the cumulative impact of delivering Application 1 and 2.

16.23 Cumulative effects associated with the delivery of the SRF have been set out where relevant.

Table 16.1: Type 1 Cumulative Effects – Construction Phase

Sensitive Receptor Group	Construction Phase Residual Effects	Likely Significant Type 1 Cumulative Effects
Neighbouring residential properties during construction of Mayfield Phase 1.	Moderate adverse (temporary) noise impacts associated with construction activity of all phases on Piccadilly Point. Moderate (temporary) vibration impacts associated with construction activity construction activity of all phases on Piccadilly Point. Migration of ground gas and dust during construction works.	Temporary in-combination effects of noise and vibration. Moderate adverse, temporary (not significant).
Neighbouring commercial properties and commercial properties within the Site during partial occupation scenario.	Negligible to Minor adverse (temporary) noise impact. Negligible to Minor adverse (temporary) vibration impact. Negligible to Minor adverse impact of road traffic noise (temporary).	Temporary in-combination effects of noise and vibration. Minor adverse, temporary (not significant).
Local highway, public transport, pedestrian and cycle networks	Minor adverse effects on local streets and minor effects on key route network roads. Minor adverse effects on	

Sensitive Receptor Group	Construction Phase Residual Effects	Likely Significant Type 1 Cumulative Effects
	pedestrians crossing local network.	
Water resources (River Medlock) and other utilities and infrastructure	Moderate beneficial effects on River Medlock through removal of heavily engineered banks to create a naturalised River Medlock and aquatic species. Minor adverse effects generated by airborne dust and pollution through delivery of building plots (temporary). Negligible effect resulting from spread of invasive species. Minor adverse effect from increased sediment loads. Minor adverse effect from accidental release of hazardous materials and hydrocarbons. Negligible effect on water services.	Moderate beneficial effect through habitat creation, with adverse impacts mitigated to non-significant levels.
Ecological receptors on and off site	Negligible impacts associated with impact on bat and bird roosts through deconstruction of roosts, air borne dust and lighting following mitigation.	No significant effects anticipated.
Local Socio-Economic Conditions	Moderate beneficial effects associated with employment. Minor beneficial effects associated with local expenditure. Minor beneficial effects associated with anticipated benefits of education and training. Moderate beneficial effect associated with the delivery of the park on open space, amenity and recreation.	Minor to Moderate beneficial effect associated with local socio-economic conditions.
Human health	Minor adverse effect (temporary) on construction workers resulting from contaminant pathways and	Negligible to minor adverse effect (non-significant).

Sensitive Receptor Group	Construction Phase Residual Effects	Likely Significant Type 1 Cumulative Effects
	ground gas migration. Minor adverse effect (temporary) on off-site public through inhalation of dust and migration of ground gas. Negligible effect on construction workers due to flood risk.	

16.24 Table 16.1 shows that there is the potential for in-combination construction phase Type 1 cumulative effects to arise in relation to the following receptor groups:

- Neighbouring residential properties;
- Commercial properties within the Site;
- Human health;
- Ecological receptors; and
- Local socio-economic conditions.

16.25 Individual residual effects with the potential to give rise to a significant Type 1 cumulative effect are predominantly expected to relate to the interaction between temporary adverse noise and vibration (nuisance) impacts. Positive socio-economic cumulative impacts are also expected to arise during the construction phase.

16.26 The combined noise and vibration effects are not considered likely to pose a significant risk to health or wellbeing due to the use of best practice construction measures and the temporary, phased nature of the works. Migration of ground gas and breaking up of pathways should also reduce any potentially significant adverse effects to a non-significant level.

16.27 The adverse Type 1 cumulative effect arising from the interaction of noise and vibration impacts would occur throughout the construction phase, however as the works and phasing progress then the location and severity of the cumulative effect will be varied in magnitude and duration. The most sensitive receptors are considered to be the residents of nearby residential properties to the north and west.

16.28 Although the potential for a Type 1 cumulative effect arising from noise and vibration impacts has been identified, this will be temporary and limited to certain elements of the construction phase. The identified effect is typical of an urban construction project, and the Environmental Statement has identified a number of key mitigation measures to be employed during the construction phase to mitigate and minimise construction impacts. These mitigation measures are expected to be secured by a CEMP which is standard construction best practice, to be agreed between the Applicant and Manchester City Council prior to commencement of development and secured as a planning condition.

16.29 The in-combination effect of the identified beneficial employment and expenditure effects are considered to be moderate beneficial, albeit temporary, across the construction phase.

Operational Phase

16.30 Based on the methodology detailed above, Table 16.2 presents the results of the review of the potential for interactions of individual effects during the operational phase of development. The potential effect interactions are then discussed further.

Table 16.2: Type 1 Cumulative Effects – Operational Phase

Sensitive Receptor Group	Relevant Operational Phase Residual Effects	Likely Significant Type 1 Cumulative Effects
Neighbouring residential properties once Phase 1 complete	Negligible plant noise egress from Baring Street Office 1 and 2. Minor adverse effects associated with loss of daylight and sunlight.	None.
Local highway, public transport, pedestrian and cycle networks on Phase 1 complete	Minor adverse effects on local streets and minor effects on key route network roads. Minor adverse effects on pedestrians crossing local network.	Minor adverse impact on local highway network as a result of increased traffic flows.
Public transport networks	Moderate adverse effect associated with additional demand on public transport network.	Moderate adverse effect on public transport network associated with increased public transport trips.
Water resources (River Medlock and groundwater) and other utilities and infrastructure	Moderate beneficial effect associated with river naturalisation. Minor beneficial effect associated with controlling leachates from onsite made ground. Negligible impact on potable water supply following mitigation measures.	Moderate beneficial effect on water resources.
Ecological receptors on site	Moderate beneficial effects on biodiversity in terms of both flora and fauna associated with delivery of varied habitats through Mayfield Park, including River Medlock naturalisation. Minor beneficial effect associated with remediation on site restricting phytotoxic metals or spillage associated with car use or waste collection.	Moderate beneficial effects on ecological receptors.
Local socio-economic conditions	Major beneficial effects associated with employment. Moderate beneficial effects	Minor to major beneficial effects on local socio-economic conditions.

Sensitive Receptor Group	Relevant Operational Phase Residual Effects	Likely Significant Type 1 Cumulative Effects
	associated with local expenditure. Minor beneficial effects associated with anticipated reduction in crime. Moderate beneficial effect associated with the delivery of the park on open space, amenity and recreation.	
End users and visitors of the site	Moderate beneficial effects associated with removal of all pathway linkages, gas protection measures and clean trenches for water supply pipes. Negligible effects associated with flood risk on end users. Negligible to minor adverse effects associated with wind speeds in localised areas. Minor beneficial effects on townscape and visual impact receptors.	Overall moderate beneficial impacts on end users and visitors to the Site.

16.31 Table 16.2 shows that there is the potential for in-combination operational phase Type 1 cumulative effects to arise in relation to the following receptor groups:

- Local highway, public transport, pedestrian and cycle networks;
- Public transport networks;
- Water resources (River Medlock and groundwater) and other utilities and infrastructure;
- Ecological receptors on site;
- Local socio-economic conditions; and
- End users and visitors of the site.

16.32 The interaction between residual traffic, air quality and noise effects of the proposals on existing residents and the local highway network is expected to give rise to adverse cumulative effects. However, it is not likely that one typical effect can be concluded, and a range of cumulative effects might be expected as shown in Table 16.2A. Similarly, these adverse effects are not anticipated to be significant.

16.33 The chapters prepared in relation to ground conditions, water resources, socio-economic and ecology have identified a range of benefits that are expected to arise. Key beneficial effects are brought about by the comprehensive remediation of the site and ground gas mitigation, naturalisation of the River Medlock, significant habitat creation and significant job creation resulting from the Phase 1 development.

16.34 The receptors would include those in the local area, and potentially also in the wider sub-regional area. The extent and magnitude of these cumulative effects would again be expected to vary as in Table 16.2, though it is noted that the majority of effects identified will be positive and are expected to have a significant beneficial cumulative socio-economic effect on the local area.

Mitigation Measures

16.35 Where relevant, the individual residual effects which contribute to the potential cumulation have been considered within the ES and mitigated where necessary and feasible.

16.36 Given that there are no adverse Type 1 cumulative effects generated as a result of the Proposed Development, no mitigation is proposed for the identified Type 1 cumulative effects.

17 Summary of Residual Effects

Introduction

17.1 This chapter summarises the mitigation measures that will be employed during the Proposed Development, as described in Chapter 3, Site and Development Description.

17.2 Mitigation measures will be employed in order to mitigate and minimise adverse environmental effects. Further detail on these mitigation methods can be found in the technical chapters of the ES (6-15).

Legislation, Policy and Guidance

Regulatory Requirement

17.3 The requirement for mitigation measures is specified in Schedule 4, Part 1 (5) of the EIA Regulations, which states that Environmental Statements should include:

"a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment."

Approach to Mitigation

17.4 The legislation does not specifically outline how mitigation measures should be incorporated into an EIA. Nonetheless, mitigation measures form an integral part of the EIA process. This is illustrated by the International Association for Impact Assessment's definition of EIA as:

"the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made."[64]

17.5 Mitigation itself is defined by the United Nations Environment Programme (UNEP) as:

"the measures that are necessary to avoid, minimise or offset predicted adverse impacts and, where appropriate, to incorporate these into an environmental management plan or system."[65]

17.6 In approaching mitigation, best practice guidance suggests a hierarchical approach. The UNEP EIA Training Resource Manual (2002) advises that impacts should ideally be:

- Avoided; if not
- Minimised; and/or
- Compensated.

Planning Policy

17.7 This chapter considers policy relating to the mitigation of impacts from the Proposed Development. It should be read in conjunction with technical chapters 7 - 15, where planning policy at the national, regional, county and local level is discussed in greater detail for each topic.

[64] International Association for Impact Assessment (1999), *Principles of Environmental Impact Assessment Best Practice*
[65] United Nations Environment Programme (2002), *EIA Training Resource Manual, Topic 7 – Mitigation and impact management*

17.8 Paragraph 152 of the National Planning Policy Framework (NPPF) also outlines a hierarchical approach to mitigating effects:

"Significant adverse impacts on any of... [the economic, social and environmental]... dimensions should be avoided and, wherever possible, alternative options which reduce or eliminate such impacts should be pursued. Where adverse impacts are unavoidable, measures to mitigate the impact should be considered. Where adequate mitigation measures are not possible, compensatory measures may be appropriate."

Planning Guidance

17.9 The National Planning Practice Guidance does not provide specific advice regarding approaches to mitigation, however Paragraph 4 (Reference ID: 6-004-20140612), '*How can adaptation and mitigation approaches be integrated?'*, suggests particular attention be paid:

"to integrating adaptation and mitigation approaches and looking for 'win-win' solutions that will support sustainable development... Environmental Impact Assessment can be a useful (sic) for testing the integration of mitigation and adaptation measures and the long term implications of decisions."

Mitigation and Enhancement by Design

17.10 The EIA process has played a key part in the evolution of the design for the Proposed Development, as discussed in Chapter 4, Alternatives and Design Evolution, of the ES. This has resulted in various features built into the design acting as inherent mitigation and enhancement measures. This includes:

- Provision for community and retail facilities;
- Improved pedestrian infrastructure, and cycle parking facilities on-site;
- Enhancement of biodiversity through sensitive landscaping, creation of new public space;
- Ecological enhancements, including bird boxes and habitat for invertebrates;
- Design of the buildings to minimise visual impact and appropriately relate to the historic and wider contexts;
- Concentrating heights in less sensitive areas of the Site; and
- Inclusion of strategic landscaping in order to minimise wind microclimate effects.

Specific Mitigation Measures

17.11 Notwithstanding the above efforts to minimise the effects of the Proposed Development on environmental receptors, some adverse effects are anticipated during the construction and operational phases of the scheme.

17.12 Detailed descriptions of the likely significant effects, both beneficial and adverse, of the Proposed Development are discussed in greater detail in the technical chapters of the ES (7 - 15). The methods and controls for mitigating adverse environmental effects are also described in detail within the ES technical chapters.

17.13 The Mitigation Schedule in Table 17.1 overleaf summarises the likely significant effects of the Proposed Development prior to mitigation being implemented, mitigation measures that will be taken to minimise any significant adverse effects, and the residual effects following mitigation.

17.14 It is anticipated these controls could be secured through the submission of details to the local authority, or alternatively by appropriate planning conditions or obligations.

Table 17.1: Residual Effects

Chapter	Phase	Likely Significant Effect	Mitigation Measure	Residual Effect
Chapter 6 – Noise and Vibration	*Construction*	Construction noise to residents at Piccadilly Place during earthworks and concreting Construction noise to residents at Piccadilly Place during piling Construction noise to residents at Piccadilly Place during main build Construction vibration – earthworks - to residents at Piccadilly Place	Use of Best Practicable Means, in line with recommendations set out in Section 8 of BS 5228-1:2009+A1:2014.	**Moderate adverse, (temporary)**
	Operation	None	None required – designed-in mitigation	**Negligible**
Chapter 7 – Transport	*Construction*	Construction Impact on all road users	CMP should be implemented and secured through appropriate planning condition	**Negligible**
	Operation	Traffic Impact on all Road Users - severance, pedestrian and cycle delay, pedestrian and cycle amenity, driver delay and accidents and safety	Implementation of the Travel Plan initiatives to reduce car movements	**Negligible**
Chapter 8 – Air Quality	*Construction*	Major adverse effect Nuisance from dust deposition and impact from elevated PM10 concentrations on human health	Best practice mitigation measures for controlling dust/emissions during construction as detailed in Appendix 8-3	**Negligible**
	Operation	Changes in pollutant concentration owing to emissions from operational traffic generated by the development.	Implementation of a travel plan to reduce reliance on car and increases in number of EV charging points.	**Minor Adverse**
Chapter 9 – Ecology	*Construction*	Loss of habitat	Creation of ecologically valuable habitat within the Mayfield Park by incorporating native and species diverse pollinator planting, replacement brownfield habitat and tree planting across the park.	**Negligible**
		Damage of habitats from pollution	Airborne dust, siltation and pollution caused by run-off, spread of invasive species and management of demolition waste and construction materials will be controlled and managed in keeping with national guidelines, following recommendations made in Chapters 5, 8 and 11 of this	**Negligible**

Chapter	Phase	Likely Significant Effect	Mitigation Measure	Residual Effect
			ES and in the CEMP, to avoid damage of retained habitats on site, habitats created ahead of construction completion and habitats beyond the site boundary.	
		Disturbance by noise/vibration and lighting	Noise and lighting will be managed in keeping with national and local guidelines following recommendations made in Chapter 6 of this ES and in the CEMP, to avoid as much as possible, disturbance beyond the development site boundary.	**Negligible**
		Disturbance by noise/vibration and lighting	Noise and lighting will be managed in keeping with national guidelines, following recommendations made in Chapter 6 of this ES and in the CEMP, to avoid as much as possible, disturbance to fauna of conservation value retained within or adjacent to the development site boundary.	**Negligible**
		Killing, injury or disturbance of individual bats, and damage or destruction of their roosts.	Prevention of an offence under legislation due to destruction of bat roosts for Phase 1 will be ensured by the production of a European Protected Species licence from Natural England. Methods of demolition and removal of any bats in-situ during demolition as well as provision of compensatory habitat replacement will be detailed within this document or a relevant Methods Statement.	**Negligible**
		Killing and injury of birds, and destruction of active nests	Avoidance of harm to birds, their nests and young to prevent an offence under legislation, will be ensured through following the recommendations outlined in the Chapter which will be detailed in the CEMP.	**Negligible**
	Operation	Impacts from noise, human disturbance and lighting	A detailed lighting plan will be prepared for Mayfield Park and each plot to minimise impacts from external and obtrusive light spill on adjacent sensitive habitats. No other specific measures – impacts assessed as negligible.	**Negligible**
		Habitat creation and enhancement	Incorporation of a range of soft landscaping across the Mayfield Park area including wildflower grassland wetland and marginal planting,	**Moderate Beneficial**

Chapter	Phase	Likely Significant Effect	Mitigation Measure	Residual Effect
			brownfield terracing, native trees and shrub planting.	
Chapter 10 – Ground Conditions	*Construction*	Adverse effects caused by: Contamination in Made Ground to construction workers.	Appropriate hazard identification during works. Tool Box Talks during site induction regarding ground conditions. The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately	**Minor Adverse**
		Exposure of preferential pathways for vertical migration of contaminants to construction workers.	Avoid deep excavations as far as is reasonably practicable. Temporary drainage measures should be provided to prevent the generation of surface water run-off and potential migration of contaminants; Stockpiling of contaminated materials, if any, should be avoided if possible and any such stockpiles should be covered when not in use. Drainage from the stockpiles should be managed to prevent the generation of contaminated run-off	**Negligible**
		Ground gas to construction workers.	Adequate gas monitoring where required. Avoidance of the creation of confined spaces, or where this is not possible, appropriate controls on entry into confined spaces	**Negligible**
		Dust to off site receptors.	Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site	**Minor Adverse**
		Pollution from hazardous materials	Implementation of pollution control measures for the storage of hazardous materials and spillage containment	**Minor Adverse**
		Pollution from fuel	Containment of fuel and / or chemicals within suitably bunded storage areas; Refuelling and washing down of plant and equipment in contact with contaminated materials in suitably bunded and controlled areas	**Negligible**

Chapter	Phase	Likely Significant Effect	Mitigation Measure	Residual Effect
		Asbestos Containing Materials (ACM)	The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately. Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site. Implementation of pollution control measures for the storage & removal of ACM.	**Minor Adverse**
	Operation	Adverse effects caused by: Contamination in Made Ground	Appropriate hazard identification during works. Tool Box Talks during site induction regarding ground conditions. The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately	**Minor Adverse**
		Exposure of preferential pathways for vertical migration of contaminants	Avoid deep excavations as far as is reasonably practicable. Temporary drainage measures should be provided to prevent the generation of surface water run-off and potential migration of contaminants; Stockpiling of contaminated materials, if any, should be avoided if possible and any such stockpiles should be covered when not in use. Drainage from the stockpiles should be managed to prevent the generation of contaminated run-off	**Negligible**
		Ground gas	Adequate gas monitoring where required. Avoidance of the creation of confined spaces, or where this is not possible, appropriate controls on entry into confined spaces	**Negligible**
		Dust	Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site	**Minor Adverse**

Chapter	Phase	Likely Significant Effect	Mitigation Measure	Residual Effect
		Pollution from hazardous materials	Implementation of pollution control measures for the storage of hazardous materials and spillage containment	**Minor Adverse**
		Pollution from fuel	Containment of fuel and / or chemicals within suitably bunded storage areas; Refuelling and washing down of plant and equipment in contact with contaminated materials in suitably bunded and controlled areas	**Negligible**
		Asbestos Containing Materials (ACM)	The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately. Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site. Implementation of pollution control measures for the storage & removal of ACM.	**Minor Adverse**
Chapter 11 – Water Resources	*Construction*	Accidental release of hydrocarbons and hazardous materials. Leak or breakage of the temporary sewerage system. Direct pollution and / or disturbance from in river works and increased sediment loads. Increased water demand during the construction period Flood risk to site workers (from groundwater, surface water, and fluvial flooding from the River Medlock)	Implementation of CEMP that considers mitigation in relation to capturing run off, incorporation of receptors, provision of storage facilities, cesspits, sewage tanking, dust suppression, selection of equipment amongst other mitigation measures.	**Minor Adverse**
	Operation	Pollutants contained in surface water. River naturalisation. Increased flood risk through change to runoff rates. Increased foul water drainage demand and increased potable water demand.	Early engagement with UU on the potable water needs for each plot, and any current restrictions and the need for any upgrades. Water efficiency measures that will reduce potable demand and subsequent foul flows including one or more of the following:	**Minor Beneficial**

Chapter	Phase	Likely Significant Effect	Mitigation Measure	Residual Effect
		Flood risk to site users.	- Low flow fittings: low flush toilets, spray taps and low flow showers, if necessary; - Efficient water supply: Leak detection, smart meters and pressure reduction; and - Water from alternative sources: greywater recycling and rainwater harvesting. The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer.	
Chapter 12 – Wind Microclimate	*Construction*	None	N/a	
	Operation	None following designed in mitigation measures.	Tree planting and porous screens as in-built mitigation measure.	**Minor adverse to minor beneficial.**
Chapter 13 – Daylight, Sunlight and Overshadowing	*Construction*	None	N/a	**Negligible**
	Operation	None – minor (non-significant impacts only)	N/a	**Minor adverse**
Chapter 14 – Townscape and Visual Impact	*Construction*	None – minor adverse impact	Hoardings on construction site.	**Minor Adverse**
	Operation	None – minor beneficial impact	N/a	**Minor Beneficial.**
Chapter 15 – Socio Economic	*Construction*	Negligible to moderate beneficial generated through local expenditure, education and training.	N/a – non-significant effect.	**Moderate Beneficial**
	Operation	Minor adverse to major beneficial impact through education, open space, employment and	N/a - no significant effect.	**Minor adverse to major beneficial.**

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Real Estate

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