Deloitte.



Plot H, Sister – Manchester

EIA Screening and Scoping Report

November 2025

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1 Introduction

1.1 This Environmental Impact Assessment (EIA) Screening and Scoping Report (the "Report") has been prepared in respect of the redevelopment of Plot H of the Sister innovation district for a purpose built student accommodation ("PBSA") led development ("the Proposed Development").

1.2 Plot H falls within Zone H of the ID Manchester Strategic Regeneration Framework (2023) ('the SRF') and will be hereby referred to solely as Plot H. ID Manchester has since been rebranded as 'Sister', however reference is made to 'ID Manchester' and 'IDM' throughout this report given the historic use of this terming and the SRF naming. The Sister innovation district is transforming the former UMIST campus in Manchester city centre, bringing new offices, homes, leisure, community uses, and public realm to the city.

1.3 The Applicants are RG Real Estate Ltd, ID Manchester Ltd and the University of Manchester ('the Applicants'). ID Manchester Ltd is a joint venture between Bruntwood SciTech Ltd and the University of Manchester, formed to deliver Sister.

1.4 This Report is submitted to request that Manchester City Council ("MCC") as Local Planning Authority ("LPA") adopt a Scoping Opinion under Regulation 15 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ("the EIA Regulations"). In accordance with Regulation 15, paragraph 2, this Report contains:

- A plan sufficient to identify the land (included at Appendix 1);
- A brief description of the nature and purpose of the Proposed Development
- An explanation of the likely significant effects of the development on the environment; and
- Other supporting information considered relevant to the LPA in adopting a robust Scoping Opinion.

EIA Requirements

1.5 The EIA process is the mechanism by which development proposals are appraised in terms of environmental criteria, in addition to socio-economic, engineering, and technical considerations. The EIA process defines the context of the Proposed Development and examines the issues considered relevant to the proposals.

1.6 The purpose of the EIA is to establish the nature of the development and the environment in which it is likely to take place, to identify likely significant effects on the environment that may arise by comparing the existing situation at the start of the work (baseline) with the situation once the proposals are in place.

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

1.8 The Proposed Development falls under the category of "Infrastructure Projects – Urban Development Projects" (Schedule 2, 10, (b)) as described in the Regulations. The applicable thresholds above which EIA is likely to be required are: (i) the development includes more than 1 hectare of urban development which is not dwellinghouse development; or (ii) the development includes more than 150 dwellings; or (iii) the overall area of the development exceeds 5 hectares.

1.9 The indicative thresholds and criteria state that:

> *"In addition to the physical scale of such developments, consideration should be given to the potential increase in traffic, emissions and noise. EIA is unlikely to be required for the redevelopment of land unless the new development is on a significantly greater scale than the previous use, or the types of impact are of a markedly different nature or there is a high level of contamination".* (Annex: Indicative Screening Thresholds (2015), Planning Practice Guidance: Environmental Impact Assessment)

1.10 The Site covers an area of approximately 0.742 ha. The Proposed Development will result in development that is of significantly greater scale and is anticipated to lead to a greater amount and intensity of environmental impacts than the existing use of the site. We consider that this exceeds the threshold in relation to parts (i) listed in Schedule 2, 10, (b) of the Regulations. The Site also forms part of a larger redevelopment, the IDM masterplan, which is relevant to the requirement of an EIA. An EIA is therefore considered appropriate to test the likely significant effects of the Proposed Development.

Purpose of the EIA Screening and Scoping Report

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

1.12 Regulation 15 of the EIA Regulations (2017) sets out the process for obtaining a Scoping Opinion from the relevant planning authority.

1.13 This Scoping Report sets out the approach taken to the topic areas and information that would be contained within the Environmental Statement ('ES'). Statutory consultees are invited to express their views on the proposed scope of the EIA or suggest additional issues which may be considered to be of significance. The views expressed by statutory consultees will then be used by the LPA to inform the formal EIA Screening and Scoping Opinion, in accordance with Regulation 15(4).

1.14 The LPA is requested to respond to the formal request for an EIA Screening and Scoping Opinion within five weeks of registering receipt.

Structure of this Report

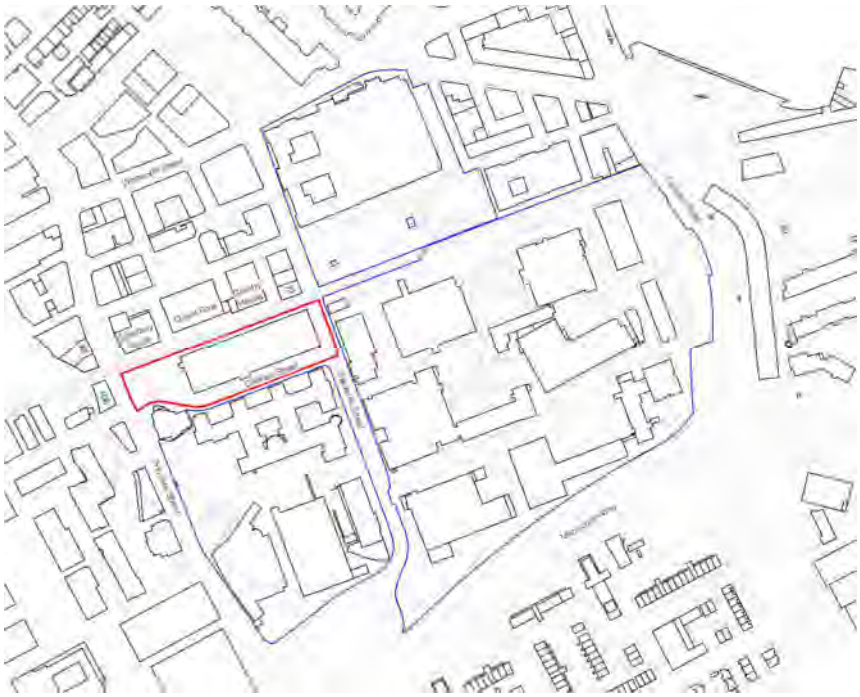
- Chapter 2 and 3 of this Report provide a site description and outline the nature of the Proposed Development.
- Chapter 4 sets out the proposed approach and methodology that an ES would take and who might need to be consulted.
- Chapter 5 provides details of those environmental disciplines to be scoped out of the EIA.
- Chapter 6 sets out the key issues that would be addressed by the EIA.

2 Site Description

Site Location

2.1 The Site is located in Manchester City Centre. It forms the north-western corner of the former UMIST Campus. The Site is bound by Charles Street to the south, Manchester South Junction and Altrincham Railway Viaduct and Granby Row to the north, Sackville Street to the east and Princess Street to the west. The Site is identified on the Figure 2.1 below as well as Appendix 1.

Figure 2.1 – Site Location Plan (source: hodder+partners)



Surrounding Land Uses

2.2 Land to north and northwest, beyond the viaduct arches on Granby Row, comprises the following residential buildings: Uncle; Granby House; and Salisbury House. Land to the north-east comprises green public space at Vimto Park and the now vacant Sackville Building, which also form part of the Sister masterplan.

2.3 To the east lies the Paper Science Building and Renold Building and, beyond Renold, Plot C for which planning applications have been recently submitted for a commercial development and new civic square. Renold Building has recently undergone works to re-activate the building for commercial uses and collaboration spaces related to Sister. Further north-east lies Piccadilly Station, Manchester's primary rail hub.

2.4 Land to the south comprises IQ Weston Hall which is a PBSA building adjoining the Pendulum Hotel and Manchester Conference Centre. This site is subject to proposals for redevelopment. An ibis hotel is located to the southwest of the site.

2.5 The southern boundary of the SRF Area is the Mancunian Way, beyond which lies the predominantly residential areas of Ardwick, Brunswick, and Hulme.

Site Description

Site Area and Topography

2.6 The Site extends to circa 0.742ha.

Existing Buildings, Structures and Spaces

2.7 The Site principally was used as a multi-storey car park which closed in October 2024 as it was at the end of its economic life and no longer in a condition fit for purpose.

2.8 The building also accommodates three ancillary commercial uses (2 x retail (Use class E) and 1 x Sui Generis Bar), all of which are now vacant.

2.9 There is evidence of anti-social behaviour at the Site with the existing car park subject to vandalism and graffiti.

2.10 The existing structures (multi-storey car park and ancillary commercial uses) are the subject of a planning application for their demolition (143741/FO/2025). This application is expected to be determined in early December 2025.

Trees

2.11 There are 11 trees on Site. Of these 6 are in B2 category, which is characterised by moderate quality and value, and 5 in C1 category, which is characterised by low quality and value. For completeness, all category B2 trees are to be retained and protected during the works. The application will be accompanied by a Tree Survey (Appendix 9).

Access and Topography

2.12 The Site is currently accessed via Charles Street from the south which runs between Princess Street and Sackville Street. Access to the Site is also via Sackville Street from the east.

2.13 There is a difference in level change of 3m across the Site from Sackville Street in the east to Princess Street in the west

Connectivity

2.14 The Site is in a highly accessible location in Manchester City Centre and enjoys a range of excellent transport links and proximity to similar and necessary establishments. Numerous bus and tram stops are located along the Oxford Road Corridor, as well as railway stations, providing further sustainable transport options, all conveniently close to the Site. Access to the inner ring road by private car is immediately south of the Site. See below for accessibility breakdown by sustainable transport modes.

Rail

2.15 Manchester Piccadilly is located just over 355m away from the Site, meaning access to the wider city region and major cities such as London and Birmingham are situated only a seven-minute walk away. 310m to the west of the Site is Manchester Oxford Road, another key transport link offering commuters access to the wider city region, and UK towns and cities

such as Liverpool, Leeds, and Birmingham. There are several pedestrian routes connecting commuters from Oxford Road Station to the Site, all of which are between 7 to 9 minutes.

Metrolink

2.16 Piccadilly Station Tram Stop, a 10 -minute walk away from the Site offers multiple services taking commuters from the centre of Manchester to a variety of towns and neighbourhoods across the City Region, including Eccles, Ashton-under-Lyne, Altrincham and Bury.

Bus

2.17 Bus routes also run along Charles Street, Sackville Street, Whitworth Street, London Road and Oxford Road. There is a BeeWay off-road cycleway on London Road, and bus stops adjacent to the Site on Sackville Street in both directions. The Site has a GMAL (measure of public transport accessibility) of 8, which is the highest possible score.

2.18 Manchester's Free Bus is a free of charge bus service linking all the main destinations across Manchester City Centre. The nearest Free Bus stop from the Site is 6 mins away at Palace Theatre. Free Bus buses are accessible by users with disabilities and run on a 10-minute daytime frequency. The Free Bus service covers most of the City Centre and provides convenient access to major activity centres in the City. In particular, it completes the City's integrated public transport service and gives the Site quick and convenient public transport connections to all mainline railway stations, principal car parks and retail centres.

2.19 Manchester Coach station is an 8-minute walk away from the Site, offering national and regional services at affordable prices.

Walking

2.20 The Site benefits from excellent pedestrian connectivity, with readily accessible transport infrastructure and a range of amenities within comfortable walking distance.

2.21 The Site's adjacency to academic institutions around Oxford Road is ideal for students residing at the Proposed Development. The presence of numerous green spaces, including Sackville Gardens and Vimto Park, contributes to a pleasant and healthy living environment.

Site Specific Environmental Designations

Air Quality

2.22 The Site is located within the Greater Manchester Air Quality Management Area (AQMA), referring to an area where air pollution levels are, or are likely to, exceed national air quality objectives. This means that the NO2 is monitored, and the local authority has a strategy in place to manage and improve air quality in these areas.

Ecology

2.23 There are no Sites of Special Scientific interest or Special Areas of Conservation ('SAC') located on or immediately adjacent to the Site. The closest, the Rochdale Canal SAC designation is 5.4km to the north-east of the Site. Two Special Biological Interest ('SBI') are located within 2 km of the Site.

2.24 Although there are protected and notable flora and fauna and other species within Central Manchester (where the Site is located), however there are no records of such species on the Site.

2.25 The Site is largely hard standing with small areas of overgrown vegetation which are of negligible ecological importance. As noted within the Ecological Impact Assessment report (Appendix 5), the Site is of negligible ecological importance for bats and no suitable bat roosting features were recorded. No evidence of other protected species has been found on the Site either.

Flood Risk and Drainage

2.26 According to The UK Governments Flood Map (Figure 2.2), the Site is located within Flood Zone 2 defined as having a medium probability of flooding, meaning there is between a 0.1% and 1% annual probability of river or sea flooding.

2.27 As with the majority of the Regional Centre, the Site is located within the Conurbation Core Critical Drainage Area, as defined in the Manchester, Salford, Trafford Strategic Flood Risk Assessment (SFRA).

Figure 2.2 – UK Government Flood Map



Heritage

2.28 While the Site is not located within a Conservation Area, the Site's northern boundary abuts the Whitworth Street Conservation Area. George Street Conservation Area is located 430m to the north-west of the Site and Deansgate/Peter Steet Conservation Area is located 484m to the north-west of the Site.

2.29 Whilst the Site does not contain any heritage assets, it is within the immediate setting of the Grade II listed Manchester and Altrincham Railway Viaduct and Grade II listed buildings along Granby Row, all located to the north.

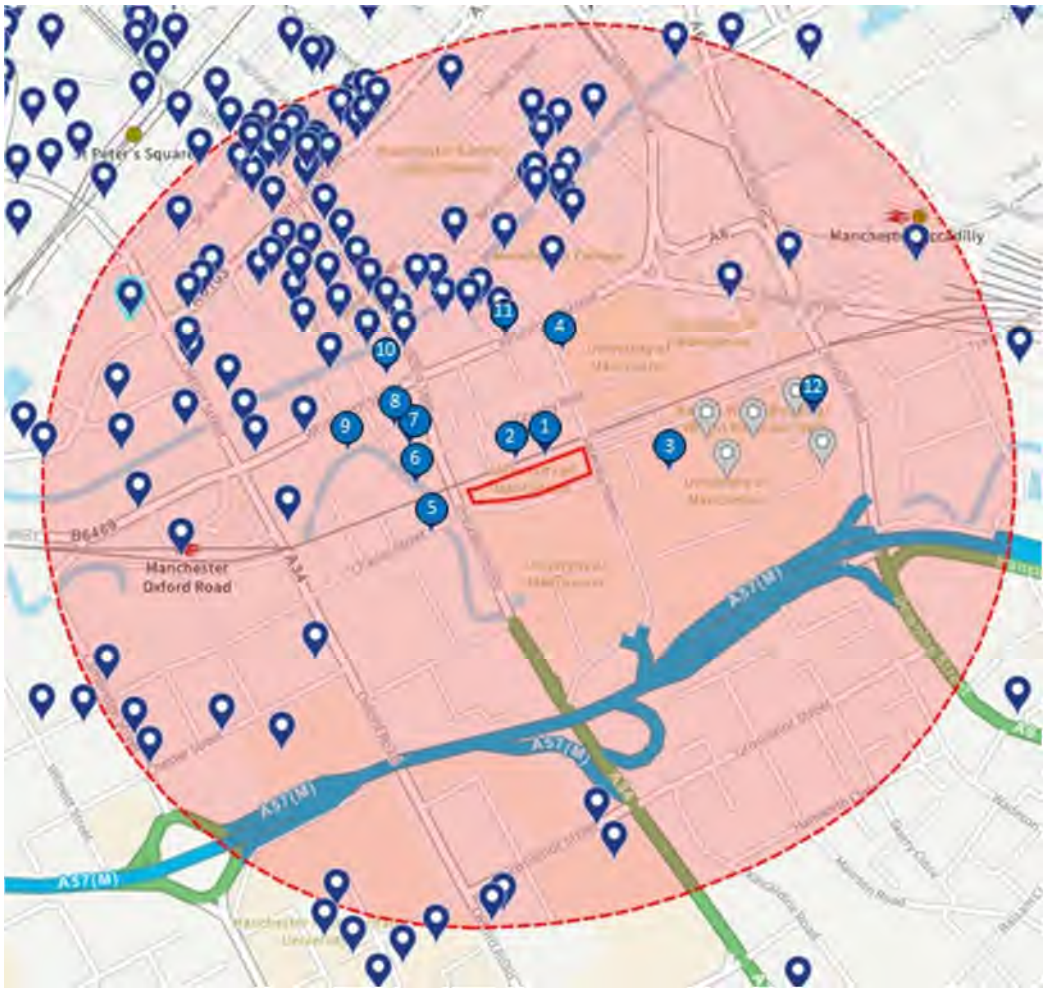
2.30 The Renold Building, located east of the Site has recently been Grade II listed.

2.31 There are 101 listed buildings located within 500m of the Site (see Figure 2.3), with the following in the immediate vicinity in order of distance from the Site:

Table 2.1: Surrounding listed buildings

Map No.	Location	Grade	List Entry Number
1	Granby House	II	1218253
2	Orient House	II	1200838
3	Renold Building, UMIST Campus	II	1491623
4	Institute Of Science and Technology	II	1247609
5	Lass O Gowrie Public House	II	1293175
6	Manchester House	II	1270897
7	Asia House	II*	1247432
8	Lancaster House	II*	1254887
9	India House (Including Attached Wrought Iron Gateway Linked to Lancaster House)	II*	1254836
10	Central House	II	1247389
11	Regency House with Barclays Bank	II	1254835
12	Sculptural Wall	II	1400857

Figure 2.3 – Historic England Listed Asset Map



Planning Policy Allocations and Strategic Frameworks

2.32 The Site is located within Manchester City Centre and Greater Manchester Regional Centre, as defined by the 2012 Manchester Core Strategy Proposals Map, as well as Policy JP-Strat2 (City Centre) of Places for Everyone (2024). The City Centre (Core Strategy CC1) is identified

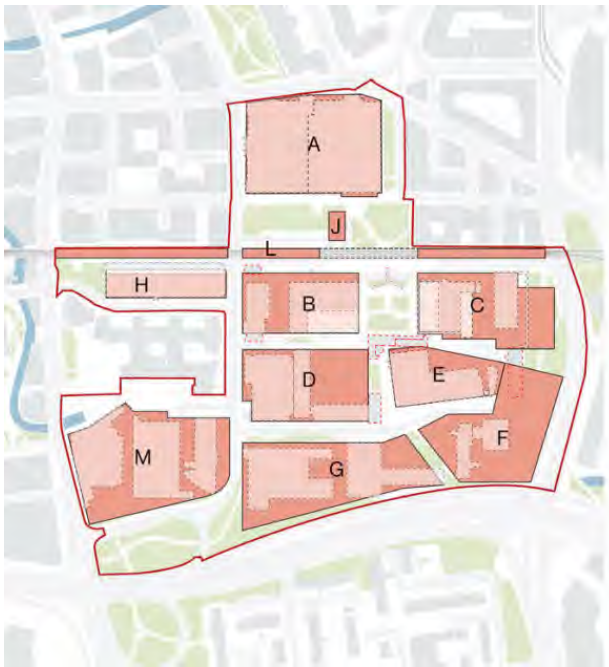
as the primary focus for economic development as well as having an increasingly important role in providing high density residential development. The Site also sits within the Regional Centre which has been identified in the Core Strategy Policy EC3 as suitable for employment generating uses.

2.33 The Site is located within the Oxford Road Corridor as defined in the Corridor Manchester Strategic Vision to 2025, Oxford Road Spatial Framework (March 2018), and the Oxford Road Corridor Strategic Regeneration Framework Guidance (September 2019). The Oxford Road Corridor is Manchester's Knowledge Quarter, a world-class innovation district that is home to a unique concentration of knowledge, business and cultural assets.

2.34 The Sister area (formerly known as North Campus and ID Manchester) is identified in the Oxford Road Spatial Framework as a strategic investment site, where a cluster can be formed to support research and development and collaboration between the University and industry partners. It is envisaged as a mixed-use district with the knowledge industry and academic research identified as key activities. New commercial, retail and hotel uses could be provided as part of its regeneration.

2.35 The Site is located within the ID Manchester SRF Area, endorsed by MCC Executive Committee in December 2023. The SRF articulates a vision to create a world-leading innovation district in the area. The place-based principles contained within the document envisage a mix of commercial and residential uses, with well connected, open and accessible routes and high-quality public spaces. Tall, landmark buildings are envisaged on Development Zone H (the Site). The illustrative masterplan envisages hotel/PBSA/bespoke residential accommodation within three inter-linked tall buildings on the Site.

Figure 2.4 – IDM SRF Boundary with Development Zones (source: IDM SRF)



Planning History

2.36 A search of the Site's planning history has been undertaken using MCC's Public Access system and those of relevance to the Site have been summarised below:

Table 2.2: Planning History

Reference	Description of Development	Status
F17029	Use of car park on Saturdays and Sundays for the sale of motor vehicles by the public to public	Temporarily Approved
F/AD03579	Removable painted sign boards at 1st, 2nd, and 3rd floor levels on Charles Street elevation of car park.	Approved
073558/FO/2004/C3	Change Of Use from vacant unit to B1 (office) for a temporary period of 2 years	Approved
128535/FO/2020	Installation of galvanised wire mesh panels to infill open balconies and staircases and the provision of electrically operated galvanised roller shutters to the vehicle's entrances; new anti-climb fencing installed around the plant roof; and new external doors are to be installed to staircases 001 and 004.	Approved
143741/FO/2025	Demolition of existing multi-storey car park and associated commercial units (retail and sui generis bar uses) to prepare site for future development.	Awaiting determination

3 Proposed Development

3.1 At the time of writing, the Proposed Development is still at concept design stage and so the final design, mix of uses, and quantum of floorspace is not yet fixed. This Scoping Report is therefore prepared on the basis of the anticipated uses, design intent, and maximum parameters of development that are expected to come forward on the Site.

3.2 Whilst the detailed design is still being developed, the Proposed Development will likely comprise:

- Redevelopment for PBSA (up to 1,145 PBSA beds) with ground floor flexible retail and community floorspace (excluding hot food) (up to 683.1sqm GIA), amenity space and cycle parking.
- The creation of a new public square, access and other associated works, including works to the public highway.

3.3 It is anticipated that the site will be cleared, following the demolition of existing structures on the site (subject to planning application and environmental impact assessment ref. 143741/FO/2025). Some of the trees are anticipated to be removed and replaced. As set out later in this report, where relevant to specific disciplines, the EIA will consider both the existing baseline, with the existing structures on the site still in place, as well as an alternative baseline, with the structures on site demolished ahead of this proposed redevelopment taking place.

3.4 As set out above, the quantum of Proposed Development has not yet been fixed and continues to be reviewed alongside technical design development, and so this EIA Screening and Scoping Request is based on realistic parameters of the Proposed Development. These parameters therefore act as a 'worst case' scenario for EIA assessment purposes and include a 'buffer' to the current design quantum's which are being developed by the design and project team. Should these parameters be exceeded or otherwise materially change then the EIA scope would be further reviewed as noted in Chapter 4.

3.5 The proposed maximum parameters for development are set out within Table 3.1, which have been the basis of the analysis as set out in this Report.

Table 3.1 – Development Parameters

Measurement detail	Maximum Parameter
Maximum Height (storeys)	42 storeys
Maximum Height AOD (metres)	163.68m - Tower 3 (Main Tower) 74.80m - Tower 2 68.53m - Tower 1 50.82m - Podium
Maximum Floorspace (sqm)	GEA – 42,487.5sqm GIA – 38,258sqm
Maximum no. PBSA bedspaces	**Total units: 1,145**

Measurement detail	Maximum Parameter
	- Cluster: 792 - Studios: 353
Maximum PBSA residential amenity floorspace (sqm)	GEA – 2,087.8sqm GIA – 1,967.9sqm
Maximum flexible commercial / retail floorspace (sqm)	GEA – 696.3sqm GIA – 683.1sqm
Number of cycle spaces	71.5 secure spaces in basement (6% of bedspaces)
Number of car parking spaces	c. 2 servicing bays accessible parking spaces

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4 Approach to EIA and Proposed Methodology

The Project Team

4.1 Regulation 18, Paragraph 5 (a) of the EIA Regulations (2017) requires the ES to be prepared by competent experts. The Applicant has instructed Deloitte to lead and manage the EIA process. Deloitte has significant experience and expertise in managing the EIA process for similar projects to the Proposed Development and holds the IEMA EIA Quality Mark.

4.2 As part of the Scoping Exercise, technical input to this EIA Screening and Scoping Report has been provided from the members of the project team, set out in Table 4.1.

4.3 All technical assessments in the EIA will be undertaken by a suitably qualified project team to ensure credibility, and coordinated by Deloitte. Table 4.1 also sets out details of the proposed EIA Team.

4.4 The following disciplines are proposed to be scoped out of the EIA, as detailed in the Chapter 5:

- Agricultural Circumstances
- Aviation
- Broadband Connectivity
- Water Resources, Flood Risk and Drainage
- Archaeology
- Ecology
- Arboriculture
- Ground Conditions

4.5 It is proposed that the following disciplines will be scoped into the EIA:

- Townscape and Visual Impact
- Heritage
- Noise and Vibration
- Daylight Sunlight and Overshadowing
- Solar Glare
- Wind

- Traffic and Transport
- Air Quality
- Climate Change
- Human Health
- Socio-Economics

Table 4.1 Project and EIA Team

Project Team			
EIA Discipline (Scoped In)	**Consultant**	**Qualifications**	**Scoped In/Out**
EIA Coordinator	Deloitte	MRTPI, MPlan, MSc, BA (Hons) IEMA Quality Mark Registered	N/A
Planning	Deloitte	N/A	N/A
Architecture and Design	Hodder+Partners	N/A	N/A
Agricultural Circumstances	N/A	N/A	Out
Water Resources, Flood Risk and Drainage	Roscoe	BEng (Hons)	Out
Broadband Connectivity	Pager Power	BSc (Hons)	Out
Aviation	Pager Power	BSc (Hons)	Out
Archaeology	Civic	BA (Hons)	Out
Ecology	Tyler Grange	BA (Hons), MCIEEM	Out
Ground Conditions	Roscoe	MEng (Hons), CEng MICE	Out
Townscape and Visual Impact	Layer Studios	BA (Hons), PgDip Landscape Architecture. Chartered Member of the Landscape Institute	In
Heritage	SLHA	BA (Hons), MA, MSc, IHBC	In
Noise and Vibration	Heyda and Blackbird	BSc (Hons), MIOA	In
Daylight/Sunlight/ Overshadowing	GIA	LLB (Hons)	In
Solar Glare	GIA	MSc. ARB	In
Wind	GIA	Meng, PHD	In

Project Team			
Traffic and Transport	Civic	BSc	In
Air Quality	Buro Happold	MMet AMIAQM, BSc MIAQM	In
Climate Change	Buro Happold	BSc, MSc, IAQM, PISEP	In
Human Health	Buro Happold	BSc, MSc Local Economic Development	In
Socio-Economics	Buro Happold	BSc, MSc Local Economic Development	In

Approach to Scoping

4.6 This Report aims to provide the LPA with sufficient information to inform a clear and agreed scope for the EIA, and ensures a robust assessment of likely significant environmental effects arising from the Proposed Development.

4.7 The Scoping exercise has taken account of the proposed construction activities, operational characteristics of the Proposed Development, relevant planning policy, knowledge of the Site, and the professional opinion of the project team.

4.8 This EIA Screening and Scoping Report seeks to establish the overall framework for the EIA in relation to the environmental topics and associated likely significant effects that will be subject to detailed assessment. However, iterative re-scoping will continue as the design and strategy is refined, plans and principles are developed, and additional technical survey work informs the final design for the Proposed Development. Any deviation between the scope of effects considered within this EIA Screening and Scoping Report and the ES will be clearly communicated in the ES.

4.9 This Report considered firstly whether technical disciplines should be "Scoped In" or "Scoped Out" of the EIA. Based on the information available at the time of writing, where the Proposed Development is not considered to give rise to likely significant effects on the environment, it is scoped out and will not be considered within the ES. Where disciplines are scoped out, a standalone technical assessment will be submitted with the planning application.

4.10 In summary, each consultant has advised:

- Whether consultation has taken place.

4.11 Rationale for scoping out, if applicable:

- Any background studies which have been completed or baseline information available.
- Provided the baseline of the Site as relevant to each of the technical areas.
- Identification of effects which are not significant at both the Construction 'C' and Operational 'O' stages of development and the mitigation proposed.

4.12 In addition, for those disciplines which are sought to be scoped in, consultants have provided a headline summary of:

- Baseline data.
- Assessment methodology for the likely significant effects.
- Limitations and assumptions (included at Appendix 3(a)).

4.13 For the purpose of the Scoping Report each of the technical consultants have looked at the potential scenarios, namely:

- Scenario 1: Existing Baseline (existing EIA Site, as of September 2025)
- Scenario 2: Existing Baseline + Proposed Development
- Scenario 3: Existing Baseline + Proposed Development + Cumulative
- Scenario 4: Existing Baseline + Proposed Development + IDM Masterplan (future surrounds/ future phases) + Cumulative

4.14 It is acknowledged that a planning application has been submitted in relation to the demolition of the existing structures (MSCP and retail units) on the Plot H Siter (under planning permission 143741/FO/2025).

4.15 It is important to note that at the time of writing this Scoping Report (28 November 2025), and therefore the time baseline studies are being undertaken, the Site contains the vacant car park and commercial buildings.

4.16 It is anticipated that demolition is unlikely to have commenced prior to the submission the main redevelopment application (which this EIA Screening and Scoping request has been submitted in relation to).

4.17 To be robust, and to assess the most 'robust case', consultants have been asked to advise if the most 'robust case' is once the buildings on site are demolished or as the site is today.

4.18 If the former, in addition to the above scenarios and to take into consideration the current live planning application for the demolition of the building on site, consultants have been presented with a series of alternative scenarios, namely:

- Scenario 1a: Alternative Baseline (existing EIA Site, but with car park and retail units demolished)
- Scenario 2a: Alternative Baseline + Proposed Development
- Scenario 3a: Alternative Baseline + Proposed Development + Cumulative
- Scenario 4a: Alternative Baseline + Proposed Development + IDM Masterplan (future surrounds/ future phases) + Cumulative

4.19 Please note as the demolition of the existing structures (car park and retails units) is either covered by the Alternative Baseline or Proposed Development (with existing baseline), this is not referenced in the cumulative / committed developments list.

4.20 Scenarios to be tested are set out in full in Appendix 3(b) alongside a matrix outlining which scenarios are to be tested for each discipline.

4.21 The following statutory consultees should be consulted through the EIA Screening and Scoping process:

- MCC – Contaminated Land, Environmental Health, Flood Risk, Highways, Tree Officer (Technical Officers);
- Transport for Greater Manchester (MCC Highways);
- Environment Agency (EA);
- Canal and River Trust;
- Greater Manchester Police Secure by Design;
- Historic England;
- Greater Manchester Archaeological Advisory Service;
- Natural England;
- NATS
- Greater Manchester Ecological Unit; and,
- United Utilities.

4.22 Early consultation with a number of the above statutory consultees has already been undertaken in order to inform specifics of the design of the Proposed Scheme and to ensure early engagement to ascertain their views on likely significant effects, baseline data collection and appropriate assessment methodologies. The outcomes of those early consultations are reflected in this EIA Screening and Scoping Report.

Structure and Scope of the ES

4.23 The ES would comprise two volumes, Volume 1 would set out the findings with respect to each of the environmental disciplines that have been examined as part of the EIA. Volume 2 would include all the supporting documents and technical appendices relating to the chapters. A Non-Technical Summary (NTS) of the ES will also be produced and form a standalone document.

4.24 Overall, the information presented in the ES will be provided in accordance with Schedule 4 of the EIA Regulations (2017) and will include:

- A description of the Proposed Development;
- An outline of the reasonable alternatives studied and reasons for selecting the chosen option;
- A description of the aspects of the environment likely to be significantly affected by the Proposed Development;

- A description of the likely significant effects of the Proposed Development on the environment, including direct and in-direct and in-combination impacts;
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment;
- A non-technical summary; and

4.25 An indication of any difficulties encountered by the applicant in compiling the required information.

4.26 The proposed structure of each ES Chapter (Volume 1) is included at Appendix 4. This is considered to be a robust approach and aligns with the EIA Regulations (2017).

EIA Boundary

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

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

EIA Methodology

4.28 The introductory chapters of the ES will provide the following information:

- An introduction to the ES in a legislative and site specific context;
- Description of the Site and Proposed Development;
- Alternatives considered and project design evolution;
- EIA methodology;
- Construction methodology and programme;
- Stakeholder engagement;
- ES structure; and
- Details of the EIA project team.

4.29 The EIA would assess both the construction and operational phases of the Proposed Development.

4.30 Each ES chapter would follow the headings set out below to ensure the final document is transparent, consistent, and accessible. A reference list will also be provided as relevant with each ES chapter. This is considered to be a robust approach and aligns with the EIA Regulations (2017).

Introduction

4.31 This Chapter will introduce the assessment discipline and the purpose for which it is being undertaken.

Legislative and Policy Context

4.32 This Chapter will include a summary of national, regional and local policy and guidance of relevance to the environmental discipline and assessment. Relevant legislation will be summarised where applicable.

4.33 In addition preparation of each ES chapter will consider relevant local and regional, social and economic policies. This will include (but may not be limited to):

- MCC Core Strategy (2012) and 2024 addendum
- ID Manchester Strategic Regeneration Framework (2023)
- Guide to Development in Manchester – Supplementary Planning Document and Planning Guidance (2007)
- Places for Everyone – Greater Manchester Combined Authority (2024)
- National Planning Policy Framework (2023)
- Assessment Methodology and Significance Criteria

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

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

Baseline Conditions

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

Identification and Evaluation of Likely Significant Effects

4.37 This Chapter will identify the likely significant effects on the environment resulting from the Proposed Development.

4.38 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the effects can be positive or negative. The criteria to be used in carrying out this process are detailed below. Where relevant, individual consultants may use a variation of the criteria and this will be clearly explained within the methodology of each chapter.

4.39 The Proposed Development will come forward in one phase.

4.40 Mindful of the separate planning application for the demolition of the buildings on site, the Proposed Development is for the redevelopment works only i.e. excluding the demolition. The Proposed Development therefore relates to construction (excluding demolition of existing structures) and operational phases. For the purposes of the EIA Scoping inputs; to be robust noting baseline studies have taken place in September 2025 (i.e. with the currently buildings on site in situ) consultants have also considered whether the most 'robust case' is as the site is now i.e. existing buildings in situ or once the demolition has taken place (i.e. noting the live application for demolition). It is Daylight, Sunlight and Overshadowing only who have concluded that the most 'robust case' is to assess the 'alternative baseline' i.e. with the existing buildings demolished.

4.41 As a rule, and to ensure consistency across disciplines, developments that are already under construction are considered to form part of the Baseline and those subject to planning permissions or otherwise identified within the committed developments as reasonably foreseeable are considered as part of the cumulative analysis.

4.42 The proposed scenarios to be tested are detailed in full within Appendix 3(b).

Prediction of Impact Magnitude

4.43 The methodology for determining the scale or magnitude of change caused by the impact is set out in Table 4.4. The below table represent a standard methodology which all disciplines shall follow unless stated otherwise within Chapter 6. Where the standard methodology is not followed, a discipline specific methodology is detailed within Chapter 6 of this Report.

Table 4.2: Standard Methodology for Assessing Magnitude of Change

Magnitude of Change	Criteria for assessing magnitude of change caused by an impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (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.

Prediction of Receptor Sensitivity

4.44 The sensitivity of a receptor is based on the relative importance of the receptor using the scale set out in Table 4.3. The below table represent a standard methodology which all disciplines shall follow unless stated otherwise. Where the standard methodology is not followed, a discipline specific methodology is detailed within Chapter 6 of this Report.

Table 4.3: Standard Methodology for Determining Sensitivity

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

Assessment of Effect Significance

4.45 Effect significance will be calculated using the matrix in Table 4.4. This illustrates the interaction between impact magnitude and receptor sensitivity. The duration of the affect will also be considered and whether it is permanent or temporary.

Table 4.4: Effect Significance Matrix

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

Mitigation Measures

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

4.47 It should be noted that a distinction will be made between 'additional' mitigation and 'embedded' mitigation. The significance will be assessed and an initial conclusion reached prior to the consideration of any additional (add-on) mitigation, and identifying of residual harm.

4.48 The approach to mitigation will follow best practice guidance, which suggests a hierarchical approach whereby effects are avoided, and if not, they are minimised and/or compensated.

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

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

Cumulative Effects

Two types of cumulative effect will be assessed:

- Type 1 Cumulative effects - are the interactions between effects of the construction and development works on a single receptor.

- Type 2 Cumulative effects - are those that arise from incremental changes caused by other past, present or reasonably foreseeable projects together with the development proposals and associated works.

4.51 An assessment of the cumulative effect of the Proposed Development and other committed developments within a defined radius of the Site, including those with recent Planning Permissions and reasonably foreseeable to come forward in the near future, will be undertaken as part of the EIA.

4.52 There is no agreed / standard threshold for how far the assessment should go. Therefore, a professional judgement has been taken regarding which schemes to highlight, taking into consideration the surrounding context of the Site, which may differ between disciplines. This is set out for the relevant disciplines in Chapter 6.

4.53 Where schemes are under construction, they have been considered part of the baseline. If applications are approved, subject to a live application reasonably considered likely to be approved, or otherwise reasonably considered likely to come forward, these are included as a committed development to be considered as part of the cumulative analysis. The list of committed developments includes schemes where the construction phase has stalled.

4.54 Full details of the committed developments to be included as part of the cumulative effects assessment are set out at Appendix 2.

Residual Effects

4.55 The residual effects, i.e. the effects of the Proposed Development assuming implementation of proposed mitigation (both embedded and additional), will be determined. The residual effects represent the overall likely significant effect of the Proposed Development on the environment having taken account of practicable/available mitigation measures.

5 Environmental Disciplines to be Scoped Out of the EIA

5.1 Table 5.1 identifies the environmental disciplines to be scoped out of the EIA, including supporting evidence base.

Table 5.1: Environmental Disciplines to be Scoped Out of the EIA

Discipline	Evidence Base
Agricultural Circumstances	The Site is entirely on brownfield land so there would be no likely significant effects with respect to agriculture. This discipline can therefore be scoped out of the EIA.
Aviation	The height of the Proposed Development will be up to 42-storeys (approximately up to 163.68m AOD), which exceeds the 90m (AOD) aviation safeguard threshold. Whilst the threshold has been exceeded, consultation is currently being undertaken with NATS and the Manchester Airport Safeguarding Team to brief them on the proposals. This will be addressed prior to the submission of the application. The consultation will include confirming the final height and location of the building to ensure that appropriate mitigation is designed into the scheme if required and secured by way of planning condition. Additional mitigation measures will also be implemented if requested. The Site is also located in Manchester City Centre, approximately 13km to the north of Manchester Airport. Significant effects upon aviation operations will be identified prior to the implementation of mitigation. Once mitigation has been implemented, no effects which could be considered significant in the context of EIA regulations will remain. For any potential technical impact, the likely mitigation requirement will be software fix to the radar, for any potential flight risk, aviation lighting and/or building heigh reductions may be required. A Technical Aerodrome Safeguarding Assessment will be submitted alongside the forthcoming planning application.
Ecology	*Summary analysis* A desk-based study of the wider 'ID Manchester' site (which, by nature, includes Plot H) was initially undertaken in May 2022; whereby available online resources were used to establish the proposed developments' potential influence on designated sites and local protected and notable habitats, flora and fauna. An update assessment was undertaken in July 2024 and once again in August 2025 using the above methods and purchase of local records from Greater Manchester Local Records Centre. Data purchased in July 2024 is considered to be still relevant for the August 2025 desk based assessment, as ecological data is valid for approximately 12 months. The desk based assessment has shown that the only internationally designated site within the Zone of Influence (10 km) is the Rochdale Canal Special Area of Conservation (SAC). At its closest point the SAC is 5.64 km NE upstream from the proposed development site with numerous barriers such as canal locks, preventing hydrological linkages. It is therefore considered that the proposed development is unlikely to have an adverse impact on the qualifying features of the SAC. There are no nationally designated sites (such as SSSI's) within 2 km of the proposed development.

Discipline	Evidence Base
	The desk based assessment has shown that there are protected and notable flora and fauna such as black redstart *Phoenicurus ochruros* and Manchester poplar *Populus nigra subsp. Betulifolia* on the Manchester Biodiversity Action Plan (BAP); although there are no records of either species on the site. Other notable species within central Manchester include peregrine falcon *Falco peregrinus* and various species of bats. A site visit (Extended Phase 1) to the whole 'ID Manchester' site was undertaken in May 2022, with an update UK Habs/ Extended Phase 1 assessment in June 2024 and a Plot H update survey undertaken in August 2025. The Plot H site visit concluded that the habitats comprise hardstanding and buildings, with areas an area of amenity grass, with mature trees to the west of the Plot. It is considered that the habitats on site provide good amenity value, and due to the lack of mature trees within central Manchester, the trees are considered to be of local ecological importance. It must be noted that the River Medlock is located approximately 30m to the west; considerations should therefore be made to protect the River (and downstream designated sites) from pollution during both the construction and operational phases of the proposed development. Mitigation to protect the Medlock can be secured through planning conditions. There was no evidence of protected fauna, including no opportunities for roosting bats. The combination of both assessments have shown that the proposed development is unlikely to have an adverse impact on Statutory designated sites and unlikely to have impacts on protected and notable flora and fauna. There is, however, opportunity to enhance to existing biodiversity of the site, through additional species planting and provisions for protected species such as additional roosting and nesting resources for birds and bats and the creation/ enhancement of habitats for the benefit of biodiversity as a whole. Due to these reasons, ecology can be scoped out of an EIA assessment. The desk-based assessment and Plot H habitat update survey is included in the Ecological Impact Assessment as part of this screening and scoping submission (Appendix 5).
	Consultation Greater Manchester Ecology Unit (GMEU) were contacted on 29th July 2024 to agree on ecological scope for the wider ID Manchester site and agree that ecology can be scoped out of EIA. GMEU replied on 7th August 2024: "I would agree that there are no statutory protected sites likely to be effected, with the Rochdale Canal SAC upstream with numerous locks preventing hydrological linkage. We would also be surprised if there were any protected species populations of significance in Central Manchester, which your surveys appear to confirm". A further response from GMEU was received on 16th September 2025: " I am satisfied that ecology can be screened out for plot H. "
	Rationale for scoping out -Proposed development is unlikely to have adverse impacts on Rochdale Canal SAC. -No other statutory designated sites within the ZoI -No evidence on protected and notable flora and fauna on site -Baseline habitats predominantly comprised habitats of negligible ecological importance (hardstanding, buildings, amenity grass), with only the occasional habitat of local ecological importance (trees).
Broadband Connectivity	*Summary analysis* It is likely that sufficient internet services are readily available at the Proposed Development location given that it is located in a built-up urban environment. It is also anticipated that it will be possible to achieve fibre or cable broadband to the premises.
	Consultation

Discipline	Evidence Base
	N/A
	Rationale for scoping out It is anticipated that superfast broadband is already available at the Site, and a broadband connectivity assessment will be undertaken to confirm this. If superfast broadband is not available, FTTP infrastructure should be provided by Openreach or other providers. It is considered appropriate for broadband connectivity to be scoped out. The following reports will be submitted with the forthcoming planning application: • Broadband Connectivity Assessment • Terrestrial Television Baseline Survey and Report – Building Development • Desk-Based Satellite Television Interference Assessment
Water Resources, Flood Risk and Drainage	*Summary analysis* For the flood risk of the scheme, the site is located within Flood Zone 2 for Rivers and Sea and Flood Zone 1 for Sewer impact. Product 4 data has been requested from the EA but it is anticipated that the FFL will stay at the previous site level to tie into surrounding road levels. The topographical survey shows existing levels for both Sackville Street and Charles St fall away sharply from the proposed site which will minimise any risk to the building flooding. Following Product 4 data review any further mitigation measures with regards to flood risk will be assessed but it is not anticipated that the flood risk will have a significant impact on the discipline. For the existing drainage, United Utilities sewer record '641696-03-04-2025-10-02-06' identified a 900mm Concrete surface water sewer crossing the site from North-East to South-West. This has since been identified as Shooters Brook. United Utilities confirmed in correspondence that it is not a public sewer and they would have no comment on asset protection / buildover requirements. Engagement with the Environment Agency and the Lead Local Flood Authority has been carried out but not concluded at this stage. A CCTV survey was carried out by Amber Group Surveys on 02/09/25 which confirmed the existing 900mm concrete sewer crossing the site is in good condition, with minor debris collection. The proposal is to re-use existing connections to 900mm sewer or provide a new connection into the existing manhole within site at a betterment on existing flow. For foul a connection into Princess St is proposed at free discharge, subject to S106 approval and agreement on discharge rates with the LLFA. As this is typical and engagement is happening pre-planning approval, no significant impact on the discipline is expected.
	Consultation LLFA consulted on shooters brook requirements on 21/07/25. With follow up engagement extending to request for confirmation on flow rate agreement. No response received to date. EA consulted on shooters brook requirements on 21/07/25, with response received 21/08/25. Follow up to discuss wider planning application on 21/08/25 but no response received. UU consulted on shooters brook requirements on 21/07/25, with response received 07/08/25. Pre-development enquiry submitted to UU 21/08/25, no response received.
	Rationale for scoping out For both flood risk and drainage, early engagement has been held and is continuing to confirm requirements for the flood mitigation and drainage connections pre-planning. As neither the existing flood zone requirements or proposed drainage solutions are anticipated to significantly impact the discipline it is concluded to scope out. A Flood Risk Assessment and a Drainage Strategy are currently being progressed and will be submitted with the planning application.
	Summary analysis

Discipline	Evidence Base
Archaeology	During the post-medieval period, the Site likely lay within parkland that surrounded Garrett Hall (HER 1414.1.0), a timber-framed mansion that was sold to Oswald Mosley in 1564 and demolished in 1910. Garratt Mill (HER 19093.1.0) had been partly established within the Site by Gartside & Thackery in *c* 1760 and utilised a waterwheel to drive swivel looms for ribbon weaving. The mill's second phase of use is thought to have commenced in *c* 1780 by John Whitehead, who used Richard Arkwright's patent machinery for spinning cotton without paying the inventor for a licence. Whitehead was successfully operating powered spinning machines in Garratt Mill and is potentially Manchester's first powered cotton mill. By the late 18th century, the mill consisted of a complex of buildings that extended beyond the Site boundary, situated on the river Medlock. The mill was operated by Thackery and Co (Joseph and John Thackeray, cotton spinners). The Manchester book of plans 1822 states that Roger Aytoun Esq owned the land that the mill was built on and that the mill continued to be operated by Thackeray and Co. The buildings that fell within the Site consisted of a warehouse and packing room of three storeys, a workshop of two storeys, a stable, a hot house and dwelling house. The mill's power systems seem to have lay beyond the Site boundary; the boiler and engine house lay immediately to the east of the Site, whilst the 18th-century waterwheel lay to the south of the Site. Most of the mill buildings within the had been demolished by 1831, however the former hothouse and dwelling remained extant functioned as 'Old Garratt Print Works'. These buildings were rebuilt or altered by 1891. By 1851, the Site had been partly redeveloped into residential and commercial buildings, including a plot of four back-to-back workers' housing, abutting the Manchester South Junction to Altrincham Railway line / viaduct (MSJ&AR), built in 1848-9, bordering the north Site boundary. A rope works and saw mill were partly within the south of the Site. Mid-19th-century mapping shows that these buildings were built on either side of Charles Street, which had an alternative alignment, running north-east to south-west through the Site. The remaining plots of undeveloped land had been built upon by the late 19th century, consisting of workshops and businesses, built up to the viaduct on the north side of Charles Street and the riverbank to the south. A metal refinery and machine shop had steam boilers , chimney and an engine / furnace that abutted the railway viaduct. All buildings within the Site had been cleared by the 1970s and the Site was redeveloped into a multi-storey car park and three retail units. The multi-storey car park is four-storeys high, with rooftop parking and a semi-basement level. A culvert runs beneath the basement level.
	Consultation Lesley Dunkley – Historic Environment Officer, Greater Manchester Archaeology Advisory Service – 29th August 2025 Ian Miller – Heritage Management Director, Greater Manchester Archaeology Advisory Service – 4th September 2025
	Rationale for scoping out The construction of the multi-storey car park includes a semi-basement that has likely damaged or destroyed archaeological remains of medium and low significance. Therefore, no further archaeological investigation is required at the Site. An Archaeological Desk-based Assessment is contained at Appendix 6 of this Report.
Ground Conditions	*Summary analysis* The site contains an existing car park, with part-basement. The new development will sit on a smaller footprint and due to the height of building this will require installation of new piles and foundations following demolition of the existing car park. A Phase 1 SI will be submitted as part

Discipline	Evidence Base
	of the planning application which will address potential sources of contamination within the ground. However, as part of the planning application for the demolition of the site, a Phase 1 desk study has already been undertaken on the site which advises that there are minimal potential sources of contaminants associated with previous use and that remediation is likely to extend to clean "cover" soil to landscaped areas and potential remediation (removal or installation of a vapour barrier) beneath the building only – both are standard measures. A Phase 2 SI was undertaken by Bruntwood for the wider site which included some investigation in the vicinity of our site. This report states that "based on the data collected it is considered likely that a large proportion of the soils on site would be chemically suitable for use within this predominantly commercial scheme with minimal mitigation. This mitigation is likely to comprise a clean cover system to minimise exposure to soil contaminants". The site specific Phase 2 SI to be undertaken will investigate this and verify it for our site.
	Consultation • Initial discussions with EA: EA consulted on shooters brook requirements on 21/07/25, with response received 21/08/25. Meeting requested 10/09/25. No response yet. • Preliminary Geoenvironmental Appraisal Report for land at Charles Street, Manchester, produced by Calabrian issued as part of demolition planning application and appended to this report (Appendix 7). • ID Manchester Preliminary Ground Investigation Interpretive Report and Final Factual Report produced by Arup appended to this report (Appendix 8).
	Rationale for scoping out Likelihood of contaminants beneath site is low based on Phase 1 undertaken. Phase 2 SI is to be undertaken which will cover off all testing and provide a remediation strategy if required.
Arboriculture	*Summary analysis* - BS5837:2012 Tree Quality Survey (Appendix 9) completed (originally for demo application) and data now verified in Sept 2025 prior to upcoming development application to ensure tree data accuracy. - There are no trees at the site considered Category A status, Veteran, nor subject to a Tree Preservation Order (TPO) according to MCC online mapping. - An Arboriculture Method Statement was produced for the demo application ensuring all existing trees are suitably safeguarded. - An Arboricultural Impact Assessment with Tree Retention and Protection Plan will be produced and submitted to detail associated impacts to RPAs/ pruning requirements and losses as part of upcoming submission, however it is anticipated based on draft GA plans provided that all highest quality and value (Category B) trees will be retainable, with only the loss of four small, Category C trees (comprising self-seeded elder). The loss of these four elder trees will cause a negligible impact on tree canopy coverage and arboricultural amenity at the site. It is anticipated that an increase in tree population and canopy cover improvements will be attainable directly on site subject to well-designed landscape and tree planting proposals to compensate for the losses and result in net-improvements overall.
	Consultation No consultation with statutory bodies commenced to date.
	Rationale for scoping out All Category B existing trees on site (to western end of application boundary), are considered retainable during development and having been demonstrated to be safeguarded during Demolition Application (143741/FO/2025 Aug 2025), trees to remain unharmed during re-development application.

6 Environmental Statement Chapters

6.1 The proposed scope of the EIA is set out in the below Chapter. Each consultant has followed the Scoping Template as issued by Deloitte, the EIA Co-ordinator.

6.2 The list if proposed technical ES Chapters are set out as follows.

- Townscape and Visual Impact
- Heritage
- Noise and Vibration
- Air Quality
- Traffic and Transport
- Daylight Sunlight and Overshadowing
- Solar Glare
- Wind
- Climate Change
- Socio-Economics
- Human Health

Townscape and Visual Impact (Layer Studio)

Consultation & Available Information, & Baseline Conditions

Consultation

6.3 The Zone of Theoretical Visibility (ZTV) and draft viewpoints were issued to the LPA on 18th September 2025. The LPA confirmed they had no comments at this time.

6.4 There are no specialists within Manchester City Council or other statutory consultees relevant to the area of townscape and visual impact. As such, no consultation has been undertaken.

Completed Background Studies

6.5 Identification of Zone of Theoretical Visibility (ZTV) and key viewpoints – Initial baseline review of urban grain, designations, transit routes, land use and building heights. Placement of massing model into VU.CITY to generate ZTV and viewpoint locations for both heritage and townscape views.

6.6 Please refer to supporting document TVIA Draft Viewpoints - Main works (Appendix 10).

Baseline Conditions

6.7 The baseline conditions are the existing land use, building height, urban grain, physical townscape and views from local viewpoints. As part of the former UMIST campus, the Proposed Development of purpose built student accommodation and flexible commercial use will bring about a change to the existing land use, building height and urban grain, which, in turn will affect the arrangement and purpose of the street network and public realm. The TVIA will consider the impacts on the existing physical townscape (including the railway viaduct and nearby Conservation Areas) and the experience of those who use it, including the change in existing views from local viewpoints.

6.8 "Site as existing" is a robust baseline for the TVIA as it enables use of verified views to compare before and after images. The magnitude of change from the baseline position to the proposed development on completion can be robustly evidenced.

Scope of Assessment

Identification of Effect/s which are Not Significant

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Impact on environmental designations	Environmental designations	n/a	Scoped out as there are no designations inside the application boundary, or in the vicinity of the Site.
View from St Peter's Square	People	n/a	The view of Plot H is heavily restricted from this location and only experienced as a glimpsed view between large buildings in the foreground. A view from Princess Street is selected as more relevant.
View from Piccadilly Station Platform 13/14	People	n/a	This is a transient view beyond the platform canopy, at the far end of the station. Few passengers frequent this part of the platform. Station security protocols make photography difficult.
View from Station Approach	People	n/a	Although this is an elevated position, receptors must bypass an array of street furniture to experience uncluttered views of Plot H. Users of the station tend to be focussed on the ramp to and from London Road (north)
View from Ardwick Green	People	n/a	Intervening buildings and vegetation restrict visibility from this position.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Change to urban grain	Urban grain	C/O	New building footprints differ from existing.
Change of land use	Land use	C/O	Consideration of townscape impacts associated with the change from a multi storey car park to PBSA/commercial use.

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Change to townscape character	Townscape character	C/O	Assessment to consider the impacts on the existing routes of Charles Street, Sackville Street and Princess Street, as well as the activation of Altrincham Street.
Changes to building heights	Townscape character and people	C/O	Proposing buildings that are taller than existing increases the Zone of Theoretical Visibility (ZTV) and has an effect on visual receptors and local townscape.
Change to the arrangement of public realm (streets and spaces)	Townscape of local streets and spaces	C/O	Holistic evolution of local streets and spaces will change the way people experience outdoor places and the move between them.
Change to the character and amenity of key views	Local residents, employees and visitors	C/O	Refer to accompanying document *451-LYR-XX-ZZ-RPT-L-0009-02 TVIA Draft Viewpoints - Main works.pdf*
Change of land use	Land use	C/O	Consideration of townscape impacts associated with the change from a multi storey car park to PBSA/commercial use.

Assessment Methodology for Likely Significant Effects

Baseline Data

6.9 The Zone of Theoretical Visibility (ZTV) will be refined using VU.CITY.

6.10 Baseline photography will be completed in accordance with Technical Guidance Note 06/19 Visual Representation of Development Proposals (Landscape Institute). Any derogation will be accompanied by a justification statement.

Method of Assessment

6.11 The TVIA will be produced in accordance with industry best practice including Guidelines for Landscape and Visual Impact Assessment, Third Edition (2013), by The Landscape Institute and the Institute of Environmental Management and Assessment and as recommended by the guidelines, be appropriate to the type and scale of the Proposed Development.

6.12 A desk based review of published documents and mapping will establish the character of existing townscape and identify visual receptors. Findings compiled using written commentary and supporting drawings.

6.13 The visual baseline will establish locations from which the Site is visible and from which views have the potential to be affected by the Proposed Development.

6.14 The assessment stage will firstly look at receptor Sensitivity will be determined by combining judgements on the susceptibility of the receptor to the specific type of development proposed and the value attributed to that receptor. Sensitivity of townscape and visual receptors will be assessed on a scale of high, moderate and low.

6.15 Next, the magnitude of change is identified by combining judgements about the size and scale of the effects, the extent of the area over which it occurs, whether it is reversible or

irreversible and whether it is of short or long term in duration and is assessed using a set of predetermined criteria. The magnitude of change is considered on a scale of major, moderate, minor or negligible. The magnitude 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.

6.16 Finally, Significance of Effect is set out for each receptor by combining the judgements previously identified for Sensitivity and Magnitude.

6.17 18 verified views (generated by a suitably qualified expert) of the Proposed Development will be completed from each baseline location, outputted as a wireline (AVR level 1) or rendered image (AVR level 3) depending on proximity to site and magnitude of change. Viewpoint location and type of visualisation is included in document TVIA Draft Viewpoints - Main works (Appendix 10).

6.18 Verified views will be completed in accordance with Technical Guidance Note 06/19 Visual Representation of Development Proposals (Landscape Institute).

6.19 Full details of the Our Studio Methodology can be found in Appendix 11 of this report.

Built Heritage (SLHA)

Consultation & Available Information, & Baseline Conditions

Consultation

6.20 Key heritage stakeholders - including Manchester City Council, Historic England and the Twentieth Century Society - have been engaged with respect to the SRF, which includes place-based principles and an illustrative masterplan with respect to the Site, which have informed the Proposed Development. TVIA views have been agreed with MCC and HE.

Completed Background Studies

6.21 On-site visual surveys of the Site and surrounding area were undertaken in May 2022, with subsequent visits taking place in 2024 and February 2025. These visits informed both the appraisal of the Site as a component of the historic environment, and its contribution to the setting of surrounding heritage assets.

6.22 On 28 July 2022, Heritage Architecture Ltd provided a baseline assessment of the wider ID Manchester site, including a study of the buildings contained in Plot H. This informed subsequent options appraisals, including a detailed appraisal study for the Charles Street multi-storey car park (MSCP). In February 2025, Heritage Architecture Ltd provided a further Heritage Assessment to support the ongoing application for the demolition of the Charles Street MSCP.

Baseline Conditions

6.23 The existing building on-Site is not considered to yield any heritage interest. The Site is not within a Conservation Area; however, the Whitworth Street Conservation Area abuts the Site to the north, and the Site is within close proximity (≤500m) to numerous Grade II and Grade II* listed buildings, including the Manchester and Altrincham Railway Viaduct, buildings along Granby Row, and the recently listed Renold Building.

6.24 The 500m study area contains 114 buildings registered on Historic England's database. In total, there are 109 listed buildings (100 Grade II, 9 Grade II*). The SRF identifies a total of eight non-designated heritage assets (NDHAs) within the former UMIST campus. Five of these NDHAs are registered with Certificate of Immunity status and are subject to a live planning application for their removal (application ref. 143024/FO/2025): Barnes Wallis and Wright Robinson Building; Butterfly Stairs; Morton Laboratory; Moffat Building and Manchester Meeting Place. The following NDHAs are within the immediate vicinity of the Site and are included within the scope of assessment: Jacksons Mill; Pariser Building; and MSS Tower.

6.25 Scenarios 1-4 are to be tested for Built Heritage on the basis of the existing building being within the Site. Potential effects associated with the construction and operational phases of the Proposed Development will relate to indirect temporary visual/setting impacts and indirect permanent visual/setting impacts. Given the sensitivity and complexity of the site with regards to both designed and non-designated heritage assets, the four baseline scenarios including the existence of the Charles Street Multi-Storey Car Park (MSCP) have been considered. This is considered to be the most robust set of scenarios, as the demolition of the MSCP would temporarily impact upon the setting of the identified heritage assets, followed by the construction phase of the Proposed Development.

Scope of Assessment

Identification of Effect/s which are Not Significant

Effect	Receptor	Construction / Operation	Discussion
Neutral (not significant)	Listed Buildings: 1. CHATHAM MILL, Grade: II, List Entry Number: 1293040 2. INDIA HOUSE (INCLUDING ATTACHED WROUGHT IRON GATEWAY LINKED TO LANCASTER HOUSE), Grade: II*, List Entry Number: 1254836 3. FORMER GROSVENOR PICTURE PALACE, Grade: II, List Entry Number: 1218431 4. 94-98, GROSVENOR STREET, Grade: II, List Entry Number: 1218404 5. ODDFELLOWS HALL, Grade: II, List Entry Number: 1200840 6. ADULT DEAF AND DUMB INSTITUTE (FORMER), Grade: II, List Entry Number: 1200839 7. FORMER MANCHESTER EAR HOSPITAL, Grade: II, List Entry Number: 1197922 8. DANCEHOUSE THEATRE INCLUDING NUMBERS 6-14, Grade: II, List Entry Number: 1384997 9. FORMER TOWN HALL FACADE TO MABEL TYLECOTE BUILDING, MANCHESTER METROPOLITAN UNIVERSITY, Grade: II, List Entry Number: 1283062 10. DALTON STATUE IN FORECOURT OF DALTON COLLEGE, Grade: II, List Entry Number: 1197791	None anticipated	Whilst the identified listed buildings fall within the 500m study area, these receptors have been scoped out from further assessment based on the data produced by the Zone of Theoretical Visibility (ZTV) study, which has indicated that the Plot H development will not give rise to any visual impact upon the setting of these heritage assets.

Effect	Receptor	Construction / Operation	Discussion
	11. MANCHESTER OXFORD ROAD STATION (INCLUDING PLATFORM STRUCTURES), Grade: II, List Entry Number: 1255053 12. PEVERIL OF THE PEAK PUBLIC HOUSE, Grade: II, List Entry Number: 1293058 13. THE RITZ DANCE HALL, Grade: II, List Entry Number: 1254888 14. THE PALACE THEATRE, Grade: II, List Entry Number: 1271227 15. CHORLTON NEW MILL AND ATTACHED CHIMNEY, Grade: II, List Entry Number: 1197774 16. CHORLTON OLD MILL, Grade: II, List Entry Number: 1197775 17. MILL ON NORTH EAST CORNER OF JUNCTION WITH CHESTER STREET, Grade: II, List Entry Number: 1197776 18. ASIA HOUSE, Grade: II*, List Entry Number: 1247432 19. FORMER PICKLES BUILDING, Grade: II, List Entry Number: 1246955 20. LINDENCOURT HOUSE, Grade: II, List Entry Number: 1208396 21. 26-30, PRINCESS STREET, Grade: II, List Entry Number: 1246961 22. 116 AND 118, PORTLAND STREET, Grade: II, List Entry Number: 1247062 23. 9, RICHMOND STREET, Grade: II, List Entry Number: 1247476 24. 103, PRINCESS STREET, Grade: II*, List Entry Number: 1247391 25. 16, NICHOLAS STREET, Grade: II, List Entry Number: 1271453 26. TRANSACT HOUSE, Grade: II, List Entry Number: 1247386 27. 59 AND 61, FAULKNER STREET, Grade: II, List Entry Number: 1282964 28. 52 AND 54, FAULKNER STREET, Grade: II, List Entry Number: 1282963 29. 46, 48 AND 50, FAULKNER STREET, Grade: II, List Entry Number: 1282962 30. 39 AND 41, GEORGE STREET, Grade: II, List Entry Number: 1218183 31. 83, PRINCESS STREET, Grade: II, List Entry Number: 1270913 32. 87-91, PRINCESS STREET, Grade: II, List Entry Number: 1247390 33. LANGLEY BUILDINGS, Grade: II, List Entry Number: 1247385		

Effect	Receptor	Construction / Operation	Discussion
	34. 109 AND 111, PORTLAND STREET, Grade: II, List Entry Number: 1271095 35. 101, PRINCESS STREET, Grade: II, List Entry Number: 1270899 36. BRAZIL HOUSE, Grade: II, List Entry Number: 1270871 37. THE CHURCHILL PUBLIC HOUSE, Grade: II, List Entry Number: 1197758 38. 109, PRINCESS STREET, Grade: II, List Entry Number: 1270914 39. FORMER WAREHOUSE, Grade: II, List Entry Number: 1431770 40. 51 AND 53, RICHMOND STREET, Grade: II, List Entry Number: 1270835 41. 110-114, PORTLAND STREET, Grade: II, List Entry Number: 1247061 42. 104, BLOOM STREET (See details for further address information), Grade: II, List Entry Number: 1218476 43. 61, OXFORD STREET, Grade: II, List Entry Number: 1246286 44. ST JAMES BUILDINGS, Grade: II, List Entry Number: 1246571 45. 127-133, PORTLAND STREET, Grade: II, List Entry Number: 1246958 46. EASTERN HOUSE PORTLAND HOUSE, Grade: II, List Entry Number: 1247058 47. BRIDGEWATER HOUSE, Grade: II, List Entry Number: 1270606 48. FORMER ELECTRICITY POWER STATION, Grade: II, List Entry Number: 1255031 49. 32, DICKINSON STREET (See details for further address information), Grade: II, List Entry Number: 1247060 50. RHODESIA HOUSE, Grade: II, List Entry Number: 1270911 51. LANCASTER HOUSE, Grade: II*, List Entry Number: 1254887 52. ROCHDALE CANAL LOCK NUMBER 87, TO EAST OF PRINCESS STREET, WITH CAST IRON FOOTBRIDGE BESIDE STREET, Grade: II, List Entry Number: 1247580 53. NEW UNION PUBLIC HOUSE, Grade: II, List Entry Number: 1247444 54. CENTRAL HOUSE, Grade: II, List Entry Number: 1247389 55. LIONESSE HOUSE, Grade: II, List Entry Number: 1247387		

Effect	Receptor	Construction / Operation	Discussion
	56. 3, BRAZIL STREET, Grade: II, List Entry Number: 1283077 57. 52 AND 54, PORTLAND STREET, Grade: II, List Entry Number: 1246953 58. 35, 37 AND 39A, GEORGE STREET (See details for further address information), Grade: II, List Entry Number: 1200836 59. ROCHDALE CANAL LOCK NUMBER 86, TO EAST OF CHORLTON STREET, Grade: II, List Entry Number: 1247481 60. Nos. 41 AND 43, FAULKNER STREET, Grade: II, List Entry Number: 1200829 61. 45 AND 47, FAULKNER STREET, Grade: II, List Entry Number: 1200830 62. 34, PRINCESS STREET, Grade: II, List Entry Number: 1247383 63. 39, CHORLTON STREET, Grade: II, List Entry Number: 1283091 64. ROCHDALE CANAL BOUNDARY WALL TO CANAL BETWEEN SACKVILLE STREET AND CHORLTON STREET, Grade: II, List Entry Number: 1270837 65. 27, SACKVILLE STREET, Grade: II, List Entry Number: 1247607 66. BOUNDARY WALL TO ROCHDALE CANAL BETWEEN PRINCESS STREET AND SACKVILLE STREET ROCHDALE CANAL BOUNDARY WALL TO CANAL STREET BETWEEN PRINCESS STREET AND SACKVILLE STREET, Grade: II, List Entry Number: 1247555 67. 55, FAULKNER STREET (See details for further address information), Grade: II, List Entry Number: 1217991 68. No. 56, FAULKNER STREET, Grade: II, List Entry Number: 1200832 69. No. 49, FAULKNER STREET, Grade: II, List Entry Number: 1200831 70. No. 36, PRINCESS STREET, No. 94, PORTLAND STREET, and No. 75, FAULKNER STREET, Grade: II, List Entry Number: 1247384 71. BASIL HOUSE, Grade: II, List Entry Number: 1246956 72. 113-119, PORTLAND STREET, Grade: II, List Entry Number: 1246957 73. ROCHDALE CANAL LOCK NUMBER 88, TO EAST OF OXFORD STREET, Grade: II, List Entry Number: 1270857 74. 2, HARTER STREET, Grade: II, List Entry Number: 1200841		

Effect	Receptor	Construction / Operation	Discussion
	75. TOOTAL, BROADHURST AND LEE BUILDING, Grade: II*, List Entry Number: 1271294 76. CIRCUS TAVERN AND ATTACHED RAILINGS, Grade: II, List Entry Number: 1247057 77. 44-50, PORTLAND STREET, Grade: II, List Entry Number: 1247041 78. 11, BLOOM STREET, Grade: II, List Entry Number: 1208005 79. LEE HOUSE, Grade: II, List Entry Number: 1218358 80. NOS 74-78, AND NO 80 (THE GREY HORSE PUBLIC HOUSE) AND ATTACHED RAILINGS, PORTLAND STREET, Grade: II, List Entry Number: 1246954 81. BRITANNIA HOTEL, Grade: II*, List Entry Number: 1246952 82. 8, MINSHULL STREET (See details for further address information), Grade: II, List Entry Number: 1219858 83. CANADA HOUSE, Grade: II, List Entry Number: 1208597 84. ROCHDALE CANAL BOUNDARY WALL TO CANAL BETWEEN CHORLTON STREET AND MINSHULL STREET, Grade: II, List Entry Number: 1247478 85. FRASER HOUSE, Grade: II, List Entry Number: 1283064 86. CITY POLICE COURTS, Grade: II*, List Entry Number: 1219894 87. JOSHUA HOYLE BUILDING, INCLUDING ROBY HOUSE, Grade: II, List Entry Number: 1271127 88. PRINCES BUILDINGS, Grade: II, List Entry Number: 1246285 89. 70 AND 72, PORTLAND STREET (See details for further address information), Grade: II, List Entry Number: 1271071 90. 57, FAULKNER STREET, Grade: II, List Entry Number: 1218005 91. 63, GEORGE STREET, Grade: II, List Entry Number: 1218197		
Neutral (not significant)	Conservation Areas: George Street Conservation Area, designated June 1985 St Peters Square Conservation Area, designated December 1973 Albert Square Conservation Area, designated March 1972	None anticipated	Whilst the identified Conservation Areas fall within the 500m study area, these receptors have been scoped out from further assessment based on the data produced by the

Effect	Receptor	Construction / Operation	Discussion
			Zone of Theoretical Visibility (ZTV) study, which has indicated that the Plot H development will not give rise to any visual impact upon the setting of these heritage assets.

Identification of Effect/s which are Likely to be Significant

**Receptor numbers correspond to the location of each listed building and NDHA indicated in Figure 1 of the Built Heritage – EIA Scoping Figures (Appendix 12).*

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Minor (indirect only)	1. Lass O Gowrie, Grade II, List Entry Number: 1293175	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	2. Manchester House, Grade II, List Entry Number: 1270897	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor-to-moderate (indirect only)	3. Former Refuge Assurance Company Offices, Grade II*, List Entry Number: 1271429	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to range from minor-to-moderate (adverse) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	4. Orient House, Grade II, List Entry Number: 1200838	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral). Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	5. Granby House, Grade II, List Entry Number: 1218253	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral). Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor-to-moderate (indirect only)	6. Renold Building, UMIST Campus, Grade II, List Entry Number: 1491623	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to range from minor-to-moderate (adverse) impact. Adverse impact may be mitigated by positive design (operational phase).

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
			No direct impact.
Minor (indirect only)	7. Sculptural Wall, Grade II, List Entry Number: 1400857	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral). Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	8. Train Shed and undercroft at Manchester Piccadilly Station, Grade II, List Entry Number: 1283014	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	9. Former Goods Offices to Piccadilly Station, Grade II, List Entry Number: 1197919	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor-to-moderate (indirect only)	10. Police and Fire Station, Grade II*, List Entry Number: 1197918	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to range from minor-to-moderate (adverse) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor-to-moderate (indirect only)	11. Institute of Science and Technology (University of Manchester), Grade II, List Entry Number: 1247609	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to range from minor-to-moderate (adverse) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	12. Regency House with Barclays Bank, Grade II, List Entry Number: 1254835	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	13. 46 Sackville Street, Grade II, List Entry Number: 1247608	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	14. 42 and 44 Sackville Street, Grade II, List Entry Number: 1270791	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor-to-moderate (indirect only)	15. The Shena Simon Sixth-Form College, Grade II, List Entry Number: 1270607	C and O	Indirect impact anticipated to the setting of the asset. Degree of indirect impact anticipated to be minor to moderate (adverse, beneficial or neutral). Adverse impact may be mitigated by positive design (operational phase).

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
			No direct impact.
Minor (indirect only)	16. Minshull House, Grade II, List Entry Number: 1283092	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	17. Mintierna House, Grade II, List Entry Number: 1197759	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	18. Manchester South Junction and Altrincham Railway Viaduct, Grade II, List Entry Number: 1200837	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	19. Barnes Wallis and Wright Robinson building, Certificate of Immunity, NDHA, List Entry Number: 1491085	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	20. Moffat Building, Certificate of Immunity, NDHA, List Entry Number: 1491090	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	21. Butterfly Stairs and Walkway Bridge (formerly known as The Sir Hubert Worthington Stair), UMIST, Manchester, Certificate of Immunity, NDHA, List Entry Number: 1491350	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	22. Staff House (Manchester Meeting Place), UMIST, Certificate of Immunity, NDHA, List Entry Number: 1491326	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	23. Morton Laboratory (Chemical Engineering Pilot Plant), UMIST, Certificate of Immunity, NDHA, List Entry Number: 1491347	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	24. Jacksons Mill, NDHA	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact.

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
			Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	25. Pariser Building, NDHA	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	26. MSS Tower, NDHA	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	27. Whitworth Street Conservaition Area, designated June 1985	C and O	Indirect impact to the setting of the asset. Degree of indirect impact anticipated to be minor (adverse, beneficial or neutral) impact. Adverse impact may be mitigated by positive design (operational phase). No direct impact.
Minor (indirect only)	28. Public Art	C and O	There are a range of public art pieces which are located within the wider masterplan site. The strategy for these is subject to a separate application but are to be considered under Plot H where necessary. Subject to NPPF para.211 which relates to historic statue, plaque, memorial or monument (whether listed or not).

Assessment Methodology for Likely Significant Effects

Baseline Data

6.26 Baseline data of the study area was collected utilising Historic England's Online Mapping tool and Manchester City Council's online data (refer to Built Heritage – EIA Scoping Figures (Appendix 12)). Google Earth was also utilised as part of the baseline data collection.

6.27 Non-designated heritage assets are as identified during pre-application discussions with the Local Planning Authority and defined in the SRF.

6.28 A study area of 500m from the Site boundary has been determined by Heritage Architecture as being appropriate for the consideration of potential significant effects of the Proposed Development on the setting of heritage assets in the local area. The determination of the study area has been based on an understanding of the existing nature of the site and its surroundings, heritage sensitivities in the locality of the site, the form and character of the proposed development, a Zone of Theoretical Visibility, and has been further informed by professional judgement and experience in similar assessments.

6.29 There are 114 listed buildings within a 500m radius of the site. However, a number of listed buildings within the wider area are to be scoped out from further assessment, due to the lack

of intervisibility with the Plot H site. This scoping exercise is supported by ZTVI studies of the site.

6.30 The built heritage chapter will identify and evaluate the nature and likelihood of the impacts of the Proposed Development, both permanent and temporary, in both the short term and long term, on built heritage receptors against clearly defined criteria.

6.31 The proposed draft views to be assessed as part of the built heritage chapter are:

- View 2 – Granby Row at Granby House
- View 3 – Vimto Park (SRF view B)
- View 4 – Altrincham Street
- View 5 – Sackville Street
- View 6 – Charles Street at Lass O' Gowrie pub
- View 7 – Princess Street
- View 8 – Sackville Gardens (SRF view 5)
- View 9 – Chorlton Street (SRF view 2)
- View 10 – London Road (SRF view 3)
- View 11 – Fairfield Street (SRF view 4)
- View 12 – Altrincham Street
- View 18 – Oxford Street Station

Method of Assessment

6.32 The assessment methodology for the historic environment is a synthesis of established guidance, best practice and professional judgement. The assessment of effects of the proposed development has been undertaken in accordance with an adapted form of the methodology set out in the ICOMOS Guidance on 'Heritage Impact Assessments' (January 2011), in which the value of heritage attributes is assessed in relation to statutory designations.

6.33 The relative 'value' and importance attributed to the identified heritage assets largely coincides with their national status. In line with ICOMOS terminology, Grade I buildings are considered to be of very high significance; Grade II* of high significance; and Grade II of medium heritage significance. The value of Conservation Areas is informed by the quality and significance of the built form within them and may be influenced by the status of listed and locally listed buildings which make up the designated area.

6.34 The receptor (which for the purposes of this assessment are 'heritage assets') which has the potential to be affected by the Proposed Development is ascribed a value and subsequently the impact of the Proposed Development on them is assessed in order to determine the significance of the effect.

6.35 The following Historic England guidance will be utilised:

- Historic England's Conservation Principles, Policies and Guidance (2008);
- Historic England's Good Practice Advice Note 3: The Setting of Heritage Assets (2017);

- Historic England. Advice Note 4: Tall Building Guidance (2022); and
- Historic England (2019). Understanding Place: Conservation Area Designation, Appraisal and Management.

6.36 A Heritage Statement will be prepared to support the Built Heritage Chapter (forming a technical appendix) and accompany the Planning Application. As stated above, the Heritage Statement will provide a detailed and robust baseline assessment of the identified heritage assets surrounding the Site, considering their significance and to what extent their setting contributes to an appreciation of this. This information will be summarised in the ES Chapter.

6.37 In order to assess the potential magnitude and significance of effect of the visual impact of the Proposed Development, the following criteria is considered:

- The sensitivity and proximity of receptors (i.e., heritage assets);
- The nature of the existing views;
- The degree of change to existing views and the visibility of the Proposed Development; and
- The availability and amenity of alternative views.

6.38 The assessment section of the Chapter will:

- Describe the potential impacts to the heritage assets as a result of the Proposed Development; and
- Outline suitable mitigation measures to deal with the potential effects of the Proposed Development on heritage assets.

6.39 Significant effects in EIA terms relate to effects categorised as Moderate, Moderate-Major, or Major. Any effects categorised below this – Minor-Moderate, Minor, Negligible, or None – are considered to be Not Significant.

Discipline specific methodology

6.40 Significance criteria for determining the value of heritage assets:

Significance / Sensitivity	Definition of receptor
Very High	- Grade I listed buildings / Grade I registered parks and gardens - World Heritage Sites
High	- Grade I and Grade II* listed buildings. - Other buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade. - Conservation Areas containing very important buildings. -
Medium	- Grade II listed buildings.

	- Historic buildings that can be shown to have exceptional qualities in their fabric or historical associations. - Conservation areas containing buildings that contribute significantly to its historic character.
Low	- Locally listed buildings. - Historic buildings of modest quality in their fabric or historical association. -
Negligible	- Recorded on the HER in record form or as 'Find Sites' - buildings, structures, or designed landscape features, which detract from the architectural design, historic, communal, or townscape interest of the principal heritage asset.
Unknown / none	- Buildings/sites where the potential importance interest requires determination - Or sites determined to be of no heritage interest

6.41 Criteria for determining the magnitude of impact:

Magnitude of Impact	Criteria for Assessing impact
Major beneficial	The development considerably enhances the heritage values of the heritage assets, or the ability to appreciate those values.
Moderate beneficial	The development enhances to a clearly discernible extent the heritage values of the heritage assets, or the ability to appreciate those values.
Minor beneficial	The development enhances to a minor extent the heritage values of the heritage assets, or the ability to appreciate those values.
Negligible beneficial	The resultant difference will be imperceptible but have a positive impact on the understanding or appreciation of the heritage asset.
Neutral	This does not necessarily mean that there will be no physical or visual change, rather that the resultant difference will be imperceptible or appropriately balanced
Negligible adverse	The development would not diminish the value of the heritage assets' significant physical fabric, their settings or significance to any appreciable degree.
Minor adverse	The development erodes to a minor extent the heritage values of the heritage assets, or the ability to appreciate those values.
Moderate adverse	The development erodes to a clearly discernible extent the heritage values of the heritage assets, or the ability to appreciate those values.
Major adverse	The development severely erodes the heritage values of the heritage assets, or the ability to appreciate those values.

6.42 Significance of effect matrix:

Magnitude	Sensitivity		
	Very High / 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 Adverse/Beneficial
Negligible	Negligible Adverse/Beneficial	Negligible Adverse/Beneficial	Negligible Adverse/Beneficial
Neutral	Neutral	Neutral	Neutral

Noise and Vibration

Consultation & Available Information, & Baseline Conditions

Consultation

6.43 No statutory consultation has been undertaken to date. The assessment scope & methodology derive from a comprehensive review of policy and the completed baseline survey. Relevant policy includes:

- Manchester Core Strategy (Development Management Policy DM1) - *Adopted 2012*
- Manchester Unitary Development Plan (1995), Saved Policy DC26: Development and Noise (retained as a saved policy, confirmed 2014 and still extant).
- Planning and Noise - Technical Guidance (Manchester City Council) – *2015*
- Guide to Development in Manchester (SPD) – *Adopted 2007*
- National Planning Policy Framework (NPPF) - *February 2025*
- Planning Practice Guidance: Noise (PPG – Noise) - *July 2019*
- Noise Policy Statement for England (NPSE) - *Published March 2010*
- Control of Pollution Act 1974

6.44 Local policy requires assessment of noise and vibration; both are scoped in. In our judgement the framework provides sufficient clarity without further consultation.

Completed Background Studies

6.45 An Environmental Noise Survey Report was completed on 22 July 2025 and is appended to this report (Appendix 13).

6.46 Unattended baseline monitoring 4–8 July 2025 at three positions (railway boundary; Sackville St; Charles St) was undertaken in general accordance with BS 7445:2003 – Description and measurement of environmental noise and the Association of Noise Consultants (ANC) - Environmental Noise Measurement Guide (2021) using Type 1 sound level meters. Outputs include the equivalent continuous sound pressure level (L_{Aeq}), background sound level (L_{A90}) and night maximum sound pressure level (L_{Afmax}) time-histories, spectra, and histograms deriving “typical-lowest” background levels for plant criteria. The existing noise climate is dominated by local road traffic (Sackville/Charles/Princess St; Mancunian Way to the south)

and rail movements on the elevated tracks along the northern boundary. Dataset forms the baseline for the EIA noise and vibration assessment.

Baseline Conditions

Baseline (2025)

6.47 The Site is a disused multi-storey car park, with vacant commercial retail units and a disused public house at ground floor level. The prevailing soundscape is dominated by road traffic (Sackville/Charles Street/wider network) and rail noise/vibration from elevated tracks to the north. Sensitive receptors include residential and educational buildings.

Do-Nothing scenario, without the Proposed Development

6.48 The Site remains vacant; with noise and vibration environment remaining unchanged. Traffic/rail noise would persist.

Do-Something scenario, with the Proposed Development

6.49 The Site becomes PBSA with very limited parking (minimal traffic uplift) and ground-floor commercial units (Class E, sui generis, Class F1 /F2). The overall noise climate is unlikely to change significantly. Very minor changes in road traffic noise may occur, and new noise sources such as patrons and servicing for the commercial units and plant servicing the building as a whole are expected and will be assessed where potential significant effects exist. Construction will cause temporary local increases in noise and vibration, after which conditions return broadly to baseline.

6.50 Alternative Baseline Scenarios (1a–4a), representing conditions with the existing buildings demolished but the Proposed Development not yet built, have been scoped out. The 2025 baseline (with buildings in situ) is considered to represent the likely operational worst-case condition, creating the most robust assessment. Removal of the existing structures would not materially alter noise or vibration exposure at receptors within this transport-dominated environment, and any demolition-only noise would mirror the early construction activities of the main scheme. In addition, assessment of future baseline scenario will pick up the proposed demolition with the cumulative schemes, therefore ensuring this is considered.

Scope of Assessment

Identification of Effect/s which are Not Significant

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Construction Traffic Vibration	Sensitive Residential / Education Receptors	Construction	There is potential for adverse effects due to construction traffic vibration where sensitive receptors are in very close proximity to roads which don't regularly experience heavy goods vehicle movements. There is no set methodology for the assessment of construction traffic vibration, however receptors that are likely to experience adverse effects are very likely to be the same as those identified in the assessment of construction traffic noise; additionally the mitigation measures

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
			implemented to reduce the impact of construction traffic noise (i.e. the routing of construction traffic) will also reduce the impact of construction traffic vibration. A separate assessment of construction traffic vibration is therefore not deemed necessary or proportionate.
Road traffic noise increase	Sensitive Residential / Education Receptors	Operation	The Proposed Development replaces a disused multi-storey car park and does not include significant parking allowances, so is not expected to generate significant road traffic in operation. As such, there is limited potential for significant adverse noise effects due to the increase in traffic flows on nearby roads because of the Proposed Development and assessment of operational road traffic is therefore not deemed necessary.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Demolition/Construction Noise	Sensitive Residential/Education Receptors	Construction	There are sensitive receptors near the Proposed Development site boundary which could be subject to temporary significant adverse effects due to demolition/construction noise.
Construction Traffic Noise	Sensitive Residential/Education Receptors	Construction	There are sensitive receptors located off roads which are likely to be used by construction traffic accessing the site. There is potential for temporary adverse effects due to the noise increase on local roads.
Construction Vibration	Sensitive Residential/Education Receptors	Construction	There are sensitive receptors near the Proposed Development site boundary which could be subject to temporary significant adverse effects due to demolition/construction vibration.
Environmental noise impacts	Proposed Development	Operation	Baseline noise levels are typical of urban sites close to transport infrastructure. Appropriate building envelope specifications and ventilation strategies will be required to achieve guideline internal noise levels and avoid significant effects.
Environmental vibration impact	Proposed Development	Operation	Rail vibration has the potential to cause perceptible vibration and/or re-radiated noise within the Proposed Development. Baseline

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
			ground-borne vibration measurements will be required to confirm risk. If significant, design mitigation (e.g. foundation isolation, structural detailing, or layout controls) may be necessary to avoid significant effects.
Noise from Building Services Plant	Sensitive Residential Receptors	Operation	There is likely to be a considerable amount of building services plant, and the existing background noise levels are likely to be relatively low. Therefore, noise emissions from building services plant have the potential to cause significant adverse noise effects at nearby sensitive receptors if not properly controlled.
Retail/Gym Noise Impacts	Sensitive Residential Receptors	Operation	Appropriate operational controls and building fabric specifications will be required to ensure that noise from proposed retail and gym activities does not result in significant effects at adjoining and offsite sensitive receptors.

Assessment Methodology for Likely Significant Effects

Baseline Data

6.51 The baseline has been established based on the results of the unattended environmental noise monitoring (4–8 Jul 2025) undertaken at three boundary positions (railway, Sackville St, Charles St). See appended Blackbird Acoustics Ltd Environmental Noise Survey Report (Appendix 13).

6.52 The existing noise climate is dominated by road traffic and rail movements; typical of urban environments close to transportation infrastructure.

6.53 The following study areas have been defined for the assessment of noise and vibration impacts:

- Construction and Operation Noise and Vibration Study Area: 100m. This extent is illustrated in Figure 6.1 and has been selected based on the following considerations:
  - A 100m radius ensures the inclusion of the vast majority of receptors with direct line of sight to the development, capturing those most likely to be affected by noise and vibration.
  - Receptors located outside the 100 m boundary are typically either more distant or acoustically screened by intervening buildings or structures, meaning any effects are likely to be significantly attenuated.
  - The selected boundary supports a worst-case assessment that remains proportionate to the scale of the development, and is expected to capture all locations where significant effects could realistically occur.

- Construction Traffic Study Area: 50m width of relevant curb lines. This extent has been selected based on the following considerations:
  - DMRB LA 111 Noise and Vibration (2020) states that a construction traffic study area shall be defined to include a 50-metre width from the kerb line of public roads where there is potential for an increase in baseline noise level (BNL) of 1 dB(A) or more as a result of additional construction traffic on existing traffic levels.
  - The existing and construction traffic flow data will be reviewed to establish the study area once the datasets have been produced by the transport engineers.

- Construction Vibration Study Area: 50m. This extent is illustrated in Figure 6.1 and has been selected based on the following considerations:
  - This reflects the physical propagation characteristics of ground-borne vibration, which decays rapidly with distance due to geometric spreading and soil damping effects.
  - Beyond about 50m, vibration levels from typical construction activities (such as piling, excavation, or heavy vehicle movements) are expected to fall below thresholds of human perception and well below any damage criteria for buildings.
  - Limiting the vibration study area to this smaller radius therefore ensures that assessment remains focused on receptors with a realistic potential for perceptible or significant impacts, without unnecessarily expanding the study area to include locations where vibration will be negligible.

6.54 Additional baseline data that is still to be recorded includes targeted attended vibration survey for PPV/VDV at rail-facing edge/nearest receptors. No further noise logging is proposed.

Figure 6.1 – Noise and Vibration Study Areas



Method of Assessment

6.55 The noise and vibration assessment will follow a structured approach, combining site measurements, prediction modelling, and comparison against relevant British Standards and

guidance. The aim is to provide a clear, proportionate assessment of likely effects during both the construction and operational phases of the development.

Baseline measurements

6.56 Unattended logging surveys have been undertaken at representative locations around the site (July 2025), in accordance with ISO 1996-1:2016 and ISO 1996-2:2017.

6.57 Class 1 instrumentation has been used, compliant with IEC 61672-1:2013, with calibration traceable to IEC 60942:2017.

6.58 Frequency spectra have been recorded to IEC 61260-1:2014 for use in both plant and façade break-in calculations.

Propagation modelling

6.59 Noise predictions will use BS ISO 9613-2:2024, the well-established method for calculating outdoor sound propagation. The method accounts for distance, ground and air absorption, and screening or reflections, providing realistic estimates of levels at receptors. Predictions will be checked against baseline measurements and tested for sensitivity to ensure robustness.

Construction phase assessments

6.60 Demolition/Construction Noise: Construction/Demolition noise will be assessed by taking an assumed plant list, agreed with the client, and modelling the expected noise levels in accordance with BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise guidance. Impact thresholds will be defined in accordance with the National Highways, Design Manual for Roads and Bridges (DMRB), LA 111: Noise and Vibration, Revision 2, February 2020, and a moderate or major effect will be deemed potentially significant.

6.61 Construction Traffic noise: Changes in road traffic noise associated with the demolition/construction of the scheme will be assessed using the Calculation of Road Traffic Noise (CRTN) basic noise level calculation method. The impact thresholds will be defined in accordance with DMRB LA 111 (short term traffic noise increase) and a moderate or major effect will be deemed potentially significant.

Operational phase assessments

6.62 Environmental noise impacts: The assessment of environmental noise impacts will be undertaken by taking the modelled external façade noise level, assessing noise break-in to the residential and other sensitive uses in accordance with BS8233:2014 and assessing against BS8233:2014 criteria for suitable internal ambient noise levels. The impact thresholds will be defined using professional judgement and accounting for BS8233:2014 and ProPG guidance and a moderate or major effect will be deemed potentially significant.

6.63 Retail / gym noise impacts: The assessment of potential noise impacts from the proposed retail and gym activities within the proposed development will be undertaken by considering typical operational noise sources, such as amplified music, fitness classes, customer activity, and exercise equipment use. Predicted source noise levels will be assessed both at the façades of the nearest offsite noise-sensitive receptors and within any adjoining sensitive uses inside the development, accounting for propagation in accordance with standard

methodologies. The results will be evaluated against relevant guidance criteria (e.g. BS 8233:2014 and ProPG for residential amenity). Impact thresholds will be defined using professional judgement, considering the character of the noise, the sensitivity of the receptor, and the relevant standards, with a moderate or major effect deemed potentially significant.

6.64 Noise from Building Services Plant*:* It is unlikely that sufficient building services design information will be available at planning to present a full and detailed assessment of the impacts. Where the design is sufficiently progressed, plant noise emissions for the major items will be assessed using the ISO 9613 prediction methodology and plant rating levels will be determined in accordance with BS 4142:2014+A1:2019. Impact thresholds will be derived from the measured background sound levels using professional judgement and accounting for BS 4142 guidance. A moderate or major effect will be deemed potentially significant. Where sufficient data is not available, external building services noise limits will be presented so that these may be secured by condition.

6.65 Environmental Vibration Impacts:

- For human exposure, the likely vibration levels in the proposed building will be established based on the measured levels, corrected to account for ground and building effects in accordance with the ANC Measurement & Assessment of Groundborne Noise and Vibration guide (2020). Impact thresholds will be defined in accordance with the ANC guide and against the guideline ranges set out in BS 6472-1:2008 using Vibration Dose Value (VDV). A moderate or major effect will be deemed potentially significant.

- For groundborne noise, the assessment will also follow the ANC Good Practice Guide. Impact thresholds will be defined in accordance with the ANC guide. A moderate or major effect will be deemed potentially significant.

Cumulative Assessment

6.66 The cumulative assessment for noise and vibration will consider consented/committed schemes within a 1km radius. It is assumed that any changes in road traffic flows will be captured within those that are derived by the transport consultants; these will be considered as necessary. The cumulative impact of any nearby construction sites will be considered where construction will occur at the same time. No other cumulative impacts are expected.

Discipline specific methodology

6.67 Effects will typically be assessed using the methodology as set out in Section 2 of the Scoping Report. However, the noise and vibration impact assessment will consider moderate impact magnitudes at high sensitivity receptors to be moderate adverse, not major adverse, because noise and vibration effects are typically transient, manageable, and reversible. This approach ensures that the assessment is proportionate, aligned with guidance, and reflective of actual environmental risk, while still highlighting the need for appropriate mitigation.

Air Quality

Consultation & Available Information, & Baseline Conditions

Consultation

6.68 Consultation is planned to be issued to MCC Environmental Health Office (EHO) to agree on specific aspects of the methodology following submission of the Scoping report. Consultation with other stakeholders is not anticipated.

Completed Background Studies

6.69 No site-specific air quality survey will be undertaken for air quality on this project.

Baseline Conditions

6.70 The Site is within the Manchester Air Quality Management Area (AQMA), which has been declared due to exceedances of the annual average NO2 and 24-hour average PM10 Air Quality Objectives (AQO).

6.71 Air quality monitoring stations from two monitoring schemes, Local Air Quality Management (LAQM) and Clean Air Plan (CAP), in the vicinity of the Site are presented in Figure 1. Elevated pollution levels are shown by monitoring stations along Oxford Road (260 m west of the Site), in which 2024 annual average concentrations recorded at most stations exceeded the UK AQO for annual average NO2 (40 µg/m3). The highest NO2 level was recorded at monitoring station CAP_MANC_183, with the annual average concentration of 53 µg/m3.

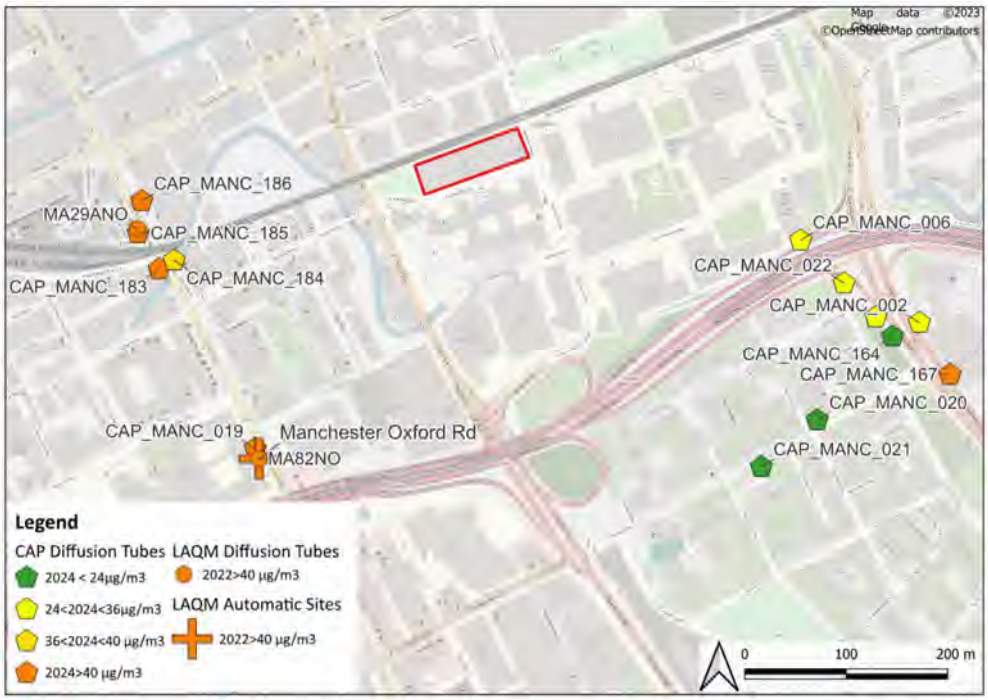
6.72 2024 NO2 concentrations recorded near Downing Street Junction (335m southeast of the Site) indicate pollution levels in compliance with the annual average AQO for all but one monitoring station. Site CAP_MANC_006 (280m to the southeast) monitored 26.5 µg/m3, and site CAP_MANC_022 monitored 31.8 µg/m3, whereas the annual mean NO2 level at monitoring station CAP_MANC_167 is 44.6 µg/m3, exceeding the AQO level of 40 µg/m3.

6.73 For particulate matter, the automatic monitoring station Manchester Oxford Road (827 m southwest of the Site) monitored the annual average PM10 concentrations of 20.5 µg/m3, well below the AQO of 40 µg/m3. In 2024, the 24-hour mean PM10 concentration exceeded the threshold of 50 µg/m³ only once, remaining well below the allowable limit of 35 exceedances per year. This indicates a low risk of both short-term and long-term PM10 exceedances.

6.74 Future NO2 concentrations are anticipated to decline as the share of the vehicle fleet with improved emissions abatement and electric vehicles increases. For other key pollutants, such as PM2.5, anticipated future changes are not as predictable.

6.75 For air quality, the worst-case scenario for assessing the total impacts of the Proposed Development is considered to be the existing baseline, as opposed to the alternative baseline where the current structures have been demolished as the existing baseline generates limited traffic. The assessment of the future baseline scenario in addition to the existing baseline will also include the proposed demolition within the cumulative schemes and therefore ensure this is considered sufficiently.

Figure 6.2 – Air quality monitoring stations from two monitoring schemes in the proximity of the Site. Monitoring stations are colour coded based on the monitored 2024 annual average NO2 concentrations.



Scope of Assessment

Identification of Effect/s which are Not Significant

Effect	*Receptor*	*Construction/Operation*	*Discussion*
Loss of amenity from dust soiling, and adverse health effects resulting from dust and PM10 generated by construction activities.	Existing sensitive receptors within 250m from the Site boundary or 50m from the vehicle trackout routes.	Construction	It is anticipated that dust and particulate matter emissions produced during construction activities will be controlled by implementing a CEMP. This CEMP will be informed by the Institute of Air Quality Management (IAQM) guidance on the assessment of dust from demolition and construction1. It would include prevention measures, such as screening stockpiles of materials, deployment of windbreak netting, and dampening exposed soils as appropriate and set out requirements for ongoing monitoring and liaison with the local community, and MCC. These tertiary mitigation measures would be considered an integral part of the Proposed Development and as part of the Schedule of Mitigation. Implementing these tertiary mitigation measures will ensure that residual effects are not significant and will not be considered within the EIA or reported in the ES. The construction dust risk assessment and proposed mitigation

[1] IAQM. (2024). Guidance on the assessment of dust from demolition and construction v2.2. https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

Effect	*Receptor*	*Construction/Operation*	*Discussion*
			measures will be included as a technical appendix to the air quality ES chapter.
Combustion emissions from Non-Road Mobile Machinery (NRMM) during construction activities	Existing sensitive receptors in the vicinity of the Site	Construction	It is anticipated that combustion emissions from NRMM during construction activities would be controlled through the implementation of a CEMP. In order to manage emissions from NRMM, the appropriate emission standards from EU Regulation 2016/1628 will be incorporated into the CEMP. Therefore, this tertiary mitigation is considered an integral part of the Proposed Development. Due to the adoption of the tertiary NRMM mitigation, significant effects are considered unlikely, and therefore, the effects of combustion emissions from NRMM on existing sensitive receptors will not be considered within the EIA or reported in the ES.
Odour emissions from proposed Class E uses	Existing sensitive receptors in the vicinity of the Site and future users of the Proposed Development	Operation	Odour emissions from any proposed Class E use included as part of the Proposed Development will be mitigated through the implementation of an odour management system. This would be enforced through a planning condition, linked to the detailed design of the kitchens proposed, when this is available. For this, assessment of odour will be completed in line with EMAQ 2018 Addendum to the 2005 Defra Guidance on the 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems'. The assessment will ensure that the odour from kitchen extracts does not cause a significant impact. Therefore, the effects of odour emissions on nearby sensitive receptors are unlikely to be considered significant and will not be considered within the ES.
Combustion plant introduced as part of the energy strategy of the Proposed Development	Nearby existing sensitive uses (Residential properties, schools, care homes, etc.)	Operation	Combustion plant, such as gas-fired boilers and CHP units, can release NOx and NO2 emissions that can have an adverse impact on local sensitive receptors. The Proposed Development will utilise an all-electric energy strategy with ASHPS or similar technology. The only proposed energy combustion sources on-site will be for life safety purposes only (such as firefighting/emergency lighting, etc.). Therefore, emissions released from energy combustion plants to nearby sensitive receptors are unlikely to be considered

Effect	*Receptor*	*Construction/Operation*	*Discussion*
			significant and will not be considered within the EIA or reported in the ES.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction/Operation*	*Discussion*
Effects associated with emissions of NO_2 and PM_{10} /$PM_{2.5}$ generated by construction vehicle traffic.	Nearby existing proposed cumulative sensitive uses (Residential properties, schools, care homes, etc.) that are close to roads along which there will be an increase in traffic due to construction.	Construction	The increase in vehicle traffic on the surrounding road network due to the construction of the Proposed Development shall be considered in line with the IAQM screening criteria for detailed assessment. If construction traffic exceeds the screening thresholds, then the impact on air quality will be assessed using dispersion modelling. Traffic generated by cumulative developments will be considered inherently in the assessment as part of the future baseline. Sensitive uses introduced by cumulative developments will be considered as receptors within the impact assessments.
Effects associated with emissions of NO_2 and PM_{10} /$PM_{2.5}$ generated by operational traffic.	Existing and proposed cumulative sensitive uses that are close to roads along which there will be an increase in traffic due to operation.	Operation	The increase in vehicle traffic on the surrounding road network due to the operation of the Proposed Development shall be considered in line with the IAQM screening criteria for detailed assessment. If operational traffic exceeds the screening thresholds, then the impact on air quality will be assessed using dispersion modelling.
Effects associated with sources of air pollutant emissions on future receptors that would be introduced to	Sensitive uses (e.g. residential) introduced by the Proposed Development	Operation	The exposure of future site users shall be considered qualitatively based on air quality monitoring in the area and relevant aspects of the Proposed Development, such as set-back from roads, rail, location of sensitive uses and mitigation measures. If the results of this qualitative assessment indicate likely risks of exceeding the relevant air quality objectives, a detailed dispersion model

the area through the Proposed Development.			will be completed. Dispersion modelling will quantify the pollutant concentrations at the façade of the Proposed Development and inform mitigation requirements.

Assessment Methodology for Likely Significant Effects

Baseline Data

6.76 Baseline data for the assessment will be gathered from the following sources:

- Greater Manchester Combined Authority air quality monitoring data, presented in the annual status report for the baseline year (2024 or future year, depending on data availability).
- Diffusion tube monitoring undertaken for the Manchester Clean Air Plan (results are presented on the Clean Air Greater Manchester website).
- Department for Environment Food & Rural Affairs (Defra) national air quality background maps.
- Data presented on the automatic urban rural network (AURN) website.

Method of Assessment

6.77 The need to conduct detailed dispersion modelling of construction and operational traffic for each scenario will be determined using the criteria set out in the IAQM/EPUK guidance on land-use planning and development control2

6.78 Initial discussions with the transport consultants indicate that, given the Proposed Development is to be car-free, there is a predicted AADT trip generation of 78 LGVs and 2HDV movements during operation. This is to fall below the IAQM/EPUK criteria of 100 LGVs and/or 25 HDV for a detailed assessment (dispersion modelling). Information on trip generation for the construction phase is currently unknown. In line with the EPUK/IAQM guidance should this criterion be exceeded, a detailed assessment will be undertaken where relevant.

6.79 Where detailed modelling is required to assess the impacts of the Proposed Development on air quality, the following scenarios will be considered within Air Quality ES chapter:

- Scenario 1: Existing Baseline (existing EIA Site, as of September 2025): For the air quality assessment and model verification only, Scenario 1 will be factored to a baseline year of 2024, to establish baseline conditions against monitored concentrations undertaken by GMCA within Manchester.

- Scenario 3: Existing Baseline + Proposed Development + Cumulative: For the purpose of air quality, a Future 'Do nothing' scenario with cumulative development but without proposed development and the Future Baseline 'Do Something' scenario with cumulative development and with proposed development, will be considered.

- Scenario 4: Existing Baseline + Proposed Development + IDM Masterplan (future surrounds/ future phases) + Cumulative. This scenario is to be considered qualitatively as details of the traffic generated by other Plots within the IDM

[2] IAQM. (2017). Land-Use Planning & Development Control: Planning for Air Quality v1.2. https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

masterplan are currently unknown, however commentary on the air quality impact in regard to the wider ID Masterplan development will also be undertaken within a qualitative assessment.

6.80 Where detailed modelling is required, the assessment will consider the following:

- Predict changes in concentrations of NO_2, PM_{10}, and $PM_{2.5}$ at selected existing worst-case receptor locations as a result of changes in traffic flows on the surrounding road network using dispersion modelling software ADMS-Roads. The scope, extent and detailed methodology of any dispersion modelling study carried out will be agreed with the Environmental Health Officer at MCC as part of the consultant process.

- Modelling will be carried out following Local Air Quality Management technical guidance (TG22)[3] and will be verified using data from nearby roadside monitoring stations operated by GMCA; monitoring sites are proposed to be used for verification, and this will be confirmed with MCC once traffic distribution is understood.

- The concentrations predicted by dispersion modelling will be compared against the relevant air quality objectives, and any exceedances will be highlighted. Significance levels will be reported using the criteria set out in the IAQM/EPUK guidance on land-use planning and development control[Error! Bookmark not defined.]. This defines the magnitude of impact with respect to the change in pollutant concentration at a sensitive receptor, in relation to the relevant AQO for a pollutant. The magnitude of impact with regard to the exposure of future site users to air pollution is determined by comparing the air pollutant concentrations the site user will experience to the AQO levels.

6.81 An assessment of the likely cumulative effects associated with committed developments will also be undertaken for the construction and operational phases (Scenario 3&4). Where detailed modelling assessment is required, each scenario will consider traffic flows associated with cumulative schemes as part of the future baseline and thus is inherent within the assessment. The cumulative assessment will consider all cumulative developments assessed in the Transport ES chapter.

6.82 The impact of the Proposed Development is to be assessed by comparing scenarios for future years (Scenario 3&4) with the Proposed Development in operation against and existing scenario where the Proposed Development is not progressed (Scenario 1). This considers the change in concentrations as a result of the traffic generation associated with the Proposed Development.

6.83 The Proposed Development is not to be considered in isolation (without consideration to cumulative schemes), as this has the potential to lead to an underprediction of pollutant concentrations at nearby existing and future sensitive receptors during the construction and operational phases. As such, accounting for cumulative traffic generation within Scenarios 3 and 4 accounts for a worst case assessment of air quality impact as a result of the Proposed Development.

[3] DEFRA. (2022) Local Air Quality Management Technical Guidance (TG22). https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf

Discipline Specific Methodology

6.84 Impact significance at each individual sensitive receptor shall be determined in accordance with the EPUK/IAQM guidance on land-use planning and development control significance criteria, as detailed in the below table. These criteria are recommended by the professional body for air quality practitioners, the IAQM. Significance criteria for air quality assessment deviate from the standard methodology criteria outlined in Section 2, and interchangeable descriptors are noted in the below table.

6.85 The overall significance of the effects of the Proposed Development on air quality will be determined using professional judgement, considering the impacts at individual receptors, whilst taking other relevant factors into account. This is in line with IAQM / EPUK guidance on land-use planning and development control.

6.86 IAQM Air quality impact significance descriptors, interchangeable descriptors used in the rest of the ES are labelled in brackets:

Long-term average concentration at receptor in assessment year	Change in concentration relative to AQO				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQO	Negligible	Negligible	Negligible	Slight (Minor)	Moderate
76-94% of AQO	Negligible	Negligible	Slight (Minor)	Moderate	Moderate
95-102% of AQO	Negligible	Slight (Minor)	Moderate	Moderate	Substantial (Major)
103-109% of AQO	Negligible	Moderate	Moderate	Substantial (Major)	Substantial (Major)
110% or more of AQO	Negligible	Moderate	Substantial (Major)	Substantial (Major)	Substantial (Major)

Traffic and Transport

Consultation & Available Information, & Baseline Conditions

Consultation

6.87 Civic Engineers held a Transport Assessment scoping meeting with MCC highway officers on 05/09/2025. Required traffic survey data has previously been obtained from TfGM.

Completed Background Studies

6.88 Completed background studies 4 August 2025 – 9 September 2025: review of pedestrian and cycle network in the area, GMAL, available vehicle routes, public transport connectivity, review of available traffic data from Department for Transport and traffic survey data, estimation of vehicle trips generated by Plot H.

Baseline Conditions

6.89 The Site is currently well located to encourage users of the site to travel by sustainable travel. Charles Street and Sackville Street are designated as Beeways, with a mixture of in-carriageway and segregated routes for cycling. Several bus stops are located within 150m of the site, together providing up to 10 buses per hour in both directions. The Oxford Road Corridor is located 300m walk from the site, with over 30 buses per hour in both directions. The site has a GMAL (measure of public transport accessibility) of 8, which is the highest possible score.

6.90 Princess Street immediately to the west of the site is currently a source of severance to pedestrian and cycle movements. Additionally, there is currently no footway on the northern side of Charles Street adjacent to the Site. Options for addressing these issues are currently being explored as part of the development design process.

6.91 For traffic generation, the worst-case scenario for assessing the total impacts of the Proposed Development is considered to be the existing baseline, as opposed to the alternative baseline where the current structures have been demolished as the existing baseline generates limited traffic. The assessment of the future baseline scenario in addition to the existing baseline will also include the proposed demolition within the cumulative schemes and therefore ensure this is considered sufficiently.

Scope of Assessment

Identification of Effect/s which are Not Significant.

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Hazardous loads/ large loads	All road users	Construction and Operation	Hazardous or large loads are not generally associated with the construction of this type of development, as movements are primarily by HGV and Light Good Vehicles (LGVs) / Medium Good Vehicles (MGVs). The requirements for any such loads requiring access during construction will therefore be limited. A methodology statement will be included within the Construction Environmental Management Plan (CEMP) to be presented and agreed with the Local Highway Authority and HSE, where appropriate. Such a statement would include the details of trained operators, provision of appropriate audio / visual aids and / or proximity devices where operator visibility is restricted and the designation of dedicated loading / unloading areas. For operation of the Proposed Scheme, due to the uses proposed, the Proposed Scheme would not require the transportation of hazardous or large loads.

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
			Therefore, effects related to hazardous or large loads are not considered significant and will not be considered further within the EIA or reported in the ES.
Road Vehicle Driver and Passenger Delay	Vehicle drivers/ occupants	Construction and Operation	The change in vehicle flows arising from the development will be low, as this is a car-free scheme. The Proposed Development will only directly generate LGV, OGV and taxi movements, which at their busiest will only amount to around 5 vehicles during the highway peak hours. IEMA Guidelines indicate that the effect of Road Vehicle Driver and Passenger Delay is only likely to be significant at junctions which are at or close to their operational capacity. However, with an increase in traffic flows of just 5 vehicles at the times that the nearby junctions will be at their busiest, the change will be imperceptible and therefore will not be assessed in more detail.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Severance of Communities	Pedestrians and cyclists	Construction and Operation	Severance of communities increases where there is an increase in vehicle trips on roads within the study area and/or when opportunities to reduce severance (e.g. improved crossings) are implemented.
Non-motorised User Delay	Pedestrians and cyclists	Construction and Operation	Non-motorised User Delay is related to ability of a person to cross the road, which is affected by volume, composition and/or speed of traffic in the study area.
Non-motorised User Amenity	Pedestrians and cyclists	Construction and operation	This is related to relative pleasantness of a journey, and is affected by traffic flow, traffic composition, footway width and separation from the carriageway.
Fear and Intimidation on and by Road Users	Vehicle drivers / occupants, pedestrians and cyclists	Construction and Operation	The extent of fear and intimidation is dependent on heavy vehicle composition, the speed vehicles are passing and proximity of traffic to people.
Road User and Pedestrian Safety	Vehicle drivers / occupants, pedestrians and cyclists	Construction and Operation	Where collision clusters are identified, an increase in traffic flow can lead to an increase in collisions.

Assessment Methodology for Likely Significant Effects

Baseline Data

6.92 The following data will be obtained and studied:

- Department for Transport annual daily traffic flow (AADF) data
- Transport for Greater Manchester traffic data (e.g. on Sackville Street)
- GFA and use type of Plot H (for Scenarios 2,3 and 4)
- GFA and use type of IDM masterplan (for Scenario 4)
- TRICS database used to estimate trip generation of the Proposed Development and the IDM Masterplan Development.
- Road collision information taken from CrashMap website to identify collision clusters.

Method of Assessment

6.93 For the effect of 'reduction in safety and increase in accident risk' collision clusters will be identified using available data from Crashmap.

6.94 For all other effects of likely significance, the change in Annual Average Daily Traffic Flow (AADT) will be used to define impacts. This will use the peak hour development flows presented in the Transport Assessment which will be converted to AADT. The peak hour flows (PHF in the image below) will be converted to Annual Average Daily Traffic flows (AADF in the image below) for the purposes of this assessment using the following factors taken from the DfT's Traffic Appraisal Manual (1991):

Figure 6.2 – DfT Traffic Appraisal Manual – Peak-hour factors by road type classification

Conversion of Hourly Flow	Types of Road					
	Main Urban		Inter Urban		Recreational Inter-Urban	
	Factor	Coeff* (%)	Factor	Coeff* (%)	Factor	Coeff* (%)
AAHF to PHF	2.630	(11)	2.825	(15)	3.890	(23)
AAHF to 10th highest hour	2.83	(14)	3.231	(20)	4.400	(23)
AAHF to 30th highest hour	2.703	(11)	3.017	(17)	4.974	(21)
AAHF to 50th highest hour	2.649	(10)	2.891	(15)	3.742	(19)
AAHF to 100th highest hour	2.549	(9)	2.711	(12)	3.381	(15)
AAHF to 200th highest hour	2.424	(9)	2.501	(9)	3.042	(13)
AAWF to AADF	0.943	(3)	0.979	(4)	1.015	(4)

Notes: AAHF is assumed to be AADF ÷ 24
AAWF is the Average Annual Weekday Flow (Monday–Friday)
*Coefficient of Variation
Source: Traffic Appraisal Manual (TAM) DOT (1991).

Table 7.2 Peak–hour factors by road type classification.

6.95 To understand which of the IEMA rules are triggered, the sensitivity of receptors on each link in the study area will need to be defined. The criteria used is set out in the below table:

Sensitivity	Factors to Consider
High	Highway links and junctions (two sensitive users present): Schools, playgrounds; Retirement/care homes; Lack of adequate footways, lack of crossings; Network congested and over capacity; Collision cluster zones.
Medium	Highway Links and Junctions (at least one of the following): Hospitals, surgeries, clinics; Shopping areas; Parks/recreation grounds; Narrow footways.

Low	Highway Links and Junctions (at least one of the following): Few residential properties with direct frontage to the highway link being used as a construction traffic route; Workplaces with direct frontage to highway link being used as construction route.
Negligible	Receptors with no material sensitivity

6.96 If a link is identified as having receptors which are of high sensitivity, the impacts are assessed in more detail where there is a change in AADT of 10% or more (Rule 2 of the IEMA Guidelines).

6.97 All other links in the study area will have impacts assessed in more detail if there is a change in AADT of 30% of more (Rule 1 of the IEMA Guidelines).

6.98 The IEMA Guidelines will be used to define the magnitude of change and resultant impact for each effect of likely significance.

Daylight, Sunlight and Overshadowing

Consultation & Available Information, & Baseline Conditions

Consultation

6.99 There are no specialists within Manchester City Council or other statutory consultees relevant to the area of daylight, sunlight & overshadowing. As such, no consultation has been undertaken.

6.100 Discussions on daylight, sunlight & overshadowing may, however, form part of any pre-application process with Manchester City Council.

Completed Background Studies

6.101 Identification of residential/student sensitive receptors surrounding the Site.

6.102 Location of floor plans for the residential/student sensitive receptors.

6.103 Identification of external amenity space sensitive receptors surrounding the Site.

Baseline Conditions

6.104 The scope of residential/student properties (the daylight and sunlight sensitive receptors) and the areas of outdoor amenity space (the overshadowing sensitive receptors) that will be assessed has been determined through professional judgement, considering their orientation and proximity to the Site.

6.105 The baseline conditions are the levels of daylight, sunlight and overshadowing that are experienced by the sensitive receptors with the Site developed as it is currently (September 2025).

6.106 The proposed assessment will also consider the alternative baseline, which assumes the demolition of the existing building on the site has commenced prior to this redevelopment application. In this instance, the demolished building will be removed from the modelling to determine the alternative baseline conditions which are the levels of daylight, sunlight and overshadowing that are experienced by the sensitive receptors with the existing building no longer in place.

6.107 Baseline daylight, sunlight and overshadowing assessments of the daylight, sunlight and overshadowing sensitive receptors are currently being undertaken. The baseline assessments will review the daylight, sunlight and overshadowing conditions within each of the sensitive receptors based on the Site area's present form (i.e. the current baseline). This will also include modelling of the alternative baseline conditions.

6.1 If the Proposed Development did not come forward, the baseline daylight, sunlight and overshadowing levels within the daylight, sunlight and overshadowing sensitive receptors would remain as per the baseline assessments. Conditions would not change unless other developments were demolished/constructed in the proximate area.

Scope of Assessment

Identification of Effect/s which are Not Significant.

Effect	*Receptor*	*Construction / Operation*	*Discussion*
Reduced daylight and sunlight amenity within commercial properties or within distant residential/student properties and upon areas of amenity space	All commercial properties. Residential/student properties and areas of amenity space which are insufficiently proximate to be affected by the Proposed Development	Construction and Operation	The scope of works will focus on the nearest sensitive receptors which are the residential/student properties and public amenity spaces in the immediate vicinity of the Site. These have been determined in line with the reasonable expectation of daylight and sunlight as per the BRE guidelines. The BRE guidelines consider that residential properties have the highest requirement for daylight and sunlight. As such, daylight and sunlight effects to commercial buildings surrounding the Site, or residential/student buildings and areas of amenity space which are not in sufficient proximity to the Site, are not considered to be significant and will not be considered further in the EIA or reported in the ES.
Reduced daylight and sunlight amenity within surrounding residential/student sensitive receptors and upon surrounding areas of amenity space	All	Construction	Owing to the evolving and changing nature of construction activities, the assessment of potential daylight, sunlight & overshadowing effects during construction of the Proposed Development on daylight and sunlight to surrounding properties and sunlight upon surrounding areas of amenity space will not be modelled.

Effect	*Receptor*	*Construction / Operation*	*Discussion*
during demolition and construction			Since the potential daylight, sunlight & overshadowing effects relating to construction works will vary throughout the construction programme and gradually increase to the potential effects identified for the completed Proposed Development, the interim construction effects will not be assessed quantitatively as it is considered that the completed Proposed Development represents the worst-case assessment in terms of likely daylight and sunlight. Therefore, reduced daylight and sunlight amenity within the surrounding residential receptors and areas of amenity space during the demolition and construction phases is not considered to be significant (or if it is, only on parity with the completed Proposed Development) and will not be considered further in the EIA or reported in the ES.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction / Operation*	*Discussion*
Reduction in daylight amenity	Residential receptors within the following buildings, facing the site: Salisbury House Orient House Granby House Weston Hall JB's Public House Princess House Stanlo House Bombay & Velvet Court Sackville Place	Operation	Reduction in daylight amenity within the daylight sensitive receptors
Reduction in sunlight amenity	Residential receptors in the following buildings, facing the site: Salisbury House Orient House Granby House Weston Hall JB's Public House Princess House Stanlo House Bombay & Velvet Court Sackville Place	Operation	Reduction in sunlight amenity within the sunlight sensitive receptors
Increased shadow	Vimto Park	Operation	Increase in shadow upon the overshadowing sensitive receptors

Assessment Methodology for Likely Significant Effects

Baseline Data

6.2 The baseline assessments will be carried out in accordance with the BRE Guidelines.

6.3 The analysis will be calculated from a 3D computer model using specialist software based on detailed architectural models, Ordnance Survey (OS) mapping and photogrammetry.

6.4 The baseline daylight amenity to the identified sensitive receptors will be considered by reference to the BRE recommended Vertical Sky Component (VSC) and No Sky Line (NSL) methods of assessment.

6.5 The baseline sunlight amenity to the identified sensitive receptors will be considered by reference to the BRE recommended Annual Probable Sunlight Hours (APSH) method of assessment. Due to the southerly location of the sun in the sky, this assessment will consider those windows which face the Site and are located within 90 degrees of due south.

6.6 The baseline overshadowing levels to the identified sensitive receptors will be considered by reference to the BRE recommended Sun Hours on Ground (SHOG) method of assessment.

Method of Assessment

6.7 In accordance with the BRE guidelines, the same assessments used to establish the baseline levels of daylight, sunlight and overshadowing will be used to assess the daylight, sunlight and overshadowing levels with the Proposed Development in place. The baseline and proposed levels will then be compared in order to determine the magnitude of change and the significance of any daylight, sunlight and overshadowing effects.

6.8 The following table provides a summary of the criteria set out within the BRE guidelines for daylight, sunlight and overshadowing.

Method	BRE Criteria
VSC	A window may be adversely affected if its VSC measured at the centre of the window is less than 27% and less than 0.8 times is former value.
NSL	A room may be adversely affected if the daylight distribution (NSL) is reduced beyond 0.8 times its existing area.
APSH	A window may be adversely affected if a point at the centre of the window received for the whole year, less than 25% of the APSH including at least 5% of the APSH during the winter months (21 September to 21 March) and less than 0.8 times its former sunlight hours during either period, and for existing neighbouring buildings, if there is a reduction in total APSH which is greater than 4%.
SHOG	An amenity area may be adversely affected if less than 50% of its area receives less than 2 hours of direct sunlight on 21 March and less than 0.8 times its former value.

Solar Glare

Consultation & Available Information, & Baseline Conditions

Consultation

6.9 There are no specialists within Manchester City Council or other statutory consultees relevant to the area of solar glare. As such, no consultation has been undertaken.

6.10 Discussions on solar glare may, however, form part of any pre-application process with Manchester City Council.

Completed Background Studies

6.11 No background studies have been undertaken for solar glare.

Baseline Conditions

6.12 The solar glare assessment is undertaken on the worst-case scenario. Solar Glare is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of the Proposed Development. Therefore, the assessment considers the effect of the Proposed Development in absolute terms.

6.13 However, it should be noted that the Proposed Development will be located on a Site where its existing state is two low-rise brick buildings with punched windows, thus there is limited opportunity for instances of solar glare from the Site to be experienced. Solar glare from surrounding buildings is not assessed.

Scope of Assessment

Identification of Effect/s which are Not Significant.

Effect	*Receptor*	*Construction/ Operation*	*Discussion*
Solar Glare causing visual discomfort to occupiers of adjoining buildings	Solar Glare impacting occupants of adjoining buildings	Operational	BRE states that reflected sunlight can affect occupants of adjoining buildings. There are two types of glare: disability glare, which is a safety issue; and discomfort glare, which includes solar reflections impacting adjacent buildings. Discomfort glare does not impair the ability to see. Whilst it can be important where work involves continuous viewing of the outdoor space from a fixed vantage point, it can generally be managed where glare is an issue by using blinds of curtains for the periods of time where such glare occurs. It is therefore considered that any impact on residential amenity is not expected to be significant and an assessment of discomfort glare is not considered necessary. Therefore, solar glare effects to occupants of neighbouring buildings is scoped out.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction/Operation*	*Discussion*
Solar Glare safety issues concerning transit through critical intersections and junctions	Solar Glare impacting visibility of road users at selected viewpoints within 500m of the Site where the Proposed Development is visible	Operational	Solar glare reflections to road drivers may cause disability glare, which would represent a hazard and so this would be technically assessed.

Effect	*Receptor*	*Construction/Operation*	*Discussion*
Solar Glare safety issues concerning visibility of train drivers along nearby railway tracks	Solar Glare impacting visibility of train drivers at selected viewpoints within 500m of the Site where the Proposed Development is visible	Operational	Solar glare reflections to train drivers may cause disability glare, which would represent a hazard and so this would be technically assessed.

Assessment Methodology for Likely Significant Effects

6.14 The assessment will consider potentially sensitive viewpoints for road and train drivers surrounding the site. The viewpoints will generally be located at the minimum stopping distance for road users and at the driver's eye level with the focal point being a relevant traffic element, such as signals or incoming traffic. For train drivers, viewpoints will be assessed where signals are visible or at representative intervals where the Proposed Development would be visible close to the direct line of sight for a substantial stretch of track.

6.15 Viewpoints within 500m of the Site, where the Proposed Development is visible within the driver's field of view will be assessed. At distances greater than 500m from the Proposed Development, instances of solar glare would be unlikely to occur. A review of the surrounding area has identified the following road junctions that are likely to be receptors sensitive to solar glare, this will be kept under review as the design evolves:

- Mancunian Way
- Princess St
- Upper Brook St
- Sackville St

6.16 For train drivers, the following receptors would be considered:

- Railway line between Manchester Piccadilly Station and Manchester Oxford Road Station

6.17 The assessment of likely significant effects to sensitive receptors will consider the sensitivity of the receptor (on a scale of high, medium, low and negligible) and the magnitude of change (on a scale of large, medium, small and negligible) to determine the level of effect on a scale of major, moderate, minor and negligible. Significant effects will be determined following this through professional judgment.

Baseline Data

6.18 Baseline information would be acquired from:

- Photogrammetry

- Aerial and street Images (Google Maps, Bing Maps)
- Site visit and survey
- Planning portal
- Valuation Office Agency
- Land Registry
- Railway Signalling Diagrams where available

Method of Assessment

6.19 The assessment of solar glare identifies the time of the day and year that solar reflections will be visible from the assessed viewpoints, as well as their relationship to a driver's line of sight. The assessment does not however, measure the intensity of the reflection but merely the occurrence and duration.

6.20 Drivers at each of the relevant road junctions are considered the sensitive receptors, where there are multiple directions of travel potentially affected, each direction of travel at the junction is considered a separate receptor as their effect significance may differ. For train tracks, the train drivers on the stretch of track are considered to be the sensitive receptor. The effect significance will be determined using professional judgement taking into consideration the duration of solar reflections, location of these in relation to a driver's line of sight, type of junction control and the probability of reflections occurring. The effect significance is given on a per junction basis considering all viewpoints assessed for that junction as well as any viewpoints that would not be affected by the Proposed Development.

6.21 There are no quantitative criteria within the BRE Guidelines or elsewhere regarding acceptable levels of solar glare. When assessing the overall significance of effect, the following factors could influence the nature, scale and resultant significance of effect:

- Sunlight availability probability;
- Area of façade off which reflections are visible;
- Period of time when reflections are visible;
- Angle at which reflections are visible from line of sight;
- Views of the Proposed Development being obscured for example by trees; and/or
- The time of day at which the solar reflection will occur for example during peak traffic times.

Discipline Specific Methodology

6.22 The factors in the table below will be used to ascertain the possible significance for each view and the factors listed above will then be taken into consideration to determine the overall significance for the designated viewpoint.

Scale of Effect	Possible factors
Negligible	No reflections are visible or if visible all occur at angles greater than 30° from the driver's line of sight and so, as stated by the CIE, will be of "little significance".
Minor	Solar reflections are visible within 30° to 10° or between 10° to 5° of the driver's line of sight for a short period of time.
Moderate	Solar reflections are visible within 10° and 5° of the driver's line of sight occurring for a long period of time.
Major	Solar reflections are visible within 5° of a driver's line of sight.

6.23 Effects classified as Moderate or Major in scale are considered to be 'significant'. Effects classified as Minor or Negligible in scale are considered to be 'not significant'.

6.24 All viewpoints assessed for solar glare are considered to be of high sensitivity.

Wind

Consultation & Available Information, & Baseline Conditions

Consultation

6.25 No consultation was undertaken.

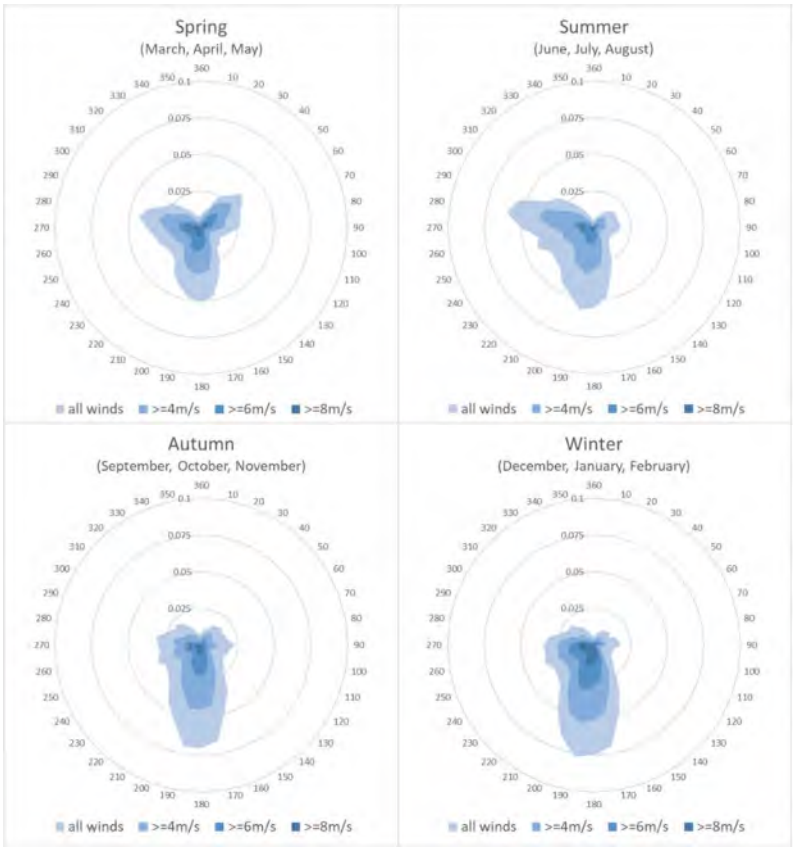
Completed Background Studies

6.26 No available baseline wind microclimate data is available for the site. This will be created as part of this assessment as laid out in the methodology section.

Baseline Conditions

6.27 Winds for the Manchester area are predominantly from the south, with a secondary peak from the north-west west during spring and summer. Winds are typically stronger in the winter season, and lighter throughout the summer. Wind roses per season for the Manchester area are shown in Figure 6.3, from data attained from Manchester airports over a period of 30 years. These wind roses provide the frequency of occurrence and magnitude of winds from all directions within the 30-year period.

Figure 6.3 – Wind roses, Manchester Airport



6.28 To understand and quantify the baseline conditions at the site, a full-scale digital model will be constructed reflecting the existing built form of the site and the surrounding area (400m radius from the centre of the site). This full-scale digital model will be tested in high resolution Computational Fluid Dynamics (CFD) to allow the baseline wind microclimate conditions to be quantified.

6.29 The baseline results from CFD will be combined with long-term meteorological climate data for the Manchester area, corrected to understand the baseline conditions specific to the site, having regard to its location within Manchester. Testing in CFD will be conducted in the absence of any existing hard or soft landscaping, in order to provide a conservative result.

Scope of Assessment

Identification of Effect/s which are Not Significant

6.30 There are no non-significant effects anticipated for the wind microclimate assessment.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction / Operation*
Wind safety risk due to strong winds	All locations which are accessible to pedestrians or cyclists either on site or in the immediate surrounding area	C & O
Changes to suitability of pedestrian wind comfort levels	Existing thoroughfares and roadways	C & O
Changes to suitability of pedestrian wind comfort levels	Existing transit stops (bus stops on Charles Street and Sackville Street)	C & O
Changes to suitability of pedestrian wind comfort levels	Existing off-site entrances	C & O
Suitability of pedestrian wind comfort levels	Entrances to the Proposed Development	O
Suitability of pedestrian wind comfort levels	External Amenity Spaces (ground floor spill out seating or public realm, roof terraces, balconies) which are introduced by the Proposed Development.	O

Assessment Methodology for Likely Significant Effects

6.31 The assessment of the wind microclimate will be based on the results from a series of tests on full-scale digital models using CFD to provide a detailed assessment. The wind microclimate will be benchmarked against the Lawson Comfort Criteria, in order to assess the pedestrian comfort for users of the Proposed Development.

6.32 During design development, CFD testing of the developing massing will be carried out for selected wind angles of concern to examine the anticipated flows and to assist in refining the design.

6.33 Given the Proposed Development contains tall buildings, in addition to the site's location in relation to surrounding buildings, it is important to avoid undesirable wind speeds being generated at ground and accessible elevated levels.

6.34 The wind microclimate assessment will therefore quantify the potential changes to the local wind environment (both on-site and within the surrounding area) in terms of pedestrian amenity and public open space and quantify these in relation to their 'usability' for a range of pedestrian and amenity activities (i.e., thoroughfares, entrances, sitting, etc), as defined by the well-known and established Lawson Comfort Criteria.

6.35 The scope of the wind microclimate assessment will include:

- A summary of all relevant national, regional, and local policy guidance on wind microclimate. Any specific local policies (e.g., Supplementary Planning Guidance (SPG)) that may be applicable to wind microclimate will also be included;
- CFD testing of the baseline conditions in and around the site as well as CFD testing of the Proposed Development in the context of both the existing and cumulative surrounds;
- Assessment of the measured wind conditions against the Lawson Comfort and Safety Criteria; and
- Where required, development and testing of measures to mitigate against strong winds and to achieve desired wind conditions.

Baseline Data

6.36 3D models of the Proposed Development, existing surroundings and nearby cumulative schemes, as appropriate, will be created and tested in high resolution CFD, to allow the future wind microclimate conditions to be quantified.

6.37 The model will cover a radius of 400m. Mean wind speeds and turbulence levels will be measured at 1.5m above ground level and any raised areas which are accessible to pedestrians.

Method of Assessment

6.38 Based on the results of the CFD testing assessed against the Lawson Comfort Thresholds, shown in Appendix 14, Table iii, the suitability of the conditions and the likely effect at particular locations, both within and off-site, will be determined. If the measured wind conditions exceed the threshold wind speed for more than 5% of the time (whether that is seasonally or annually), then they are unacceptable for the stated pedestrian activity and the expectation is that there may be complaints of nuisance or people will not use the area for its intended purpose.

6.39 Strong winds are reported for exceedances of 15m/s (to account for less able-bodied people or vulnerable users such as cyclists) and 20 m/s (for able bodied people) for more an 0.025% of the year (or above approximately 2 hours).

6.40 The suitability of the conditions both within and surrounding the site, both in terms of comfort and strong winds, will be presented and discussed within the report, and a supporting technical appendix.

6.41 Should mitigation measures be required to provide wind conditions within a particular area / space to be suitable for their intended use, or are required to mitigate against predicted strong winds, the areas identified requiring suitable mitigation measures will be developed in consultation with the Applicant and the Design Team. Where necessary, mitigation measures

will be tested through additional rounds of CFD studies. Following mitigation, the scale of any residual effects will be identified.

Discipline Specific Methodology

6.42 The assessment methodology is to differ from that laid out in Section 2 of this scoping report. Please refer to tables in Appendix 14 of this document ((i) Standard Methodologies for Determining Impact Magnitude and Receptor Sensitivity, (ii) Standard Impact Significance Matrix), which outline the intended approach.

Climate Change

Consultation & Available Information, & Baseline Conditions

Consultation

6.43 No consultation has been undertaken to date or is proposed to be carried out for the purposes of the assessment, beyond that carried out through EIA scoping.

Completed Background Studies

6.44 Historic average climatic conditions and projected climate conditions data relevant to the Site has been obtained from online sources.

Baseline Conditions

Current and Projected Climatic Conditions

6.45 Table 6.1 provides a summary of the current baseline climatic conditions, taken from the closest weather station, Woodford weather station, located circa 10 km south-east of the Site. The data provides historic average climatic conditions for 1991-2020, which is assumed to be representative of the baseline year of the assessment (i.e. 2025). The monthly mean minimum/maximum temperatures are calculated from the average of the daily maximum and daily minimum temperatures for each month.

6.46 On average, the warmest month was July and the coolest month was January; the wettest month was December and the driest month was March; and the sunniest month was June and the least sunny month was January.

Table 6.1 Summary of historic average climatic conditions for 1991-2020 taken from the Woodford Met Office monitoring station.

Month	*Mean daily maximum temperature (degrees C)*	*Mean daily minimum temperature (degrees C)*	*Days of air frost (days)*	*Sunshine (hours)*	*Rainfall (mm)*
January	7.71	1.07	8.82	45.09	77.00
February	7.92	1.40	8.44	76.06	60.48
March	10.13	2.42	5.53	103.86	52.53
April	13.01	4.13	2.40	151.19	55.81

May	16.25	7.05	0.28	179.27	56.21
June	18.93	9.55	0.00	179.53	64.61
July	20.66	11.81	0.00	157.07	80.19
August	20.24	11.64	0.00	144.97	79.73
September	17.56	9.51	0.07	137.66	76.09
October	13.84	6.78	1.01	94.70	91.69
November	9.96	3.35	4.11	62.62	77.08
December	7.47	1.15	9.29	53.08	96.98

6.47 The UK Climate Projections 2018 (UKCP18) (Met Office, 2018) provide the most up-to-date assessment of how the climate of the UK may change over the 21st century. UKCP18 uses Representative Concentration Pathways (RCPs), named according to the concentration of greenhouse gas modelled to occur in the atmosphere in 2100 under each pathway. There are four RCPs available in the UKCP18 climate projections: RCP 2.6, RCP 4.5, RCP 6.0 and RCP 8.5. In line with the IEMA EIA Guide to Climate Change Resilience and Adaptation (IEMA, 2020), RCP 8.5 has been used, which represents the most conservative, highest-impact scenario. Table 6.2 summarises the projected summer and winter mean temperature and precipitation changes up to the 2090s for RCP 8.5.

Table 6.2 UKCP18 data for north west England RCP 8.5

Season	Variable	Time Period	Projected Change At		
			10th percentile	50th percentile	90th percentile
Winter	Mean temperature (ºC)	2020 - 2039	0 to 1	0 to 1	1 to 2
		2040 - 2059	0 to 1	1 to 2	2 to 3
		2060 - 2079	0 to 1	2 to 3	3 to 4
		2080 – 2099	1 to 2	3 to 4	5 to 6
	Mean precipitation change (%)	2020 – 2039	-10 to 0	0 to 10	10 to 20
		2040 - 2059	-10 to 0	0 to 10	10 to 20
		2060 - 2079	-10 to 0	10 to 20	20 to 30
		2080 – 2099	-10 to 0	10 to 20	30 to 40
	Mean daily maximum temp change compared to 1981-2000	2020 - 2039	0 to 1	0 to 1	1 to 2
		2040 - 2059	0 to 1	1 to 2	2 to 3
		2060 - 2079	0 to 1	2 to 3	3 to 4
		2080 – 2099	1 to 2	3 to 4	5 to 6
	Mean daily minimum temp	2020 - 2039	-1 to 0	0 to 1	1 to 2
		2040 - 2059	0 to 1	1 to 2	2 to 3

	change compared to 1981-2000	2060 - 2079	0 to 1	2 to 3	4 to 5
		2080 – 2099	1 to 2	3 to 4	5 to 6
Summer	Mean temperature (ºC)	2020 - 2039	0 to 1	1 to 2	1 to 2
		2040 - 2059	0 to 1	1 to 2	3 to 4
		2060 - 2079	1 to 2	3 to 4	5 to 6
		2080 – 2099	2 to 3	4 to 5	7 to 8
	Mean precipitation change (%)	2020 - 2039	-30 to -20	-10 to 0	10 to 20
		2040 - 2059	-40 to -30	-20 to -10	0 to 10
		2060 – 2079	-50 to -40	-30 to -20	0 to 10
		2080 – 2099	-60 to -50	-40 to -30	-10 to 0
	Mean daily maximum temp change compared to 1981-2000	2020 - 2039	-1 to 0	1 to 2	2 to 3
		2040 - 2059	0 to 1	2 to 3	3 to 4
		2060 - 2079	1 to 2	3 to 4	5 to 6
		2080 – 2099	2 to 3	5 to 6	8+
	Mean daily minimum temp change compared to 1981-2000	2020 - 2039	0 to 1	0 to 1	1 to 2
		2040 - 2059	0 to 1	1 to 2	2 to 3
		2060 - 2079	1 to 2	2 to 3	4 to 5
		2080 – 2099	2 to 3	4 to 5	6 to 7

Greenhouse Gas Emissions

6.48 The IEMA Greenhouse Gas (GHG) Guidance (2022) states that "the ultimate goal of establishing a baseline is being able to assess and report the net GHG impact of the proposed project." The building on Site is currently not in use and therefore, it is assumed that currently there are no GHG emissions from the Site. Whilst existing vegetation would in practice provide some carbon sequestration, the assumption of a no GHG emissions baseline is considered a conservative scenario.

Scope of Assessment

Identification of Effect/s which are Not Significant

Effect	*Receptor*	*Construction/Operation*	*Discussion*
GHG emissions associated with waste generated by the Proposed Development during the	The global atmosphere	Operation	The opportunities for design and construction decisions to significantly influence the reduction of GHG emissions associated with operational waste are low, as it is highly dependent on occupant behaviour and waste processing at the city scale by the Local Authority. The emissions associated with operational waste are also not expected to be material in scale, such that they

Effect	*Receptor*	*Construction/Operation*	*Discussion*
operational phase.			could influence the overall significance of effects, and are therefore proposed to be scoped out. A Waste Management Strategy is expected to be submitted alongside the planning application in due course. This will set out how physical and operational interventions will be adopted that follow the waste hierarchy.
GHG emissions associated with carbon sequestration of green infrastructure	The global atmosphere	Operation	GHG emissions associated with carbon sequestration from any proposed green infrastructure would be low relative to the total GHG emissions over the life of the Proposed Development. Any new planting would also reduce the overall emissions from the Proposed Development, rather than increase them, and a 10% biodiversity net gain is targeted. On this basis, excluding carbon sequestration from the assessment is considered conservative and robust.
GHG emissions associated with the 'beyond building lifecycle' stage	The global atmosphere	N/A	This stage encompasses emissions associated with activities beyond the Site boundary and life cycle of the Proposed Development. This relates to the repurposing of discarded building elements or any energy recovered from beyond a project's lifecycle. The IEMA guidance states that "*Certain life cycle modules (or stages) can be excluded if these exclusions are clearly highlighted and justified by the practitioner using professional judgement and in accordance with the materiality and cut-off guidance."* Reliable information about how the components of the Proposed Development could potentially be repurposed following its demolition at the end of its life is not currently available. Given that this module (Module D) lies outside the Proposed Development's lifecycle and only covers GHG emissions that could potentially be avoided as a result of repurposing of discarded materials, it is considered that the proposed assessment of the project's lifecycle emissions (Modules A to C) (only) comprises a conservative assessment. On this basis, consideration of Module D is proposed to be excluded from the scope of the assessment.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction / Operation*	*Discussion*
Embodied carbon associated with the product stage (lifecycle stages A1 (raw material supply), A2 (Transport) and A3 (Manufacturing))	The global atmosphere	Construction	GHG emissions associated with extraction & manufacturing of building materials and installation of products on site.
Embodied carbon associated with the construction process stage (lifecycle stages A4 (transport) and A5 (construction and installation))	The global atmosphere	Construction	GHG emissions associated with construction waste removal, installation and construction transport.
Embodied carbon associated with the in-use stage (lifecycle stage B1 (use), B2 (maintenance), B3 (repair), B4 (replacement) and B5 (refurbishment))	The global atmosphere	Operation	GHG emissions associated with maintenance, repair, replacement and refurbishment within the proposed buildings (i.e., the embodied carbon).
GHG emissions associated with operational energy (lifecycle stage B6)	The global atmosphere	Operation	GHG emissions associated with the operational energy use for the day to day running of the building (i.e. heating, cooling, lighting etc.).
GHG emissions associated with operational water (lifecycle stage B7)	The global atmosphere	Operation	GHG emissions associated with operational water consumption.
GHG emissions associated with the end-of-life stage (lifecycle stage C1-C4)	The global atmosphere	Operation	GHG emissions associated with demolition of the Proposed Development at the end of its life.
GHG emissions associated with operational transport	The global atmosphere	Operation	GHG emissions associated with operational transport (e.g. deliveries and staff/occupant journeys), where appropriate transport figures are available for the proposed development

Assessment Methodology for Likely Significant Effects

Baseline Data

Greenhouse Gas Emissions

6.49 As previously noted, the building on Site is currently not in use and therefore it is assumed that currently there are no GHG emissions from the Site. Whilst existing vegetation would in practice provide some carbon sequestration, the assumption of a no GHG emissions baseline is considered a conservative assumption.

6.50 The future baseline scenario considers how the GHG emissions associated with the Site are likely to change in the future, should the Proposed Development not come forward, based on a time period comparable to the design life of the Proposed Development (i.e. a 60 year Reference Study Period (RSP)). Should the Proposed Development not come forward, the future baseline GHG emissions from the Site are also considered to be zero.

6.51 The receptor of greenhouse gas emissions is the global atmosphere.

Climate Change Resilience & Adaptation

6.52 Historic average climatic conditions and projected climate conditions data relevant to the Site has been obtained from online sources to inform the assessment (Part 1).

Method of Assessment

GHG Emissions ES Chapter

6.53 The GHG emissions impact assessment will be reported in the main body of the Climate Change & Greenhouse Gas Emissions ES chapter (Part 2).

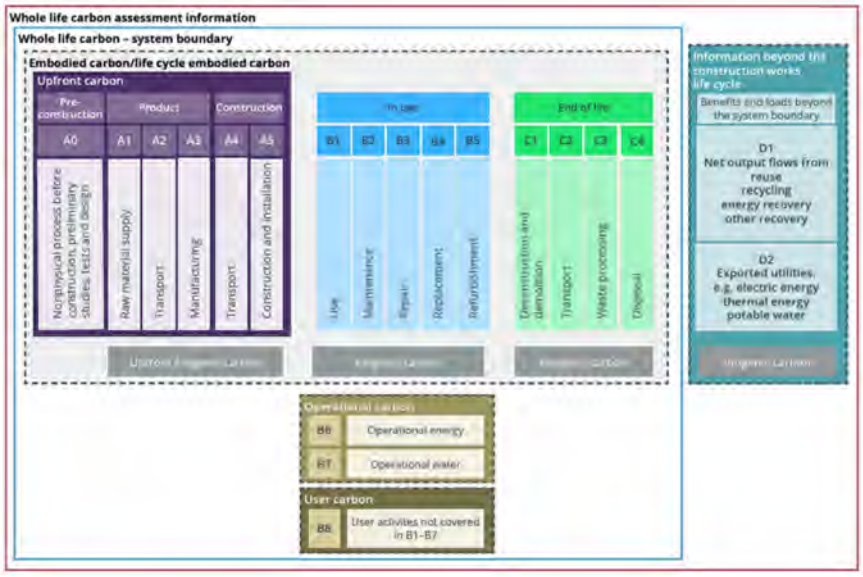
6.54 There is currently no standard methodology for quantifying GHG emissions within EIA. However, best practice will be drawn from guidance documents, including:

- EIA Guide to Assessing GHG Emissions and Evaluating their Significance (IEMA, 2022);
- Royal Institute of Chartered Surveyors (RICS) Whole Life Carbon Assessment for the Built Environment (2023) (effective from 2024); and
- BS EN 15978:2011 Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method.

6.55 A reference study period (RSP) of 60 years is proposed, as per the principles outlined in BS EN 15978. This is based on the typical expected service life of a building. The total estimated GHG emissions will be estimated over a period of 60 years from the start of the in-use stage.

6.56 The GHG emissions sources that will be assessed will align with the lifecycle stages / modules within BS EN 15978, with building elements included as per the guidance within the RICS Whole Life Carbon Assessment for the Built Environment (2023) guidance ('the RICS Guidance 2023'). Figure 6.4 shows the stages of a lifecycle GHG emissions assessment, taken from the RICS Guidance 2023, based on the lifecycle stages set out in EN 15643:2021, EN 15978.

Figure 6.4. Whole life Carbon Assessment information (Source: RICS 2023)



6.57 The following lifecycle stages would be assessed in the ES chapter:

- Demolition of existing buildings;
- A1-A3 Product stage;
- A4-A5 Construction process stage;
- B1-B5 In-use stage;
- B6 Operational energy;
- B7 Operational water;
- Operational transport; and
- C1-C4 End of Life Stage.

6.58 A Whole Life Carbon (WLC) Assessment Report will be prepared and submitted separately alongside the planning application. GHG emissions associated with the enabling works and construction phase, and the in-use and end of life embodied carbon will be sourced from this Report where available. Where this information is not provided in the WLC assessment, appropriate published industry benchmarks will be used in combination with the proposed floorspace quanta and other proposed scheme information, to estimate the GHG emissions.

6.59 Where information is available from the project sustainability and energy consultants on likely operational energy, and utilities engineers on likely operational water, Department for Energy Security & Net Zero (DESNZ) carbon emissions factors will be applied to this data to determine GHG emissions from these sources. Where this information is not available, appropriate published benchmarks will be used in combination with the proposed floorspace quanta and other proposed scheme information, to estimate the GHG emissions.

6.60 GHG emissions associated with vehicles travelling to and from the Proposed Development during the operational will be estimated by applying a DESNZ emissions factor for average vehicle use, anticipated trip data provided by the project transport consultant, and indicative trip distance figures. These emissions factors include wheel to tank emissions as well as tail pipe emissions.

6.61 The ES chapter will provide a summary of the GHG emissions from each stage across the 60-year RSP.

Climate Change Resilience and Adaptation Risk Assessment

6.62 The effects of climate change on the Proposed Development and its users will be reported in a Climate Change Resilience & Adaption Risk Assessment, will be summarised within the main chapter (Part 1), with full details provided as an appendix to the GHG ES Chapter. This will be completed in line with the Institute of Environmental Management and Assessment (IEMA) EIA Guide to Climate Change Resilience and Adaptation (IEMA, 2020). The assessment would be reported in the form of a risk assessment, rather than an assessment of effect significance, in line with advice provided in the IEMA guidance.

6.63 The Report will include the following:

- Review of relevant legislation and policy;
- Review and interpretation of Met Office UK Climate Projections 2018 (UKCP18) data;
- Identification of hazards and associated risks to the Proposed Development due to climate change;
- Proposed mitigation measures; and
- Assessment of residual risks to the Proposed Development.

6.64 The variables that will be assessed in the UKCP climate data include changes in temperature and precipitation. Qualitative changes in other variables, such as snow and wind will also be considered. The future projections will be assessed based on timescales equivalent to the anticipated design life of the Proposed Development and based on Relative Concentration Pathway 8.5 (RCP 8.5). RCP8.5 assumes more than 4°C warming above pre-industrial levels and is the most severe pathway. This approach is therefore considered conservative.

6.65 To ensure the assessment is comprehensive, the list of hazards set out in the C40 Cities Climate Change Risk Assessment Guidance (C40 Cities, 2017) will be considered. Hazards that are not relevant to the Site will be scoped out with justification provided.

Discipline Specific Methodology

6.66 Specific criteria for assessing the significance of GHG emissions effects are provided in the IEMA (2022) Guidance on Assessing GHG Emissions, shown in the below table. The assessment of significance will be undertaken in line with these criteria.

Significant of Effect	Criteria for assessing effect significance
Major	The Proposed Development's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero
Moderate	The Proposed Development's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero
Minor	The Proposed Development's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with neutral effects is fully in line

	with or exceeds measures necessary to achieve the UK's trajectory towards net zero.
Negligible	The Proposed Development's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Beneficial	The Proposed Development's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with major beneficial effects substantially exceeds net zero requirements with a positive climate impact

6.67 The guidance also recommends that the context of the project's carbon footprint is determined to establish whether the project supports or undermines a trajectory towards net zero. This can help decision makers in their evaluation of the effects of the proposals. The estimated net GHG emissions will be considered in the context of both the UK National Carbon Budgets and the Tyndall Centre recommended energy only carbon budgets for Manchester City. GHG emission impacts and resulting effects are global.

6.68 In line with the IEMA (2022) guidance, the sensitivity of the receptor (i.e., the global atmosphere) in relation to GHG emissions is always considered to be 'high'. The magnitude of the impact would be linked to the volume of GHG emissions produced. However, in accordance with the IEMA Guidance, it is not considered necessary to determine the sensitivity of the receptor or the magnitude of the impact in order to assess the significance of the effects of GHG emissions.

6.69 Therefore, as is standard practice, the Standard Methodology for Assessing Magnitude of Change (Chapter 4, Table 4.2), for Determining Sensitivity (Chapter 4, Table 4.3) and Effect Significance Matrix (Chapter 4, Table 4.4), are not applicable.

Socio-Economics

Consultation & Available Information, & Baseline Conditions

Consultation

6.70 No consultation has been undertaken to inform this chapter.

Completed Background Studies

6.71 No prior studies have been completed to date.

Baseline Conditions

6.72 The baseline conditions focus on the socio-economic conditions in the area surrounding the Site in order to provide a demographic context of the existing community locally.

6.73 The Site has access to a range of community facilities and social infrastructure, including several primary schools and secondary schools, four GP surgeries within 1km of the Site, all of which are accepting new patients, and several outdoor spaces, including Mayfield Park, Sackville Gardens, and Vimto Park.

6.74 If the Proposed Development does not come forward, the Site would remain as it is, pending the determination of planning application 143741/FO/2025 for the demolition of the existing car park and retail units on site. There will unlikely be any socio-economic impacts if the Proposed Development does not come forward

Scope of Assessment

Identification of Effect/s which are Not Significant

Effect	*Receptor*	*Construction / Operation*	*Discussion*
Increased demand for educational facilities	Local residents	Operation	The Proposed Development comprises Purpose Built Student Accommodation (PBSA), which will introduce additional higher education students to the area. As these residents will be university-level students, the development is not anticipated to generate additional demand for primary or secondary education facilities.

Identification of Effect/s which are Likely to be Significant

Effect	*Receptor*	*Construction/Operation*	*Discussion*
Temporary employment opportunities, direct and indirect	The local economy and labour market	Construction	Temporary construction employment opportunities will be created during the construction phase of the Proposed Development.
Employment generation through the increased population and new commercial space	The local economy and labour market	Operation	Permanent employment opportunities will be created during the operational phase of the Proposed Development in the ground floor flexible commercial space.
Increase in student accommodation	Local student housing market	Operation	The Proposed Development comprises PBSA, providing additional student accommodation housing units in Manchester. Provision of affordable student accommodation will be considered qualitatively under this effect.
Increased spending in the local economy as a result of the increased population	Local economy and local businesses	Operation	The increase in students arising from the additional student accommodation units provided within the Proposed Development will lead to an increase in local spending.
Gross Value Added (GVA) impacts through	Local economy	Construction & Operation	Employment opportunities during the construction and operation phases will lead to an increase in economic output in

Effect	*Receptor*	*Construction/Operation*	*Discussion*
increased temporary and permanent employment			Manchester and the wider region, measured by GVA.
Increased demand for healthcare facilities	Local residents	Operation	The increase in students arising from the additional student accommodation units will lead to an increased demand for social infrastructure associated with the residents of the student accommodation, including primary healthcare.
Increase demand for open space	Local residents	Operation	The increase in students arising from the additional student accommodation units will lead to an increased demand for social infrastructure associated with the residents of the student accommodation, including open space.

Assessment Methodology for Likely Significant Effects

Baseline Data

6.75 A baseline assessment will be undertaken to establish the socio-economic conditions which currently surround the Site, both at the local and regional level. The ES chapter will utilise data from a variety of sources including:

- 2021 Census data to provide insights into the demographic and economic makeup of the area;
- Data from the Office for National Statistics (ONS) to offer a comprehensive understanding of key local socio-economic indicators;
- National Health Service (NHS) data to comprehend healthcare and related socio-economic facets within the vicinity of the Site; and
- Relevant local and regional studies and assessments will be referenced to enrich the baseline assessment.

Method of Assessment

6.76 The assessment of potential socio-economic effects will be undertaken using several methodologies, data sources and assumptions. These are set out below:

- Construction related employment effects will be assessed using established ratios of construction output to employment, considering the distinctive characteristics of the project;
- Regional GVA by industry data will be used to calculate the estimated GVA impacts from the construction and operational employment arising from the Proposed Development;
- Additionality effects such as deadweight (effects that would occur regardless of the Proposed Development), leakage (the proportion of an effect that will occur outside the target area or group), displacement (the proportion of an impact accounted for by the reduction of existing outputs), and substitution effects (those which replace existing outputs) using HCA Additionality Guidance (2015);

- Population yield projections based on the number of student rooms available in the PBSA of the Proposed Development;
- Availability of primary healthcare facilities in the local area will be assessed using public NHS data. This information will be compared with the projected new population in the Proposed Development to estimate the likely effect of the development on primary healthcare facilities;
- Open space provision will be assessed against relevant local standards and compared to the estimated additional student yield arising from the Proposed Development; and
- An estimate of spending generated as a result of the completed Proposed Development will be calculated using local data on the average expenditure for undergraduate students in Manchester. To ensure a conservative estimate of increased local spending, additionality effects will be applied.

Human Health

Consultation & Available Information, & Baseline Conditions

Consultation

6.77 No consultation has been undertaken to inform this chapter.

Completed Background Studies

6.78 No prior studies have been completed to date.

Baseline Conditions

6.79 The baseline conditions will focus on the health determinants in the area surrounding the site in order to provide a demographic context of the existing community locally. It then considers the baseline in terms of access to infrastructure and conditions relevant to the health of the potential occupants of the Proposed Development.

6.80 There are four GP surgeries within 1km of the Site, all of which are accepting new patients. The site is close to several outdoor spaces, including Mayfield Park, Sackville Gardens, and the Vimto Park. A larger park and garden, Pin Mill Brow, is located just over 1km from the Site, which has the River Medlock running through it.

6.81 If the Proposed Development does not come forward, the Site would remain as it is, pending the determination of planning application 143741/FO/2025 for the demolition of the existing car park and retail units on site. There will unlikely be any human health impacts if the Proposed Development does not come forward.

Scope of Assessment

Identification of Effect/s which are Not Significant.

6.82 The HUDU Rapid HIA Toolkit identifies eleven health determinants to assess potential impacts. All eleven health determinants have been scoped in for this assessment.

Identification of Effect/s which are Likely to be Significant

6.83 All eleven determinants are relevant to the Proposed Development and have therefore been scoped in to this assessment and are listed below

Health determinant	*Potential health impact*	*Relevance to the Proposed Development*
Housing quality and design	Access to adequate housing is important for health and wellbeing, and environmental factors such as overcrowding and sanitation in buildings have been identified as causing illness.	The Proposed Development will introduce new student accommodation to the local area.
Access to healthcare services and other social infrastructure	Accessibility is important in terms of transport and access into a building, and the range and quality of service offers. Access to good quality health and social care, education, and community facilities has a direct positive effect on human health.	The Proposed Development may alter access to healthcare services or other social infrastructure as it may impact on demand, physical access or land take for such facilities.
Access to open space and nature	Providing secure, convenient and attractive open/green space can lead to more physical activity and reduce levels of heart disease, strokes and other ill-health problems that are associated with both sedentary occupations and stressful lifestyles. There is growing evidence that access to parks and open spaces and nature can help to maintain or improve mental health.	The Proposed Development will introduce new student accommodation to the local area. As such, the Proposed Development is expected to have an impact on the parks, gardens, and open spaces close to the site.
Air quality, noise and neighbourhood amenity	The quality of the local environment can have a significant impact on physical and mental health. Pollution from construction can lead to poor air quality which can lead to health conditions. Noise pollution can have a detrimental impact on health resulting in sleep disturbance and other effects.	Findings from other topics – air quality, noise and vibration, and climate change will be reviewed to assess the potential impacts on human health resulting from construction and operation of the Proposed Development.
Accessibility and active travel	Convenient access to services and facilities encourages greater opportunities for social interaction. Accessible buildings encourage all groups, including older people and people with a disability, to use them. Discouraging car use and providing opportunities for walking and cycling can increase physical activity and provide health benefits.	The Proposed Development will introduce new student accommodation to the area. As such, the Proposed Development may have an impact on accessibility and active travel in the area.

Crime reduction and community safety	Thoughtful planning and urban design that promotes natural surveillance and social interaction can help to reduce crime and the 'fear of crime', both of which impact on the mental wellbeing of residents.	The Proposed Development will introduce new student accommodation to the local area. As such, the Proposed Development is expected to have an impact on crime and community safety.
Access to healthy food	Access to healthy and nutritious food can improve diet and prevent chronic diseases related to obesity. Opportunities to grow and purchase local healthy food and limiting concentrations of hot food takeaways can change eating behaviour and improve physical and mental health.	The Proposed Development includes Flexible Use Class E commercial space which may include food and beverage establishments. This may therefore have an impact on demand and physical access to healthy food services.
Access to work and training	Employment and income is a key determinant of health and wellbeing. Unemployment generally leads to poverty, illness and a reduction in personal and social esteem. Work aids recovery from physical and mental illnesses.	The Proposed Development may support local employment opportunities, providing access to jobs and training for the local workforce during the construction phase and employment opportunities in the commercial space once operational
Social cohesion and neighbourhoods	Friendship and supportive networks in a community can help to reduce depression and levels of chronic illness as well as speed recovery after illness and improve wellbeing. Fragmentation of social structures can lead to communities demarcated by socio-economic status, age and/or ethnicity, which can lead to isolation, insecurity and a lack of cohesion.	The Proposed Development may affect social cohesion and neighbourhoods as it may impact accessibility of facilities and composition of communities.
Minimising the use of resources	Reducing or minimising waste including disposal, processes for construction as well as encouraging recycling at all levels can improve human health directly and indirectly by minimising environmental impact, such as air pollution.	Construction activities as well as creation of waste during operation of the Proposed Development may have an impact on resources.
Climate change	There is a clear link between climate change and health. Planning is at the forefront of both trying to reduce carbon emissions and to adapt urban environmental to cope with higher temperatures, more uncertain rainfall, and more extreme weather events and their impacts such as flooding. Poorly designed	The Proposed Development may result in changes to the climate and environment of the Site. Findings from other topics – air quality, noise and vibration and climate change will be assessed to determine the impact on health.

	homes can lead to fuel poverty in the winter and overheating in summer contributing to excess winter and summer deaths.	

Assessment Methodology for Likely Significant Effects

Baseline Data

6.84 A baseline assessment will be undertaken to establish the health conditions of the current residents surround the Site, both at the local and regional level. This chapter will utilise data from a variety of sources including:

- 2021 Census data to provide insights into the demographic makeup of the area;
- Data from the Office for National Statistics (ONS) to provide further insight into the demographic makeup of the area;
- National Health Service (NHS) data to comprehend facets within the vicinity of the site;
- Index of Multiple Deprivation (IMD) 2019 to examine the deprivation levels of the proposed site and the surrounding area;
- Department of Health and Social Care (DHSC) data to analyse key health indicators including life expectancy; and
- Relevant local and regional studies and assessments will be referenced to enrich the baseline assessment.

Method of Assessment

6.85 The human health assessment will consider the effects on the physical and mental health of local residents, new residents and workers that may arise from the construction and operation of the Proposed Development.

6.86 There is no recognised or consolidate methodology for the assessment of effects on human health, and there is no definitive guidance on how to assess human health within an ES. Best practice principles are provided in NHS England's Healthy Urban Development Unit's (HUDU) Rapid Health Impact Assessment (HIA) Toolkit (Fourth Edition) 2019 and will form the basis of the approach adopted to assess impacts on health and wellbeing in the ES chapter.

6.87 The Rapid HIA Tool suggests the evaluation of potential health impacts under the eleven topics or broad determinants listed previously, which include:

- Housing design and affordability;
- Access to health and social care services and other social infrastructure;
- Access to open space and nature;
- Air quality, noise and neighbourhood amenity;
- Accessibility and active travel;
- Crime reduction and community safety;
- Access to healthy food;
- Social cohesion and inclusive design;
- Access to work and training;
- Minimising the use of resources; and
- Climate change

6.88 The assessment of potential health impacts will be undertaken using the assessment matrix set out within the Rapid HIA Tool, taking account of published data from a variety of sources including those listed above, and applying professional judgement by relevant guidance to evaluate the health impacts of the scheme.

Discipline Specific Methodology

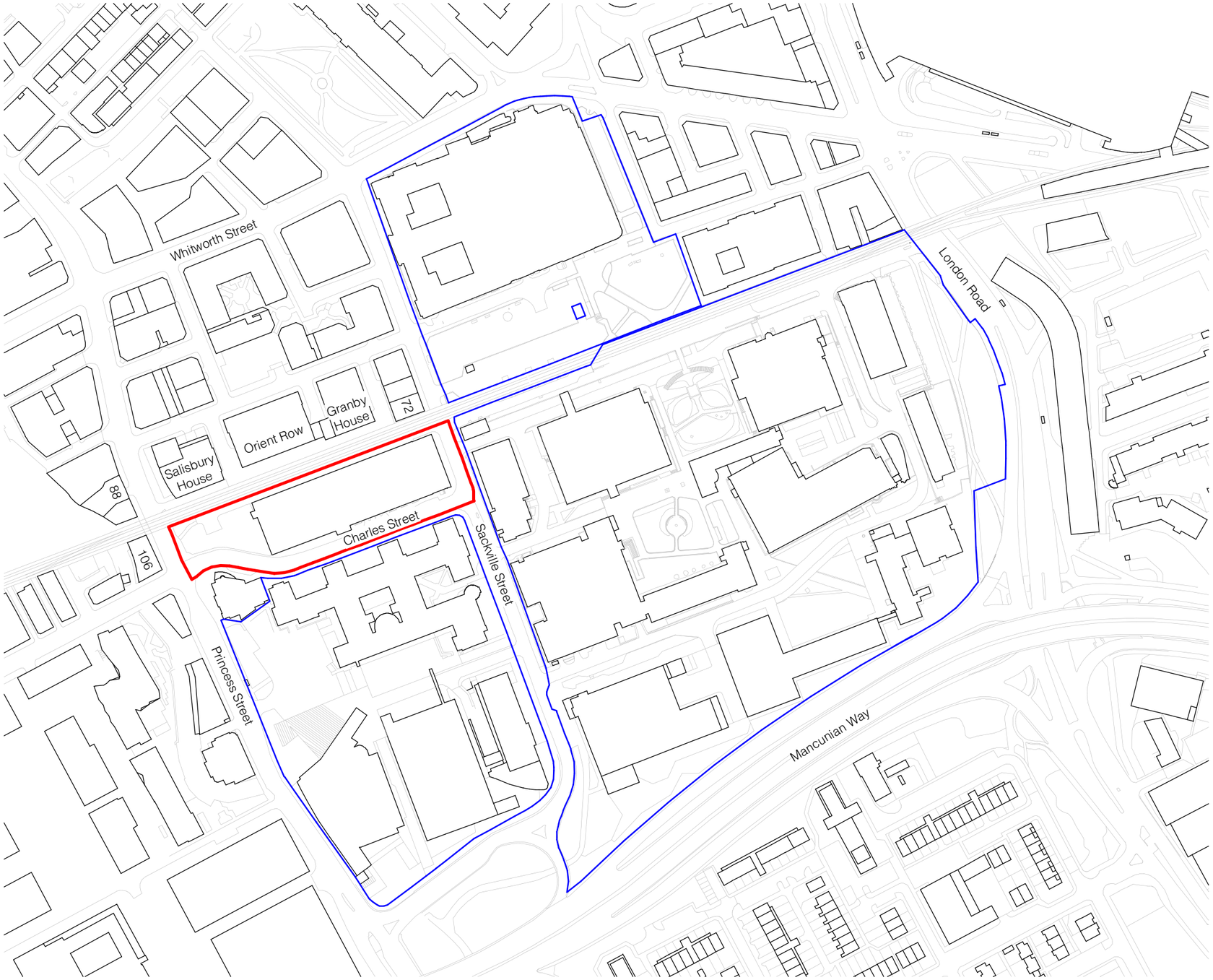
6.89 The human health assessment will not use the standard methodology set out in Chapter 2 of the Scoping Report.

6.90 Whilst the overall approach to the methodology aligns with the assessment methodology set out in Chapter 2, the assessment will be qualitative, rather than quantitative, due to the diverse nature of health determinants and health outcomes which are assessed. Although the ES chapter will describe the likely qualitative health impacts, it is not possible to quantify the severity or extent of the effects. The methodology set out in the HUDU Toolkit does not include a temporal scale of considerations of the effects. It does not provide a methodology for assessing the significance of outcomes or effects and as such none is proposed here. Instead, the potential health effects during construction and operation will be described using the criteria provided in the HUDU Toolkit, which are outlined below.

Impact Category	Impact Symbol	Description
Positive	+	A beneficial impact is identified
Neutral	0	No discernible health impact is identified
Negative	-	An adverse impact is identified
Uncertain	?	Where uncertainty exists as to the overall impact

Appendices

Appendix 1 - Site Location Plan



Key

- Site Boundary Line
- Other Land in Applicants Ownership

DO NOT SCALE
Work to annotated dimensions only. Read drawings in conjunction with relevant specification, Structural Engineers' and Services Engineers' drawings. Confirm all dimensions before commencement of any work on site or fabrication.

Rev:	Details:	Date:
03	Red Line Boundary updated to include Charles and Sackville St for EIA	23/09/25
02	Red Line Boundary updated to show Planning Boundary Line as requested for EIA	21/08/25
01	First issue for review and comment	06/08/25

client:
RG Group

project:
Plot H

job number:
0667

status:
Planning

title:
Location Plan - ID Manchester

scale:
1 : 2500
@ A3

drawn by:
RM

drawing number:
(--)101

current revision date:
23/09/25

revision:
03

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23/09/2025 12:23:08

Appendix 2 - Committed and Cumulative Schemes, including reasonably foreseeable schemes

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Sister, Plot H – Committed Developments

Date: 28 November 2025

Search updated w/c 28 November 2025, based on a 1km radius

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		Baseline		
1	IQ Echo Street 136874/FO/2023	Erection of 3 interlinked towers ranging from 27, 21 and 16-storeys together with intermediary link buildings (15 and 11-storeys) to form Purpose Built Student Accommodation (Sui Generis) with associated amenity space, external landscaping and other associated works	12/09/23 Planning Application Approved Under Construction 05/08/2023 Construction Commenced Expected Completion Q3 2026	280m
2	Princess House 131733/LO/2021 and 131732/FO/2021	Listed Building Consent Listed Building Consent partial change of use and building alterations to accommodate retention of existing nightclub use (sui generis) on basement and ground floors; and proposed office (E(g)(i) use) on 1st, 2nd, 3rd and 4th floors; with new office reception, bin store and cycle store on ground floor. Planning Permission Partial change of use and building alterations to accommodate retention of existing nightclub use (sui generis) on basement and ground floors; and proposed office (E(g)(i) use) on 1st, 2nd, 3rd and	28/01/2022 Planning Application and Listed Building Consent Approved Construction commenced	308m

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Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		4th floors; with new office reception, bin store and cycle store on ground floor.		
3	London Road 125712/FO/2019 (Refreshed scheme of 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 leisure (Use Class D2), together with access and highways works, servicing, rooftop plant, landscaping and associated works.	116099/FO/2017 approved on 31/07/2017 Under Construction on 05/08/2018 125712/FO/2019 approved on 17/04/2019 Construction Commenced. It is understood that while the scheme has consent, construction has stalled.	350m
4	Barclay House 118033/P3OPA/2017 New Application 128804/FO/2020 S73 133770/JO/2022	118033/P3OPA/2017 Notification for Prior Approval for a Proposed Change of Use of building (excluding basement) from Office Use (Class B1 (a)) to a provide 90 no. residential apartments (Use Class C3) 128804/FO/2020 Erection of a 2-storey rooftop extension to form 9 duplex apartments and the conversion of the existing redundant internal car park to create a further 4 duplex apartments at Barclay House, Whitworth Street West, Manchester 133770/JO/2022 Variation of condition number 2 (specified plans) from planning permission reference 128804/FO/2020 for an amendment to the approved site plan to include the updated site plan and additional information in connection with the construction of the sub-station.	31/01/2018 Planning Application Approved Under Construction 04/02/2019 Construction Commenced New Application Approved: 08/10/2021 S73. Approved: 20/10/2022 It is understood that while the scheme has consent, construction has stalled. It was announced that funding had been secured for the redevelopment in July 2025.	550m
5	The Republic, Baring Street 125248/FO/2019	125248/FO/2019: Erection of 13-storey building (including ground and mezzanine) comprising office space (Use Class B1) above flexible uses at ground	14/02/2020 Original Planning Application Approved	638m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
	137349/JO/2023 141645/JO/2024	and mezzanine levels (Class A1 (Shop), A2 (Financial and Professional Services), A3 (Café and Restaurant), A4 (Drinking Establishment) /D1 (Art Gallery, Museum and Conference & Training Centre)/D2 (Cinema)/ Theatre (Sui Generis)) with rooftop amenity spaces and external terrace levels, internal ancillary storage spaces for waste, cycles, rooftop plant, back of house functions and associated landscaping works. 137349/JO/2023: Variation of condition 2 (approved Dwgs) attached to planning permission 125248/FO/2019 with amendments to include alterations to massing on southern elevation terrace areas, changes to external facade design and changes in entrance and internal layout and to amend the wording of conditions 3 (Materials), 4 (Contaminated Land), 5 (CMP), 6 (Archaeology), 7 (EA contamination), 8 (Piling), 10 (SUDS 1), 13 (Circular Economy Statement), 14 (Local Labour Agreement), 17 (Noise commercial), 23 (Surface Water Drainage), 30 (Landscaping), 34 (Noise External Areas), 36 (Management of Commercial units) and 38 (UXB Mitigation) to align with condition discharges for application ref no 125248/FO/2019 as amended by 134907/NMC/2022 and 135956/NMC/2023 141645/JO/2024 Variation of conditions 2 (Approved Drawings), 5 (CMP), 14 (Labour Agreement) and 17 (Noise and Ventilation) of planning permission 137349/JO/2023 to allow for alterations to the massing of the approved building and update wording of discharged conditions.	15/09/2023 Amendment Application Approved 141645/JO/2024 Amendment application approved 25/04/2025. Construction commenced 15/07/2025 Expected completion Q2 2027	
6	Town Hall Refurbishment 119106/LO/2018	LISTED BUILDING CONSENT for Internal and external intrusive surveys to the Grade I Listed Old Town Hall in order to inform the Our Town Hall Project to include intrusive survey works within Albert Square adjacent to the Grade II Listed Frasers Statue, the Grade II Listed Jubilee Fountain, the Grade II Listed Brights Statue, the Grade I Listed Albert Memorial, the Grade II Listed Heywoods Statue and the Grade II Listed Gladstones statue.	Construction commenced Expected completion Q2 2027	780m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
7	Niven Street 135857/FO/2022	Erection of 16 x 3-storey townhouses (Class C3) with associated parking, landscaping and boundary treatment and new vehicular access from Cotter Street and associated works	27/03/2024 Planning Application Approved Under Construction Construction Commenced Q4 2024	815m
8	The Fairfax 121099/FO/2018 (S73. 141176/JO/2024 approved 09/07/2025)	Construction of two residential buildings (Use Class C3) comprising Block 1 (29-storeys) (224 apartments (4 x 1 bed 1 person, 52 x 1 bed 2 person, 64 x 2 bed 3 person and 104 x 2 bed 4 person) 25% 1 bed and 75 % 2 bed) Block 2 (23-storeys) (264 apartments 44 x1 bed 1 person, 44 x 1 bed 2 person, 92 x 2 bed 3 person and 84 x 2 bed 4 person) (33% 1 bed and 67%% 2 bed) with a linked central podium, to deliver 488 units, shared amenity space, 27 car parking spaces, 492 cycle spaces, landscaping (including new public park) , lighting, highways and associated works following demolition of existing buildings and structures. S73 Variation to Planning Permission 121099/FO/2018 consisting of the re-wording of conditions 12 (Public Realm delivery) and 13 (Landscaping and Highways).	16/01/2019 Planning Application Approved Under Construction 30/08/2023 Construction Commenced S73 approved 09/07/2025 Expected completion Q1 2026	845m
9	One Medlock Street 135419/FO/2022	Demolition of the existing hotel building and structures and redevelopment of the site to comprise two separate buildings: one 13 storey office building with commercial unit (Use Class E) at ground floor; a part 11, part 38 storey building comprising 1,014 purpose built student accommodation units (sui generis) with ground floor office/community uses (Use Class E, F1 or F2); and associated ancillary internal and external amenity space, hard and soft landscaping and associated highway works.	Construction Commenced 13/05/2025 Expected completion 2028	860m
10	32-34 Laystall Street 128911/FO/2020	Erection of 9-storey residential building (Use Class C3) comprising 89 residential units (28 x 1 bed and 61 x 2 bed) and conversion of and 3-storey extension to 32-34 Laystall Street for use as offices (Class E) with associated external works following demolition of outrigger and associated structures along with other associated works including access, servicing, landscaping and secure cycle parking	02/02/2022 Planning Application Approved Under Construction 14/10/2022 Construction Started Expected Completion Q2 2026	888m
11	The Joinery 135675/FO/2022	Erection of two residential apartment buildings (Use Class C3) comprising Block 1-part 9, part 10 (plus roof level amenity block) and	01/06/2023 Planning Application Approved	900m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
	S73. 137807/JO/2023 141790/NMC/2024 141504/NMC/2024	Block 2- 12-storey building (comprising of 261 dwellings in total) above basement levels with ground floor commercial units (Use Class E (excluding E (b)), associated residents amenity space, cycle parking, landscaping, access, street loading and other associated works following demolition of the existing building and structures on site S73 Variation of condition 2 attached to application ref no 135675/FO/2022 in relation to Block 1 to include internal layout changes, changes to landscaping and to design of substation and to Block 2 to make internal and elevational alterations associated with introduction of a 2nd staircase comprising alteration of some window positions and sizes, omission of windows, minor increase in building footprint above ground floor, a reduction in height (ground floor level) and minor changes to landscaping. NMA Two NMAs approved to make changes to windows in December 2024 and January 2025.	16/10/2023 S73 Approved Under Construction 13/02/2024 Construction Commenced Expected completion Q1 2026	
12	One Port Street 132489/FO/2021	Erection of a part-33, part-11, part 9 part 7-storey residential building above semi-basement level, with associated residents' amenity space including gym (Use Class C3) (comprising 477 dwellings), commercial space (Use Class E), basement car parking (47 spaces), cycle parking (481 spaces) landscaping, and other associated works	28/07/2022 Planning Application Approved 135938/NMC/2023 approved 25/01/2023 12/04/2023 Construction Commenced Expected completion Q1 2026	930m
13	No.2 St. Michael's, Jacksons Row 135827/JO/2022 137873/JO/2023 (latest variation)	Ground+43 storey tower including 229 apartments, 30,095 sqm GIA office floorspace, 1,827sqm NIA retail floorspace and a 162-bed hotel.	Latest amendment application approved 07/08/2024. Under construction Completion expected in 2027.	930m
14	Hilton Motto Hotel, Laystall Street 135662/FO/2022	135662/FO/2022 Erection of a 20-storey building to create a 154 bedroom hotel (Class C1) above 2 basement levels with ancillary café / bar / restaurant and gym and other associated works including highway improvements,	01/06/2023 Planning Application Approved. Two NMAs have since been approved.	960m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		cycle parking and creation of accessible parking bay following removal of on site structures. 140984/NMC/2024 Non material amendment to Condition 2 attached to Planning Permission 135662/FO/2022 to enable alterations to internal layouts, minor increase in floor to ceiling heights as well as rationalisation of building structure. 141309/NMC/2024 Non material amendment to planning permission 135662/FO/2022 (as amended by 140984/NMC/2024) to alter the time trigger for conditions 33 (Landscape and Highways) and 34 (Noise Hotel Use)	Construction anticipated to start this year (funding secured May 2025), with completion by the end of 2026.	
15	Larard's Still 134953/FO/2022	Partial demolition of existing buildings (68-70 Oldham Street) (retention of facades to both 68 & 70 Oldham Street and internal floors of 68 Oldham Street), and erection of new 10-storey building (plus plant room) to incorporate retained elements, removal of roof and conversion of existing warehouse building (61 Spear Street) with 3-storey rooftop extension to create aparthotel (sui generis) and ground floor commercial uses (use class E)((a), (b), (c), (e) and (g) only.	19/01/2022 Planning Application Approved Under Construction 08/09/2023 Construction Commenced 143316/NMC/2025 approved 24/07/2025 Expected completion Q3 2033.	1.03km
		Cumulative		
14	Faraday Building, Sackville Street 143769/FO/2025	Demolition of Faraday Tower to ground floor slab level and works to remediate/make safe the retained structure (including the erection of a perimeter hoarding) to prepare site for future development.	Application approved 21/11/2025. Not on site.	150m
15	Energy Centre 141496/FO/2024	Construction of a new above ground Energy Centre and associated below ground plant, landscaping, revised access road, boundary treatments and building illumination	Application approved 20/01/2025. Not on site.	215m
16	Sister Plot C 143024/FO/2025	Proposed demolition of existing buildings and development of two connected blocks rising to 12 and 20 storeys, comprising 585,000sqft office floorspace; alongside new public realm and repurposed railway arches to provide commercial space. Phased development comprising: Phase A- demolition of existing buildings and structures, erection of a basement (C1 Building and C2	Resolution to grant secured at Planning Committee 20/11/2025, subject to s106.	270m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		Building) and a podium across lower ground and upper ground floors comprising flexible commercial space (Class E and/or Sui Generis drinking establishment), erection of a building (C1 Building) to form offices (Class E), landscaping works, highways, access, servicing, infrastructure and other associated works; , Phase B: erection of a podium across lower ground and upper ground floors and a new building (C2 Building) to form offices (Class E) and flexible commercial and community uses (Class E, F2 and/ or Sui Generis drinking establishment), alterations to the existing Sculptural Wall (Hollaway Wall), relocation of existing art work, landscaping works, highways, access, servicing, infrastructure and other associated works; , Phase C- change of use and associated works to railway Viaduct arches to form flexible commercial units (Class E, and/ or Sui Generis- drinking establishment) including highways, access and servicing arrangements, and other associated works.		
17	8 Minshull Street and 42 Bloom Street 143562/FO/2025 143563/LO/2025	Change of use of 8 Minshull Street and 42 Bloom Street with alterations to accommodate 39 apartments (Use Class C3).	Application validated 08/08/2025. Awaiting determination.	340m
18	Student Castle Hulme Street 121252/FO/2018 139489/NMC/2024	Partial reconfiguration of existing Multi-Storey Car Park (MSCP), including temporary access off Great Marlborough Street, construction of 5-storey external ramps, closure of vehicular access to top level; and construction of new facade; and partial demolition of the surplus part of existing MSCP and erection of a part 55, part 11-storey, part 4-storey mixed-use building comprising 853 Purpose Built Student Accommodation units (sui generis), ancillary amenity space and support facilities, and 786sqm (GIA) SME incubator workspace (Use Class B1), including public realm improvements and other associated work. NMA to vary the wording of condition 12 (materials).	01/07/2018 Planning Application Approved. NMA approved March 2024. Implemented but not on site.	390m
19	Piccadilly Warehouse, 10 Minshull Street 119374/FO/2018 133975/JO/2022 140382/JO/2024	119374/FO/2018: Change of use and alterations to Mindel House and 11 Bloom Street to accommodate 80 apartments (Use class C3) including 1-storey roof top extension to 11 Bloom Street 133975/JO/2022:	19/11/2020 Original Planning Application Approved 31/10/2022 Amendment Application Approved 03/12/24 Amendment Application approved	420m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		Variation of Conditions 3 (Materials) and 11 (Heritage) of application referenced 119374/FO/2018 to amend the wording of these conditions 140382/JO/2024 Variation of application 119374/FO/2018, as varied by 133975/JO/2022, to amend conditions 2 (Specified Plans), 10 (Construction Management Plan), 11 (Heritage), and 13 (Environmental Standards)	Not on site. Estimated completion 2027.	
20	Boulton House, Chorlton Street 143253/FO/2025	Refurbishment and reuse of Boulton House (including new build extensions up to 6 storeys to Bloom Street and 1 storey to Major Street) to provide 261 serviced apartments and associated amenity space (Class C1) plus flexible ground floor commercial uses (Use Class E and/or Sui Generis (p) and (q) along with associated landscaping and public realm works, external plant, and amended servicing and access arrangements (including new secure cycle parking)	Application approved 18/09/2025. Not on site.	435m
21	Metropolitan University Library 138424/FO/2023 143943/FO/2025 EIASCO/25/008	(138424/FO/2023) Part demolition and redevelopment of existing library building to form new library (Use Class F1) including a new 13-storey building, external amenity spaces, public realm, access and servicing arrangements and other associated works. (143943/FO/2025) Partial demolition, temporary waterproofing and associated works to library building. (EIASCO/25/008) EIA scoping sets out revised proposals, including a maximum height of ground+8 storeys and 12,000sqm floorspace.	15/02/2024 Planning Application Approved Not on site. It was announced in February 2025 that due to increased construction costs, a refreshed vision and design brief is being worked on, with a likely new planning application to come forward with revised designs. Standalone partial demolition application validated 10/09/2025, awaiting decision. EIA Scoping validated 12/09/2025. As the approved consent is for a larger building, this consent should be used in cumulative development assessments as a worst case scenario.	475m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
22	Land Between Upper Brook Street, Kincardine Road And Grosvenor Street Manchester 137401/FO/2023 NMA 141897/NMC/2025	Full planning application for the demolition of existing buildings and erection of three ground floor + 12/14/29-storey buildings to be used for Purpose Built Student Accommodation (Use Sui Generis), comprising 983 bedrooms in total and 506sqm of ground floor ancillary uses (café/commercial and convenience store- Use Classes E (a)/(b)/(c)), three buildings comprising ground floor + 5/7/9-storeys for Science and Innovation uses (Use Class E (g)(i) & (ii)) and 834sqm ground floor community uses (retail/ cafés and medical facility (Use Classes E (a)/(b) and (e)), and the provision of new public realm, two new public squares, new access and parking, and associated works 141897/NMC/2025 Non Material Change to planning permission 137399/FO/2023 to make alterations building height, elevational alterations and alterations to landscaping	29/11/2024 Planning Application Approved. Above ground works are expected to commence Q4 2025.	486m
23	The Poulton, Baring Street 137263/FO/2023	Erection of 9-storey office development with mezzanine and plant level (Class E) with ground and basement floor retail, cafe and / or restaurant and / or gym (Use Class E) uses, rooftop amenity spaces and terrace levels, associated public realm and riverside walkway and associated works.	18/09/2023 Planning Application Approved Not on site.	580m
24	Union Building, 12 Piccadilly 137794/FO/2023	Erection of a 32-storey building (land at no. 14-16 Piccadilly) and conversion of adjacent building (no.12 Piccadilly) (basement to fourth floor) to create an aparthotel, including a ground floor cafe (Use Class E (b), first floor exhibition hall (Use Class F1) and a rooftop bar and restaurant (Use Class E (b)), and associated works	30/08/2024 Planning Application Approved Not on site.	595m
25	Hotspur House 138805/FO/2023	Partial demolition of the former Hotspur Press Complex (Medlock Mill) and redevelopment of the Site to provide 619 Purpose Built Student Accommodation (Sui Generis Use Class) rooms above ground floor commercial or community uses (Use Classes F(e), F2(a)(b) and E(b)),within a part 4/5-storey and part 37-storey building plus roof parapet level above basement level, associated ancillary internal and external amenity space, public realm (including a new 10,000sqft public square), hard and soft landscaping and associated highway works	Application approved at committee, subject to s106 agreement. 13/12/2023 Planning Application Validated. Resolution to grant secured at Planning Committee in May 2024. Following the committee approval, an application to list the existing building was made which was dismissed in January 2025.	600m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
			Updated designs were submitted in April 2025 which include revised façade designs. In June 2025, a fire destroyed most of the existing Hotspur Press building and it remains in a dangerous condition. It is unlikely that development will now come forward as proposed currently. The latest update anticipates the submission of a new application in Q1 2026.	
26	Mayfield Baring Street Car Park 124972/FO/2019 S73. 137350/JO/2023	124972/FO/2019: Phased creation of circa 2.4 ha (6 acres) of public park, including hard and soft landscaping and new bridges across the River Medlock; erection of 9-storey office development above basement with mezzanine and plant level (Class B1) with ground floor Class A1 (Shop), A2 (Financial and Professional Services), A3 (Café and Restaurant), A4 (Drinking Establishment) B1 (Office) uses, rooftop amenity spaces and terrace levels, associated public realm and riverside walkway; erection of 11-storey Multi-Storey Car Park to provide 581 car parking spaces with associated landscaping; highways and infrastructure works including the creation of new junction from London Road to provide access to the multi-storey car park (MSCP) (Use Class Sui Generis); works to Baring Street, stopping up of Bond Street and Nether Street (alongside associated Traffic Regulation Orders to manage unrestricted parking to Buxton Street, Berry Street and Travis Street (to be delivered and implemented prior to the MSCP becoming operational)) alongside enabling works comprising 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 137350/JO/2023:	13/02/2020 Original Application Approved 03/07/2023 Amendment Application Approved Implemented but not on site. Construction expected to commence in 2026.	630m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		Variation to condition 2 (approved drawings) to make amendments to Multi-Storey Car Park to include; an increase in the basement area to provide a full basement comprising circa 450 cycle parking spaces, lockers, shower facilities, introduction of commercial uses (Class E) at ground floor and basement; amendments to location of parking spaces and reduction in overall spaces from 581 spaces to 488 spaces; the provision of additional EV spaces and capacity; amendments to the external appearance (revised façade treatment to facilitate active and basement uses and alteration to the proposed structural grid and structural construction to allow for demountable modular build sitting above a concrete plinth to improve future adaptability); inclusion of Plant, PV array at roof level; inclusion of additional plant for powering, heating, cooling, and ventilating the building and EV charging spaces and revisions to the location of the security room, storage areas, servicing areas and back of house facilities and to amend conditions 43(Plant noise) , 44 (Noise uses), 45 (Refuse), 46 (hours), 47 (Fumes), 51(Deliveries), 61 (Amplified Music) 62 (Uses) and 63 (Management) to include these requirements for Phase C (MSCP) as a result of the new ground floor and basement uses proposed included attached to on planning permission		
27	Cambridge Halls 142888/FO/2025	Demolition of existing halls of residence (770 beds) and erection of two buildings of 30 and 24 storeys above ground, plus basement and rooftop plant levels, comprising up to 2,302 PBSA beds, up to 1,277sqm ground floor commercial and community space, hard and soft landscaping and associated highway works.	Validated 05/06/2025. Resolution to Grant secured at Planning Committee in August 2025. Pending s106 agreement.	650m
28	Sparkle Street 139986/FO/2024	Demolition of existing part vacant buildings and erection of a part 10 storey, part 27, part 28 storey residential development comprising 359 homes (Use Class C3) with supporting amenity spaces, and associated highways works, landscaping, plant areas, and other associated works	Resolution to Grant secured at Planning Committee in November 2024. Formally approved 29 October 2025. Not on site.	670m
29	M1 Piccadilly, 47 Store Street 132626/FO/2022 1st NMA: 142675/NMC/2025 2nd NMA: 143338/NMC/2025	132626/FO/2022 Erection of 15-storey building comprising 54 apartments (Use Class C3) with associated residential facilities (residents lounge and terrace and office space), 2 car parking spaces and 57 cycle parking spaces, landscaping, access and associated development.	30/06/2022 Planning Application Approved. Latest NMA approved 29/07/2025. Not on site.	715m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		142675/NMC/2025 Non Material Amendment to planning permission ref 132626/FO/2022 to enable the introduction of a second staircase and associated internal alterations. 143338/NMC/2025 Non Material Amendment to planning permission ref 132626/FO/2022(as amended by 142675/NMC/2025) to amend the wording of conditions 3 (External Materials), 7 (CMP), 8 (Landscaping) and 34 (Wind Mitigation).		
30	First Street Plot 10a 136043/FO/2023	Erection of 13-storey office building (Use Class E) with associated public realm, external roof terraces (floors 11 and 12) and other associated works including external amenity spaces (Plot 10A)	12/05/2023 Planning Application Approved. Not on site.	750m
31	50 Fountain Street 131859/FO/2021	Full Planning Permission for the demolition of modern extension to Grade II Listed building, retention and refurbishment original Victorian facade, erection of commercial building (Use Class E) with landscaping, and other associated works. 142725/NMC/2025 Non-material amendment to revise the wording of conditions 3, 4, 5, 6, 7, 9, 10 and 16a to amend the trigger points.	30/06/2022 Planning Application Approved. NMA approved 09/05/2025 Not on site.	760m
32	Apex Tower 133172/FO/2022	Erection of a 26-storey residential tower for 72 apartments (Use Class C3) with associated car parking, cycle parking, servicing, and associated landscaping works	Application submitted – awaiting determination. 09/03/2022 Planning Application Validated. No updates since 2022.	775m
33	50-56 Great Bridgewater Street 133176/FO/2022 In parallel with apex tower scheme.	Erection of a 7-storey building with commercial floorspace (Use Class E/Sui Generis) to first and second floors and residential use to floors three to six containing 4 no. apartments (Use Class C3) with associated parking and servicing	Application submitted awaiting determination. 09/03/2022 Planning Application Validated. No updates since 2022.	775m
34	Plot 11 Block C First Street South 138831/FO/2023	Erection of a ground plus 28-storey building plus plant level, comprising purpose-built student accommodation (PBSA-Sui Generis) and other associated works including public realm, secure cycle parking and servicing arrangements	18/12/2023 Planning Application Validated. Resolution to Grant secured.	775m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
			No formal decision notice.	
35	First Street Plot 9b 141786/FO/2024	Erection of part 12, part 34 storey building comprising 861 purpose-built student accommodation (PBSA) rooms, alongside ancillary amenity space, landscaping, secure cycle parking and other associated works; and use of land east of River Street as a construction compound (Plot 9B)	Planning Application Approved 18/07/2025. Construction expected to commence in Q4 2025. Completion expected in August 2028.	790m
36	Mayfield Plots J and K, Hoyle Street 141788/FO/2024	Phased development comprising (a) site remediation and reprofiling; and (b) erection of two residential plots of development comprising 879 no. new homes (Use Class C3) contained within four buildings ranging from 7 storeys to 23 storeys in height (Plot J) and 9 to 28 storeys in height (Plot K), with upper and lower ground floor commercial spaces comprising restaurant and / or retail units (Use Class E(b) and/or E(a)), and / or indoor sports facilities (Use Class F2) together with highways works, associated public realm and other associated works for each relevant phase.	Application submitted on 19 December 2024. Resolution to Grant secured at Planning Committee 31/07/2025. No formal decision notice.	790m
37	Land Bounded By Upper Brook Street, Cottenham Street & Kincardine Road 137399/FO/2023 NMA 143469/JO/2025 approved November 2025.	Erection of a 6 to 9-storey building for Sci-Tech use (Use Class E (g)(ii)) and 265sqm of a cafe/bar (Use Class E (b)), and a 9 to 23-storey building for Purpose Built Student Accommodation (PBSA) (Use Sui Generis), comprising 737 bedrooms and 293sqm of community use (Use Class F2 (b)) and 80sqm of commercial floorspace (Use Class E), alongside new public realm, access, parking, and associated works following demolition of existing buildings. NMA to amend Condition 30 to allow non term time use of the PBSA.	18/01/2024 Planning Application Approved. Construction anticipated to commence Q4 2025. Completion anticipated for Q1 2028.	800m
38	Uno (Formerly One City Road) 128002/FO/2020	128002/FO/2020 Full Planning Application for demolition of existing structures on site, erection of one 11-storey plus basement office building (Use Class E) and one 14-storey plus basement office building with ground floor commercial unit (Use Class E), landscaping, highways works, and associated works. 139088/NMC/2024 Non-Material Amendment to planning permission 128002/FO/2020 to amend the wording of Condition 4 to alter triggers associated with submission of details.	Planning Application Approved 26/01/21 Demolition has taken place; however, construction is currently on hold.	855m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
39	Viadux Phase 2 139715/FO/2024	Phased construction of 3 buildings to include: Plot 2a: residential building (Use Class C3a) with flexible commercial units (Use Class E) and basement, Plot 2b: residential building (Use Class C3a) with flexible commercial units (Use Class E); and Plot 2c: commercial building (Use Class E) (Plot 2c), landscaping and public realm, servicing and access arrangements, with associated highways alterations, and other associated works.	Resolution to Grant secured at Planning Committee in May 2025. No formal decision notice.	895m
40	Ferrous, Chapeltown Street 132214/FO/2021	Erection of a 15-storey building to form 107 apartments (Use Class C3) at floors 1 to 15, residential amenity facilities including a roof terrace (level 14), associated ground floor cycle storage (68 spaces), two ground floor commercial units (Use Class E/ Sui Generis (Drinking Establishment), multipurpose events Pavilion (Use Class E/ Sui Generis (Drinking Establishment), associated landscaping to site perimeter and rooftop PV panels.	17/03/2022 Planning Application Approved Some pre-commencement conditions discharged August 2025. Not on site.	920m
41	Curlew Student Hulme, Boundary Lane 130387/FO/2021	Erection of a 6 to 9-storey building for Sci-Tech use (Use Class E (g)(ii)) and 265sqm of a cafe/bar (Use Class E (b)), and a 9 to 23-storey building for Purpose Built Student Accommodation (PBSA) (Use Sui Generis), comprising 737 bedrooms and 293sqm of community use (Use Class F2 (b)) and 80sqm of commercial floorspace (Use Class E), alongside new public realm, access, parking, and associated works following demolition of existing buildings	Application approved 13/06/2024 Not on site.	920m
42	Great Northern Warehouse 135565/FO/2022	Demolition of the central atrium, car park ramps, and other elements, retention of casino (Sui Generis), bowling alley and existing food and drink unit (Use Class E) alongside to allow refurbishment, restoration and re-use of the Great Northern Car Park to provide office accommodation, retail and/or food and drink uses (Use Class E) and ancillary areas; and Refurbishment, restoration, partial demolition and erection of a 3-storey extension to Deansgate Terrace (northern Chapter) and Goods Yard Entrance to form office, retail and / or food and drink use (Use Class E) and drinking establishments / hot food takeaway (Sui Generis), with associated public realm works comprising the reconfiguration of Great Northern Square and the introduction of additional public realm with associated hard and soft landscaping, highways works, access and servicing facilities, rooftop plant and	Resolution to Grant secured at Planning Committee on 16/02/23. No formal decision notice.	945m

Map No.	Site/Location	Description of Development	Status as of November 2025	Distance from Site
		other associated works; and Partial demolition of the existing leisure box to erect three residential buildings (ground plus 16, 27 and 34-storeys) to provide 746 residential apartments (Use Class C3), reconfiguration of existing car parking together with the creation of office, retail and / or food and drink use (Use Class E), or Sui Generis (drinking establishments / hot food takeaway) at ground floor and level 3, hard and soft landscaping, together with highways works, access and servicing facilities, rooftop plant and other associated works; and, External alterations and restoration of Deansgate Terrace (southern Chapter) to provide office, retail or food and drink use (Use Class E) or Sui Generis (drinking establishments / hot food takeaway / live music venue), along with delivery of associated public realm, highways works, plant, and associated works		
43	2-4 Whitworth Street West 141773/FO/2024	Demolition of buildings at 2 and 4 Whitworth Street West and the construction of a residential building (Class C3) with associated servicing arrangements, landscaping, and associated works	Resolution to Grant secured at Planning Committee in March 2025. No formal decision notice.	950m
44	140 Great Ancoats Street 142535/FO/2025	Demolition of existing buildings and erection of 2no. new buildings ground+49 and ground +24 storeys tall, providing up to 758 apartments (Use Class C3), 4,000sqm flexible Class E floorspace and associated hard and soft landscaping.	Resolution to Grant secured at Planning Committee on 20 November 2025, subject to s106. No formal decision notice.	960m
45	Manchester Digital Campus 141607/FO/2024	Creation of a new office campus comprising two office buildings (Use Class E), including: North Building comprising ground plus seven storeys (Use Class E) plus up to a total of two storeys of enclosed and exposed rooftop plant; and South Building comprising ground plus six storeys (Use Class E), plus up to a total of two storeys of enclosed and exposed rooftop plant, and also including flexible commercial uses (Use Class E and / or Use Class Sui Generis (p) and (q)) at ground floor and cycle parking; together with basement car parking, landscaping and public realm, servicing and access arrangements, highways alterations and other associated works (including the establishment of new site levels for the proposed new park)	Application approved 21 February 2025. Not on site.	1km

Plot H Site – Planning History (Included for info / reference):

Charles Street Car Park 143741/FO/2025	Full Planning Permission for demolition of existing multi-storey car park and associated commercial units (retail and sui generis bar uses), to facilitate future redevelopment.	Validated 27 August 2025. Awaiting determination – target determination date 4 December 2025.



Figure 1 - Committed Developments Map

Appendix 3(a) – Limitations and Assumptions

Discipline	Limitations and Assumptions
Townscape and Visual Impact	• Photographs are taken from publicly accessible locations and so viewpoints are at ground level. • The impact of seasonal change on the effectiveness of vegetation is accounted for through descriptive commentary.
Built Heritage	• Survey of the identified heritage assets within the study area was undertaken from publicly accessible areas. As such the study is limited to assessment from ground level. • An assessment of below ground archaeology does not form part of this assessment.
Noise and Vibration	• The assessment will be based on the best available data at the time of reporting, with a number of reasonable assumptions made where final details are not yet fixed. Key assumptions and limitations are as follows: • Baseline conditions – Noise surveys undertaken between 4–8 July 2025 are assumed to be representative of typical conditions in the area. Clearly atypical events (for example, emergency sirens or unusual local activity) will be excluded to avoid skewing results. • Building services plant – Information on plant type, servicing patterns, hours of operation, and end-use is still in development. The assessment will therefore use a reasonable worst-case basis, assuming equipment operates in the loudest credible mode and during sensitive times, to ensure impacts are not underestimated. • Retail / gym activity noise – Information on activity types, operational patterns, hours of use, and management measures is still in development. The assessment will therefore adopt a reasonable worst-case basis, assuming activity occurs at the highest credible noise level and during sensitive times, to ensure that impacts to adjoining and offsite receptors are not under-estimated. • Construction programme and methods – Details of demolition and construction phasing, methods, and plant selection will ultimately be determined by the appointed contractor. For assessment purposes, however, a reasonable worst-case demolition/construction scenario will be adopted, drawing on typical programmes and plant lists for schemes of this scale and type, as set out in BS 5228-1 and BS 5228-2. This ensures that predicted noise and vibration impacts represent the upper end of what could realistically occur. Should the contractor's actual methods be quieter or less intensive, the real-world effects would be expected to fall within or below the levels reported in this assessment.

Discipline	Limitations and Assumptions
	• Traffic data and cumulative schemes – Predictions of construction traffic noise will be based on traffic flows, routing, and peak movement profiles provided by the project's transport team. Where data vary between forecast scenarios, a reasonable worst-case dataset will be adopted to ensure effects are not underestimated. • Cumulative schemes – Consented and committed developments within the study area will be reviewed using local authority planning records. Where detailed traffic or construction data are not available, conservative allowances will be applied to capture the potential for overlapping activity. This ensures that cumulative effects are accounted for even where third-party information is incomplete or subject to change. • Noise mapping assumptions – Standard assumptions will be made for ground absorption and building façades, and simplified representations will be used for terrain and screening where detailed modelling inputs are not available. These assumptions will be set conservatively to avoid under-predicting effects. • Rail operations and vibration – Rail noise will be assessed using current timetables and on-site observations. To establish potential ground-borne vibration risks, site-specific measurements will be taken, as this effect is highly dependent on local ground conditions and building types. • Monitoring access – During works, access restrictions may limit the ability to carry out attended checks within the construction site. In such cases, monitoring will focus on the nearest sensitive façades (e.g. homes and community uses), ensuring the receptors most at risk are prioritised.
Air Quality	• There are a number of factors that will contribute to uncertainty in the modelling predictions, including the traffic and emissions data model inputs, which will have inherent uncertainty associated with them. There is also additional uncertainty owing to the model simplifying real-world conditions into a series of algorithms. • To reduce this uncertainty, model verification will be carried out for any assessment of traffic emissions by comparing modelled and monitored concentrations, which will ensure a good degree of confidence in modelled results for the existing baseline year. Furthermore, the professional judgement and experience of the consultants preparing this Air Quality ES Chapter will be used to ensure a robust assessment. • It will be assumed that the latest version (at the time of the assessment) of Defra's NOx to NO2 calculator accurately predicts NO2 concentrations. • Sensitive receptor locations identified will be considered at worst-case locations regarding sensitivity to poor air quality and potential for impacts. However, this will not be an exhaustive list, and there may be other locations within the vicinity of the Site that may

Discipline	Limitations and Assumptions
	experience air quality impacts due to emissions generated by the Proposed Development that will not have been individually assessed. These locations will be considered when determining the overall effect significance.
Traffic and Transport	• For cumulative sites, data will be taken from available Transport Assessments on the planning file. Only developments which are considered to interact with the proposed development will be included in the assessment. • For Scenario 4 which include the IDM masterplan area, GFA and land use mix will be taken from documents produced for the IDM Strategic Regeneration Framework.
Daylight, Sunlight and Overshadowing	• Best estimates were made in determining building uses (residential or commercial). Generally, these were made from external observations and recourse to the Valuation Office Agency's (VOA) council tax records. • Where publicly available, room layouts will be included within the modelling of the sensitive receptors. Reasonable assumptions as to the floor levels within these modelled rooms, which dictate the level of the working plane relevant for the NSL assessments, will be based on external observations.
Solar Glare	• Façade details are not yet known however the façade design of the Proposed Scheme is anticipated at this stage (worst case) to comprise large areas of glazing which have the potential for solar glare effects. • Although great care will be taken to identify typical viewpoints, this does not guarantee that there will be no additional sensitive locations where reflected solar glare could present a particular risk. For practical reasons, the area of the assessment has been limited to the area surrounding the Proposed Scheme This area extends to a distance of approximately 500m around the site in all directions. At greater distances, the likelihood of solar reflections causing significant glare is reduced as the time that buildings will reflect is reduced and the area of façade visible constitutes a reduced angle and so reduces the possibility of the whole sun disk being reflected. • The assessment methodology for solar glare is not aimed at addressing the intensity of an instance of reflected solar glare, but rather its occurrence, duration throughout the year, and the location of this occurrence in respect of an individual's line of sight. It must also be noted that the hours presented reflect solar time and therefore do not take Daylight Saving Hours into account. This approach to solar glare assessment within EIA has been adopted using professional judgement and by reference to Commission Internationale L'Eclairage (CIE) guidance.
Wind	• The accuracy of the results is dependent upon the accuracy of the architectural CAD used to construct the model.

Discipline	Limitations and Assumptions
	• There is an inherent assumption that on-site wind speeds will scale linearly with the measured wind speeds at the airport (Manchester International). • It is assumed that, during the construction process, wind conditions will gradually change from the Baseline Conditions to the conditions for the Completed Proposed Development. • It is assumed that on-site activity during construction will be able to withstand a higher category of pedestrian comfort level that for the Completed Proposed Development.
Climate Change	• In instances where full scheme information is unavailable, to calculate the GHG emissions associated with the construction and operation of the Proposed Development, appropriate carbon benchmarks, based on floor area and building use, will be sourced from relevant industry publications. These benchmarks will be conservative and are considered the best available methods of estimating GHG emissions given the information available.
Socio-Economic	Limitations include: • The baseline conditions used for the socio-economic assessment may change over time and this could influence the findings of the assessment, and could lead to the findings suffering from statistical time lag; and • The latest Use Class Order, published in 2021, does not include employment density guidance for calculations allowing additional flexibility to the new use classes it proposes. For the purposes of calculating employment generated during operation of the Proposed Development, the assessment will apply the 2015 HCA Employment Densities Guide to use classes pre-2021. If facilities are used differently, then there may be variations in employment generation. Assumptions include: • Employment density from the 2015 HCA employment density guidance will be used to calculate the potential employment generated during operation of the Proposed Development. • The existing retail units on site are currently vacant. The assessment will therefore assume that no employment is associated with the site.
Human Health	Limitations include:

Discipline	Limitations and Assumptions
	• The baseline conditions may change over time and this could influence the findings of the assessment, and could lead to the findings suffering from statistical time lag. • Given the lack of clear industry recognised methodology in the assessment of health effects in EIA, particularly in respect of significance, the assessment presented in the Human Health ES chapter will be qualitative and will be based on the framework provided by the HUDU/NHS Planning for Health Rapid HIA Toolkit. Assumptions include: • The existing retail units on site are currently vacant. The assessment will therefore assume that no employment is associated with the site.

Appendix 3(b) – Scenarios Tested

For the purpose of the EIA scenarios, 'Proposed Development' is defined as follows:

- Construction – demolition of existing structures on site (multi-storey car park and retail units), and construction/ erection of new build.
- Operational – occupation/ operational running of new build/ scheme

The alternative baseline assumes the demolition has commenced prior to this redevelopment application.

Scenario 1	Existing Baseline (existing EIA Site, as of September 2025)
Scenario 2	Existing Baseline + Proposed Development
Scenario 3	Existing Baseline + Proposed Development + Cumulative
Scenario 4	Existing Baseline + Proposed Development + IDM Masterplan (future surrounds/ future phases) + Cumulative
Alternative baseline scenarios	
Scenario 1a	Alternative Baseline (existing EIA Site, but with multi-storey car park and retail units demolished)
Scenario 2a	Alternative Baseline + Proposed Development
Scenario 3a	Alternative Baseline + Proposed Development + Cumulative
Scenario 4a	Alternative Baseline + Proposed Development + IDM Masterplan (future surrounds/ future phases) + Cumulative

Discipline/ Scenario	1	2	3	4	1a	2a	3a	4a	Supporting Commentary
Townscape and Visual Impact	Y	Y	Y	Y	N	N	N	N	The worst case scenario is considered to be represented by the existing baseline (as of September 2025) and so consideration of an alternative baseline has been scoped out. On that basis scenarios 1(a), 2(a), 3(a) and 4(a) will not be assessed in relation to TVIA.
Built Heritage	Y	Y	Y	Y	N	N	N	N	Scenarios 1-4 to be tested for Built Heritage on the basis of the existing building being within the Site.
Noise and Vibration	Y	Y	Y	Y	N	N	N	N	Scenarios 1–4 are taken forward as proportionate and representative. The prevailing acoustic climate is transport-led (road and rail) and will persist irrespective of the Proposed Development.

Discipline/ Scenario	1	2	3	4	1a	2a	3a	4a	Supporting Commentary
									Given very limited parking and low-intensity ground-floor commercial uses (café/convenience with typical daytime servicing), operational increments are expected to be negligible relative to the September 2025 baseline. The principal effects are likely to be temporary and demolition/construction-related. A planning application has been submitted for demolition of the existing MSCP and retail units on Plot H (143741/FO/2025). Demolition is not expected to commence before submission of the main redevelopment application. For acoustics, the 2025 baseline is considered to represent the likely operational worst case; an Alternative Baseline (demolition without redevelopment) is therefore scoped out. Removing the car park/retail would not materially alter receptor exposure in a transport-dominated context, and any demolition-only noise would mirror the early scheme works. Accordingly, Scenarios 1a–4a are not taken forward. If standalone demolition begins earlier, the scenario set will remain unchanged.
Air Quality	Y	N	Y	Y	N	N	N	N	It is acknowledged that planning application has been submitted in relation to the demolition of the existing structures (MSCP and retail units) on the Plot H Siter (under planning permission 143741/FO/2025). It is anticipated that demolition is unlikely to have commenced prior to the submission the main redevelopment application (which this EIA Screening and Scoping request has been submitted in relation to). For Air Quality, the worst-case scenario is considered to be represented by the existing baseline (as of September 2025) and so consideration of an alternative baseline has been scoped out. On that basis scenarios 1(a), 2(a), 3(a) and 4(a) will not be assessed in relation to Air Quality. The Future Baseline 'Do Something' scenario is equivalent to scenarios 3 and 4, which include the traffic associated with the Proposed Development and cumulative schemes in the future year scenarios. Comparing scenarios 3 and 4 (with cumulative schemes and proposed development) to the existing baseline (scenario 1) will ensure a robust worst-case approach of air quality concentration at the Proposed Development. For completeness, should demolition commence prior to the submission of the Plot H main redevelopment planning application, the proposed EIA scenarios to be tested will not be amended. Whether scenarios 3 and 4 will be considered quantitively depends on if the trip generation of the Proposed Development triggers the requirement for dispersion modelling.

Discipline/ Scenario	1	2	3	4	1a	2a	3a	4a	Supporting Commentary
									Furthermore, the air quality ES chapter will assess the additional scenarios during the peak construction year traffic on air quality, where required.
Traffic and Transport	Y	Y	Y	Y	N	N	N	N	Scenarios 1-4 to be tested as worst case.
Daylight, Sunlight and Overshadowing	Y	Y	Y	N	Y	Y	Y	N	Assessments against the alternative baseline represents the worst case scenario in daylight, sunlight and overshadowing terms. However to ensure a robust assessment both 'baselines' will be assessed - with and without the current buildings in situ, and form part of the ES assessment. As the future phases of the IDM Masterplan have not yet been consented i.e. the extent of the proposed massing confirmed, the in combination effect assessments of them together with the Proposed Development would not represent potentially realistic scenario in daylight, sunlight and overshadowing terms.
Solar Glare	N	Y	N	N	N	N	N	N	For solar glare, the worst-case scenario is portrayed by the complete and operational Proposed Development, where all reflective facade materials have been installed and any covers, films or hoarding used during the construction period have been `. As construction works progress, and the facades of the Proposed Development are installed, the potential solar glare effects would be similar to those once the Proposed Development is complete and operational. It is therefore considered that the completed Proposed Development represents the worst-case assessment in terms of likely solar glare effects. The construction scenario will be assessed qualitatively, based on professional judgement. As the worst-case scenario for solar glare is portrayed by the complete and operational development, a quantitative assessment has been undertaken for the operational phase only. Based on a common practice approach to portray the worst-case scenario, the cumulative effect will not be considered as neighbouring Committed Developments can block sunlight reaching the facades of the Proposed Development and/or obscure the Proposed Development from the viewpoints to be assessed. However, committed development are included within the surrounding context as their completed form where their construction has commenced.
Wind	Y	Y	Y	Y	N	N	N	N	Scenario 4 to be assessed qualitatively. Scenarios 1-4 to be tested as opposed to Scenarios 1a-4a as this represents the worst-case scenario.
Climate Change	Y	Y	N	N	N	N	N	N	The following scenarios will be assessed: • The baseline (including anticipated evolution of the baseline over the RSP) (Scenario 1)

Discipline/ Scenario	1	2	3	4	1a	2a	3a	4a	Supporting Commentary
									• The construction and operational phases (including product stage, construction stage, in use stage and end-of-life stage GHG emissions) (Scenario 2). Given that inclusion of the demolition of the existing building with the scope of the Proposed Development represents the worst case scenario for the Proposed Development's GHG emissions, assessment of Scenarios 1a and 2a is not necessary. The atmospheric concentration of GHGs and the resulting effects on climate change are affected by all sources (anything emitting GHG) and sinks (anything absorbing GHG) globally, anthropogenic and otherwise. As GHG emission impacts and resulting effects are global rather than affecting one localised area, the approach to cumulative effects assessment for GHGs differs from that for many EIA topics where only projects within a geographically bounded study area would be included. As such, as stated in the IEMA Guidance, effects of GHG emissions from specific cumulative schemes should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other. The Guidance goes on to advise that the contextualisation of GHG emissions should incorporate by its nature the cumulative contributions of other GHG sources which make up that context. As part of this assessment, an inter-development cumulative effects assessment will not be undertaken on a specific cumulative scheme basis; however, the Proposed Development's GHG emissions will be considered in the context of both the UK national carbon budgets and the Tyndall Centre recommended energy only carbon budgets for Manchester City. As such, the cumulative contributions of other GHG sources that make up the national and local contexts will be considered within the assessment. On this basis, assessment of Scenarios 3, 3A, 4 & 4a is not necessary.
Socio-Economic	Y	Y	Y	Y	N	N	N	N	It is acknowledged that a planning application has been submitted in relation to the demolition of the existing structures (MSCP and retail units) on the Plot H Sister (under planning permission 143741/FO/2025). It is anticipated that demolition is unlikely to have commenced prior to the submission of the main redevelopment application. For socio-economics, the worst case scenario is considered to be represented by the existing baseline (as of September 2025) and so consideration of the alternative baseline has been scoped out. On that basis, scenarios 1a, 2a, 3a, and 4a, will not be assessed in relation to socio-economics.
Human Health	Y	Y	Y	Y	N	N	N	N	It is acknowledged that a planning application has been submitted in relation to the demolition of the existing structures (MSCP and retail units) on the Plot H Sister (under planning permission 143741/FO/2025). It is anticipated that demolition is unlikely to have commenced prior to the submission of the main redevelopment application. For human health, the worst case scenario is

Discipline/ Scenario	1	2	3	4	1a	2a	3a	4a	Supporting Commentary
									considered to be represented by the existing baseline (as of September 2025) and so consideration of the alternative baseline has been scoped out. On that basis, scenarios 1a, 2a, 3a, and 4a will not be assessed in relation to human health.

Appendix 4 – Environmental Statement Structure

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

A reference list will also be provided as relevant with each ES chapter.

This is considered to be a robust approach and aligns with the EIA Regulations (2017).

Introduction

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

Legislative and Policy Context

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

In addition, preparation of each ES chapter will consider relevant local and regional, social and economic policies. This will include (but may not be limited to):

- Manchester City Council Core Strategy (2012) and 2024 addendum
- ID Manchester Strategic Regeneration Framework (2023)
- Guide to Development in Manchester – Supplementary Planning Document and Planning Guidance (2007)
- Places for Everyone – Greater Manchester Combined Authority (2024)
- National Planning Policy Framework (2023)
- Assessment Methodology and Significance Criteria

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

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

Baseline Conditions

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

Identification and Evaluation of Likely Significant Effects

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

The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the effects can be positive or negative. The criteria to be used in carrying out this process are detailed below. It should be noted that these tables provide a standardised set of criteria, which may not be applicable to all technical disciplines considered within the EIA. Where relevant, individual consultants may use a variation of the criteria and this will be clearly explained within the methodology of each chapter.

The Proposed Development will likely be delivered in a single phase. If the building were to come forward in phases scenarios would be reconsidered and amended where appropriate.

As a rule, and to ensure consistency across disciplines, developments that are already under construction are considered to form part of the Existing Baseline and those subject to planning permissions or otherwise identified within the committed developments are considered as part of the cumulative analysis.

The proposed scenarios to be tested are detailed in full within Appendix 3(b).

Prediction of Impact Magnitude

The methodology for determining the scale or magnitude of change caused by the impact is set out in Table 3.1. The below table represent a standard methodology which all disciplines shall follow unless stated otherwise.

Table 3.1: Standard Methodology for Assessing Magnitude of Change

Magnitude of Change	Criteria for assessing magnitude of change caused by an impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (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.

Prediction of Receptor Sensitivity

The sensitivity of a receptor is based on the relative importance of the receptor using the scale set out in Table 3.2. The below table represent a standard methodology which all disciplines shall follow unless stated otherwise.

Table 3.2: Standard Methodology for Determining Sensitivity

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

Assessment of Effect Significance

Effect significance will be calculated using the matrix in Table 3.3. This illustrates the interaction between impact magnitude and receptor sensitivity. The duration of the affect will also be considered and whether it is permanent or temporary.

Table 3.3: Effect Significance Matrix

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

Mitigation Measures

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

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

- Avoided; if not

- Minimised; and/or compensated.

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

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

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

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

Cumulative Effects

Two types of cumulative effect will be assessed:

- Type 1 Cumulative effects - are the interactions between effects of the construction and development works on a single receptor.

- Type 2 Cumulative effects - are those that arise from incremental changes caused by other past, present or reasonably foreseeable projects together with the development proposals and associated works.

An assessment of the cumulative effect of the Proposed Development and other committed developments within a defined radius of the Site, including those with recent Planning Permissions and reasonably foreseeable to come forward in the near future, will be undertaken as part of the EIA.

There is no agreed / standard threshold for how far the assessment should go. Therefore, a professional judgement has been taken regarding which schemes to highlight, taking into consideration the surrounding context of the Site, which may differ between disciplines.

Where schemes are under construction, they have been considered part of the baseline. If applications are approved, subject to a live application reasonably considered likely to be approved, or otherwise reasonably considered likely to come forward, these are included as a committed development to be considered as part of the cumulative analysis. The list of committed developments includes schemes where the construction phase has stalled.

The schedule of committed developments has been issued to the LPA to seek their agreement on 29/08/2024 and is currently awaiting a response.

Full details of the committed developments to be included as part of the cumulative effects assessment are set out at Appendix 2.

Residual Effects

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

Appendix 5 – Ecological Impact Assessment

Ecological Assessment



Plot H, ID Manchester, Manchester

7th August 2025

Tyler Grange

TG Report No. 14667_R06a_NB

Project No:	Report No.	Date	Revision
14667	R06a	10th July 2025	a

Admin QA	Author	Checked	Approved
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Plan 1: Habitat Features and Preliminary Bat Roost Assessment Plan 14667 P17

Summary

S.1. This report has been prepared by Tyler Grange Group Ltd on behalf of ID Manchester Limited and University of Manchester. It sets out the findings of an Ecological Appraisal at Plot H of the wider ID Manchester scheme, centred around OS Grid Reference SJ 84441 97567, hereafter referred to as 'the site'.

S.2. An Extended Phase 1/ UK Habs survey and Preliminary Bat Roost Assessment was conducted 25th August 2022, with an update survey on the 11th July 2024 of the wider ID Manchester site, including Plot H; a specific update survey of Plot H was undertaken on 7th July 2025. The surveys recorded the habitats present on site and included an assessment of the confirmed presence or likely absence of protected and notable fauna. A data search was conducted to establish potential impacts on designated sites within the Zone of Influence.

S.3. In terms of protected sites, one internationally designated site, Rochdale Canal SAC, is located within 10 km of the site (5.4 km) and two SBI's are located within 2 km. All three sites are designated for their canal/ aquatic habitats and given that there are no hydrological linkages from site to/ from the SAC, Rochdale Canal/ Ducie Basin SBI or Ashton Canal (West) SBI, no adverse direct or indirect effects are anticipated as a result of development

S.4. *Habitats*: The development will only affect habitats of negligible ecological importance (composed of hardstanding and building). Due to this, a Biodiversity Net Gain assessment is not required and specific mitigation to compensate for the loss of the hardstanding habitat is not required.

S.5. *Species*: Plot H was subject to a preliminary bat roost assessment. No suitable bat roosting features were recorded. The site offers limited value for foraging and commuting bats due to the heavily urbanised context; the site is therefore considered to be of negligible ecological importance for bats. The site was found to provide limited habitat for common and widespread bird species; however, recommendations have been made to safeguard nesting birds, should they be present and the building at Plot H is due for removal during the nesting bird season; in which case, a pre-works check by a suitable qualified Ecologist would be required to determine whether active birds' nests are present prior to demolition.

S.6. In conclusion, in anticipation of the implementation of any necessary mitigation, the proposed development will be compliant with relevant local planning policies, such as PfE JP-G8, as well as legislation with regard to ecology.

Section 1: Introduction and Context

Introduction

1.1. This report has been prepared by Tyler Grange Group Ltd on behalf of ID Manchester Limited and University of Manchester. It sets out the findings of a Preliminary Ecological Appraisal (PEA) at ID Manchester, Plot H, centred around OS Grid Reference SJ 84441 97567, hereafter referred to as 'the site'. See **Figure 1.1** for the red line boundary.



Figure 1.1: Red line boundary (© Google Aerial Imagery)

1.2. This assessment has been undertaken to inform a planning application for the redevelopment of numerous buildings, as part of Manchester University, for science, technology and work spaces, with associated access, infrastructure and landscaping. However, this report solely relates to the demolition of an existing car park, entitled Plot H.

Site Context

1.3. Plot H comprises an unused car park and is due for demolition, to facilitate the redevelopment of the wider 'ID Manchester' scheme. The site is approximately 0.36 ha and comprises no naturalised habitats.

1.4. The site is set within the heavily urbanised location of central Manchester, with few linking habitats from the site to the wider habitats beyond. Although the newly created Mayfield Park, on the opposite side of the A6 (approximately 500 m to the east) and the River Medlock

(culverted underneath the adjacent plots to the south), offer some habitats for flora and fauna within the wider area.

Purpose

1.5. This report:

- Uses available background data and results of the field surveys to describe and evaluate the ecological features present within the likely "Zone of Influence"[1] (ZoI) of the proposed development;
- Describes the actual or potential ecological issues and opportunities that might arise as a result of the site's development.
- Where appropriate, makes commitments for mitigation measures for adverse effects on ecological features as well as ecological enhancements, to ensure conformity with policy and legislation listed in **Appendix 2**; and
- Can be used to inform a planning application for the site's development.

1.6. This assessment and the terminology used are consistent with the Guidelines for Preliminary Ecological Appraisal[2] and the Guidelines for Ecological Impact Assessment[3]. A full methodology is set out in **Appendix 3**.

Methodology

1.7. Full methods for the data search, 'extended' phase 1/ UK Habs survey and Preliminary Bat Roost Assessment work can be found in **Appendix 3.**

1.8. As there are no naturalised habitats onsite, a Biodiversity Net Gain (BNG) assessment is not required.

Quality Control

1.9. All ecologists at Tyler Grange Group Limited are members of the Chartered Institute of Ecology and Environmental Management (CIEEM) or are working towards membership, and act under the direction of members and abide by the Institute's Code of Professional Conduct[4].

[1] Defined by the CIEEM (2018) Guidelines for Ecological Impact Assessment as the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries
[2] CIEEM (2017) Guidelines for Preliminary Ecological Appraisal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.
[3] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.
[4] CIEEM (2022) Code of Professional Conduct, CIEEM, Winchester

Section 2: Ecological Features and Evaluation

Designated Sites

2.1. The data search was based on records purchased from Greater Manchester Records Centre (GMRC), as well as data from the Multi-Agency Geographic Information for the Countryside (MAGIC). See **Appendix 3** for full methodology.

2.2. The data search returned one internationally designated site within 10 km of the site, no nationally designated site within 2 km and two non-statutory designated sites within 2 km of the site. These are detailed in **Table 2.1** below.

Table 2.1: Designated Sites

Designated site	Distance and direction from site	Citation	Ecological Importance
Rochdale Canal Special Area of Conservation (SAC, SSSI)	5.4 km northeast at nearest point	Designated for it's populations of floating water plantain *L. Natans.*	International
Rochdale Canal: Stott's Lane to Ducie Street Basin Site of Biological Important (SBI)	460 m northeast	Comprises the 'downstream' component of the European statutory Rochdale Canal SAC, SSSI.	Local
Ashton Canal (West) (SBI)	665 m west	Comprises the 'downstream' component of the European statutory Rochdale Canal SAC, SSSI.	Local

2.3. The site does not fall into the SSSI Impact Risk Zone for the Rochdale Canal SAC, SSSI; as such consultation with Natural England is not considered necessary for habitat regulations assessment and associated further work, and this is **not discussed further within this report**.

Habitats and Flora

2.4. The habitats present on site are summarised below in **Table 2.2**, along with an assessment of their ecological importance. The location of habitats are shown on the Habitats Features and Preliminary Bat Roost Assessment Plan **14667 P17**

2.5. As there are no naturalised habitats onsite, a Biodiversity Net Gain (BNG) assessment is not required.

Table 2.2: Habitats and Flora

Habitat	Description and Species	Ecological Importance	Photograph
Primary code: u1 Secondary code(s): Developed land; sealed surface U1b	The site is composed of hardstanding/ building, which is described as 'developed land; sealed surfaces'. This habitat has no intrinsic ecological value.	Negligible ecological importance	

Protected and Notable Species

2.6. The below section sets out the potential for protected species on site. Species which are considered likely absent from the site based on professional judgement, are not discussed.

Bats

2.7. The data search returned 78 bat roost records within 2 km of the site; the closest being a Pipistrelle sp. roost approximately 465 m east of the site from 20/05/2008. The GMLRC also returned 173 other bat records, of these the closest were signs of Pipistrelle sp. 141 m southwest of the site from 03/02/2018; this record related to a sighting only and not a bat roost.

Bat Activity

2.8. The site lies within an urban context, with assumed high levels of light pollution within and adjacent to site, and limited habitats for commuting and foraging bats in the wider landscape. It is assumed that light tolerant species, such as common and soprano pipistrelle, could forage within and adjacent to the site, but only occasionally. The habitats on site provide limited commuting and foraging opportunities for bats.

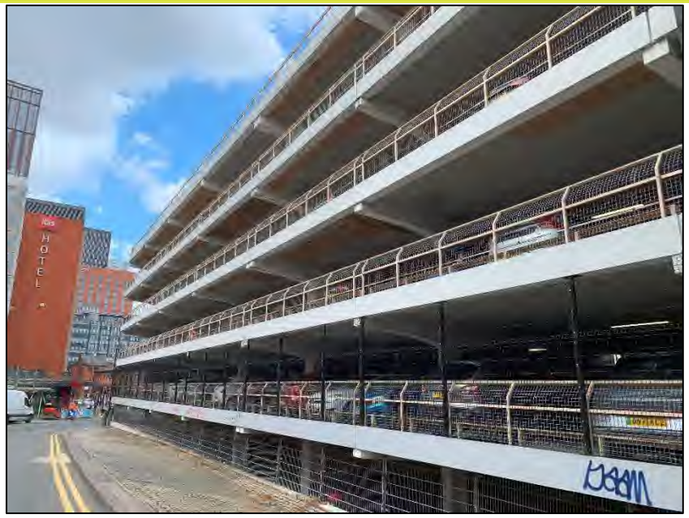
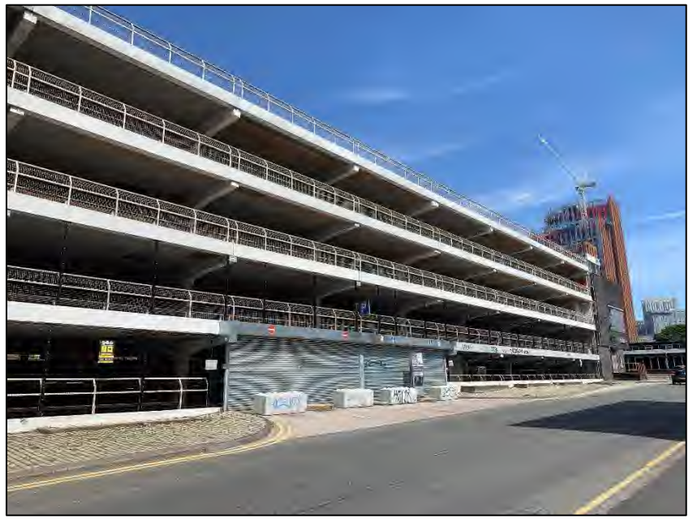
Preliminary Bat Roost Assessment

2.9. A Preliminary Bat Roost Assessment (PBRA) was conducted alongside the 'extended' Phase 1 Habitat survey. This assessment was carried out as part of the wider 'ID Manchester' survey, which included an assessment of all the buildings and trees on and directly adjacent to the wider ID Manchester scheme. Plot H was assessed again on 7th July 2025, to establish whether the habitat and conditions were similar to that recorded in 2022 and 2024.

2.10. See **Appendix 3** for methodology, **Table 2.3** below for results, and the Habitat Features and Preliminary Bat Roost Assessment Plan **14667 P17** for locations.

2.11. As described in **Table 2.3**, Plot H was graded as providing **negligible bat roosting suitability**.

Table 2.3: PBRA Results

Structure/tree and Suitability	Potential Roost Feature (PRF)	Photograph
Plot H – Car Park	Plot H comprises a large concrete built car park with a brick stairwell. Despite the relatively poor appearance of the car park, with evidence of vandalism and mdf/ wooden boarding erected in some locations, the concrete structure itself was found to be in good condition with no discernible cracks and crevices and the temporary boarding did not offer suitable roosting features. It was therefore graded as having **negligible bat roosting suitability**. The first photograph provided was taken on 11th July 2024, with the second photograph taken on 7th July 2025.	 

Birds

2.12. The data search returned a number of records of protected and notable birds species within 2 km of the site. Most notably are the 99 records of Manchester Biodiversity Action Plan (BAP) species black redstart *Phoenicurus ochruros*, with the closest record being 456 m West.

2.13. Other notable bird species (in context to the site) include peregrine falcon *Falco peregrinus* (151 records), bullfinch *Pyrrhula pyrrhula* (20 records) and house sparrow *Passer domesticus* (43 records).

2.14. None of the notable species listed above were observed during visits to the site. The habitats on site are considered to be largely unsuitable for peregrine, black redstart (have preference to more 'brownfield' habitat) and bullfinch. Recommendations have therefore been made in Section 3 to safeguard birds during construction.

2.15. Habitats on site have limited potential to support nesting birds. It is considered the assemblage of birds that may use the site for foraging and breeding is of **negligible ecological importance**, nevertheless, as mentioned above consideration for nesting birds to avoid a breach of legislation is discussed in **Section 3** of this report.

Section 3: Ecological Impacts, Mitigation, and Enhancement

Proposed Development

3.1. The proposals for the wider ID Manchester scheme are for the redevelopment of the whole site, to create an 'innovation district', composed of a series of newly created office and laboratory buildings, following the demolition of existing buildings. However, this report solely relates to the demolition of Plot H.

Designated Sites

Statutory Sites

3.2. Given the nature of the site proposals and the distances involved between the site and Rochdale Canal SAC, with no linking habitats from the proposed development to the designated site, no adverse direct or indirect effects are anticipated, and no specific mitigation is required.

Non-statutory Sites

3.3. Similarly with Rochdale Canal SAC, the two SBI's within 2 km of the site are designated for their canal/ aquatic habitats; there are no hydrological linkages from site to/ from Rochdale Canal/ Ducie Basin SBI or Ashton Canal (West) SBI. It is therefore considered that no adverse direct effects are anticipated. It is possible however that the SBI's could be impacted by airborne particles in the construction/ demolition phase of the development, and therefore best practice pollution prevention measures should be included in the condition discharge.

Habitats and Flora

3.4. All of the habitats onsite to be impacted by the proposals are of negligible ecological importance and as such no specific mitigation is required.

Protected and Notable Species

Bats

3.5. No bat roosting features were recorded at Plot H. The site was also considered to be of negligible importance for foraging and commuting bats due to the heavily urbanised context of the site.

3.6. Although considered to be largely unsuitable for bats, indirect impacts associated with dust and noise during the construction phase should be minimised by the implementation of a Construction and Environmental Management Plan (CEMP). No lighting during construction should be proposed. It is anticipated that lighting levels post-construction will not be greater

than current levels. However, any outside lighting should avoid spilling onto retained habitats include retained and newly planted trees.

Birds

3.7. All birds, their nests and eggs are protected by law and as such it is an offence to intentionally kill, injure, or take any wild bird; intentionally take, damage, or destroy the nest of any wild bird while it is in use or being built; and intentionally take or destroy the egg of any wild bird.

3.8. To avoid triggering the legislation protecting nesting birds, clearance of suitable habitat (the buildings, trees, and hedgerow) should be timed outside the nesting bird season (generally taken as March to September inclusive, though this is not defined in law and birds may nest outside of this time). If any clearance/ demolition works are required during the nesting season, then pre-removal checks for nesting birds must be carried out by a suitably experienced Ecological Clerk of Works (ECoW), no more than 48 hours prior to the works commencing. If any nesting birds are found to be present, an appropriate buffer zone will be implemented, within which works are excluded for the duration of the breeding attempt. Any active nests will need to be left in situ until a suitably experienced ecologist confirms that the chicks have fledge and the nest is no longer active.

Section 4: Conclusions

4.1. **Designated sites**: One internationally designated site, Rochdale Canal SAC, is located within 10 km of the site (5.4 km) and two SBI's are located within 2 km. All three sites are designated for their canal/ aquatic habitats and given that there are no hydrological linkages from site to/ from the SAC, Rochdale Canal/ Ducie Basin SBI or Ashton Canal (West) SBI, no adverse direct or indirect effects are anticipated as a result of development, as long as standard best practice is followed to control impacts via air, run-off, and other pollutants. These are to be incorporated into a CEMP.

4.2. **Habitats**: The development will only affect habitats of negligible ecological importance, therefore no specific mitigation is required to compensate for the loss of the car park building at Plot H.

4.3. **Species**: The car park was subject to preliminary bat roost assessment. No suitable bat roosting features were recorded. The site offers no value for foraging and commuting bats due to the heavily urbanised context; the site is therefore considered to be of negligible ecological importance for bats.

4.4. The car park building should be checked for nesting birds prior to demolished, should it be demolished during the core nesting bird season (March-August, inclusive), a pre-works check by a suitable qualified ECoW would be required to determine whether active birds' nests are present.

4.5. **Conditions**: An appropriately worded planning condition is expected to secure a Construction and Environmental Management Plan (CEMP) to safeguard the potential for protected and notable species within the area.

4.6. In conclusion, it is anticipated that the proposals would not result in adverse impacts on the favourable status of protected and notable species, providing the recommendations made throughout this assessment are implemented. Development will primarily affect habitats of negligible ecological importance and recommendations have been made to enhance the site's biodiversity. The proposed development will therefore be compliant with relevant local planning policies, such as PfE JP-G8, as well as legislation with regard to ecology.

Appendix 1: Legislation and Planning Policy

Legislation

A1.1. Specific habitats and species receive legal protection in the UK under various pieces of legislation, including:

- The Environment Act 2021;
- The Wildlife and Countryside Act (WCA) 1981 (as amended);
- The Conservation of Habitats and Species Regulations 2017 (as amended);
- The Countryside and Rights of Way (CRoW) Act 2000;
- The Natural Environment and Rural Communities Act (NERC) 2006;
- The Hedgerows Regulations 1997; and
- The Protection of Badgers Act 1992.

A1.2. The European Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna, 1992, often referred to as the 'Habitats Directive', provides for the protection of key habitats and species considered of European importance. Annexes II and IV of the Directive list all species considered of community interest. The legal framework to protect the species covered by the Habitats Directive has been enacted under UK law through The Conservation of Habitats and Species Regulations 2017 (as amended).

A1.3. In Britain, the WCA 1981 (as amended) is the primary legislation protecting habitats and species. SSSIs, representing the best examples of our natural heritage, are notified under the WCA 1981 (as amended) by reason of their flora, fauna, geology or other features. All breeding birds, their nests, eggs and young are protected under the Act, which makes it illegal to knowingly destroy or disturb the nest site during nesting season. Schedules 1, 5 and 8 afford protection to individual birds, other animals and plants.

A1.4. The CRoW Act 2000 strengthens the species enforcement provisions of the WCA 1981 (as amended) and makes it an offence to 'recklessly' disturb a protected animal whilst it is using a place of rest or shelter or breeding/nest site.

Environment Act 2021: Upcoming Town and Country Planning Act

A1.5. The Environment Act gained Royal Assent in November 2022. Whilst the premise of Biodiversity Net Gain (BNG) has been around prior to this, the Assent of the Act sets the Framework for future legislation to be changed. This will be in the form of the Town and Country Planning Act (TaCPA), specifically Schedule 14 of the TaCPA, which will make Biodiversity Net Gain a condition of planning (not a planning condition). The target 'gain' is currently set at 10% but the Secretary of State has the ability to change this.

A1.6. The timescales for changes to the wording of the TaCPA are that it will be legally mandated and enforceable from January 2024.

National Planning Policy

National Planning Policy Framework (NPPF), December 2024

A1.7. The updated National Planning Policy Framework (NPPF) was published in December 2023 and sets out the Government's planning policies for England and how these should be applied. It replaces the first National Planning Policy Framework published in March 2012.

A1.8. Paragraph 11 states that:

"Plans and decisions should apply a presumption in favour of sustainable development."

Section 11 of the NPPF, paragraph 120, sub-section b states that planning policies and decisions should:

b) "encourage multiple benefits from both urban and rural land, including through mixed use schemes and taking opportunities to achieve net environmental gains such as developments that would enable new habitat creation or improve public access to the countryside;

c) recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production"

A1.9. Section 15 of the NPPF (paragraphs 174 to 188) considers the conservation and enhancement of the natural environment.

A1.10. Paragraph 180 states that planning and decisions should contribute to and enhance the natural and local environment by:

a) "protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate; and

d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures"

A1.11. Paragraph 181 states that plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.

Paragraph 185 states that in order to protect and enhance biodiversity and geodiversity, plans should:

a) *"Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity[5]; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation[6]; and*

b) *promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity."*

A1.12. When determining planning applications, Paragraph 186 states that local planning authorities should apply the following principles:

a) *"if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*

b) *development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;*

c) *development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons[7] and a suitable compensation strategy exists; and*

d) *development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate."*

A1.13. As stated in paragraph 187 the following should be given the same protection as habitats sites[8]:

a) *"potential Special Protection Areas and possible Special Areas of Conservation;*

[5] Circular 06/2005 provides further guidance in respect of statutory obligations for biodiversity and geological conservation and their impact within the planning system.

[6] Where areas that are part of the Nature Recovery Network are identified in plans, it may be appropriate to specify the types of development that may be suitable within them.

[7] For example, infrastructure projects (including nationally significant infrastructure projects, orders under the Transport and Works Act and hybrid bills), where the public benefit would clearly outweigh the loss or deterioration of habitat.

[8] The policies referred to are those in this Framework (rather than those in development plans) relating to: habitats sites (and those sites listed in paragraph 181) and/or designated as Sites of Special Scientific Interest; land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, a National Park (or within the Broads Authority) or defined as Heritage Coast; irreplaceable habitats; designated heritage assets (and other heritage assets of archaeological interest referred to in footnote 68); and areas at risk of flooding or coastal change.

b) listed or proposed Ramsar sites[9]; and

c) sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites."

A1.14. Paragraph 182 states that the presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site.

Local Planning Policy – Manchester City Council Core Strategy

A1.15. Local Policy EN 15 'Biodiversity and Geological Conservation' states:

A1.16. The council will seek to maintain or enhance sites of biodiversity and geological value throughout the City. Particular consideration will be given to:

- Sites with international or national designations for their biodiversity value and other sites of biodiversity value (SBIs, LNRs);
- Protected and priority species, as listed in the Manchester Biodiversity Strategy and included in the Greater Manchester Biodiversity Action Plan (GM BAP);
- Sites that are recognised for their geological importance;

A1.17. The council's objective to protect and conserve the City's existing trees and woodlands and aim for a net increase in trees across the City.

A1.18. Developers will be expected to identify and implement reasonable opportunities to enhance, restore or create new biodiversity, either on-site or adjacent to the site, contributing to linkages between valuable habitat areas where appropriate, with reference to the Manchester Biodiversity Strategy and the Green Infrastructure Framework for Manchester'

[9] Potential Special Protection Areas, possible Special Areas of Conservation and proposed Ramsar sites are sites on which Government has initiated public consultation on the scientific case for designation as a Special Protection Area, candidate Special Area of Conservation or Ramsar site.

Places for Everyone (PfE)

A1.19. Policy JP-G8 A Net Enhancement of Biodiversity and Geodiversity.

A1.20. Through local planning and associated activities a net enhancement of biodiversity resources will be sought, including, where relevant, by

- Increasing the quality, quantity, extent and diversity of habitats, particularly priority habitats identified in national or local biodiversity action plans and those that support priority species;
- Improving connections between habitats, to protect and enhance the provisionof corridors, ecological networks (including Nature Recovery Networks) and steppingstones that enable the movement of species, especially as the climate changes;
- Enhancing the management of existing habitats, including through habitat restoration, avoiding habitat fragmentation and combating invasive species;
- Protecting sites designated for their nature conservation and/or geological importance, with the highest level of protection given to international and then national designations;
- Facilitating greater access to nature, particularly within urban areas;
- Supporting the development and implementation of the Great Manchester Wetlands Nature Recovery Network; and
- Safeguarding, restoring and sustainably managing our most valuable soil resources, tackling soil degradation/erosion and recovering soil fertility, particularly to ensure protection of peat-based soils and safeguard 'best and most versatile' agricultural land.

Biodiversity Action Plans

A1.21. The UK Post-2010 Biodiversity Framework succeeded the UK BAP partnership in 2011 and covers the period 2011 to 2020. However, the lists of Priority Species and Habitats agreed under the UKBAP still form the basis of much biodiversity work in the UK. The current strategy for England is 'Biodiversity 2020: A Strategy for England's wildlife and ecosystem services' published under the UK Post-2010 UK Biodiversity Framework. Although the UK BAP has been succeeded, Species Action Plans (SAPs) developed for the UK BAP remain valuable resources for background information on priority species under the UK Post-2010 Biodiversity Framework.

A1.22. Priority Species and Habitats identified under the UKBAP are also referred to as Species and Habitats of Principal Importance for the conservation of biodiversity in England and Wales within Sections 41 (England) and 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006. The commitment to preserving, restoring or enhancing biodiversity is further emphasised for England and Wales in Section 40 of the NERC Act 2006.

Local Biodiversity Action Plan

A1.23. The Greater Manchester Biodiversity Action Plan lists the following species relevant to the site:

- All UK bat species;
- Black redstart

Appendix 2: Methodology

Data Search

A2.1. A desk-based study was conducted whereby records of designated sites and records of protected and priority species were purchased and interrogated for the site and the surrounding landscape. The aim of the data search is to collate existing ecological records for the site and adjacent areas. Obtaining existing records is an important part of the assessment process as it provides information on issues that may not be apparent during a single survey, which by its nature provides only a 'snapshot' of the ecology of a given site.

A2.2. The following resources were consulted/contacted:

- Multi-Agency Geographic Information for the countryside (MAGIC) website[10];
- Greater Manchester Ecology Unit (GMEU)[11]; (Received on 11th September 2024);
- Greater Manchester Combined Authority[12];
- Joint Nature Conservation Committee (JNCC) website[13];
- Natural England (NE) designated sites website[14];
- Ordnance Survey mapping; and
- Google Maps, including aerial photography.

A2.3. The following areas of search around the boundary of the site boundary were applied:

- 2 km for protected and priority species, national statutory designated and non-statutory sites; and
- 10 km for European statutory sites.

'Extended' Phase I Habitat Survey and UKHabs

A2.4. An 'extended' Phase 1 survey and Preliminary Bat Roost Assessment was carried out on the wider ID Manchester site (including Plot H) the 25th August 2022 and 11th July 2024, with a specific survey of Plot H undertaken on 7th July 2025, all by Nick Bell, a suitably experienced ecologist and Full Member of CIEEM and Level 1 Natural England Bat Licence holder. The methods used during the walkover survey broadly followed methods used in an 'extended' Phase I habitat survey[15] and

[10] https://magic.defra.gov.uk/ [Accessed 12/10/2024]
[11] https://gmlrc.org/
[12] https://www.greatermanchester-ca.gov.uk/what-we-do/planning-and-housing/places-for-everyone/ [Accessed 12/10/2024]
[13] http://jncc.defra.gov.uk/ProtectedSites/ [Accessed 12/10/2024]
[14] https://designatedsites.naturalengland.org.uk/ [Accessed 12/10/2024]
[15] Joint Nature Conservation Committee (2010). Handbook for Phase 1 habitat survey - a technique for environmental audit. JNCC, Peterborough.

entailed recording the main plant species and classifying and mapping habitat types with reference to the Habitat Definitions provided by the UK Habitat Classification Working Group[16].

A2.5. Additionally, the habitats identified were evaluated for their potential to support legally protected and notable fauna species. Where access allowed, adjacent habitats were also considered in order to assess the site within the wider landscape and to provide information with which to assess possible impacts within the context of the site boundary.

A2.6. All habitats were assessed utilising the relevant condition criteria for the relevant habitat type under the Statutory Metric, which included confirming 'pass' / 'fail' criteria taken from the UK Habitat/Phase 1 methodology where necessary. However, the Biodiversity Net Gain Assessment does not form part of this assessment.

Preliminary Bat Surveys

A2.7. The surveys followed standard methodologies set out in the Bat Mitigation Guidelines[17], the Bat Workers Manual[18] and Bat Surveys for Professional Ecologists- Good Practice Guidelines 4th Edition[19] and comprised:

- Preliminary Roost Assessment (PRA) – External and internal building inspection survey to assess potential of buildings on site to support roosting bats;
- Ground Level Tree Assessment (GLTA) – Ground level inspection of trees to assess potential of trees on site to support roosting bats; and
- Day-time Bat Walkover (DBW) – Walkover of the sites to assess potential bat activity including foraging areas and potential commuting routes.

Preliminary Bat Roost Assessment (PBRA)

A2.8. Preliminary Bat Roost Assessment was carried out on the wider ID Manchester site (including Plot H) the 25th August 2022 and 11th July 2024, with a specific survey of Plot H undertaken on 7th July 2025by Nick Bell MCIEEM (Level 1 Natural England Bat Licence holder: 2018-37985-CLS-CLS), alongside Elliot Grundy. All surveys were daytime inspections and the conditions for all surveys was considered optimal. The location of the buildings and trees at the Site are shown on **Plan 14667 P17**. All buildings were inspected from the ground using binoculars, high powered torch, digital camera. In relation to buildings, such signs may include bat droppings, urine splashes, staining and features suitable for allowing bats access to roost (e.g. gaps behind soffits / hanging tiles / ridge tiles, lifted slates / flashing). The internal inspection of the buildings comprised a thorough search for evidence of roosting bats in accessible loft spaces (i.e. droppings, urine stains) and an assessment of the presence of potential roosting features internally.

[16] UKHab Ltd. (2023). UK Habitat Classification Version 2.0 (at https://www.ukhab.org)
[17] Reason, P.F. and Wray, S. (2023). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Chartered Institute of Ecology and Environmental Management, Ampfield.
[18] Mitchell-Jones, A.J, & McLeish, A.P. (eds). (2004) 3rd Edition Bat Workers' Manual., JNCC, Peterborough, ISBN 1 86107 558 8
[19] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition). The Bat Conservation Trust, London. ISBN-978-1-7395126-0-6

A2.9. The potential of the buildings and trees to support roosting bats was assessed using the criteria shown in **Table A3.1** below.

Table A3.1 Building / Structure Assessment Criteria - adapted from Collins, 2023.

Suitability	Description of Roosting Habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e. a complete absence of crevices/suitable shelter at all ground/underground levels).
Negligible	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[b] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity and not a classic cool/stable hibernation site, but could be used by individual hibernating bats[c]).
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[b] and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed)
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[b] and surrounding habitat. These structures have the potential to support high conservation status roosts, e.g. maternity or classic cool/stable hibernation site.
[a] Negligible is defined as 'so small or unimportant as to be not worth considering, insignificant'. This category may be used where there are places that a bat could roost or forage (due to one attribute) but it is unlikely that	

Suitability	Description of Roosting Habitats
they actually would (due to another attribute). [b] For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance. [c] Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments. Common pipistrelle swarming has been observed in the UK and winter hibernation of numbers of this species has been detected at Seaton Delaval Hall in Northumberland. This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in prominent buildings in the landscape, urban or otherwise.	

Day-time Bat Walkover (DBW)

A2.10. A DBW was undertaken on all habitats within the Site boundary. The assessment was undertaken on 25th August 2022 and again on 11th July 2024 by Nick Bell MCIEEM (Level 1 Natural England Bat Licence holder: 2018-37985-CLS-CLS), alongside Elliot Grundy. All surveys were daytime inspections and the conditions for all surveys were considered optimal. The DBW assessed habitats on-site for the likelihood to be used by foraging and commuting bats as detailed in **Table A3.4** below. This combined with desk study records of local bats and bat roosts, and potential for roosting bats on-site is used to determine suitability of the site for bat activity.

Table A3.4: Flight Path and Foraging Habits Assessment Criteria - adapted from Collins, 2023.

Suitability	Description of Roosting Habitats
None	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e. no habitats that provide continuous lines of shade/protection for flight-lines, or generate/shelter insect populations available to foraging bats).
Negligible	No obvious habitat features on site likely to be used as flight-paths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	Continuous habitat connected to the wider landscape that could be used by

Suitability	Description of Roosting Habitats
	bats for flight-paths such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flight-paths such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Plans:

Plan 1: Habitat Features and Preliminary Bat Roost Assessment Plan **14667 P17**

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Appendix 6 – Archaeological Desk-based Assessment

Plot H, Sister, Charles Street, Manchester

Archaeological Desk-based Assessment

September 2025

PREPARED FOR

RGRE Ltd, ID Manchester Ltd and The University of Manchester



Archaeological Desk-based Assessment

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Report Reference	61198_Plot H, Sister, Charles Street, Manchester_Archaeological Assessment
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EXECUTIVE SUMMARY

RGRE Ltd, ID Manchester Ltd and The University of Manchester is devising proposals for the redevelopment of Plot H, Sister, Charles Street, Manchester (centred on NGR 384439 397566). In order to facilitate the planning process, Civic Heritage were commissioned to carry out an archaeological desk-based assessment of the proposed development site. The assessment is based on the findings of an initial desk-based assessment that was produced by Salford Archaeology in 2022. This desk-based assessment was intended to establish, as far as possible, the nature and significance of the sub-surface archaeological resource, in order to enable informed recommendations to be made for the future treatment of any surviving archaeological remains.

During the late medieval and post-medieval periods, the site was most likely agricultural land on the fertile banks of the River Medlock. Much of the development area seems to have been within the manor of Chorlton. The site likely lay within parkland associated with the nearby post-medieval Garratt Hall.

Late 18th-century maps annotated the owners of fields within the site, including Roger Aytoun, who had acquired the Chorlton estate by marriage in 1775. Land within the south-east of the site had been partly developed into Garratt Mill by 1783, built by the partnership of Thackeray, Whitehead and Ryder. The mill complex consisted of three blocks of buildings. The buildings that extended within the site included workshops, a packing room, a stable, a hot house and dwelling. The main mill building, dating to *c* 1760, was built by Gartside and Thackeray, and the mill's power systems were beyond the site boundary. Much of the mill had either been destroyed by fire or demolished by 1825, with remnants of the 18th-century mills surviving to the south of the site.

The site had been partly redeveloped by the mid-19th century. The Manchester South Junction and Altrincham Railway viaduct bordered the north site boundary, and the former route of Charles Street ran through the site, aligned north-east to south-west. The north-west part of the site had been developed into commercial properties, with a row of four back-to-back dwellings abutting the viaduct. A sawmill and timber yard and ropework were built along the south side of Charles Street.

By the late 19th century, the entire site had been developed into various factories and works. This included a metal finishers and engineering works that had their own steam power plant. The engineering works had a steam boiler, engine and chimney with the yard, whilst the metal refiners had a steam boiler and furnace.

The 19th-century buildings within the site were demolished during the late 1960s and early 1970s and most of the site was redeveloped into a multi-storey car park that is four storeys high, with rooftop parking and a semi basement. A culvert runs north-east to south-west through the site and is likely associated with the River Medlock. The construction of the multi-storey car park has likely damaged or destroyed much of the archaeology within the site.

Following consultation with GMAAS (Greater Manchester Archaeology Advisory Service), it is anticipated that no further archaeological work will be required.

1. Introduction

1.1. Background

1.1.1. Purpose

RGRE Ltd, ID Manchester Ltd and The University of Manchester are preparing an application for Full Planning Permission for a Purpose Built Student Accommodation (PBSA) with ground floor flexible commercial floorspace across three buildings of 8, 11 and 38 storeys, connected by a five-storey podium (centred on NGR 384439 397566). The proposed development includes the demolition of existing structures on site (multi-storey car park and retail units), which forms a separate planning application (Planning Reference: 143741/FO/2025). In accordance with National, Regional and Local Planning Policies, RGRE Ltd, ID Manchester Ltd and The University of Manchester have commissioned Civic Heritage to carry out an archaeological desk-based assessment for the proposed development site. The assessment will support the planning application for the scheme and has largely reproduced the text from an initial desk-based assessment that was produced by Salford Archaeology in 2022 (Salford Archaeology, 2022).

The desk-based study aimed to identify as far as possible from existing records, the nature, extent and significance of the archaeological remains within the site so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in relation to the proposed development. The archaeological resource may include below-ground remains, earthworks, standing buildings and other structures. A detailed consideration of the above-ground historic environment is not considered within this assessment, which is focused on below-ground heritage assets. A separate heritage statement is being prepared to consider the impact of the proposed development on built heritage.

1.1.2. Location

RGRE Ltd, ID Manchester Ltd and The University of Manchester are preparing a planning application for the redevelopment of Plot H, Sister, Charles Street, Manchester (centred NGR 383639, 398487; Plate 1; Figs 1-2; referred to herein as the 'Site'). The Site is bounded by the Manchester South Junction and Altrincham Railway Viaduct (a Grade II Listed Building) to the north, Sackville Street to the east, Charles Street to the south and Princess Street to the west. The Site is located within the ID Manchester Strategic Regeneration Framework Area.



Plate 1 Recent satellite image of the Site, showing the red line development boundary

1.1.3. Topography and Landuse

The course of the River Medlock previously ran immediately to the south of the Site however, this section of the river has been built over. A culvert runs through the Site that is likely associated with the river.

1.1.4. Geology and Soils

The solid geology of the area comprises the sandstone of the Chester Formation formed between 250 and 247 years ago, during the Triassic period. The solid geology is overlain by superficial deposits of Devensian – Diamicton till formed between 116 and 11.8 thousand years ago during the Quaternary period (BGS, 2025).

1.2. Designations

The Site does not contain any designated heritage assets, such as Listed Buildings, Scheduled Monuments, or any Registered Parks and Gardens. The Site does not fall within a Conservation Area, though the Whitworth Street Conservation Area borders the north Site boundary.

There are 37 statutory Listed Buildings, and a Conservation Areas within a 300m radius of the Site. In total, seven Listed Buildings and one Conservation Area are within 100m of the Site (Table 1). The proposed development will not have a physical impact on these designated heritage assets, and so they are not considered further in this report; however, it may have an indirect impact on the setting of the designated heritage assets. A detailed consideration of the above-ground historic environment is not considered within this assessment, which is focused on below-ground heritage assets. A separate heritage statement is being prepared to support the scheme and consider the impact on built heritage (Stephen Levrant Heritage Architecture 2025).

Description	Designation	HER Number	National Grid Reference
Manchester South Junction and Altrincham Railway Viaduct (MSJA)	Grade II Listed Building	11681.1.0	Centred SJ 8382 9770 (2031m by 487m)
Orient House	Grade II Listed Building	8408.1.0	SJ 84412 97609
Granby House	Grade II Listed Building	8407.1.0	SJ 84447 97612
Renold Building UMIST	Grade II Listed Building	19118.1.0	SJ 84593 97591
Lass O Gowrie Public House	Grade II Listed Building	11783.1.0	SJ 84313 97523
Manchester House	Grade II Listed Building	12117.1.0	SJ 84296 97579
Asia House	Grade II* Listed Building	8569.1.0	SJ 84288 97624
Whitworth Street	Conservation Area	DGM1553	SJ 8438 9770 (775m by 463m)

Table 1 list of designated heritage assets within 100m of the Site

2. Methodology

2.1. Introduction

The aim of the desk-based assessment is to consider the potential impact of the proposed development upon any buried archaeological remains within the site. The production of the assessment followed the Chartered Institute for Archaeologists (CIfA) standard and guidance for undertaking archaeological desk-based assessments (CiFA, 2020).

2.2. Research sources

The desk-based assessment consists of existing written, cartographic, photographic and electronic information, which have been analysed in order to identify known and unknown heritage assets. These include:

- National Library of Scotland;
- The Historic Environment Record supplied by GMAAS on 29th August 2025;
- The National Heritage List for England (NHLE);
- Reports of archaeological work carried out in the Study Area;
- A History of the County of Lancaster;
- Previous archaeological assessment
- Historic Landscape Characterisation, and;
- Historical trade directories and newspapers.

2.3. Site inspection

The aim of the Site inspection was to relate the findings of the desk-based study to the existing land use of the application area, in order to identify any evidence for surviving below-ground remains.

2.4. Significance and impact assessment methodology

The Secretary of State's criteria for the scheduling of ancient monuments, outlined in Annex 1 of '*Scheduled Monuments: identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979'* (DCMS, 2013) provides a methodology for assessing archaeological significance. These criteria have been utilised in Chapter 7.3) of this assessment.

The International Council on Monuments and Sites (ICOMOS) issued '*Guidance on Heritage Impact Assessments for Cultural World Heritage Properties'* in January 2011 (ICOMOS, 2011), which outlines an option on assessing heritage value. In line with the ICOMOS guidance, this document states that an archaeological asset's significance can be assessed as very high, high, medium, low, negligible or unknown (Chapter 7.4).

The impact assessment assesses the potential impact of the proposed development upon the significance of the archaeological resource within the Site. Mitigation strategies may be recommended in order to reduce the level of impact on the significance of the identified assets.

3. Planning Policy

3.1. Introduction

This assessment accords with National, Regional and Local Planning Policies which relate to the historic environment. National planning policies relevant to heritage asset management are contained within the National Planning Policy Framework (NPPF 2024).

3.1.1. National Planning Policy Framework (NPPF)

The NPPF sets out the Government's planning policies for England, which aim to achieve sustainable development (Ministry of Housing, Communities & Local Government, Dec 2024). Sustainable development is defined by three overarching objectives: economic, social and environmental. Section 16 deals specifically with Conserving and enhancing the historic environment (paragraphs 202-221). The section states that heritage assets are an irreplaceable resource that can range from buildings of local historic importance to World Heritage Sites, that should be conserved 'in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations'.

Paragraph 203 states that: Plans should set out a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. This strategy should take into account:

- the desirability of sustaining and enhancing the significance of heritage assets, and putting them to viable uses consistent with their conservation;
- the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;
- the desirability of new development making a positive contribution to local character and distinctiveness; and
- opportunities to draw on the contribution made by the historic environment to the character of a place.

Paragraph 207 states that "local planning authorities, when determining applications, should require the applicant to describe the significance of any affected heritage assets, including any contribution made by their setting. 'The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation".

Paragraph 216 states that the effect of a proposal on non-designated heritage assets (designated assets are covered in paragraphs 207-210) should be taken into account in determining a planning application.

Paragraph 218 states that local planning authorities should require developers to record and advance understanding of any heritage assets to be lost, in a manner appropriate to their importance and impact, and to make this evidence publicly accessible.

3.1.2. Local Development Framework

The NPPF outlines the need for local planning policies to create local plans and frameworks to implement the NPPF at a local level. Manchester City Council adopted a Core Strategy in July 2012. *Policy EN 3 – Heritage* sets out the approach to the Historic Environment.

Policy EN 3 states:

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 (Manchester City Council, 2012, p. 172).

An addendum was produced in 2024 to be read in conjunction with the Core Strategy. The addendum states that the second paragraph of Policy EN 3 is to be replaced by Places for Everyone (PfE) policies (see below).

3.1.3. Places for Everyone

Places for Everyone (PfE) was adopted in March 2024 and forms part of the development plan for nine districts in Greater Manchester. Places for Everyone Plan is a strategic plan, and it does not cover everything that a local plan would, therefore Local Plans set out more detailed policies (both strategic and non-strategic).

In relation to the historic environment, Policy JP-P2: Heritage: '*We will proactively manage and work with partners to positively conserve, sustain and enhance our historic environment and heritage assets and their settings. Opportunities will be pursued to aid the promotion, enjoyment, understanding and interpretation of heritage assets, as a means of maximising wider public benefits and reinforcing Greater Manchester's distinct character, identity and sense of place. Local Plans will set out the key elements which contribute to the district's identity, character and distinctiveness and which should be the priority for conserving and enhancing in the future and demonstrate a clear understanding of the historic environment and the heritage values of sites, buildings or areas and their relationship with their surroundings. This knowledge should be used to inform the positive management and integration of our heritage by:*

1. Setting out a clear vision that recognises and embeds the role of heritage in place-making;

2. Ensuring that the heritage significance of a site or area is considered in accordance with national planning policy in the planning and design process and opportunities for interpretation and local engagement are optimised;

3. Integrating the conservation and enhancement of heritage assets and their settings, with creative contextual architectural responses that contribute to their significance and sense of place;

4. Delivering positive benefits that sustain and enhance the historic environment, as well as contributing to the economic viability, accessibility and environmental quality of a place, and to social wellbeing; and

5. Exploring opportunities to reduce greenhouse gas emissions that restoration of historic buildings offer.

Particular consideration will be given to ensure that the significance of key elements of the historic environment which contribute to Greater Manchester's distinctive identity and sense of place are protected from harm. These include historic town centres, places of worship, historic transport routes including the canal network, industrial buildings and structures including textile mills, farmsteads and other sites, buildings, and areas of identified archaeological, architectural, artistic and/or historic value. Development proposals affecting designated and non-designated heritage assets and/or their settings will be considered having regard to national planning policy. Where heritage assets have been identified as being at risk, Local Plans should identify specific opportunities for them to contribute to regeneration and placemaking, and they should set out strategies for their repair and re-use. Development proposals which will help safeguard the significance of and secure a sustainable future for Greater Manchester's heritage at risk will be supported in principle, provided they are not contrary to national policy or other policies in the development plan. Proposals should be informed, as necessary, by the findings and recommendations of the appropriate heritage

assessment(s) in the development plan evidence base and/or any updated heritage assessment submitted as part of the planning application process" (Greater Manchester combined authority, 2024, pp. 192-4).

Manchester City Council is advised on archaeological matters by the Greater Manchester Archaeological Advisory Service (GMAAS).

4. Historical and archaeological background

4.1. Introduction

The historical background provides context for the Site and has been largely reproduced from a Salford Archaeology Report (2020) that covered the entire Site.

4.2. Prehistoric (pre-10,000 BC to AD 43)

The current understanding of human activity in the Manchester region during the prehistoric period is poor, although it is reasonable to suggest that several areas in the centre of the city, such as Castlefield and Ardwick, may have been conducive for late prehistoric settlement on account of the natural topography and the abundance of natural water sources (i.e. rivers) (Gregory, 2007). There is no known evidence for prehistoric activity within the boundary of the Site or the study area, and the potential for any such remains to survive from this period is considered to be very **low**, particularly due to the intensive development since the mid-18th century.

4.3. Roman (AD 43 – AD 410)

Archaeological evidence for Romano-British activity in Manchester is focused on the Roman fort of *Mamucium,* located in Castlefield, and established during the governorship of Agricola (AD 77-84). The fort was initially constructed of wood, but underwent several phases of development, rebuilt in stone around AD 200. The Site lies *c* 1.1km to the west of the Site.

As this military complex developed, a grid of roads was laid out and a substantial extramural settlement, or *vicus*, developed. Based on archaeological excavations and the distribution of Roman finds, the limits of this civilian settlement appear to have extended south-eastwards along Chester Road, terminating somewhere in the vicinity of Great Jackson Street, northwards from the fort to approximately Quay Street, westwards along Liverpool Road for *c* 100m from the north-west corner of the fort, and eastwards across Deansgate to the area now occupied by Viadux, *c* 800m west of the Site. The Roman Road heading south-east from the fort linked Manchester with Buxton. The projected course of the Roman road from Manchester to Buxton (HER 28.3.0) lies *c* 230m to the south-east of the Site.

The potential for any *in-situ* remains of Romano-British activity to survive is considered to be **low** given the distance from Roman-British settlement and the intensive development throughout the post-medieval and industrial periods.

4.4. Medieval (AD 410 – AD 1540)

There is very little archaeological evidence in the region as a whole that represents the period between the end of the Roman occupation and the Norman Conquest of 1066. Edwin took control of Manchester in AD 620, and it is believed that this may have marked the beginning of a settlement near the site of the present-day cathedral (Farrer & Brownbill, 1908). Later, in AD 919, Edward the Elder established a fortified stronghold—known as a burh—in Manchester, which at the time was part of Viking-controlled Northumbria.

After the Norman Conquest, William I granted most of the territory between the Ribble and Mersey rivers to Roger of Poitou, who retained the manor of Salford demesne (Tupling, 1962, p. 116), but divided his other newly acquired land into several fiefdoms (Kidd, 1996, p. 13). The substantial of these was the estate centred on Manchester, created by the grant of extensive lands in the hundreds of Salford, Leyland and West Derby to Albert Grelley (Tupling, 1962, p. 116).

By the 13th century, the Grelley family had established a manor house at the confluence of the rivers Irwell and Irk, where they governed both the manor and the extensive barony (Hartwell, Hyde, & Pevsner, 2004, p.

256). It was from this hall that. In 1222 Manchester was granted an annual fair, and in 1301 Thomas Grelley was granted the Great Charter of Manchester by Edward I, and thus it became a free borough (*ibid*). A survey of the Area of Medieval Manchester (HER 16050.1.0) was undertaken by GMAU in 1980 (Morris, 1983). The Site lies *c* 1km to the southeast of Manchester's medieval core.

At the beginning of the 13th century, the manor of Chorlton was held by thegnage by a local family, who took the name of the area as their surname. The manor was assessed as two plough-lands, and a rent of 20***s***. was the annual service. Gospatrick de Chorlton was tenant in 1202 until 1223, when his son Brun received seisin of one plough-land in Chorlton, having paid the king two marks as relief. Gospatrick had lost four oxgangs of land to Matthew, son of William (de Hathersage), by wager of battle. He had granted a further two oxgangs to his brother, Adam, for fighting with him against William, son of Wulfric de Withington. Gospatrick also granted four oxgangs of land to Henry de Trafford, who held a fifth in 1212 (Farrer & Brownbill, 1911, pp. 251-4).

The land in Chorlton was escheated to the Crown in the late 13th century, as it became part of the possessions of the Grelleys and La Warres, Lords of Manchester, and was held as one ploughland by the old service of 20***s***. The Grelleys appear to have granted the Chorlton estate to Robert Grelley (a relative), who was in possession in 1278 and was succeeded by a son John, who granted his lands in Chorlton to Henry de Trafford in 1334. The Traffords thus acquired practically the whole manor, but part was afterwards held by the Traffords of Garrett (*ibid*).

The Garrett estate was closely connected with Chorlton-upon-Medlock. Sir Henry de Trafford, after purchasing the estate, appears to have granted part at least his younger son, Thomas; the gift of Gatecote field in 1373. Thomas died in 1410 holding lands in Chorlton, probably including Garrett. Henry, as son and heir of Thomas Trafford, held the estate in 1473; it included Eleynfield, Dogfield, and Gatecotefield, held by the ancient rents of 4*s*. and 2*s*. George Trafford of the Garrett held the estate between *c* 1525-1542 (Farrer & Brownbill, 1911, pp. 230-51).

The Site was likely within the Garrett estate during the medieval period. The potential for any such remains to survive from this period is considered to be **low**, particularly due to the intensive development since the mid-18th century.

4.5. Post-medieval period (AD 1540 – *c* AD 1750)

By 1539, John Leland was able to describe Manchester as the 'finest and busiest town in the whole of Lancashire, with the best buildings and the greatest population' (Chandler, 1993, p. 263), at a time when the textile industries in South Lancashire were beginning to flourish. Manchester emerged as a centre for the textile finishing processes, as woollen cloth was brought in from outlying areas for bleaching and dyeing. Most importantly, however, Manchester expanded its role as a market centre for textiles produced in the towns and hamlets of the surrounding district (Frangopulo, 1964, p. 26).

Manchester underwent a rapid expansion during the post-medieval period. The population of Manchester increased from approximately 1800 people in 1563 to just over 3000 people in the year 1642 (Willian, 1980, pp. 38-9). The Hearth Tax Returns of 1664 listed 820 households, which suggests a population of approximately 3690. The population of Manchester roughly doubled between 1563 and 1664, despite an outbreak of plague in 1645 (Phillips & Smith, 1994, p. 7). By the census of 1773, the town's population had dramatically increased even further, with approximately 24,937 people living in the township of Manchester, 23,032 of which were living in the town itself. During the post-medieval period, Manchester changed from what had been a small market centre into the largest town in Lancashire (Nevell, 2003).

The Site lay beyond Manchester's core, likely within the Garrett estate. The nearest known post-medieval building to the Site was Garrett Hall (HER 1414.1.0), the former seat of the Trafford family, located *c* 60m to the north-west of the Site. The earliest reference to the Hall dates to 1595, when Oswald Moseley purchased

the property from a relative of his wife (the daughter of Rev. R. Gerrard), though the hall likely had earlier origins. In the 16th century, the building was a black and white timber mansion with a stone base, enclosed by a courtyard of buildings. The principal façade faced south towards the Medlock, which here flowed in a series of curves through a large meadow, and is described as 'extremely picturesque with numerous gables and tall chimneys' (Farrer & Brownbill, 1911, pp. 230-51). The Hall's location near the River Medlock is believed to have been defensive, though it was later surrounded by parkland through which ran Shooter's Brook on the north side. Records of the hall can be traced up to 1683 when it potentially descended to Daniel Hough of London. The building may have tenanted as an inn at this time.

The Minshulls' acquired the Chorlton estate in the 17th century, this also included the adjacent Garrett estate, and Hough Hall in Moston. The entire Minshull estate was obtained through marriage to Roger Aytoun of Inchdarney in Fife in the 18th century.

Several illustrations of the hall in the late 18th and early 19th centuries show what it may have looked like (Plate 2). The illustration likely looks south from opposite the hall, potentially showing Garratt Mill in the left of the frame and buildings along Brook Street in the right. The Site likely fell within the hall's grounds. The Hall had fallen into decay by the end of the 18th century and was let as tenements. By 1864 only the west wing was still standing, though it was demolished in 1910. A photograph taken in 1910 captured the remains of Garratt Hall during demolition works (Plate 3).

The Site likely comprised undeveloped land close to the hall during the post-medieval period, until Garratt Mill was constructed in the mid-18th century. The potential for remains from this period are considered to be **low**.



Plate 2 Illustration of Garratt Hall in the late 18th or early 19th century, courtesy of Manchester Local Image Collection



Plate 3 Garratt Hall, taken in 1910, courtesy of Manchester Local Image Collection

4.6. Industrial period (*c* 1750 - 1914)

By around 1750, pure cotton fabrics were being produced, and cotton had overtaken wool in importance. Textiles were generally manufactured in domestic-based workshops or weavers' cottages as part of the putting-out system, whereby merchants employed textile workers and supplied them with raw materials, later manufactured in purpose-built factories.

Advances in transportation were vital to the growth of the textile industry in Manchester. The first key development was the opening of the Mersey & Irwell Navigation Company in 1734, which provided a navigable route from the Mersey estuary in Liverpool to Salford and Manchester (George & Brummond, 2002, p. 22). The next development was the construction of the Bridgewater Canal, the first true canal in the world, which was completed between the Duke of Bridgewater's coal mines at Worsley and Castlefield by 1765. The Manchester end of the Bridgewater Canal was fed by the River Medlock, which was navigable as far as India House (HER 8654.1.0) on Whitworth Street.

The success of the Bridgewater Canal stimulated canal construction throughout the country, including the Rochdale Canal. The Rochdale Canal had been planned in 1765 by James Brindley but was not completed until 1804 when it joined the Ashton Canal to the north of the city centre. In 1805, John Rennie engineered its connection to the Bridgewater Canal, to the south of the city centre (DGM1553). The Rochdale Canal is located *c* 200m to the north of the Site (HER 11683.1.0; HER 11726.1.0; HER 11730.1.0).

The River Medlock was utilised for early industry, and several industrial premises associated with the textile production and associated finishing industries had been established along its banks. These included mills,

dye works and printworks, which are shown along its course on late 18th-century mapping.

As the textile industry boomed, the necessity for warehouses to store products manufactured in the nearby mills and textile-finishing factories led to specially designed buildings erected near the city centre. By the middle of the 19th century, Manchester had become the largest textile centre in the world. The demand for larger warehouses grew, and many new warehouses, designed with considerable architectural characteristics, were built in the Whitworth Street area, near the Rochdale Canal and MSJ&AR. Grand warehouses of this period survive within the study area and include Manchester House (HER 12117.1.0), Orient House (HER 8408.1.0), Lancaster House (HER 8653.1.0), Granby House (HER 8407.1.0), Minshull House (HER 8340.1.0), Mindel House (HER 11749.1.0), Asia House (HER 8569.1.0), Regency House (HER 12147.1.0), buildings on Sackville Street (HER 11311.1.0) and buildings on Richmond Street (HER 12120.1.0).

The advent of the railways was another major improvement in transportation during the industrial period. The earliest railway station in the vicinity of the Site was the Store Street Station, which was opened on the 8th May 1842 by the Manchester and Birmingham Railway (HER 1391.1.0). The railway station was built on the site of the current station complex at Piccadilly and was the terminus for the Manchester and Birmingham Railway line. Shortly after the station opened, it became a joint terminus, which also served the Sheffield, Ashton-under-Lyne and Manchester Railway.

Soon after the station was built, it was realised that it would need to be connected to the other railway lines that served Manchester. The Manchester & Birmingham Railway (later the LNWR) and the Sheffield, Ashton-under-Lyne & Manchester (later MSLR) companies proposed an extension of their lines, which would skirt the southern part of Manchester City Centre on a 2.4 km viaduct, and join the Liverpool and Manchester Railway at Ordsall Lane in Salford. A branch line was also proposed, leaving the South Junction line at Castlefield (west of today's Deansgate Station) and following the Bridgewater Canal to Altrincham. The Manchester South Junction and Altrincham Railway (MSJ&AR) Act received royal assent on the 21st July 1845 (HER 11681.1.0). The MSJ&AR viaduct was one of the country's earliest suburban railways constructed by David Bellhouse in 1846-9. The MSJ&AR viaduct is currently designated as a Grade II Listed Building (HER 11681.1.0) bordering the north Site boundary.

4.7. Development of the site

The earliest available maps that capture the Site include Laurent's map of 1793 (Plate 4) and Green's map of 1787-94 (Plate 5; Fig. 3) that provide detailed surveys of the area, showing that some development had taken place within the Site. Both maps captured the River Medlock running a short distance to the south of the Site with Shooter's Brook to the north. A grid of streets had been laid across former fields, notably Granby Row to the north of the Site and Brook Street that bounded the Site to the west. The owners of some of the fields are annotated on Green's map, indicating that land within the Site was owned by Roger Aytoun Esq, implying that the Site had partly fallen within the manor of Chorlton.

Both late 18th-century maps show that Garratt Mill (spelt variously as Garrett, Garrat and Garret) had been established within the south of the Site, annotated as the premises of Messrs Thackeray and Whitehead on Laurent's plan (Plate 5). The mill was originally established by Gartside and Thackery in *c* 1760 as a ribbon weaving mill with swivel-looms powered by a waterwheel (Grace's Guide).

Around *c* 1780 the premises was converted into a cotton mill by John Whitehead. Whitehead used Richard Arkwright's patent machinery for spinning cotton without paying the inventor for a licence. Richard Arkwright attempted to prosecute Whitehead for infringement of his patent, although the trial collapsed in July 1781. The trial proceedings clearly indicate that Whitehead had successfully implemented powered spinning machinery at Garratt Mill at least a year prior to the commencement of operations at Arkwright's Shudehill Mill. Shortly after the trial, in 1783, Joseph Thackery and Joseph Ryder joined in partnership with Whitehead

and the mill was expanded. This is likely when the mill buildings within the Site were constructed.

Farey writes that *"this was the first cotton mill which was established in Manchester. The spinning machinery was on Sir Richard Arkwright's plan and was worked by water wheels on the river Medlock; but the waterpower being found insufficient, two engines on Savery's system were put up by Mr. Joshua Rigley, in 1784, to return the water of the river for the water wheels"* (Farey, 1827, p. 662). This implies that the River Medlock provided insufficient power to the waterwheel to drive the machinery continuously, leading to the investment in the two steam-powered pumping engines. The steam engine borrowed a condenser and air pump from Watt's engine. Farey also notes that "*the proprietors were prosecuted by Messrs Boulton and Watt for an infringement of Mr Watt's patent*" (ibid). This was rectified by the proprietors paying for a licence.

One of the earliest references to the mill was in a newspaper article of 1804, which reported the death of a Mr Bradley, who was reported to have been a '*partner in the house of Messrs Thackeray & Co, Garratt Mill, Manchester'* (Lancaster Gazette, 25th March 1804). Another article described Joseph and John Thackeray as 'cotton spinners, dealers and chapman' (Manchester Mercury, 10th October 1809). The article also notes that the mill had a steam engine. An auction took place at Garratt Mill in 1806, which comprised '*A quantity of burnt and old iron, steel and brass in lots; well worth the attention of machine makers, brass and iron founders, blacksmiths, plumber, dyers &c'* (Manchester Mercury, 2nd September 1806).

The mill complex consisted of the three blocks of buildings situated on the north bank of the River Medlock. Both plans show a similar arrangement of buildings. A building that lay on the west side of a lane that extended south towards the mill complex was partly within the Site. This building had an irregular footprint and was set back from the river frontage, bordering Roger Aytoun's fields to the north. In addition, the northern end of the southernmost mill range was within the Site boundary.

Green's map shows that the main mill building aligned broadly north-west to south-east lay to the east of the Site (Plate 6). This building was likely the original *c* 1760 building. An inlet or head or tail race seems to be depicted to the east of the main mill building, with a weir situated slightly south of the mill and a second weir located in the bend of the river. This may have fed the original waterwheel The northern end of the building returned westwards for a short distance. Further mill buildings lay to the south of the Site boundary, alongside the river. Laurent's plan (Plate 5) seems to depict an 'engine wheel' and 'corn mill' at the third, southernmost mill building that lay beyond the Site boundary.

In the surrounding area, the late 18th-century maps captured Garratt Hall at the junction of Granby Row and Brook Street to the north-west of the Site. The building consisted of an irregular footprint, with small parcels of land to the south.

Several names annotated on Green's and Laurent's map (Plate 5 and Plate 6) appear in Scholes' trade directory, including Joseph Thackeray, a cotton-spinner at no. 5 Granby Row, with a warehouse, no. 8 High Street (Scholes, 1797, p. 127). John Hardman, a merchant and manufacturer at no. 22 Spring Gardens, had a house at no. 1 Granby Row (Scholes, 1797, p. 55). In addition, Richard Mills, a cotton manufacturer, had a house at no. 3 Granby Row, Thomas Satterthwaite, a merchant, resided at no. 4 Granby Row, and Scholes Birch, a dealer in cotton, twist and weft at McDonald's Lane, had a house at no. 2 Granby Row (Scholes, 1797, pp. 14, 87, 109).

The trade directory also suggests that this area of Manchester was known as Garratt (also spelt *Garret*), which was within the Minshull district of Manchester. The line of Brook Street had begun to be developed and was occupied by a Mantua-maker, a potter and cotton manufacturer, a joiner, and a cotton manufacturer (Scholes, 1797, pp. 20, 37).



Plate 4: Laurent's map of 1793, showing approximate Site boundary, map not oriented north

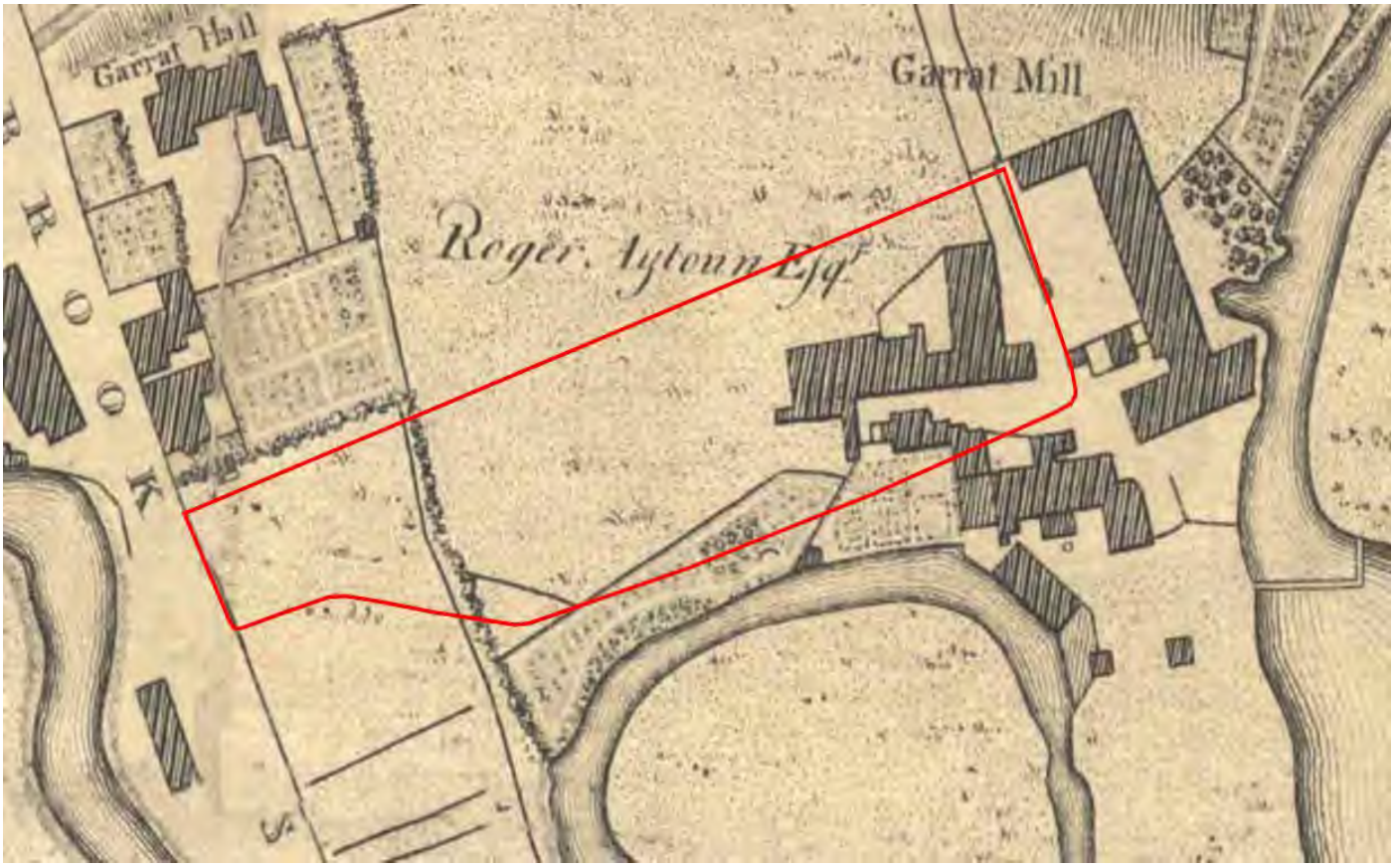


Plate 5 Extract from Green's map of 1787-1794, with Site boundary

The Manchester Book of plans dating to 1822 (Plate 6) provides a detailed insight into the arrangement of

buildings at Garratt Mills. The book states that Roger Aytoun Esq owned the land that the mill was built on. The mill building that partly occupied the south-east of the Site comprised buildings annotated ‘a’, ‘b’ and ‘c’ on the plan (Plate 6). The building aligned broadly north to south, annotated ‘a’ on the plan, was a three-storey warehouse and packing room that covered 199 square yards. Adjoining building ‘b’, aligned east to west, functioned as a workshop, covering 307 square yards and two storeys high. The building, annotated as ‘c’, was a stable of 152 square yards. The complex of buildings to the south of the Site included a hot house, two dwellings, two factories, a waterwheel and workshop. Buildings ‘d’ a hot house and ‘e’ a dwelling also fell within the south Site boundary.

By 1822, most of the factory to the east of the Site had burnt down. The building that flanked the southern end of the former mill, aligned east to west, had survived the fire. This building was annotated ‘k’ on the plan and described as a four-storey factory covering 294 square yards. The engine house, boiler house and a square chimney (‘l’ and ‘m’) were north-west of building ‘k’.



Plate 6 Manchester book of plans, 1822, no. 107, not orientated north

The same configuration of buildings is shown on Swire’s map of 1824 and is not reproduced within this document.

Newspaper articles provided an insight into the machinery and equipment used within Garratt Mill in the first part of the 19th century. In 1825, Thackeray was reportedly bankrupt. An article states ‘*valuable cotton machinery and steam engine to be sold*’, which included ‘*33 carding engines, breakers, 34 carding machines, finishers, a doubler engine, finisher, 32 heads drawing frames, 15 roving machines, 12 water frames with 96 spindles, 2 throstles with 102 spindles, a throstle with 144 spindles and a throstle with 168 spindles, 2 pair of*

mules with 102 spindles, 21 different reel, bobbins and making up presses, 1 willow, spreading machine, blowing, devil, doffer cans, roving skips etc, superior lapping machine, 90 horsepower steam engine, very larger boiler nearly new, large old boiler, cast iron water wheel…' (Manchester Courier and Lancashire General Advertiser 16th July 1825). A month later the sale of '*valuable l…, buildings, stock in trade of a joiner, builder, cabinet makers, brokers, turners and others. By Mr Mills, on Tuesday 23rd instant, at the timber yard and turning shop at Old Garratt Mill, and at the shop situate at Albion-Street, Granby Row*' was advertised at the premises (Manchester Guardian, 20th August 1825).

Almost two years later, a '*superior steam engine and boiler (four horsepower) and other valuable effects and household furniture'* were for sale at auction at Garratt Mill. Items listed included '*turning and slide lathes, upright and horizontal shafting, with bevil drills of various sizes, raggins, spreading frame, rose bits, drills and mandrills, heel tools and gravers, vices, pulling and geering, and a large quantity of iron castings, set of iron patterns for spreading, blowing, lapping, raggins, roller gins, power-loom, screw and rack press machines, a quantity of dry timber, sheet iron and bellows, anvil, complete set of smiths' tools, round and bar iron'* (Manchester Courier and Lancashire General Advertiser, 4th August 1827). The machinery listed implies that the mill may have no longer been operating as a cotton spinning concern and instead functioned as a print works.

Bancks's map of 1831 shows the route of a proposed road running through the centre of the Site. The map also shows that remnants of the former mill buildings survived and are annotated on the plan as part of Old Garratt Print Works (HER 19093.1.0). The footprint of the former buildings was reduced and partly lay within the south of the Site. The lane that provided access to the mill had been widened and named Sackville Street (later known as Zara Street). A newspaper advertised the sale of Garratt Mill in 1837, stating that the building contained '*several valuable printing machines and copper rollers &c. By T. M Fisher at Old Garratt Mill, Zara Street, Granby Row, Manchester'* (Manchester Courier and Lancashire General Advertiser, 7th October 1837).

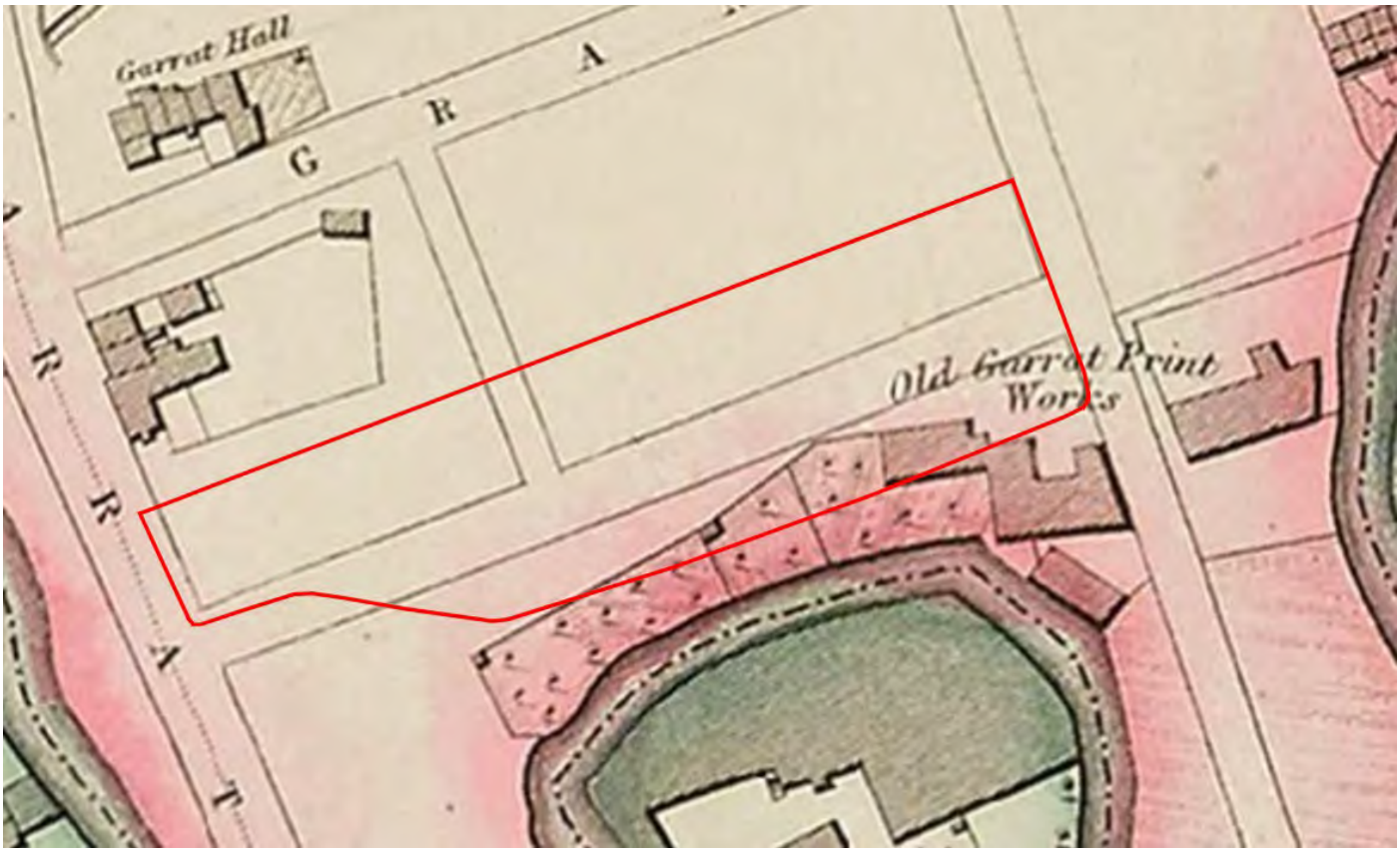


Plate 7 Extract from Bancks & Co.'s map of 1831 with Site boundary

The Ordnance Survey map of 1851 (Plate 8; Fig 6) and Adshead's map of 1851 (Plate 9) are the next maps

to capture development within the Site. One of the most notable changes was the erection of the Manchester South Junction to Altrincham Railway line (MSJ&AR), which ran north-east to south-west immediately to the north of the Site. The MSJ&AR viaduct was constructed in 1846-9 by David Bellhouse junior for the MSJ&AR Company (HER 11681.1.0). Bellhouse was also responsible for laying the track, though several cast-iron bridges situated along the viaduct were built by his son, the engineer and iron-founder, Edward Taylor Bellhouse. Other viaducts were constructed by the line's Chief Engineer, William Baker, and William Cubitt.

Adshead's map (Plate 9) shows the former route of Charles Street running north-east to south-west through the Site. Some development had taken place on either side of the road. Several small buildings that functioned as either warehouses or 'places of business' had been established. Annotated buildings include a timber yard that lay on the south side of the street, whilst a single private dwelling was on the north side of the street. The Ordnance Survey map of 1851 (Plate 8; Fig 6) shows an alternative arrangement of buildings on the north side of the road, capturing a block of four back-to-back workers' housing that weren't shown on Adshead's map.

Slater's trade directory provides an insight into the types of businesses that were operating within the Site. Properties on the north of the street functioned as a woodscrew manufacturer, an engraver, shopkeepers, beer retailers, clog makers, a butcher, a grocer and a blacking maker. The south side of the street included a similar array of business, with the addition of the George VI public house, bobbin turners, engineers and wood turners and iron founders (Slater, 1850, pp. 23-4).

An article written in 1846 states that Messrs Holmes and Roberts had occupied Old Garratt Mill in 1846, however, they received notice that the mill would be '*pulled down to make way for the South Junction Railway'* (Manchester Times, 3rd January 1846). However, both maps show that remnants of the two surviving mill buildings were still extant to the south and south-east of the Site (Plate 6.). The building to the south-east had been extended and was annotated as Zara Street Cabinet Manufactory on the Ordnance Survey map of 1851.



Plate 8 Extract from the Ordnance Survey map of 1851, showing the Site boundary

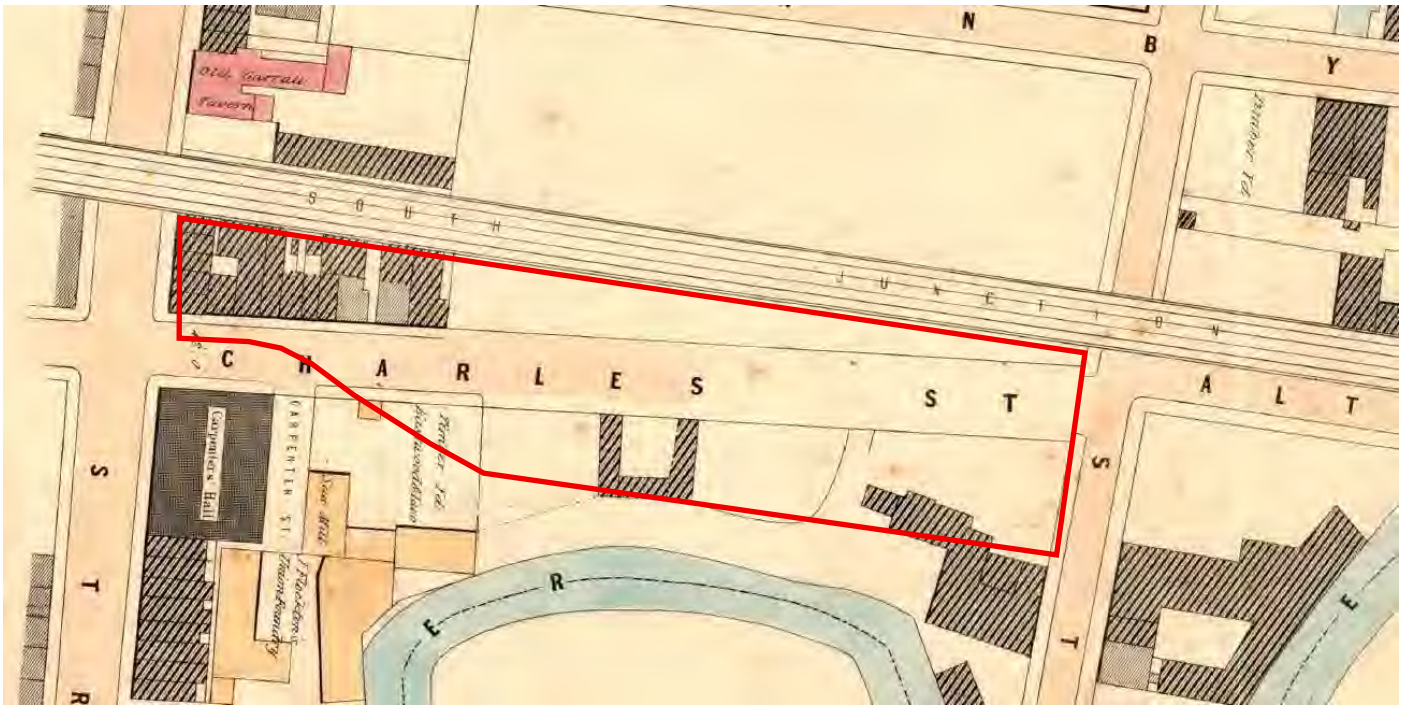


Plate 9 Extract from Adshead's map of 1851 showing the approximate Site boundary, not orientated north

The Ordnance Survey map of 1891 (Plate 10; Fig. 7) shows that the configuration of buildings at Old Garrat Mill had been altered. The original structures may have been demolished and rebuilt. These extended up to the Charles Street frontage

The Ordnance Survey map of 1891 (Plate 10) captures further development along Charles Street. The north side of Charles Street had developed into a series of yards and small workshops, which abutted the MSJ&AR. Charles Street Saw Mills, which extended slightly within the Site boundary, lay on the southern side of Charles Street. A building had also been tagged onto the remains of the Old Garratt Mills warehouse, which extended north, within the west of the Site. Slater's trade directory of 1895 lists the businesses that traded on Charles Street, this included: Henry Brown, a flint glass cutter; Henry Sainter, a wire mattress maker; Emery & Sons, packing case makers; James Neild, a box frame maker; Reavey & Co, stretcher and finishers; Kirk Wheatly, Price and Goulty, auctioneers; Manchester Raising & Finishing Co; Lancashire Sand Blast Works, glass bevellers; John McInerny, a wood turner; Nathaniel & Co, tin packing case makers; and, Eastwood & Sons, packing case makers (Slater, 1895, p. 84). The north side of the street was mostly occupied by householders, shopkeepers, beer retailers, a furniture painter and wood turner. John Montgomery, a packing case maker, and Fuseli and Toulson, engineers also occupied the street (Slater, 1895, p. 84).

Goad's Insurance plan, surveyed in 1886 and 1889, and revised in 1901 shows the buildings on the north side of Charles Street. The buildings ranged from one to three storeys high, none of which contained basements. These functioned as furniture and lamp factories, a public house, stables, an engineering works, polishers and saw mill turnery. The plan shows that the Metal Refiners contained a small steam boiler, furnace and chimney in the same location as that depicted on the Ordnance Survey map. In addition, the engineering works contained a steam boiler, engine and chimney within the yard to the east of the machine shop.

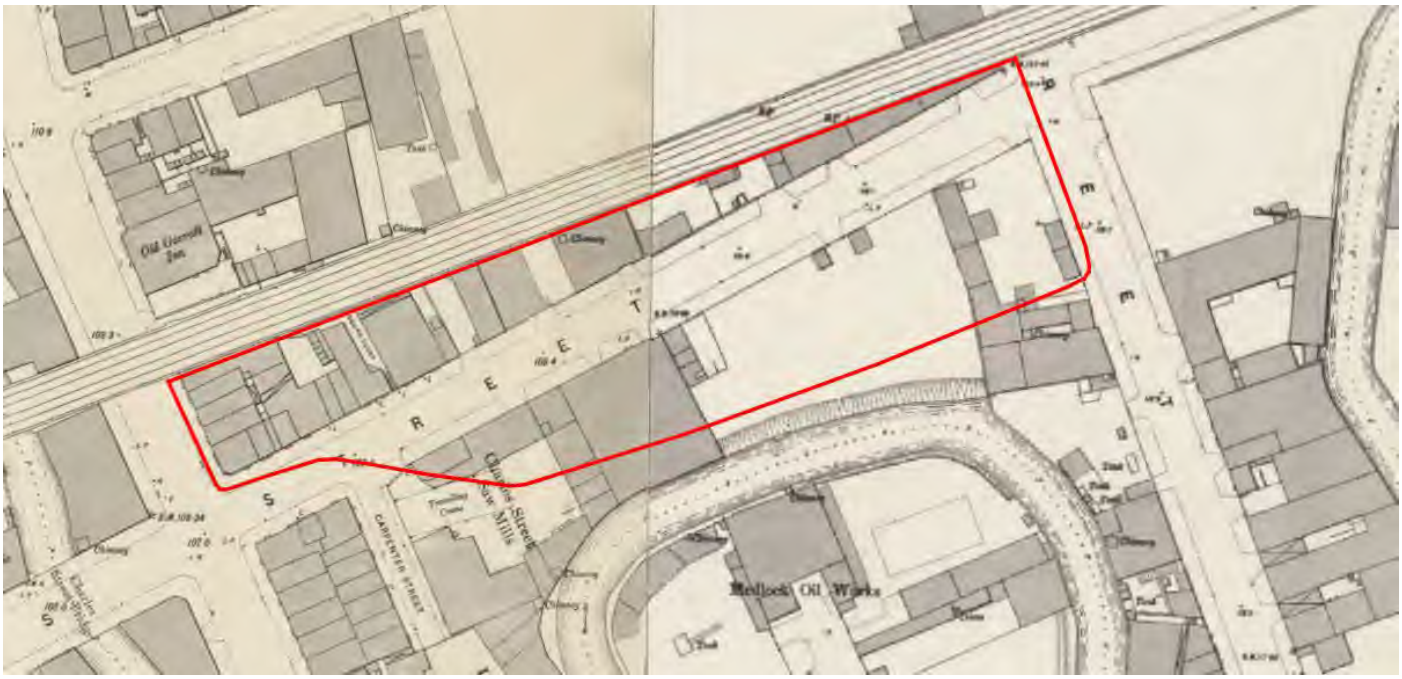


Plate 10 Extract from the Ordnance Survey map of 1891, showing the Site boundary

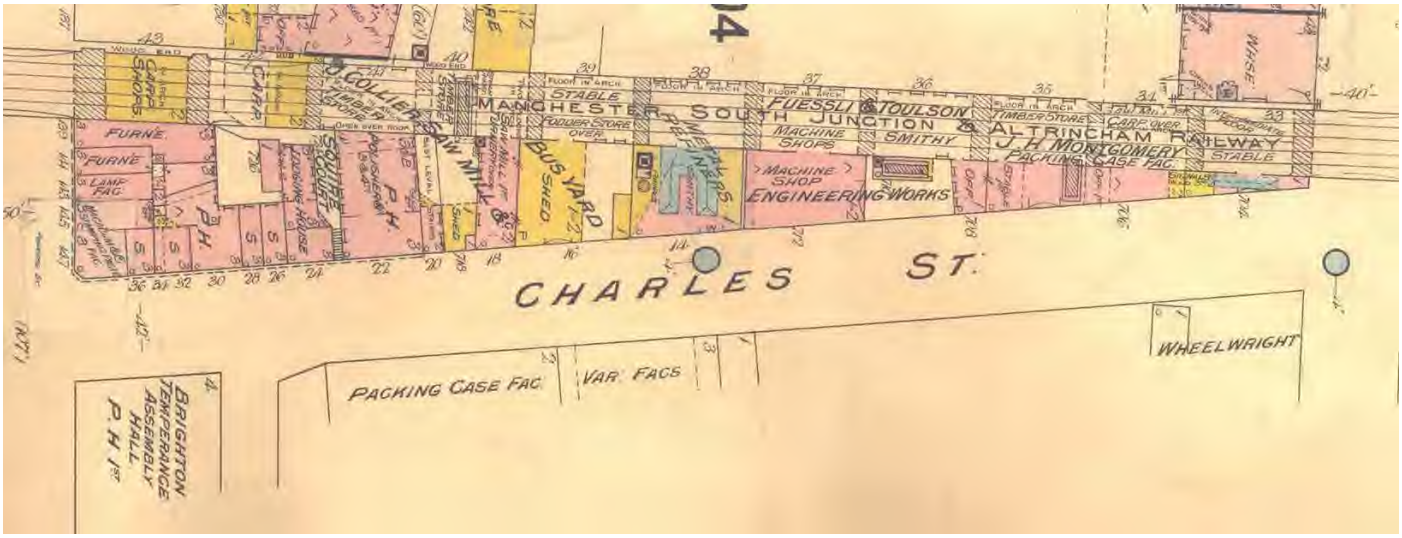


Plate 11 Goad's insurance plan of Manchester, surveyed 1886, 1889 and revised in 1901, with Site boundary

The southern side of Charles Street had been redeveloped into buildings that stretched from the street frontage to the riverbank by 1922 (Fig. 8). An additional saw mill and a box makers had been established in two of these buildings. The same configuration of buildings occupied the north side of Charles Street, captured on early 20th-century photographs. The photograph, taken in 1916, shows that these mainly consisted of single-storey and two-storey brick-built sheds and workshops, with three-storey shops to the west, as indicated on Goad's earlier map (Plate 12).

The same buildings occupied the Site up until the late 1960s, when buildings along the south side of the street were demolished (Fig 10). The River Medlock was culverted to the south of the Site in the 1970s and the multi-storey car park was built over the Site, with Charles Street repositioned to the south of the Site.



Plate 12 Junction of Charles Street and Sackville Street, showing buildings within the Site, taken 1916, courtesy of Manchester Local Image Collection

4.7.1. Previous archaeological works

In total, 48 archaeological events have been recorded within a 300m radius of the Site. Most of these comprise desk-based assessments, heritage statements and historic building surveys. Intrusive archaeological investigations include three watching briefs, four evaluations and two excavations.

Previous archaeological desk-based assessments within the Site

An archaeological desk-based assessment produced by Salford Archaeology in 2022 to support the ID Manchester scheme covered the Site area (Salford Archaeology, 2022). This report highlighted the archaeological potential of 18th- and 19th-century remains across a much larger site.

A second archaeological desk-based assessment was undertaken to support a planning application for proposed improvements to Manchester Oxford Road and Piccadilly railway stations (Parsons Brinckeroff, 2014). The report covered the west part of the Site that is currently a grass verge (EGM4229).

Intrusive archaeological investigations

At the former BBC site, located 50m to the south-west of the Site, two evaluations and a watching brief were undertaken before redevelopment works (EGM4717; EGM4278; EGM4277). The investigations revealed early 19th-century deposits, basal elements of a series of flues associated with a brick-drying chamber and remnants of mid-19th-century workers' houses (Pre-Construct Archaeology Ltd, 2015). A watching brief revealed a brick clamp and workers' housing also dating to the 19th century (Pre-Construct Archaeology Ltd, 2016). Further evaluation works revealed the remains of early 19th-century structures and deposits off Heron Street (Pre-Construct Archaeology Ltd, 2017).

Evaluation trenches at Mayfield targeted various 18th- and 19th-century remains and brought to light significant archaeological remains associated with the Mayfield Dyeworks, Chapelfield Dyeworks, the Ardwick Tannery, and the Mayfield Baths. Following consultation with GMAAS, further excavation was required in four areas - the Mayfield Dyeworks, the Ardwick Tannery, the Mayfield Baths and Chapelfield Dyeworks (EGM4488).

The excavation was undertaken in two phases, the first completed November – December 2020 and the second in February 2021. Both elements of the excavation uncovered significant remains associated with the 18th- and 19th-century development of the site. Area 1 was located across a portion of the mid-19th-century Ardwick Tannery, uncovering a series of walls, floor surfaces, boiler beds, a chimney and flues, which formed a key part of the power-systems within the complex. Area 2 uncovered considerable remains of the mid-19th to mid-20th-century remains of the Mayfield Baths. It uncovered the remains of two swimming pools, two boilers, flues, engine-beds, and a chimney. Area 3 selectively targeted a range of buildings forming a small part of the extensive complex of Mayfield Dyeworks in the north of the site. This complex spanned the 18th to 19th centuries and included a suite of structural remains forming the boiler house, economising house, flues and a chimney, multiple engine- and machine beds, dye-vat bases and subfloor drainage. Area 4 investigated the Chapelfield and Ardwick Dye works, founded in the late 18th century and continuing until late 19th century when converted into an India Rubber factory (Salford Archaeology, 2021).

Significant archaeological remains were also revealed at Piccadilly Place by Oxford Archelogy North in 2006 (EGM3792). The excavation revealed six well-preserved cellar dwellings. Evidence for earlier structures associated with the late 18th-century infilling of Shooter's Brook was also recovered. Survival of remains of this quality within an urban setting is most unusual, and provided the opportunity to distinguish plan types, differences in construction techniques, and even produce a sequence of the development of fireplaces within the cellars. Excavation within the northern part of the study area revealed *in situ* remains of Shepley Street Mill, including a chimney and flue, associated with an expansion of the mill during the mid-19th century. A stair tower, probably of similar date, was also exposed within the excavation trench, providing information about the construction techniques used, and also demonstrating the use of architectural stone embellishments within the mill complex. The results of the excavation were enhanced by a watching brief that was maintained during construction work. This revealed fragmentary archaeological remains pertaining to the former Brook Street Mill on the northern side of Brook Street, which comprised the basal courses of a narrow block, a stair tower, and an associated flagstone yard surface (OAN, 2006).

An excavation undertaken at New Wakefield Street revealed structural elements of a 19th-century machine works that was converted subsequently to a textile finishing works, a block of early 19th-century back-to-back workers' housing, and a 19th-century distillery (Salford Archaeology, 2018).

5. Site Inspection

A site inspection was carried out on 17th September 2025. The Site currently encompasses a vacant multi-storey car park and retail units. The car park has a semi basement level along Charles Street, with lower basement level to the rear. A narrow road is within the north of the Site, bordering the MSJ&AR (Plate 13 and Plate 14).



Plate 13 View of multi-storey car park, looking north-west



Plate 14 View of retail units fronting Charles Street, looking west

6. Gazetteer

The following gazetteer sites (GS) summarise the sites of potential archaeological interest and elements of the historic landscape within the Site and its immediate vicinity. The identification of these heritage assets is drawn primarily from the historic map regression analysis, Historic England, and the HER data, and includes both designated and non-designated heritage assets. The locations of the gazetteer sites are shown on Figures 12 within Appendix 1 - Figures.

Gazetteer Site (GS)	01
Site Name	Old Garratt Mill buildings a, b and c (site of)
Designation	-
HER number	19093.1.0
Period	Late 18th century
NGR	384475 397582
Description	Possibly associated with the expansion of the mill in 1783 by the partnership Thackeray, Whitehead and Ryder. Garratt Mill was first shown on Green's map of 1787-94 (Fig. 3) and Laurent's map of 1793, operated by Messrs Thackeray and Whitehead. The complex consisted of three blocks of buildings. The mill building that partly occupied the south-east of the Site comprised the buildings annotated as 'a', 'b' and 'c' on the Manchester book of plans 1822 (Plate 7). The building 'a' was a three-storey warehouse and packing room that covered 199 square yards. Adjoining building 'b' aligned east to west functioned as a workshop that covered 307 square yards, whilst the west end of the building, annotated as 'c', was a stable of 152 square yards. These buildings had been demolished by 1831. The mill's power systems lay to the south and south-east of the Site boundary. Original phase, to the east of the Site, dates to *c* 1760 and was established by Gartside & Thackery. Buildings 'a', 'b' and 'c' were built over by 19th-century works and the 1970s multi-storey car park.
Assessment	Remains associated with the former mill have likely been damaged or destroyed during the construction of the multi-storey car park that includes a semi-basement level.

Gazetteer Site (GS)	02
Site Name	Old Garratt Mill buildings d and e (site of)
Designation	-
HER number	19093.1.0
Period	Late 18th century
NGR	384475 397582
Description	Possibly associated with the expansion of the mill in 1783 by the partnership Thackeray, Whitehead and Ryder. Garratt Mill was first shown on Green's map of 1787-94 (Fig. 3) and Laurent's map of 1793, operated by Messrs Thackeray and Whitehead. The complex consisted of three blocks of buildings. The mill building that partly occupied the south of the Site comprised the buildings annotated as 'e' and 'd' on the Manchester book of plans 1822 (Plate 7). Buildings 'd', a hot house and 'e' a dwelling house fell partly been within the Site. Both were built over by 19th-century works and the 1970s multi-storey car park.
Assessment	Remains associated with the former mill have likely been damaged or destroyed during the construction of the multi-storey car park that includes a semi-basement level.

Gazetteer Site (GS)	03

Site Name	Back-to-backs (site of)
HER number	-
Period	Early to mid-19th century
NGR	384388 397551
Description	Block of four back-to-back dwellings shown on the 1851 Ordnance Survey map, but not captured on Adshead's map of 1851. The buildings didn't seem to contain cellars. Converted or redeveloped into a larger building by the early 20th century.
Assessment	Remains associated with the former back-to-backs may be affected by the proposed development scheme.

Gazetteer Site (GS)	**04**
Site Name	Commercial properties, Charles Street (site of)
Designation	-
HER number	-
Period	19th century
NGR	384388 397511
Description	Various commercial properties along the north side of Charles Street and fronting Brook Street, included a lodging house, public house, stables and various works buildings. Brick-built buildings abutting the MSJ&AR viaduct, all between one and three-storeys, without basements. Demolished in the late 1960s or early 1970s and mostly replaced by multi-storey car park.
Assessment	Remains associated with the buildings will have been damaged or destroyed by the construction of the multi-storey car park. Buildings nearer to the junction of Princess Street have a greater chance of survival and might be affected by the proposed development scheme.

Gazetteer Site (GS)	**05**
Site Name	Engineering works (site of)
Designation	-
HER number	-
Period	Mid to late 19th century
NGR	38442 397586
Description	An engineering works and machine shop occupied the north side of Charles Street. The yard adjacent to the machine shop included a steam boiler, engine and chimney, shown on Goad's insurance plan 1886-8, revised in 1901. Demolished in the late 1960s or early 1970s and mostly replaced by multi-storey car park.
Assessment	Remains associated with the buildings will have been damaged or destroyed by the construction of the multi-storey car park. There is good potential for the steam power plant to survive beneath the narrow road to the north of the Site.

Gazetteer Site (GS)	**06**
Site Name	Metal refiners (site of)
Designation	-
HER number	-
Period	Mid to late 19th century
NGR	384415 397572

Description	A metal refinery occupied the north side of Charles Street. The works included a furnace, steam boiler and chimney, shown on Goad's insurance plan 1886-8, revised in 1901. Demolished in the late 1960s or early 1970s and mostly replaced by multi-storey car park.
Assessment	Remains associated with the buildings will have been damaged or destroyed by the construction of the multi-storey car park.

Gazetteer Site (GS)	**07**
Site Name	Rope works (site of)
Designation	-
HER number	-
Period	Mid to late 19th century
NGR	384427 397544
Description	Rope works on the south side of Charles Street, partly within the Site. Expanded during the 19th and 20th centuries. Demolished in the late 1960s or early 1970s and mostly replaced by multi-storey car park.
Assessment	Remains associated with the buildings will have been damaged or destroyed by the construction of the multi-storey car park.

Gazetteer Site (GS)	**08**
Site Name	Saw mill and timber yard (site of)
Designation	-
HER number	-
Period	Mid to late 19th century
NGR	384401 397539
Description	Saw mill and timber yard, shown on mid-19th-century mapping, partly within the Site. Expanded throughout the 19th and 20th centuries. Demolished in the late 1960s or early 1970s and mostly replaced by multi-storey car park.
Assessment	Remains associated with the buildings will have been damaged or destroyed by the construction of the multi-storey car park.

7. Significance

7.1. Policy context for heritage assets

Under both national and local planning policy, both designated and non-designated heritage assets are to be considered within the planning process (as previously stated in Chapter 3). The NPPF emphasises assessing the development proposals in line with an up-to-date local plan. Therefore, Policy JP-P2: Heritage (Places for Everyone 2024) and Policy EN 3 of Manchester's Core Strategy were consulted as the key Development Plan Document in the Local Development Framework (LDF).

7.2. Non-designated and designated heritage assets

The Site is situated within 300m of 38 designated heritage assets, however, the proposed development will not have a physical impact on these designated heritage assets, and so they are not considered further in this report (see Chapter 1.2). A detailed consideration of the above-ground historic environment is not considered within this assessment, which is focused on below-ground heritage assets. A separate heritage statement has been produced that will consider the impact of the proposed development on built heritage.

7.3. Significance of the archaeological resource

The Secretary of State's criteria for the scheduling of ancient monuments, outlined in Annex 1 of '*Scheduled Monuments: identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979'* (DCMS, 2013) provides a methodology for assessing archaeological significance. This criterion has been used to assess archaeological significance, below.

7.3.1. Historical and archaeological interest

The development of the site relates to the development of Manchester city centre during the industrial period, which is of historical and archaeological interest.

7.3.2. Baseline Significance conditions

Period

No prehistoric, Roman, or medieval activity is known to have taken place within the Site and the potential for remains is considered to be low. The Site likely remained undeveloped land within the Garratt estate during the post-medieval period. Remains from the post-medieval period are considered to be low given the later development of the Site.

The most likely remains to be encountered within the Site would date to the industrial period, including remains associated with Garratt Mill (GS01-2), back-to-back dwellings (GS03), and commercial and works buildings (GS04-8).

Manchester was at the forefront of the industrial revolution, and as, sites reflecting the city's industrial heritage may be considered significant due to period.

Rarity

Archaeological remains associated with 19th-century houses and works would not be considered significant due to rarity as many examples have been subject to recent investigation.

Documentation

The historical development of the Site can be traced reasonably well from cartographic and other primary sources. Further documentary research would undoubtedly furnish additional evidence, although this is unlikely to alter the outline and conclusions presented in this assessment.

Group value

Buried remains within the Site may hold group value in that they are contemporary features.

Survival / condition

The survival, extent and condition of any below-ground archaeological remains within the Site is presently unknown. The existing multi-storey car park includes a semi-basement level that has likely damaged or destroyed the majority of archaeological remains within the Site. A culvert runs north-east south-west beneath the basement, likely associated with the River Medlock.

Fragility / vulnerability

Any buried archaeological remains, should they be present and survive *in situ*, are vulnerable to damage or destruction during any earth-moving works associated with the development scheme.

Diversity

The heritage assets within the Site are likely associated with development of Manchester during the 18th and 19th centuries and therefore may not be considered significant due to diversity.

Potential

There are no prehistoric, Roman, or medieval sites within the sites or its environs, and the potential for remains from these periods is considered to be low. The Site likely remained undeveloped land within the Garratt estate during the post-medieval period. Remains from the post-medieval period are considered to be low given the later development of the Site.

The Site has some potential for remains associated with the 18th-century Garratt Mill (GS01-2). The survival of remains associated with the mill has the potential to address the research agendas outlined in the current *Archaeological Research Framework for North West England (*https://researchframeworks.org/nwrf/industrial; Table 2):

Industrial period	
Agenda No	**Agenda Description**
Ind55	What is the evidence for the development of power production?

Table 2 Industrial research agendas

The power systems associated with the mill lay beyond the Site boundary. The buildings within the Site were likely damaged or destroyed during the construction of the multi-storey car park. The Site therefore has limited potential to address the research agendas listed above (Table 2).

The Site has some potential for remains associated with 19th-century houses (GS03). The survival of remains associated with the houses has the potential to address the research agendas outlined in the current *Archaeological Research Framework for North West England (*https://researchframeworks.org/nwrf/industrial; Table 3):

Industrial period	
Agenda No	**Agenda Description**
Ind22	How can we take forward our understanding of the impact of industrialisation on the working class and their living conditions?

Table 3 Industrial research agendas

The former houses did not contain cellars and were likely impacted by the construction of the multi-storey car park. The Site therefore has limited potential to address the research agendas listed above (Table 3).

The Site has some potential to contain remains of a former 19th-century engineering works, metal refinery,

rope works and saw mills (GS05-8). The survival of remains associated with the various works buildings has the potential to address the research agendas outlined in the current *Archaeological Research Framework for North West England (*https://researchframeworks.org/nwrf/industrial; Table 4):

Industrial period	
Agenda No	**Agenda Description**
Ind52	What Industrial and Modern period type sites need further study?
Ind55	What is the evidence for the development of power production?

Table 4 Industrial research agendas

The engineering works had a steam boiler and engine, whilst the metal refinery had a furnace, steam boiler and chimney. These remains have some potential to survive within the north of the Site beneath a narrow road that borders the MSJ&AR viaduct (Table 4). Therefore, there is limited potential for the Site to address the research aims listed above (Table 4).

The former commercial buildings have no potential to address the research aims listed in the NWRRF.

7.4. Summary of significance

A summary of the potential and significance of the archaeological remains within the site is outlined in the table below (Table 5). These conclusions have been informed by the above criteria, professional judgment, the ICOMOS guide to assessing the value of heritage assets, as well as contributions that could be made towards local and regional research agendas.

Identified Asset	Period	Potential	Significance
Old Garratt Mill (GS01)	Late 18th century	Limited	Negligible
Old Garratt Mill (GS02)	Late 18th century	Limited	Negligible
Back-to-backs (GS03)	Mid-19th century	Limited	Negligible
Commercial properties (GS04)	Mid-19th century	Limited	Negligible
Engineering works (GS05)	Late 19th century	Low	Low
Metal Refiners (GS06)	Late 19th century	Low	Low
Rope works (GS07)	Late 19th century	Limited	Negligible
Saw mill and timber yard (GS08)	Late 19th century	Limited	Negligible

Table 5 Summary of potential archaeological sites and their significance

Archaeological remains of Old Garratt Mill would be of high to medium significance, however, buried remains are likely to have been damaged or destroyed by the construction of the multi-storey car park. Archaeological heritage assets therefore have little or no surviving archaeological interest, therefore this assessment concludes that the Site is of negligible signficance.

8. Impact Assessment

8.1. Site conditions

The Site currently comprises a multi-storey car park with semi basement level, three retail units and a grass verge. The construction of the multi-storey car park has likely damaged or destroyed archaeological remains within this part of the Site.

8.2. Proposed development

The proposed development comprises the following:

'*Full Planning Permission for a Purpose Built Student Accommodation (PBSA) with ground floor flexible commercial floorspace across three buildings of 8, 11 and 38 storeys, connected by a five-storey podium*'.

The scheme includes the demolition of existing structures on site (multi-storey car park and retail units), which form a separate planning application (Planning Reference: 143741/FO/2025).

8.3. Review of impact on the archaeological resource

The construction of the multi-storey car park has likely damaged or destroyed archaeological remains within the Site, as such any remains would be of negligible significance. There is some potential for later power production sites at engineering works and metal finishers to survive beneath Altrincham Street to the north of the Site, however these are likely to be of limited archaeological interest. Therefore, the development proposals will have a limited impact on buried remains.

9. Conclusions

9.1. Planning policy

The NPPF makes clear that where the loss of the whole or a material part of a non-designated heritage asset's significance is justified by a development, the developer should be required to record that asset and advance understanding of its significance, and to make this evidence publicly accessible.

9.2. Recommendation for further work

Following consultation with GMAAS, it is anticipated that no further archaeological work will be required.

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https://images.manchester.gov.uk/
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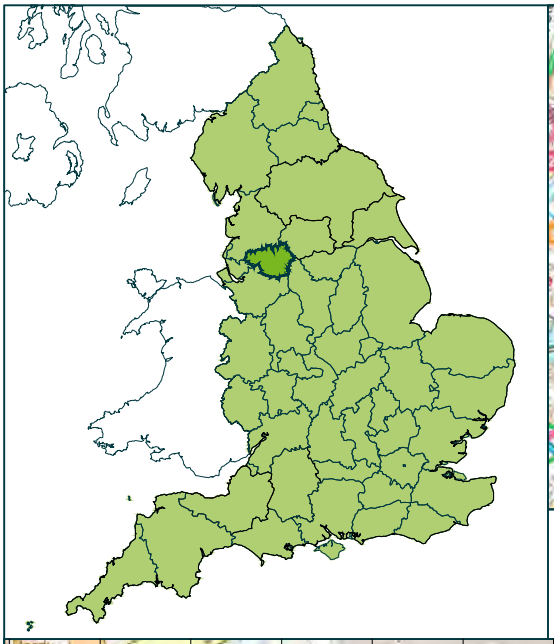
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Figure 1: Site location map
Figure 2: Site boundary superimposed on modern mapping
Figure 3: Site boundary superimposed on Green's map of 1793
Figure 4: Site boundary superimposed on Bancks & Co's map of 1831
Figure 5: Site boundary superimposed on the Ordnance Survey 60": 1 mile map of 1851
Figure 6: Site boundary superimposed on the Ordnance Survey 1: 500 Town Plan of 1891
Figure 8: Site boundary superimposed on the Ordnance Survey 25": 1 mile map of 1922
Figure 9: Site boundary superimposed on the Ordnance Survey 25": 1 mile map of 1933
Figure 10: Site boundary superimposed on the Ordnance Survey 25": 1 mile map of 1955
Figure 11: Site boundary superimposed on the Ordnance Survey 25": 1 mile map of 1970
Figure 12: Gazetteer sites superimposed onto Open Street mapping

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Charles Street, Manchester

Project Code: 61198

Figure 1: site location

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Carver's Warehouse
77 Dale Street, Manchester, M1 2HG



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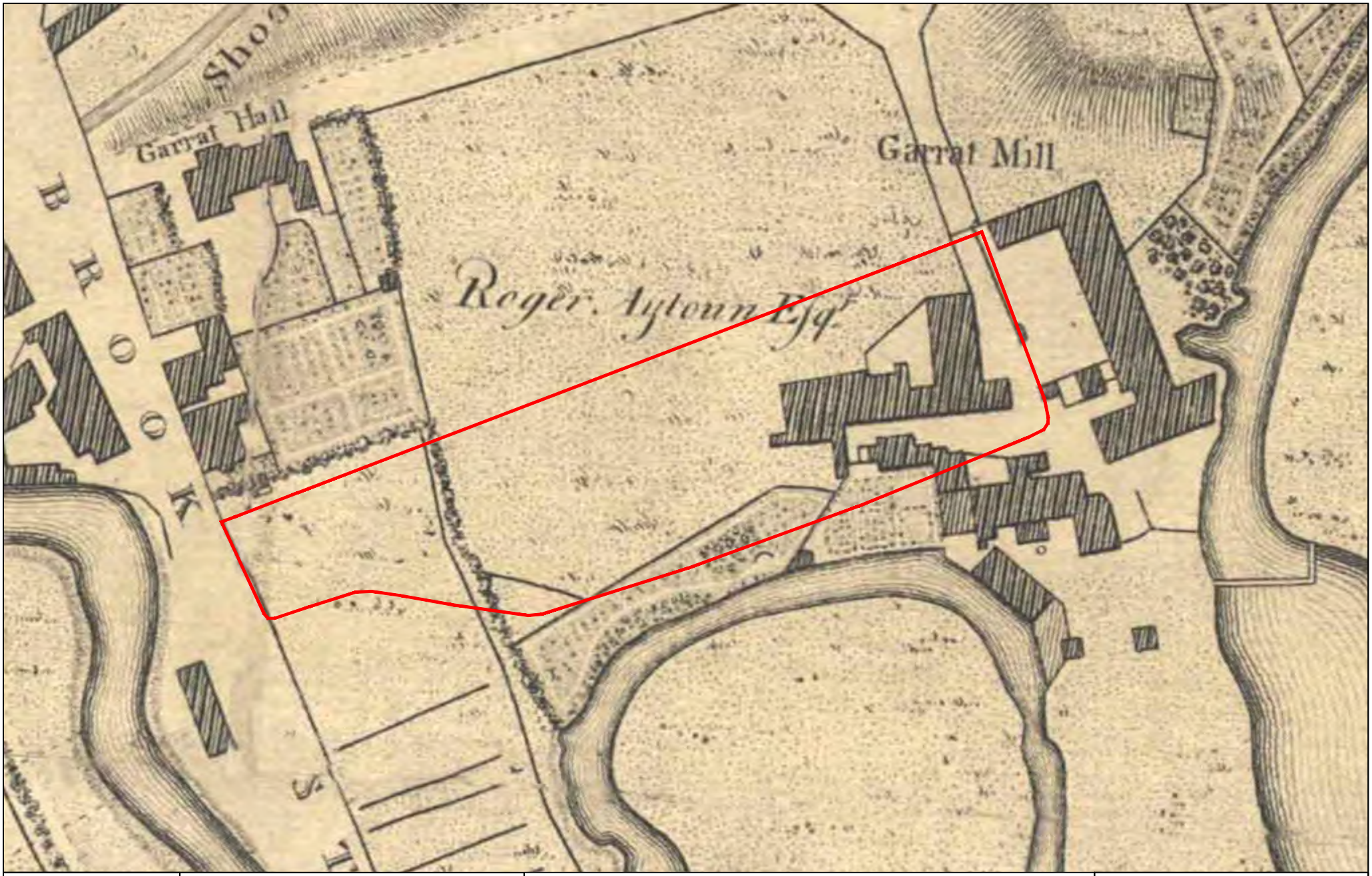
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77 Dale Street, Manchester, M1 2HG

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Charles Street, Manchester
Project Code: 61198
Figure 2: Site boundary superimposed on modern mapping

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Key: Site boundary



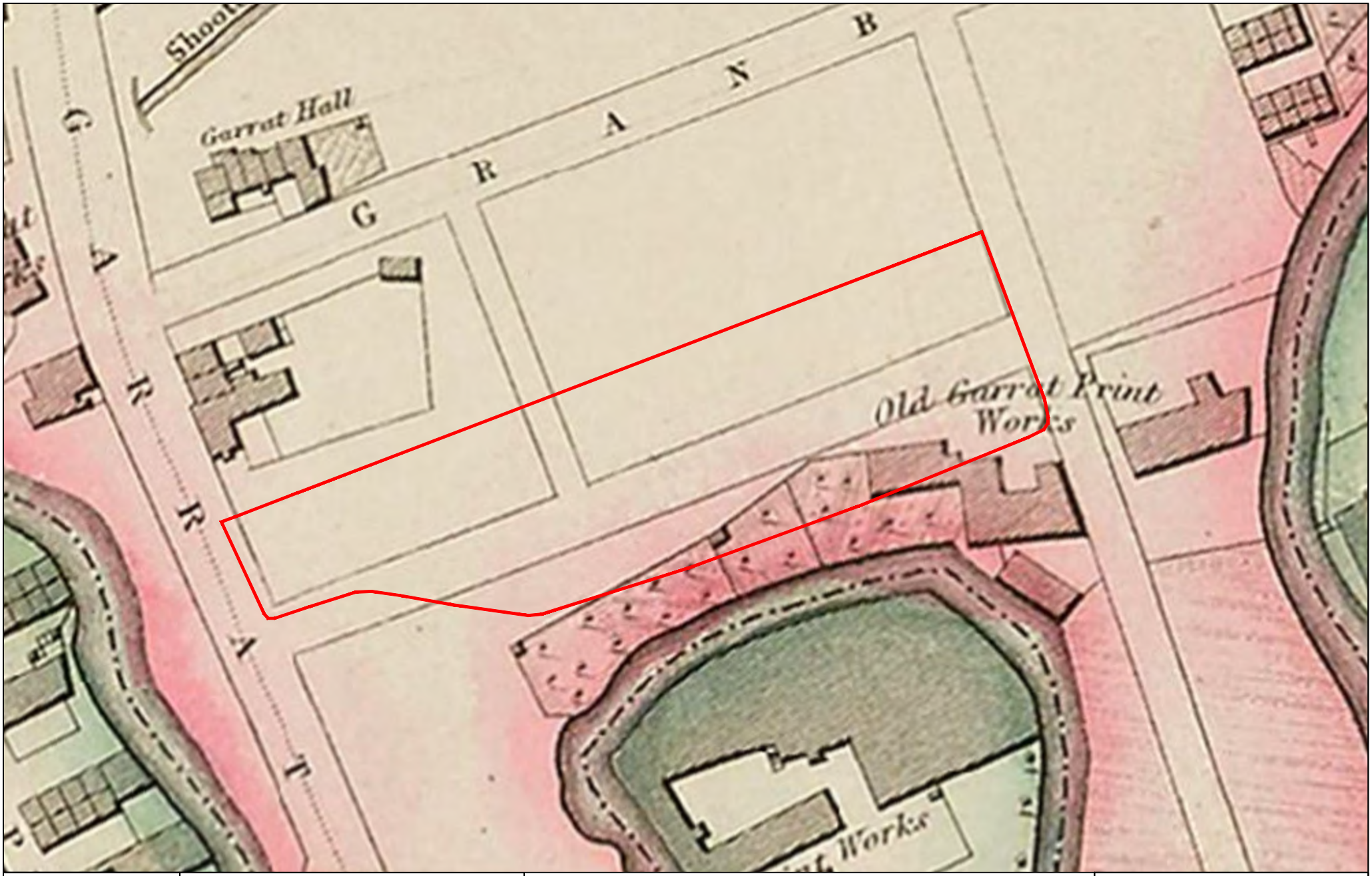
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Charles Street, Manchester
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Figure 3: Site boundary superimposed on Green's 1794 plan of Manchester and Salford

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Key: Site boundary



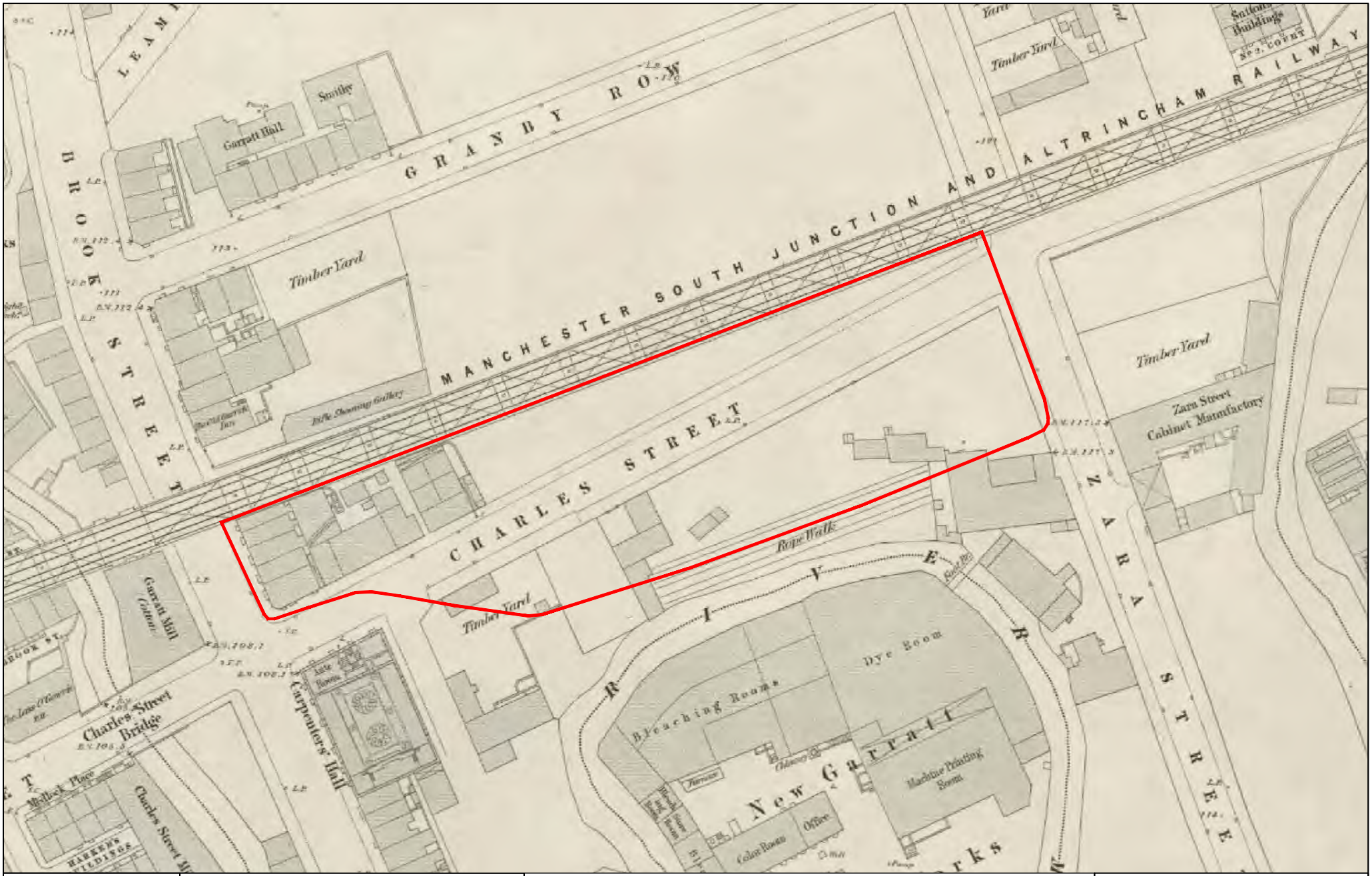
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Charles Street, Manchester
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Figure 4: Site boundary superimposed on Banck's &Cos 1831 plan of Manchester and Salford

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Key: Site boundary



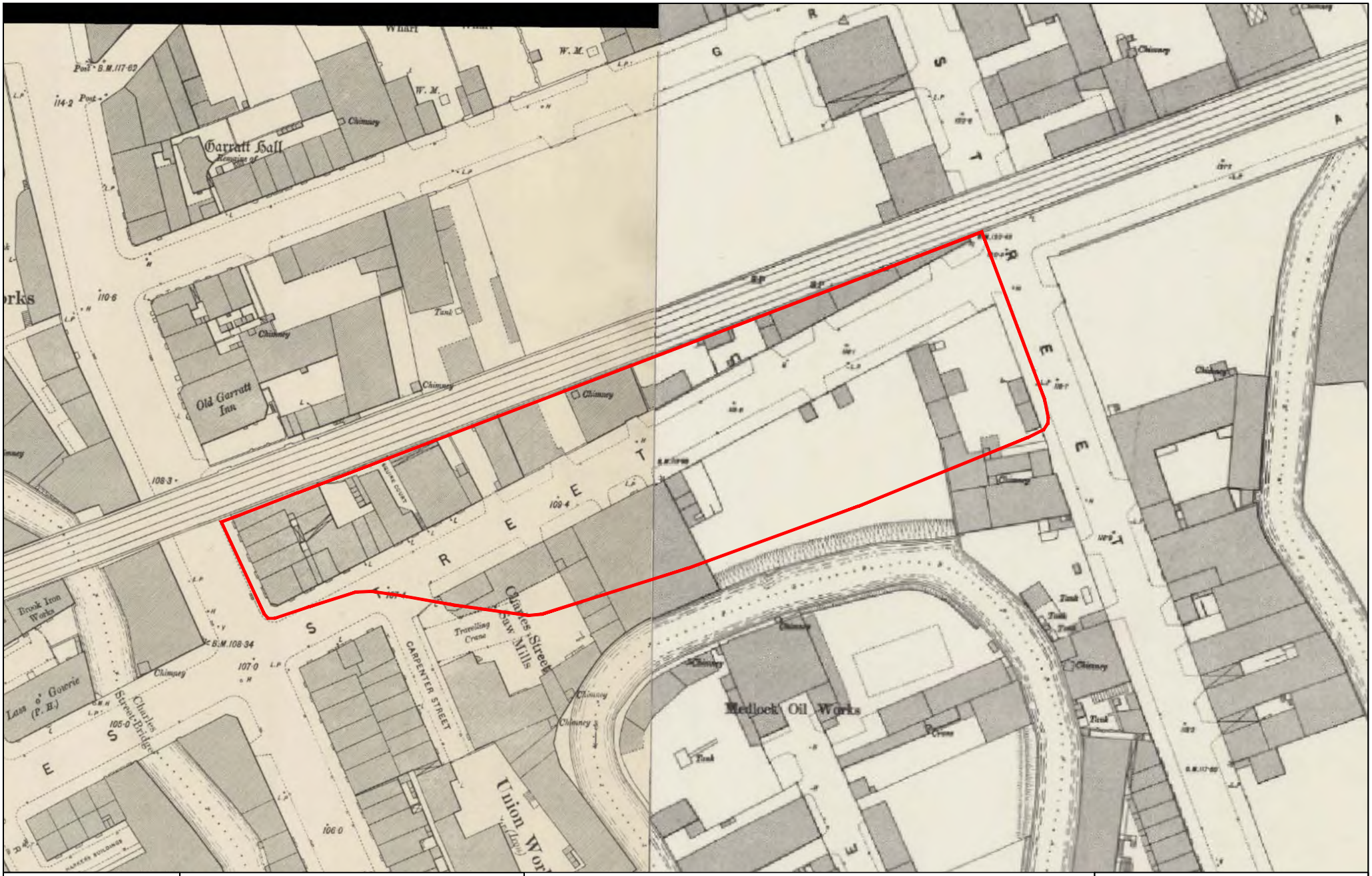
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Charles Street, Manchester
Project Code: 61198
Figure 5: Site boundary superimposed on the 1851 Ordnance Survey town plan

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Key: Site boundary



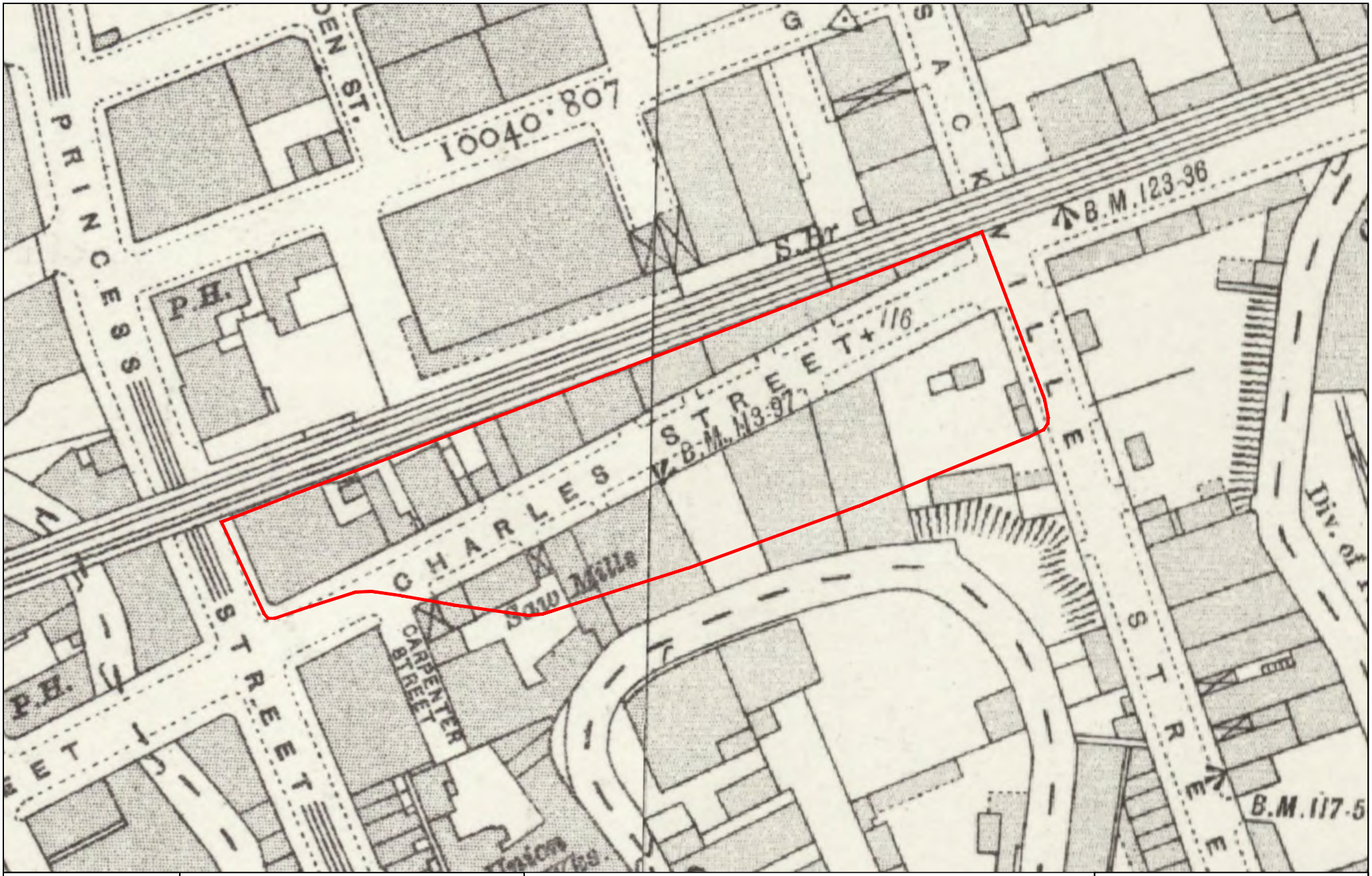
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77 Dale Street, Manchester, M1 2HG

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Charles Street, Manchester
Project Code: 61198
Figure 6: Site boundary superimposed on the 1891 Ordnance Survey town plan

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Key: Site boundary



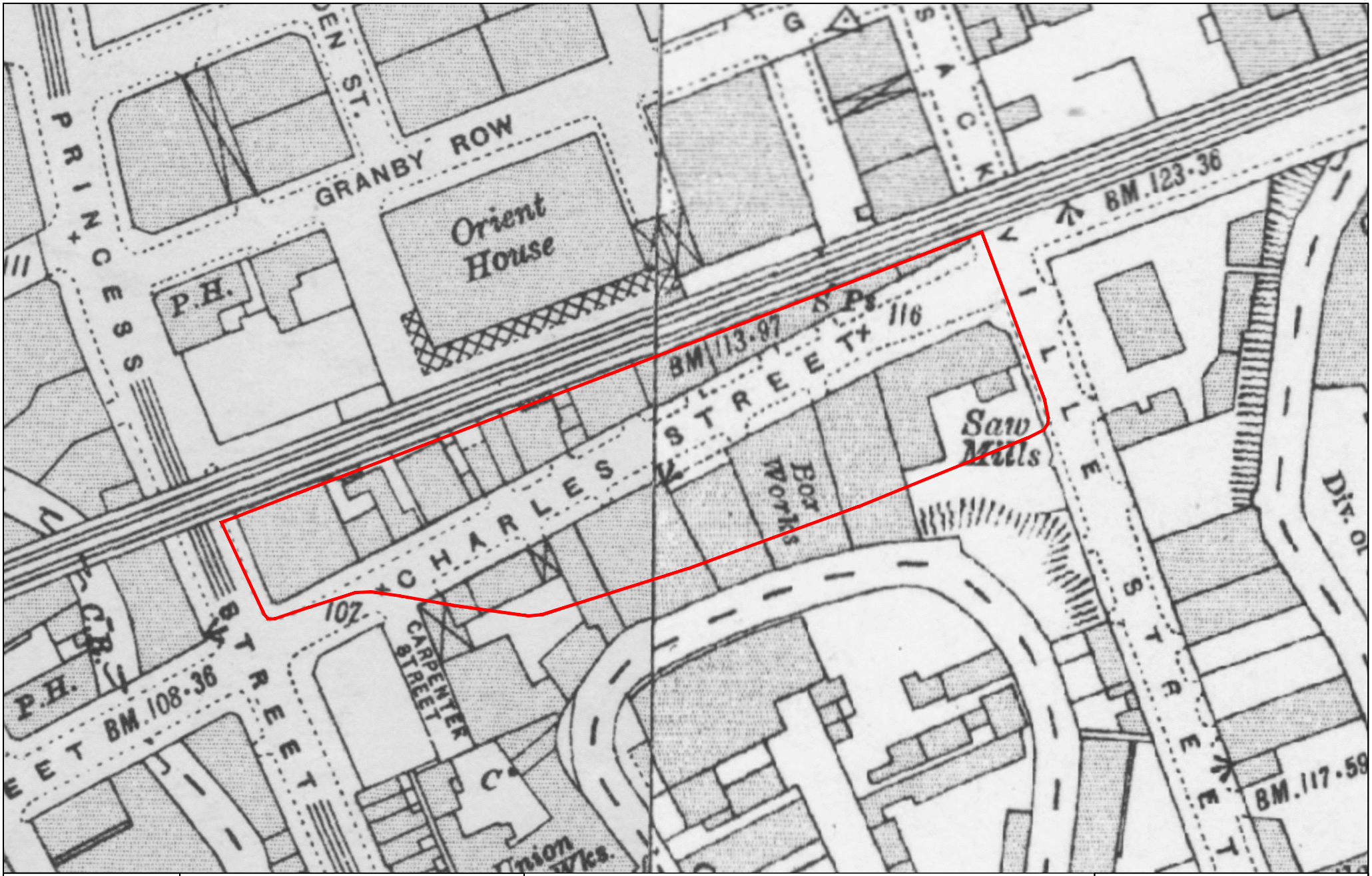
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77 Dale Street, Manchester, M1 2HG

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Charles Street, Manchester
Project Code: 61198
Figure 7: Site boundary superimposed on the 1922 Ordnance Survey 25-inch to 1-mile plan

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Key: Site boundary



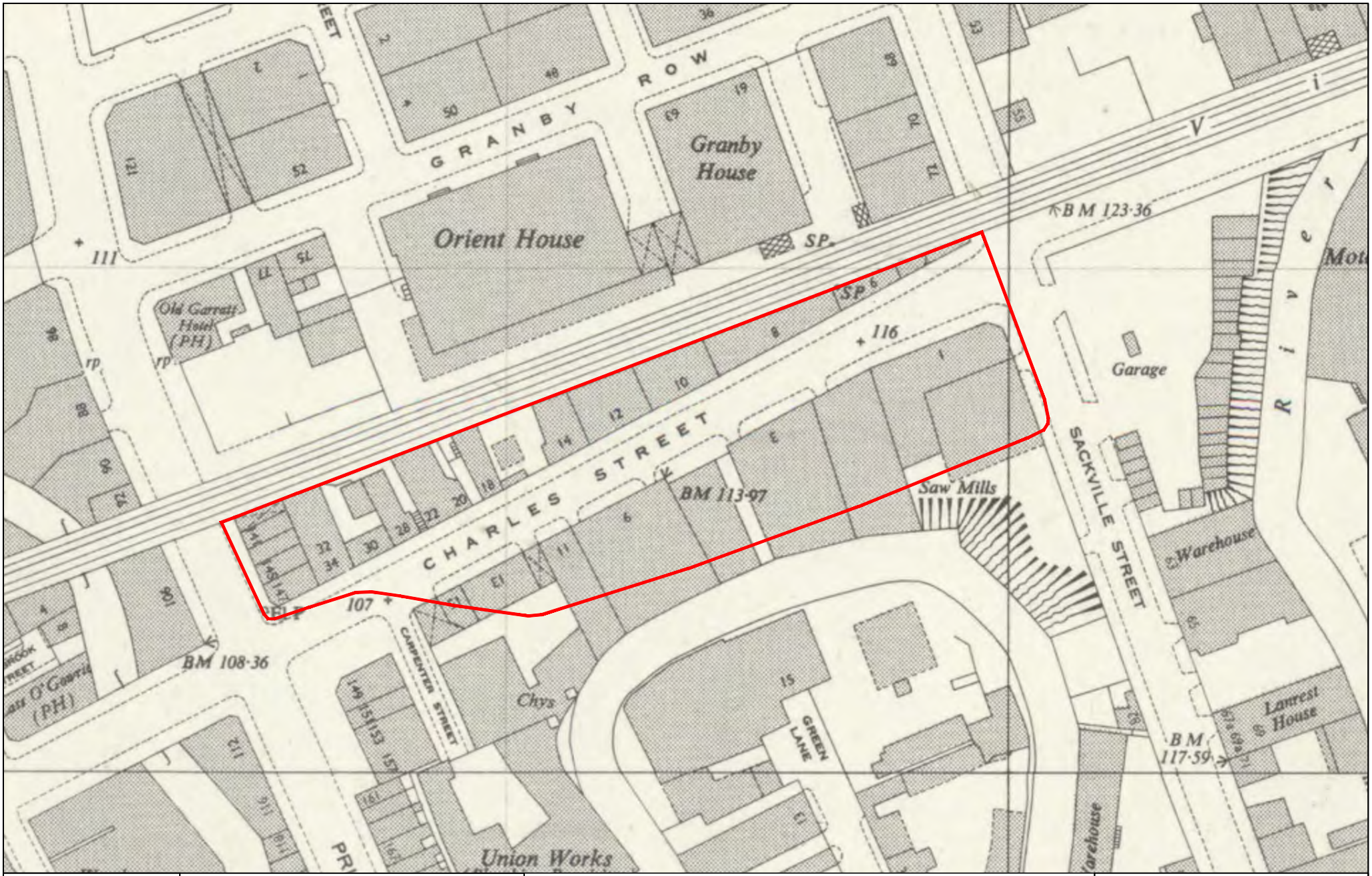
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Charles Street, Manchester
Project Code: 61198
Figure 8: Site boundary superimposed on the 1933 Ordnance Survey 25-inch to 1-mile plan

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Key: Site boundary



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Charles Street, Manchester
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Figure 9: Site boundary superimposed on the 1955 Ordnance Survey 1:2500 plan

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Key: Site boundary



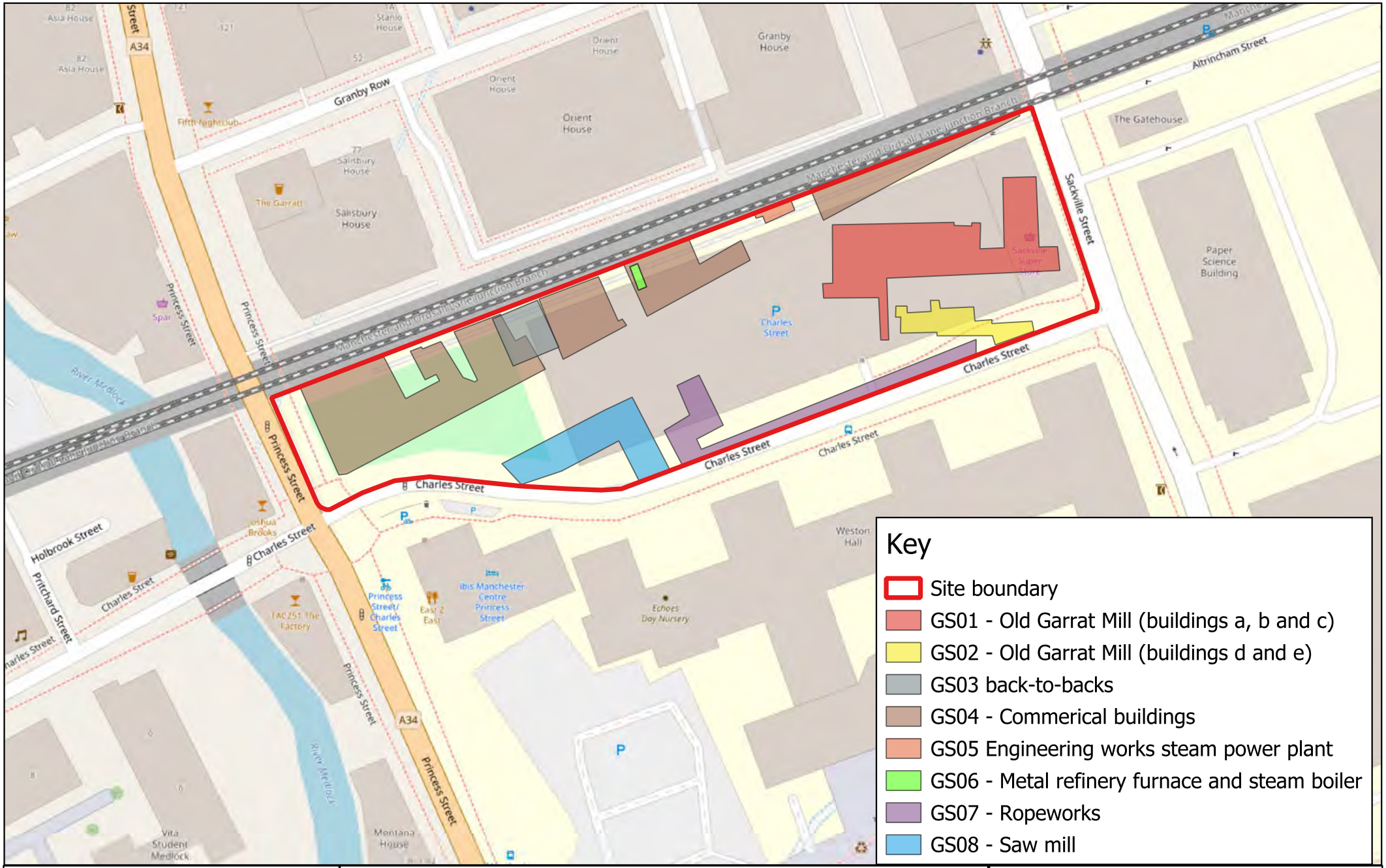
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Charles Street, Manchester
Project Code: 61198
Figure 10: Site boundary superimposed on the 1970 Ordnance Survey 1:2500 plan

N

Key: Site boundary



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Charles Street, Manchester

Project Code: 61198

Figure 11: Gazetteer Sites superimposed onto Open Street mapping

0 25 50 m

Appendix 7 – Preliminary Geoenvironmental Appraisal of land at Charles Street, Manchester

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Geotechnical Engineering | Geoenvironmental Consultants

PRELIMINARY GEOENVIRONMENTAL APPRAISAL

of land at

CHARLES STREET, MANCHESTER, M1 7AR

Prepared on behalf of ID Manchester Limited & University of Manchester

Report 7356/1

July 2025

FOREWORD (Preliminary Geoenvironmental Investigation Report)

This report has been prepared for the sole use and reliance of ID Manchester Limited & University of Manchester and cannot be relied upon by any other parties without the express written authorisation of Calabrian Limited (Calabrian). Any unauthorized third party relies on this report at their own risk and the authors owe them no duty of care.

The report presents observations and factual data obtained during our site investigation and provides an assessment of geoenvironmental issues with respect to information provided by the Client regarding the proposed development. Further advice should be sought from Calabrian prior to significant revision of the development proposals.

The report should be read in its entirety, including all associated drawings and appendices. Calabrian cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context

The findings and opinions conveyed in any Desk Study section of the report (including review of any third-party reports) are based on information obtained from the sources listed, which Calabrian understands are reliable. All reasonable skill, care and diligence has been applied in examining the information obtained. However, Calabrian accept no responsibility for inaccuracies in the data supplied or for opinions based on any such inaccurate data.

Where the report refers to the potential presence of invasive weeds such as Japanese Knotweed, or the presence of asbestos containing materials, it should be noted that the observations are for information only and should be verified by a suitably qualified expert.

Calabrian reserve the right to amend their conclusions and recommendations in the light of further information that may become available.

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7356/3	Existing Site Features
7356/4	Site History
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7356/6	Preliminary Conceptual Site Model

APPENDIX A	COMMISSION
APPENDIX B	HISTORICAL OS PLANS
APPENDIX C	SEARCHES
Landmark	Envirocheck Report
Coal Authority	Consultants Mining Report
ZeticaUXO	UXO Risk Map
BGS	Archive Borehole Records

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1 INTRODUCTION

1.1 The Commission and Scope

Calabrian Limited (Calabrian), were commissioned by ID Manchester Limited & University of Manchester (Client) to carry out a preliminary geoenvironmental appraisal of land at Charles Street, Manchester, M1 7AR.

The agreed scope for this report is summarised below with full details of Calabrian's appointment included in Appendix A:

- A site walkover and inspection;
- an assessment of the land use history;
- determination of the site's environmental setting;
- assessment of anticipated ground conditions, including potential contaminants;
- assessment of anticipated foundation and engineering issues associated with redevelopment; and,
- provision of recommendations for an appropriate ground investigation.

This preliminary appraisal comprised inspection of historical and geological maps and data provided by the British Geological Survey and Landmark along with additional information provided by the Coal Authority, and ZeticaUXO. In addition, a site walkover survey has been carried out by Calabrian.

1.2 Objectives

To identify salient geoenvironmental issues affecting the site to enable the Client to obtain budget costs for the necessary site preparatory and remediation works, and to support the initial submission of a planning application to the local authority.

1.3 Development Proposals

At this stage it is proposed to demolish the existing vacant multi-storey car park.

1.4 Limitations

General notes and limitations relevant to all Calabrian preliminary investigations are described in the Foreword and should be read in conjunction with this report. The text of the report draws specific attention to any modification to these procedures and to any other special techniques employed.

2 SITE DESCRIPTION

2.1 GENERAL

Details of the site are given below:

- Location: 400m south-west of Manchester Piccadilly Train Station
- National Grid Reference: 38444, 39757 (SJ 8444 9757)
- Nearest Postcode: M1 7AR
- Area: 0.53 hectares

2.2 SITE FEATURES

Calabrian completed a walkover survey of the site on 2nd July 2025.

The site is elongate in shape and is predominately occupied by a concrete framed vacant four-storey car park. The eastern end of the structure most recently housed a two-storey public house and coffee shop with offices above.

The wedge-shaped western end of the site is occupied by a number of mature trees with grass beneath.

A narrow strip of land runs between the car park and the railway viaduct to the north. The eastern section of this is secured by a palisade fence with the western end being open and providing a footpath beneath the viaduct running along the extreme west of the site.

The site has no external physical boundaries. The railway viaduct lies immediately north with commercial properties beyond. To the south runs Charles Street with multi-storey residential student accommodation beyond. To the east lies Sackville Street with university buildings further east. West is the junction of Charles Street and Princess Street with further commercial properties beyond.

Existing salient features, at the time of the walkover are presented on Drawing No. 7356/3. A selection of site photographs are included on Drawing 7356/4.

3 SITE HISTORY

In order to investigate the development history and previous land uses at the site and immediate surrounding land, site centred extracts from Ordnance Survey (OS) plans dating back to 1848 have been examined. These plans are presented in Appendix B.

Dates	On Site Features	Off Site Feature
1848	The site appears to be undeveloped.	
1851	**Charles Street** is shown running roughly centrally through the site. The site appears to be generally devoid of development with unknown buildings being located in the far west and sporadically in the south.	The railway viaduct marks the sites northern boundary. '**Timber Yard**'s are located immediately to the south-west, north-west and east with a 'Rope Walk' to the south. The River Medlock meanders towards the site from the south.

Dates	On Site Features	Off Site Feature
1908	Further un-named buildings have been constructed to the north of Charles Street with two '**Saw Mill**' and a 'Box Works' in the south	
1928/39 (could be 1960s)	A detailed survey shows the buildings north of Charles Street to comprise a number of small-scale enterprises including stores and a number of **garages** that extended under the viaduct arches. The central garage is noted to have a '**Petrol Tank'**. At this time land to the south of Charles Street hosted a car park and **saw mill**.	Surrounding land was mainly occupied with warehouses.
1948	The entire site is developed north and south of Charles Street.	
1970/72	The land south of Charles Street has been cleared. By 1972 land to the north has also been cleared.	The River Medlock has been culverted under land south of the site.
1985	The site has been cleared, and the current car park and open space is detailed on site.	Charles Street has been moved to its current location immediately south of the site.
1992		Land to the south has now been redeveloped with the existing Weston Buildings.

It is not the intention of this report to describe in detail all the changes that have occurred on or adjacent to the site. Significant former uses/operations are highlighted in bold text for ease of reference.

4 ENVIRONMENTAL SETTING

4.1 GENERAL

Information supplied by the Coal Authority, the BGS, ZeticaUXO and Landmark is summarised in the table below and presented in Appendix C.

Issue Data Reviewed	Remark
Geology 1:50,000 BGS map 1:10,000 BGS Map (SD89NW) Borehole Data	Superficial – Made Ground and Till (likely stiff gravelly clay) Solid - Chester Formation (sandstone), formerly Chester Pebble Beds. Shallowest coal seam – Bradford Four Foot Coal at ~200m beneath base of Chester Formation. Strata Dip – Not recorded. Faults – The north-west to south-east trending, north-east downthrowing East Manchester Fault runs immediately east of the site. Nearby BGS archive boreholes suggest that made ground, soft clay and possibly gravel extend to around 7m depth with sandstone below.
Mining Coal Authority BGS maps	The site is located within a Coal Mining Reporting Area (within the defined coalfield, but no known defined risks have been recorded by the Coal Authority; there may still be unrecorded issues). Past and present workings – None within 500m. Opencast – None within 500m. Mine entries – None within 100m.
Quarrying Landmark Report Historical OS Plans	None within 500m

Issue Data Reviewed	Remark
Radon UKHSA Map Landmark	No protective measures required. The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).
Hydrogeology Landmark Report Groundwater Vulnerability map	Source Protection Zone? No. Aquifers: Secondary (Superficial); Secondary (Bedrock). Groundwater abstractions? Nearest 162m north. Pollution incidents? None relating to the site.
Hydrology Landmark Report	Nearest watercourse(s) – Noted to be on site, likely a culverted former tributary of the River Medlock. Water quality – Not recorded. Pollution incidents? None relating to the site. Abstractions? None within 1.8km. Discharge consents? None relating to the site.
Landfill Sites Landmark Report	None within 250m. Four areas of potentially infilled land within 250m.
Flood Risk Landmark Report	The western section of the site lies in Flood Zone 2.

4.2 Preliminary Mining Risk Assessment

This Section provides the necessary preliminary mining risk assessment required by the proposed planning application.

The site is located within a Coal Mining Reporting Area (within the defined coalfield, but no known defined risks have been recorded by the Coal Authority).

Geological maps suggest that the shallowest coal seam beneath the site is the Bradford Four Foot Coal at 200m beneath base of Chester Formation.

A Coal Authority (CA) mining report states that:

- The property is not within the zone of likely physical influence on the surface from past or present underground workings. This means there are no known shallow mineworkings;
- there are no known mine entries within, or within 100 metres of, the boundary of the property;
- there are no plans to extract coal beneath the site:
- the Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining. This confirms the absence of any known significant geological faults below the site;
- the property is not within 500 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods; and,
- there is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

The mechanism of roof collapse involves progressive upward migration of a void until it is either choked by the spalled roof debris or reaches the surface as a crown hole. The progress of upward migration is influenced by the nature of the overlying strata and the presence of joints\faults.

The vertical distance through which a mining related void can migrate is difficult to assess. Superficial deposits are considered to have no inherent strength, and the assumption is generally made that if a void reaches the base of these formations, it will reach the surface. CIRIA C758D[1] suggests a thickness of solid rock through which a void can migrate as 7h to 10h above the roof of the workings, where h is the height of the workings (generally assumed to be similar to the seam thickness). The lower end of this range (7h), is generally only applicable where the overlying strata are predominantly thickly bedded sandstones.

Given the thickness of competent rock cover over the Bradford Four Foot Coal seam the risks posed by potential mineworkings beneath the site are negligible.

4.3 Unexploded Ordnance (UXO) Risk Assessment

Military activities including those conducted as part of both the First and Second World Wars have resulted in a legacy of unexploded ordnance (UXO) being present within the shallow soils of the UK.

UXO result from various sources including both allied (military training) and German (bombing raids) with a guide figure of approximately 10% of all munitions failing to function as designed.

The likelihood of UXO being encountered on a development site is influenced by several factors including: the proximity to strategic targets; the nature of the development works being undertaken; and evidence of local damage in the post-war periods amongst others. To determine the likelihood of UXO being present on a site, a stepwise risk assessment process is followed. This process is outlined within CIRIA C681[2].

An initial UXO threat assessment has been undertaken using the ZeticaUXO risk map. The site is located in a medium-risk area and a Detailed Unexploded Ordnance (UXO) Threat Assessment should be carried out prior to any intrusive works below ground level.

5 PREVIOUS INVESTIGATIONS

5.1 General

There are no publically available records (Manchester City Council planning portal, BGS archive, etc) of previous investigations on or close to the site.

[1] CIRIA C758D - *Abandoned mine workings manual, 2019*
[2] CIRIA C681 Unexploded Ordnance: A Guide for the Construction Industry.

6 LAND CONTAMINATION - PART IIA & PLANNING

Local Authorities have responsibilities with respect to land contamination in the context both of Part IIA of the Environmental Protection Act 1990, and Planning.

The contaminated land regime in Part IIA was introduced specifically to address the historical legacy of land contamination. It applies where there is unacceptable risk, assessed on the basis of the current use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission. This is primarily a task for the planning system, which aims to control development and land use in the future.

Planning

With respect to contamination and site investigation the Planning Policy Framework (NPPF) states that:

- 'Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Planning policies and decisions should ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses, and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- adequate site investigation information, prepared by a competent person, is presented'.

Annex 2 of the NPPF states that 'all investigations of land potentially affected by contamination should be carried out in accordance with established procedures (such as BS10175 - 2011, Code of Practice for the Investigation of Potentially Contaminated Sites)'.

This Site

Given the presence of secondary aquifers below the site and the culverted watercourse beneath it, the environmental setting of the site is considered to be of moderate sensitivity.

Former uses may have given rise to some ground and groundwater contamination.

7 GROUND INVESTIGATION DESIGN

7.1 ANTICIPATED GROUND CONDITIONS

Based on the Environmental Setting and previous land use data reviewed anticipated ground conditions are expected to comprise:

- **Made Ground** - possibly up to 6m in thickness comprising a mixture of natural soils with anthropogenic clasts.
- **Natural Soils** - possible stiff gravelly clay or gravel.
- **Bedrock –** sandstone likely at around 7m depth.
- **Mineworkings –** no shallow workings anticipated.
- **Groundwater –** possible within made ground and deeper in the sandstone.

7.2 POTENTIAL ISSUES

Based on the data above and that in Sections 2 (Site Description) and 3 (History), potential ground-related issues associated with this site are likely to include:

Potential on-site contamination sources:

1. Made ground associated with previous phases of development.
2. Possible small-scale petrol and oil storage associated with garages.

Potential off-site contamination sources:

1. Made ground (hazardous gas only).

Potential geotechnical hazards:

1. Deep made ground.

Other potential constraints:

1. Railway viaduct including its foundations.
2. Culverted watercourse beneath the site.

7.3 PRELIMINARY CONCEPTUAL SITE MODEL

The historical plans show that the site has been occupied by small-scale industries and commercial properties including garages all of which are considered to have the potential to have caused ground contamination.

An assessment of potential contaminants associated with the former uses has been undertaken including reference to the following DETR Industry Profiles:

- Road vehicle fuelling, service and repair - garages and filling stations;
- Road vehicle fuelling, service and repair - transport and haulage centres;
- Timber products manufacturing works;
- Timber treatment works.

Because of this assessment, anticipated potential contaminants, within soil and/or groundwater include:

- pH, and total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc);
- asbestos;
- calorific Value (CV) within any ashy material;
- Poly Aromatic Hydrocarbons (PAH); and,
- Total Petroleum Hydrocarbons (TPH) includes BTEX.

Potential pollutant linkages are shown on a preliminary conceptual site model, presented as Drawing No 7356/6 with a summary of the possible source-pathway-receptor linkages and risk definitions provided in the table on page 9 below. Clearly the conceptual model will be subject to modification in light of data arising from the proposed intrusive ground investigation.

7.4 Investigation Strategy

The preliminary conceptual site model has used as a basis for design of an appropriate ground investigation, the scope of which is summarised below:

Exploratory Hole Type	Purpose
Trail Pits (Machine Excavated)	To determine the general nature of soils underlying the site, including the: • Nature, distribution, and thickness of made ground; • nature, degree, and extent of contamination; • proportion of undesirable elements eg biodegradable matter, foundations etc; and, • suitability of the ground for founding structures and pavements.
Cable Percussion with Rotary Core Boreholes	To retrieve geotechnical data from depth and install monitoring wells across the site in order to: • Monitor for hazardous gas; • determine groundwater levels and assess flow direction; and, • retrieve representative groundwater samples, to determine water quality.

Proposed exploratory hole locations should be selected to provide a representative view of the strata beneath the site and to target potential areas of interest. A nominal 30m grid spacing should be appropriate, with additional exploratory locations scheduled as necessary in light of the ground conditions actually encountered.

The number of soil samples taken should be reflective of the geological complexity actually encountered, but in general about three samples should be taken from most exploratory holes.

The generation potential of this gas source is considered likely to be Low. Therefore, in general accordance with CIRIA Report C665, we have initially allowed for six visits over a three-month period. A hazardous gas risk assessment will be prepared on completion of monitoring.

Preliminary Conceptual Site Model – the table below summarises the possible source-pathway-receptor linkages with risk definitions in accordance with CIRIA C552[3].

Source	Exposure Pathway	Potential Receptor	Probability of Exposure	Consequence of Exposure	Discussion of Pollutant Linkage	Risk
Made Ground associated with previous development, And small-scale industries including garages (heavy metals, PAHs, asbestos, and fuel / oil hydrocarbons).	Inhalation, Ingestion and Dermal Contact	Humans – future users of site infrastructure	Likely	Medium (dependent on contaminants someone is exposed to).	Site users could come into contact with made ground if near surface in garden or landscaped areas.	Moderate Risk
		Humans - construction & maintenance workers	Low (with appropriate use of PPE / RPE)	Medium (dependent on the types of contaminants someone is exposed to).	Potential for construction and maintenance workers to encounter contaminated soil / asbestos fibres. Exposure times likely to be limited and risks should be reduced by wearing appropriate personnel protective equipment (PPE/RPE).	Low to Moderate Risk
	Leaching and migration	Groundwater – underlying Secondary Aquifer (superficial).	Low Likelihood	Medium	Potential for mobile contaminants on site.	Low to Moderate Risk
		underlying secondary Aquifer (bedrock).				
		Surface water – Culverted watercourse	Low Likelihood	Medium	Potential for mobile contaminants on site that could migrate.	Low to Moderate Risk
	Direct contact	Foundation	Likely	Mild	Potential for contaminants posing risk to new foundations and underground structures.	Moderate Risk
Hazardous ground gases from made ground.	Migration towards surface.	Humans – site users, construction & maintenance workers	Unlikely	Severe	Potential for hazardous gas migration into new structures.	Low to Moderate Risk
		Risk of explosion with future buildings and infrastructure				

[3] *Contaminated land risk assessment. A guide to good practice (C552), 2001.*

8 CONCLUSIONS & RECOMMENDATIONS

8.1 General

At this stage it is proposed to demolish the existing vacant multi-storey car park.

8.2 Mining and Quarrying

This site is located within a Coal Mining Reporting Area (within the defined coalfield, but no known defined risks have been recorded by the Coal Authority; there may still be unrecorded issues).

Geological maps suggest that the shallowest coal seam beneath the site is the Bradford Four Foot Coal at 200m beneath base of Chester Formation. Therefore, the risks posed by mineworkings beneath the site are negligible.

There are no quarries within 500m of the site.

8.3 Hazardous Gas

Information from historical OS plans, Landmark indicates that there are no known former landfill sites at or within 250m of the site. As such it is unlikely that the site will be affected by landfill gas. The site is not underlain by shallow mineworkings nor located in an area considered susceptible to mines gas emissions.

The site and surrounding land may be underlain by a moderate thickness of made ground that presents a potential source of hazardous gas generation. An appropriate period of gas monitoring and risk assessment may be required dependent upon ground conditions encountered.

BRE Report BR211 (2015 Edition) indicates that radon protection measures are not required for new dwellings at the site. Information from Landmark confirms that the site is in an area where less than 1% of homes are estimated to be above the action level, and that radon protection measures are therefore not required.

8.4 Foundations

At present, no geotechnical ground investigation data is available and consequently it is only possible to estimate the ground conditions. Before firm foundation recommendations can be given, it will be necessary to undertake an appropriate ground investigation. However, tentative recommendations are provided below.

The published geological data and information from the adjacent boreholes suggests that made ground likely extends to around 6m with possible clay and granular soils to 7m where sandstone is anticipated.

Made ground is not generally considered suitable founding materials and foundations should be taken through these into underlying natural in-situ strata of adequate bearing capacity. Consequently, it is likely that end-bearing piles of around 12m length will be required for any future redevelopment.

All concrete slabs and service ducts will require breaking out during the demolition of existing buildings. Foundations of plots that conflict with relict foundations should be taken to greater depth than the relict foundations and into natural ground of adequate bearing capacity.

8.5 Flooding

The western section of the site lies in Flood Zone 2.

8.6 Contamination & Remediation

The current use of the site as a car park is unlikely to have caused any significant ground or groundwater contamination. Former small-scale industrial and commercial uses of the land may have given rise to some ground and groundwater contamination.

At this stage the only potential requirement for remediation might be 'clean' soil cover within landscaped areas and potentially remediation (removal or suitable vapour barrier) of volatile compounds from beneath the building.

8.7 Potential Development Constraints

The adjacent railway viaduct including its foundations may constrain any further development.

The culverted water course beneath the site will require consideration within any future redevelopment of the site.

8.8 Further Investigation

Any proposed change in use will require intrusive investigation. This would include:

- machine-excavated trial pits to determine near surface ground conditions, the presence of obstructions, groundwater and stability;
- geotechnical soils analysis to enable foundation recommendations;
- chemical testing on soil and if necessary, groundwater, samples to assess the significance of contamination, if any, as a result of former industrial land use.
- Cable percussion with rotary cored boreholes to gain geotechnical data from depth and enable installation of wells for gas monitoring and water sampling.

DRAWINGS	
7356/1	Site Location Plan
7356/3	Existing Site Features
7356/4	Site History
7356/5	Site Photographs
7356/6	Preliminary Conceptual Site Model

calabrian



client	ID MANCHESTER LIMITED & UNIVERSITY OF MANCHESTER
project	CHARLES STREET, MANCHESTER, M1 7AR
drawing title	SITE LOCATION
drawing number	7456/1
revision	-
drawing status	Final
scale	1:25,000 @ A4
date	03/07/2025
drawn by	RJH
checked by	

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info@calabrian.co.uk

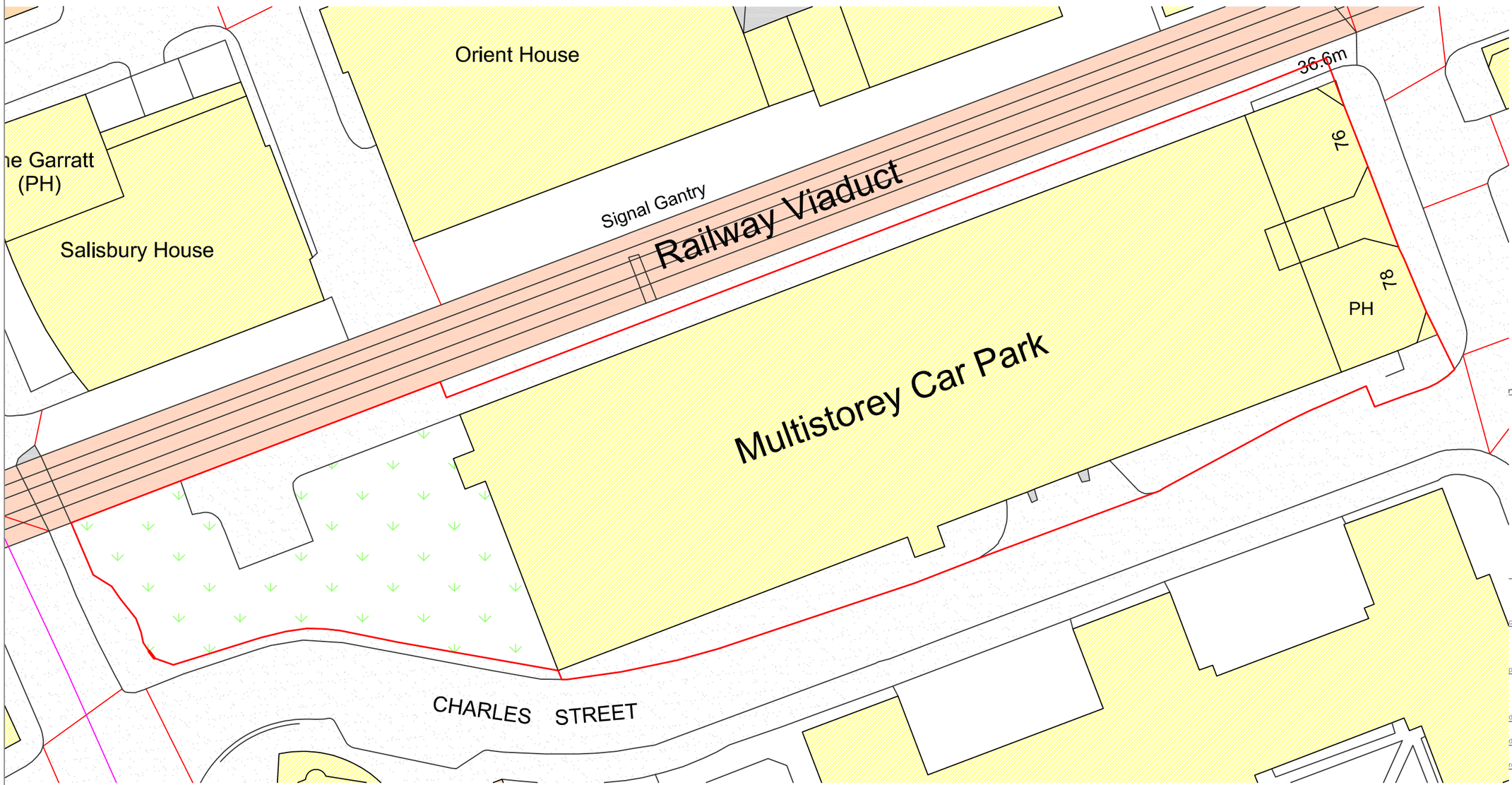
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GRASS & MATURE TREES
BUILDING
GRAVEL OR HARDCORE SURFACING
TARMAC HARDSTAND

APPROXIMATE SITE BOUNDARY



rev. description

client: ID MANCHESTER LIMITED & UNIVERSITY OF MANCHESTER

project: CHARLES STREET, MANCHESTER, M1 7AR

drawing title: SITE FEATURES

drawing number: 7356/3

revision: –

drawing status: Final

scale: 1:500@A3

date: 03/07/2025

drawn by: RJH

checked by: –

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notes

APPROXIMATE SITE BOUNDARY

EXISTING BUILDING FOOTPRINT

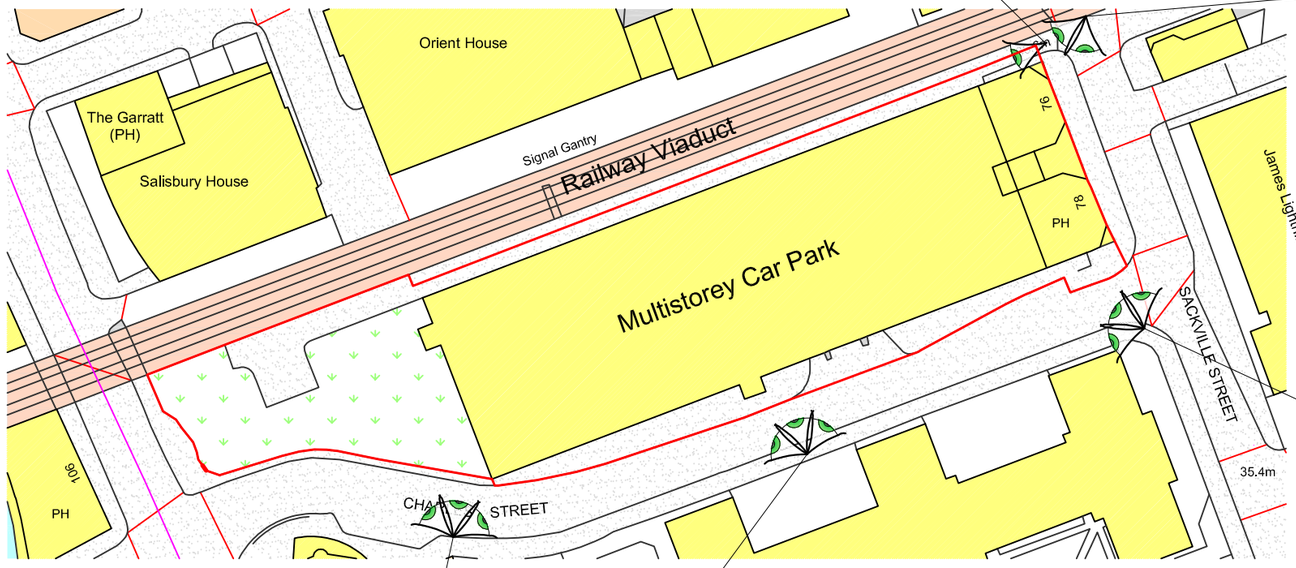
rev. description

client	ID MANCHESTER LIMITED & UNIVERSITY OF MANCHESTER
project	CHARLES STREET, MANCHESTER, M1 7AR
drawing title	HISTORICAL FEATURES *Reproduced from OS 1891 Map*
drawing number	7356/4
revision	–
drawing status	Final
scale	1:500@A3
date	03/07/2025
drawn by	RJH
checked by	–

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notes

APPROXIMATE SITE BOUNDARY

LOCATION & ORIENTATION OF PHOTOGRAPH

rev. description

client: ID MANCHESTER LIMITED & UNIVERSITY OF MANCHESTER

project: CHARLES STREET, MANCHESTER, M1 7AR

drawing title: PHOTOGRAPHS

drawing number: 7356/5

revision: –

drawing status: Final

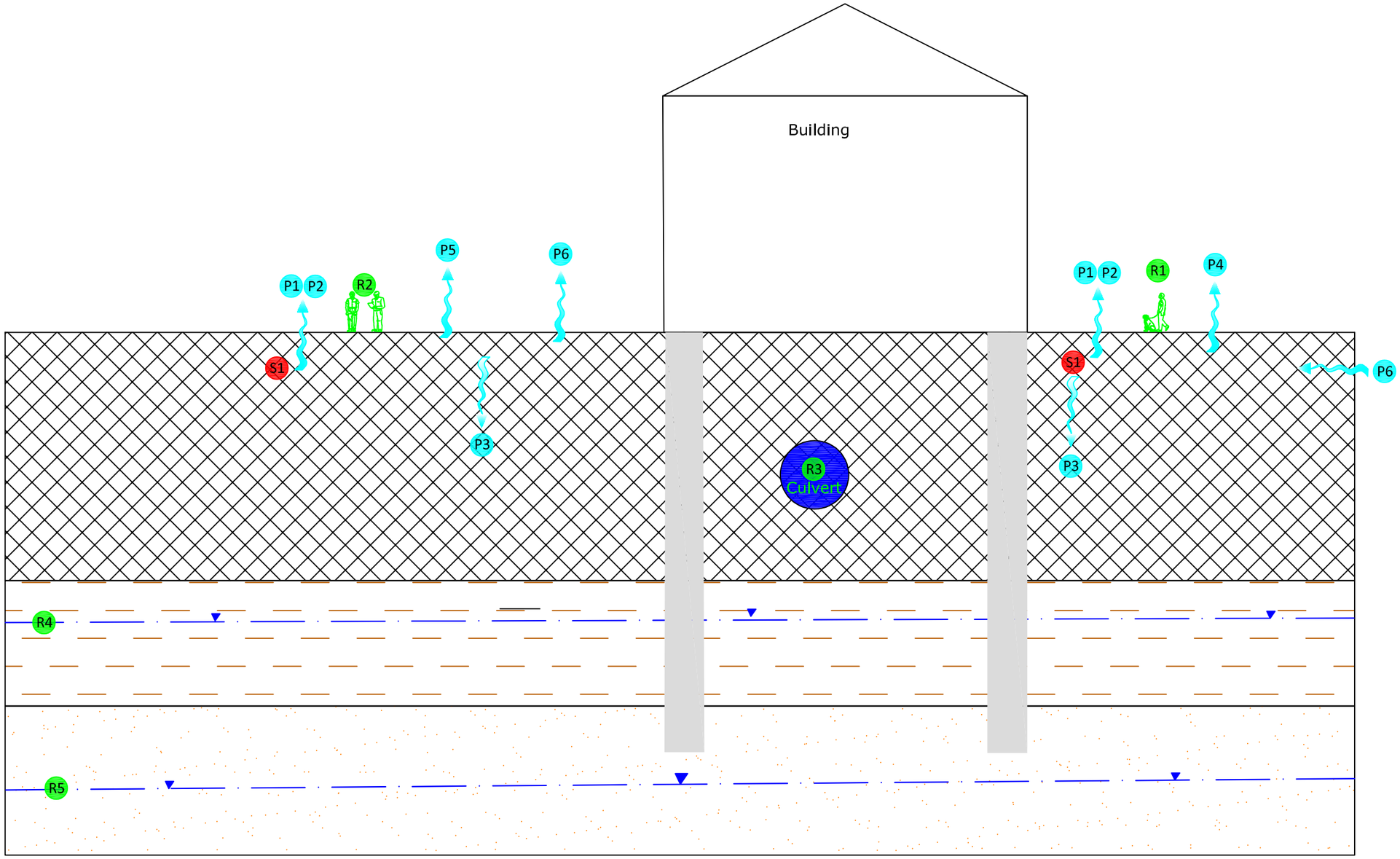
scale: 1:1000@A3

date: 03/07/2025

drawn by: RJH

checked by: –

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GEOLOGY

- MADE GROUND
- TILL (CLAY, possible GRAVEL)
- CHESTER FORMATION (SANDSTONE)

SOURCES

- S1 **MADE GROUND** (inorganics, organics & asbestos)

POTENTIAL PATHWAYS

- P1 **DERMAL CONTACT**
- P2 **INGESTION\INHALATION**
- P3 **LEACHING OF CONTAMINANTS**
- P4 **UPTAKE BY PLANTS**
- P5 **VOLATILISATION**
- P6 **MIGRATION OF GAS**

SIGNIFICANT RECEPTORS

- R1 **END USERS**
- R2 **SITE WORKERS**
- R3 **SURFACE WATERS** (Culvert)
- R4 **SECONDARY AQUIFER** (Superficial)
- R5 **PRINCIPAL AQUIFER** (Bedrock)

notes

rev. description

client: ID MANCHESTER LIMITED & UNIVERSITY OF MANCHESTER

project: CHARLES STREET, MANCHESTER, M1 7AR

drawing title: PRELIMINARY CONCEPTUAL SITE MODEL

drawing number: 7356/6

revision: –

drawing status: Final

scale: Not to Scale

date: 03/07/2025

drawn by: RJH

checked by: –

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APPENDIX A COMMISSION



7356/002/RJH/rjh

2nd July 2025

Mr A Wall
Roscoe
38 Mosley Street
Manchester
M2 3AZ

Dear Aaron

Charles Street, Manchester, M1 7AR – Desk Study Fee Proposal

Further to your recent invitation, please find below our proposal for undertaking a geotechnical and environmental desk study appraisal of the above land. It is understood that the site consists of a single parcel of land of approximately 0.54 hectares and is currently a large multi-storey car park.

This site is located within a Coal Mining Development High Risk Area (an area with specific mining legacy risks to the surface, including mine entries; shallow coal workings etc), and therefore a mining report will be obtained. Our report will include a mining risk assessment (desk-based) that should satisfy the Mining Remediation Authority.

Environmental search data and historical maps (obtained from Landmark) will be reviewed in order to determine whether any past land uses have had any effect on the proposed development. In addition, we will visit site to review current operations and undertake a walkover survey.

Preliminary and detailed unexploded ordnance (UXO) risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'. An initial UXO threat assessment has been undertaken using the ZeticaUXO risk map. The site is located in a medium-risk area and a Detailed UXO Threat Assessment should be undertaken; however, at this stage no allowance has been made for provision of such an assessment.

The report will include preliminary recommendations with respect to mining, foundations, contamination and hazardous gas. It is anticipated, allowing for receipt of statutory search information that a final bound report will be available within around one week of receiving your written instruction to proceed. Our lump sum fee for provision of this report is £*** plus VAT.

Terms & Conditions

This work will be undertaken in accordance with our Standard Terms and Conditions, a copy of which are enclosed.

Should you require any further information, please contact the undersigned.

Yours sincerely

Richard Hey - Managing Director
for and on behalf of
CALABRIAN LIMITED
enc

Terms and Conditions for the Appointment of Calabrian Limited

1 DEFINITIONS AND INTERPRETATION

1.1 In this Agreement, unless the context otherwise requires, the following words and expressions have the following meanings:

"Agreement" shall mean these Terms (entitled "Terms and Conditions for the Appointment of Calabrian Limited"), the Proposal, any document recording the Client's unequivocal acceptance of the Proposal and any other documents or parts of other documents expressly referred to in any of the foregoing:

"Client" shall mean the party for whom the Services are being provided by Calabrian;

"Documents" shall mean all documents of any kind and includes plans, drawings, reports, programmes, specifications, Bills of Quantities, calculations, letters, e-mails, faxes, memoranda, films and photographs (including negatives), or any other form of record prepared or provided or received by, or on behalf of Calabrian, and whether in paper form or stored electronically or on disk, or otherwise;

"Calabrian" shall mean Calabrian Limited whose registered office is at Holly Rise, 17 The Maltings, Liphook, GU30 7DG.

"Intellectual Property" includes all rights to, and any interests in, any patents, designs, trade marks, copyright, know-how, trade secrets and any other proprietary rights or forms of intellectual property (protectable by registration or not) in respect of any technology, concept, idea, data, programme or other software (including source and object codes), specification, plan, drawing, schedule, minutes, correspondence, scheme, programme, design, system, process logo, mark, style, or other matter or thing, existing or conceived, used, developed or produced by any person;

"Parties" shall mean the Client and Calabrian

"Project" shall mean the project described in the Proposal and any enquiry from the Client on which Calabrian has based its Proposal;

"Proposal" means the offer document prepared by Calabrian in response to an enquiry or otherwise, in connection with the proposed provision of the Services;

"Services" means the work and services relating to the Project to be provided by Calabrian pursuant to the Agreement and as set out in the Proposal and shall include any additions or amendments thereto made in accordance with these Terms;

"Terms" means these terms entitled "Calabrian Terms of Appointment";

1.2 Words importing the singular only shall also include the plural and vice versa, where the context requires.

1.3 Words importing persons or parties shall include firms, corporations and any organisation having legal capacity and vice versa, where the context requires; and words importing a particular gender include all genders.

1.4 The sub-headings to the clauses of these Terms are for convenience only and shall not affect the construction of the Agreement.

1.5 A reference to legislation includes that legislation as from time to time amended, re-enacted or substituted and any Orders in Council, orders, rules, regulations, schemes, warrants, by-laws, directives or codes of practice issued under any such legislation.

1.6 In the event of conflict between the documents forming part of the Agreement, the Proposal shall prevail, followed by the Terms.

2 APPOINTMENT

2.1 The Client agrees to engage Calabrian and Calabrian agrees to provide the Services in accordance with the provisions of the Agreement.

3 OBLIGATIONS OF CALABRIAN

3.1 Calabrian shall perform the Services using the reasonable standard of skill and care normally exercised by similar professional Environmental firms in performing similar services under similar conditions.

3.2 Calabrian shall use all reasonable endeavours to perform the Services in accordance with all relevant environmental and safety legislation.

4 OBLIGATIONS OF THE CLIENT

4.1 Throughout the period of this Agreement the Client shall afford to Calabrian or procure the affording to Calabrian of access to any site where access is required for the performance of the Services.

4.2 The Client accepts responsibility for ensuring that Calabrian is notified in writing of all special site and/or plant conditions, including without prejudice to the generality of the foregoing, the existence and precise location of all underground services, cables, pipes, drains or underground buildings, constructions or any hazards known or suspected by the Client, which the Client shall clearly mark on the ground or identify on accurate location plans supplied to Calabrian prior to the commencement of the Services. The Client shall also inform Calabrian in writing of any relevant operating procedures including any site safe operating procedures and any other regulations relevant to the carrying out of the Services. The Client shall indemnify Calabrian against all costs, claims, demands and expenses arising as a result of any non-disclosure in this respect, including but not limited to indemnification against any action brought by the owner of the land or otherwise.

4.3 If the Client discovers any conflict, defect or other fault in the information or designs provided by Calabrian pursuant to the Agreement, he will advise Calabrian in writing of such defect, conflict or other fault and Calabrian shall have the right to rectify the same or where necessary, to design the solution for rectification of any works carried out by others pursuant the conflicting, defective or in any other way faulty information or designs.

5 INTELLECTUAL PROPERTY

5.1 The copyright in all Intellectual Property prepared by or on behalf of Calabrian in connection with the Project for delivery to the Client shall remain vested in Calabrian.

5.2 The Client shall have a non-exclusive licence to copy and use such Intellectual Property for purposes directly related to the Project. Such licence shall enable the Client to copy and use the Intellectual Property but solely for its own purposes in connection with the Project and such use shall not include any licence to reproduce any conceptual designs or professional opinions contained therein nor shall it include any license to amend any drawing, design or other Intellectual Property produced by Calabrian.

5.3 Should the Client wish to use such Intellectual Property in connection with any other works or for any other purpose not directly related to the Project or wish to pass any Intellectual Property to any third party, it must obtain the prior written consent of Calabrian. The giving of such consent shall be at the discretion of Calabrian and shall be upon such terms as may be required by Calabrian. Calabrian shall not be liable for the use by any person of such Intellectual Property for any purpose other than that for which the same were prepared by or on behalf of Calabrian.

5.4 Ownership of any proposals submitted to the Client that are not subsequently confirmed as part of the Services to be provided for the Client remain with Calabrian and such proposals must not be used as the basis for any future work undertaken by the Client or a third party and no liability can be accepted howsoever arising from such proposals.

5.5 In the event of the Client being in default of payment of any fees or other amounts due, Calabrian may suspend further use of the licence on giving 2 days' notice of the intention to do so. Use of the licence may be resumed on receipt of the outstanding amounts

6 TITLE

6.1 Calabrian shall transfer only such title or rights in respect of the Documents as it has, and if any part is purchased from a third party Calabrian shall transfer only such title or rights as that party had and has transferred to Calabrian.

6.2 Title in the Documents shall remain with and shall not pass to the Client until the amount due under the invoice(s) (including interest and costs) has been paid in full.

6.3 Until title passes, the Client shall hold the Documents as bailee for Calabrian and shall store or mark them so that they can at all times be identified as the property of Calabrian.

6.4 At any time before title passes (save and except where payment is not due), but only after prior consultation with the Client, Calabrian may without any liability to the Client repossess and use or sell all or any of part of the Documents and by doing so terminate the right of the Client to use, sell or otherwise deal in the Documents.

6.5 Calabrian may maintain an action for the price of the Documents notwithstanding that title in them has not passed to the Client.

7 CONFIDENTIALITY

7.1 Calabrian undertakes not to divulge or disclose to any third party without the written consent of the Client information which is designated confidential by the Client or which can reasonably be considered to be confidential and arises during the performance of the Services unless required to do so by law or necessary in the proper performance of its duties in relation to the Project, or in order to make full frank and proper disclosure to its insurers or intended insurers, or to obtain legal or accounting advice.

7.2 Subject to the above, Calabrian shall be permitted to use information related to the Services it provides in connection with the Project for the purposes of marketing its services and in proposals for work of a similar type.

8 THIRD PARTIES

8.1 The Agreement or any part thereof or any benefit or interest thereunder may not be assigned by the Client without the prior written consent of Calabrian. The giving of such consent shall be at the discretion of Calabrian and Calabrian will only agree to an assignment on its terms and in return for payment of a fee by the Client to Calabrian to cover Calabrian's legal and other costs associated with any assignment.

8.2 The Agreement shall not confer and shall not purport to confer on any third party any benefit or any right to enforce any term of this Agreement for the purposes of the Contracts (Rights of Third Parties) Act 1999 or otherwise.

8.3 Calabrian will consider and may consent to any request from the Client for Calabrian to enter a collateral warranty with a third party with regard to the Services provided under the Agreement. The giving of such consent shall be at the discretion of Calabrian and Calabrian will only enter a collateral warranty on its terms and in return for payment of a fee by the Client to Calabrian to cover Calabrian's legal and other costs associated with any collateral warranty.

9 INSURANCE

9.1 Calabrian warrants to the Client that there is in force a policy of Professional Indemnity insurance covering its liabilities for negligence under this Agreement, with a limit of indemnity of £5,000,000 (FIVE MILLION POUNDS) any one Single Claim, Defence Costs in addition. This policy is annually renewable and whilst renewal is not automatic, Calabrian agrees to use reasonable endeavours to maintain such insurance at all times until six years from the date of the completion (or termination) of the Services under the Agreement, provided such insurance is available at commercially reasonable rates having regard, inter alia, to premiums required and policy terms obtainable.

9.2 If for any period such insurance is not available at commercially reasonable rates, Calabrian shall forthwith inform the Client and shall obtain in respect of such period such reduced level of Professional Indemnity insurance as is available and as would be fair and reasonable in the circumstances for Calabrian to obtain.

10 LIMITATIONS ON LIABILITY

10.1 Unless otherwise agreed in writing, Calabrian's liability under or in connection with the Agreement whether in contract, tort, negligence, breach of statutory duty or otherwise (other than in respect of personal injury or death) shall be limited to and shall not exceed the lesser of either five million pounds in the aggregate or 10 times the total value of invoices issued to the Client for consultancy work instructed under the Agreement.

10.2 No action or proceedings under or in respect of the Agreement whether in contract, tort, negligence, under statute or otherwise shall be commenced against Calabrian after the expiry of a period of six years from the date of the completion (or termination) of the Services under the Agreement.

10.3 Whilst Calabrian will scan all potential exploratory locations with a Cable Avoidance Tool, Calabrian shall not be liable for any damage to underground services, cables, pipes, drains or underground buildings, constructions and the like which were either not marked on site or for which accurate plans were not provided.

10.4 Calabrian shall not be liable for the cost of rectifying any defect, conflict or other fault in the information or designs provided by Calabrian or for the cost of designing a solution for and rectifying any subsequent works carried out by others pursuant to the conflicting, defective or in any other way faulty information or designs, unless Calabrian has been advised in writing of the same by the Client and has been given the opportunity to rectify the same or where necessary, to design the solution for rectification of any subsequent works carried out by others pursuant to the same.

11 PAYMENT

11.1 Invoices for services rendered will be submitted for payment in accordance with the Proposal.

11.2 The due date for payment is the date of the invoice and the final date for payment is 28 days from the date of the invoice.

11.3 If the Client disputes the amount included for payment in an invoice a written notice must be served on Calabrian by the Client not later than 14 days before the final date for payment. If no notice is given the amount due shall be the amount stated in the invoice.

11.4 In the event of failure on the part of the Client to pay any monies in accordance with the foregoing payment provisions, Calabrian will be entitled to charge interest on any monies owed to it by the Client, such interest to be at a rate of 8% above the base rate of a clearing bank from time to time calculated from the final date for payment to the date of actual payment on a compound basis.

12 DELAY

12.1 Calabrian will comply with any timescale agreed for completion of the Services unless delayed or prevented by circumstances beyond its reasonable control and in the event of any such circumstances arising Calabrian undertakes to complete the Services within a reasonable period, but will not be liable to the Client for any delay as a result.

13 TERMINATION

13.1 The Agreement may be determined by either party in the event of the other making a composition or arrangement with its creditors, becoming bankrupt, or being a company, making a proposal for a voluntary arrangement for a composition of debts, or has a provisional liquidator appointed, or has a winding-up order made, or passes a resolution for voluntary winding-up (except for the purposes of a bona fide scheme of amalgamation or reconstruction), or has an administrator or an administrative receiver appointed to the whole or any part of its assets. Notice of determination must be given to the party which is insolvent by the other party.

13.2 If for any reason the performance of the Services by Calabrian is suspended for a period in excess of three calendar months then Calabrian shall be entitled to determine its appointment in respect of the Services by seven days written notice to the Client.

13.3 If the Client shall fail to pay in full any sum due under the terms of the Agreement by the final date for payment for that sum and no effective notice of intention to withhold payment has been issued, Calabrian may serve written notice on the Client demanding payment within 14 days of such notice. If the Client shall fail to comply with such notice, Calabrian shall be entitled to terminate its employment under the Agreement forthwith.

13.4 Any determination of the appointment of Calabrian howsoever caused shall be without prejudice to the right of Calabrian to require payment for all services performed up to the date of such determination including but not limited to payment of a fair and reasonable proportion of any figure identified in the Proposal or otherwise for fees in respect of a particular service which Calabrian has started, but not completed.

14 NOTICES

14.1 Any notice provided for in the Agreement shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post to the address of the relevant party as may have been notified by each party to the other or, in the absence of notification, to the address of Calabrian set out above or to the registered address of the Client.

14.2 Such notice shall be deemed to have been received on the day of delivery if delivered by hand or on the second working day after the day of posting if sent by first class post.

15 ENTIRE AGREEMENT

15.1 The Agreement constitutes the complete and entire agreement between the Client and Calabrian with respect to the Services and supersedes any prior oral and/or written warranties, terms, conditions, communications and representations, whether express or implied and any claim against Calabrian in respect of the Services can only be made in contract under the provisions of the Agreement and not otherwise under the law or tort or otherwise.

15.2 No amendments, modifications or variation of the Agreement shall be valid unless made in writing and agreed to by both the Client and Calabrian; such agreement must be recorded in writing by at least one of the Parties.

15.3 Calabrian will not be bound by any standard or printed terms or conditions furnished by the Client in any of its documents unless Calabrian specifically states in writing separately from such documents that it intends such terms and conditions to apply.

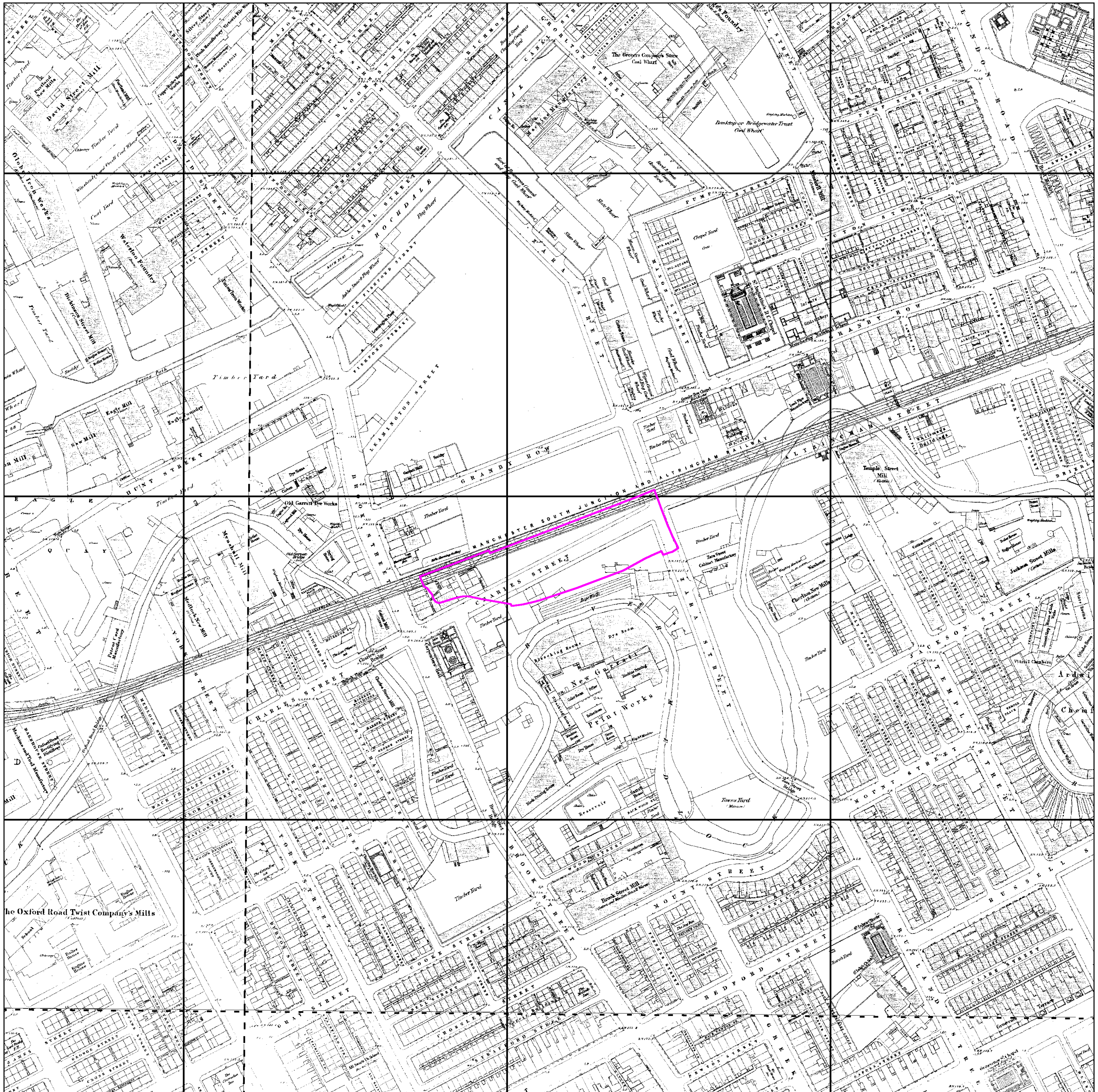
16 DISPUTES AND GOVERNING LAW

16.1 The Agreement shall be governed by and construed in accordance with English law and the Parties irrevocably and unconditionally submit to the jurisdiction of the English Courts.

16.2 Where the Housing Grants, Construction and Regeneration Act 1996 applies, any dispute between the Parties may be referred to adjudication in accordance with The Scheme for Construction Contracts Regulations 1998 or any amendment or modification thereof being in force at the time of the dispute, as applicable to England, Wales, Scotland and Northern Ireland.

APPENDIX B HISTORICAL OS PLANS





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Lancashire And Furness

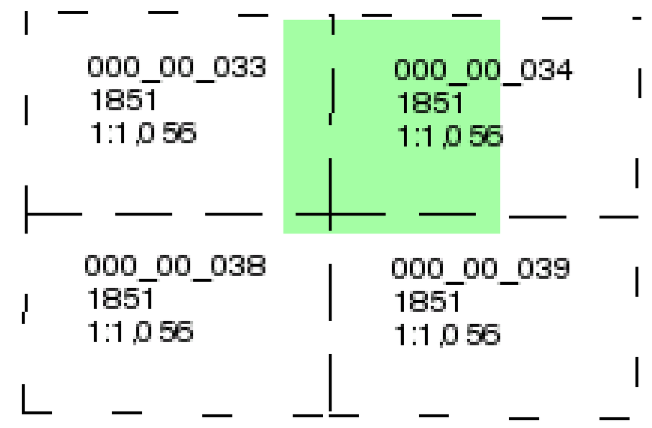
Published 1851

Source map scale - 1:1,056

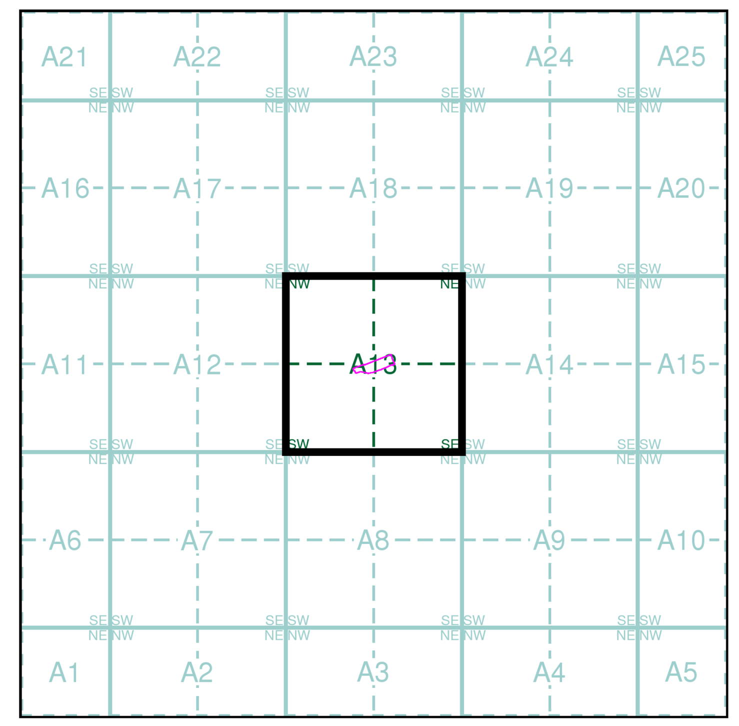
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

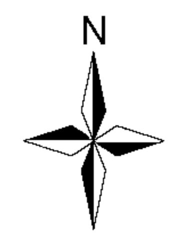
Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)



Historical Town Plan - Segment A13





Order Details

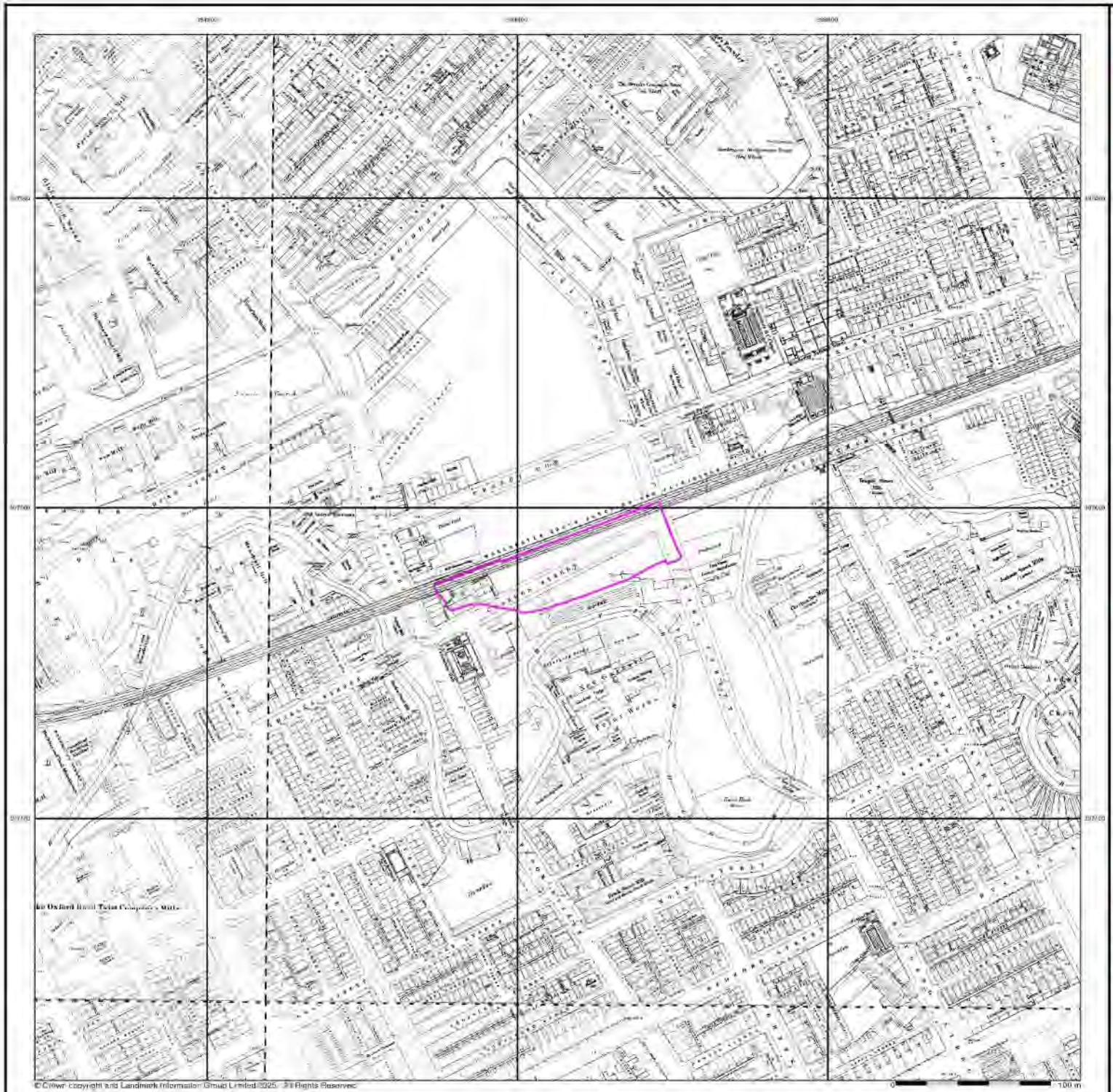
Order Number: 380510101_1_1
Customer Ref: 7356
National Grid Reference: 384430, 397560
Slice: A
Site Area (Ha): 0.53
Search Buffer (m): 0

Site Details

Site at 384426,397568

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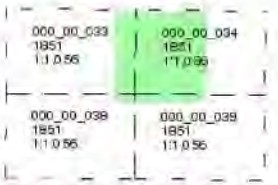
Published 1851

Source map scale - 1:1,056

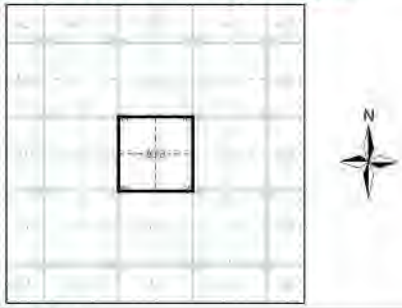
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1846 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-95. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans as of the specification of the map.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)



Historical Town Plan - Segment A13



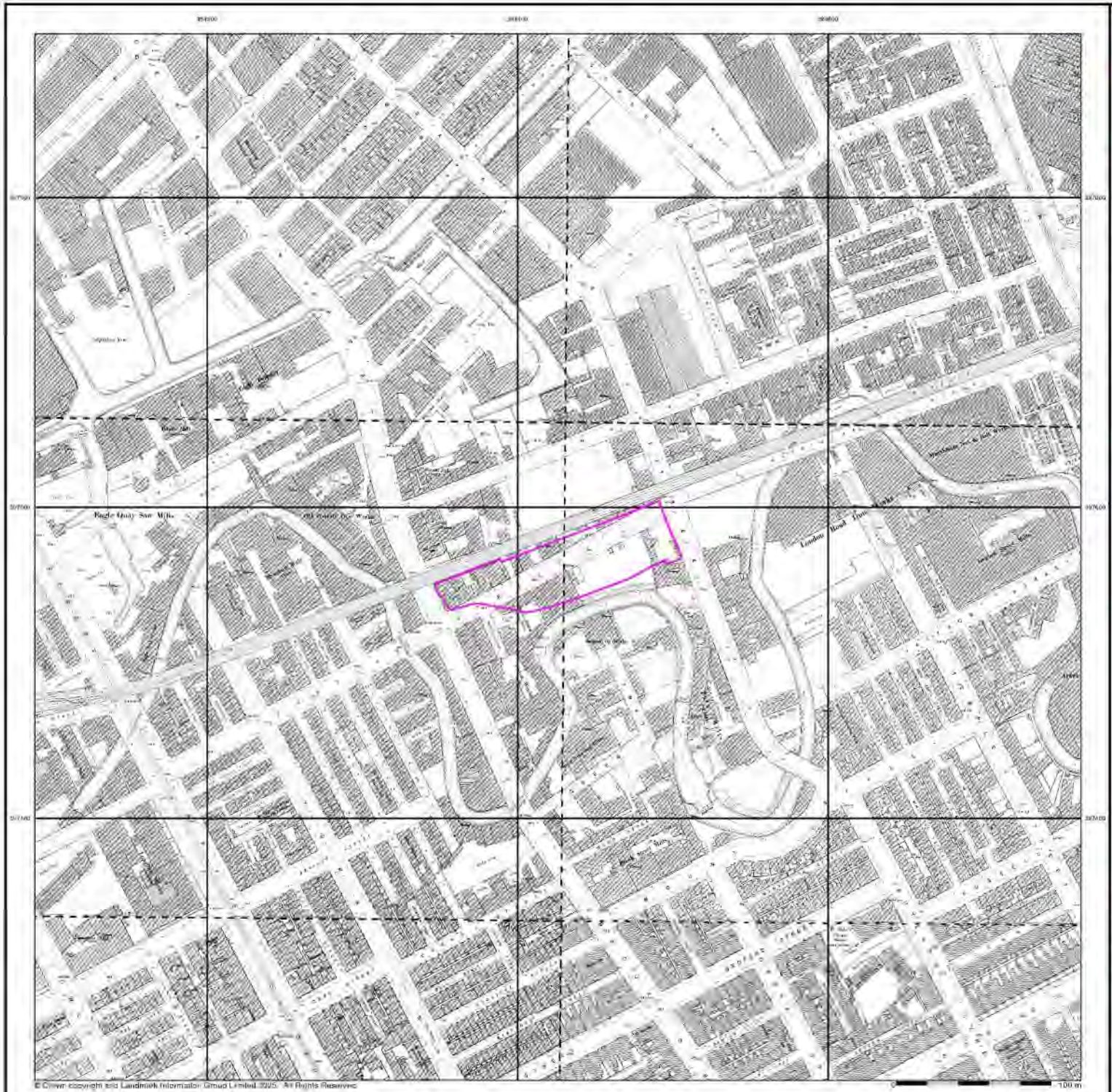
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Lancashire And Furness

Published 1891

Source map scale - 1:500

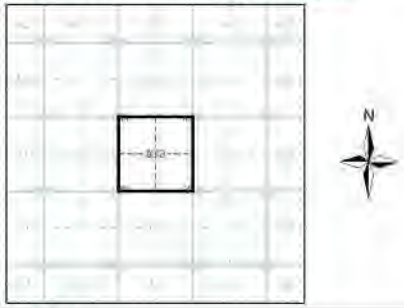
The 1:500 scale Ordnance Survey mapping was introduced in 1855 as a replacement for the 1:528 scale and to compliment the 1:2500 scale that had been implemented in 1853. By 1895, the 1:500 scale covered most towns over a population of about 4000 at the time of survey, although very few towns were mapped more than once at this scale, and none have been since 1910. The 1:500 scale gives particular emphasis to such features as lamp posts, man holes, arched passages and minor building projections. Also often featured are divisions between tenements, interior ground floor layouts of public buildings, and on earlier plans, the functions of the various parts of larger industrial premises are also indicated. Content of the plans does vary however, from one town to the next in terms of, for example, the completeness of railway tracks and the coverage of public buildings.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)

104_10_010 1891 1:500
104_11_006 1891 1:500
104_10_015 1891 1:500
104_11_011 1891 1:500
104_10_020 1891 1:500
104_11_016 1891 1:500

Historical Town Plan - Segment A13



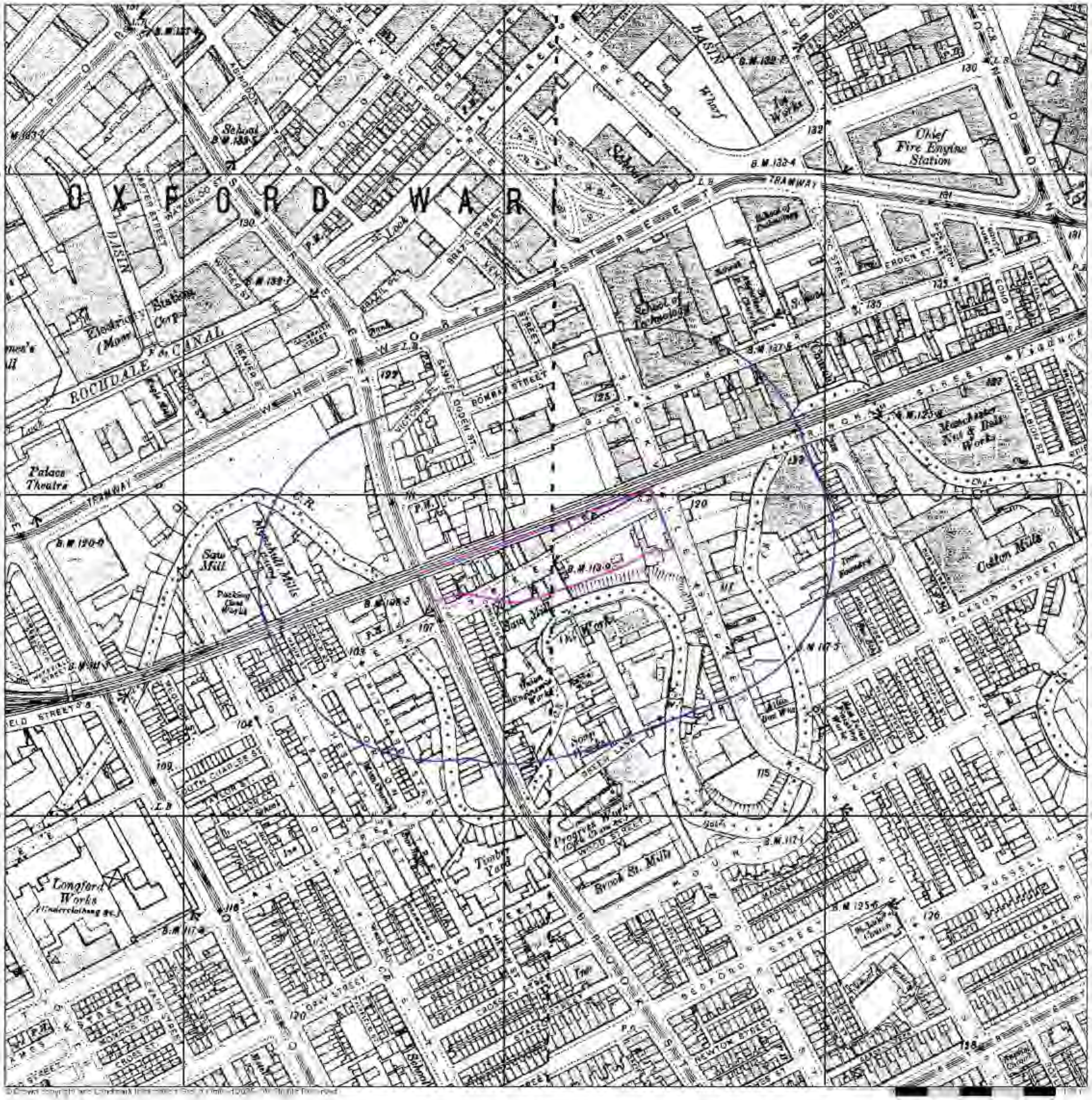
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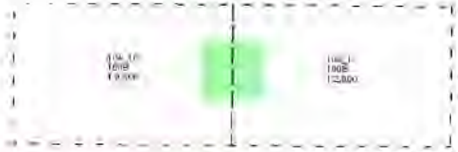


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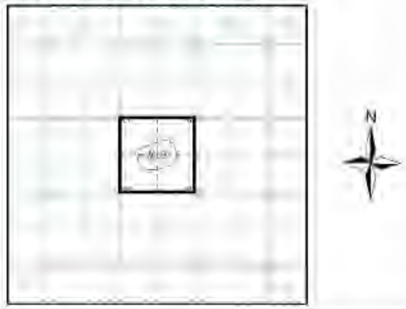
Lancashire And Furness
Published 1908
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



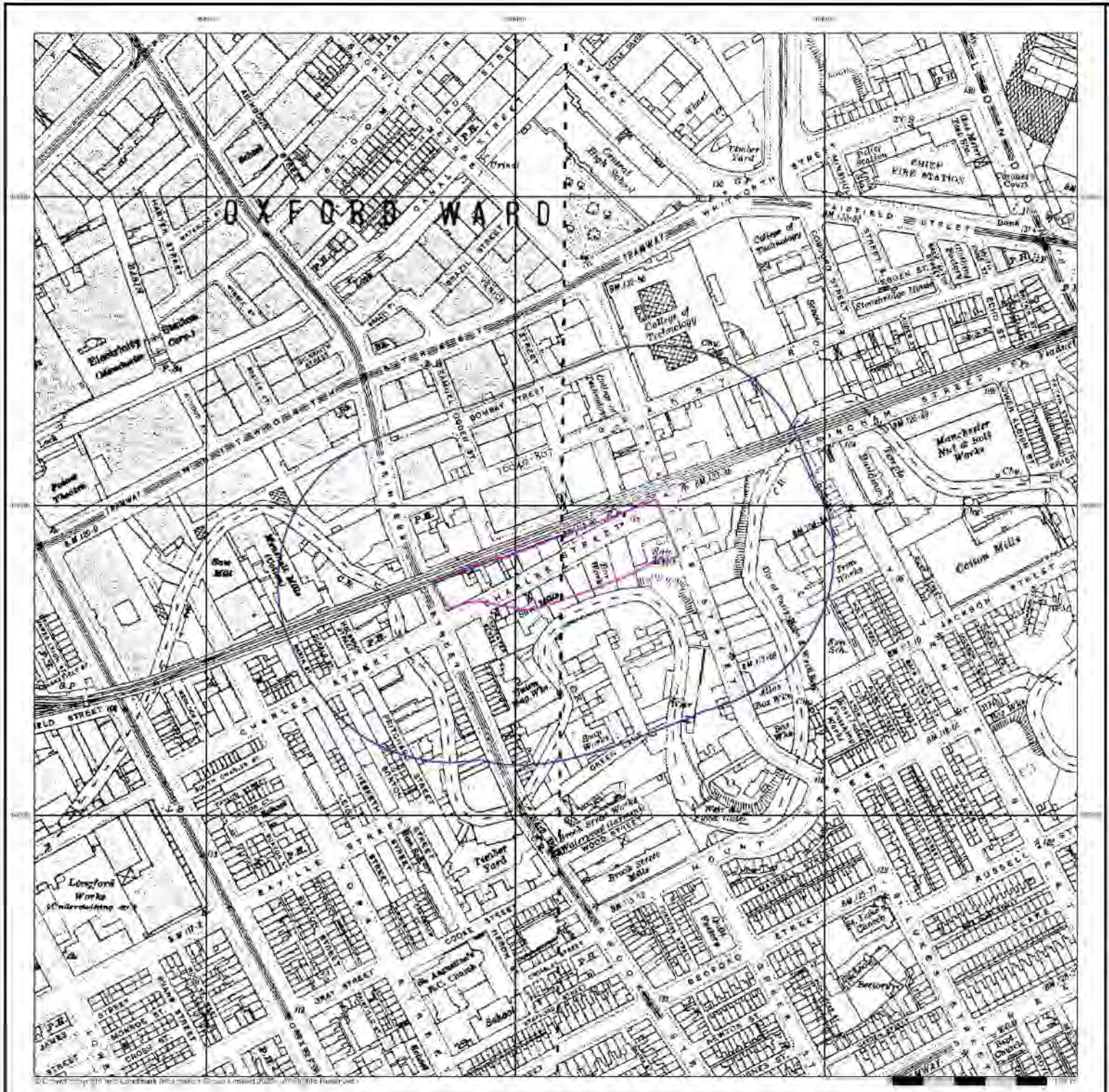
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Search Buffer (m): 100

Site Details

Site at 384426,397568

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Lancashire And Furness

Published 1932

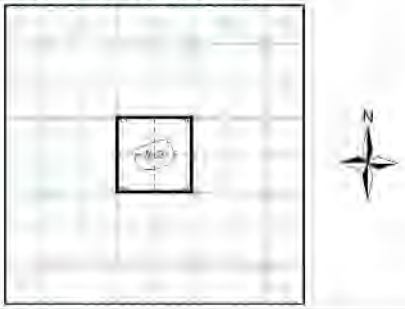
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13

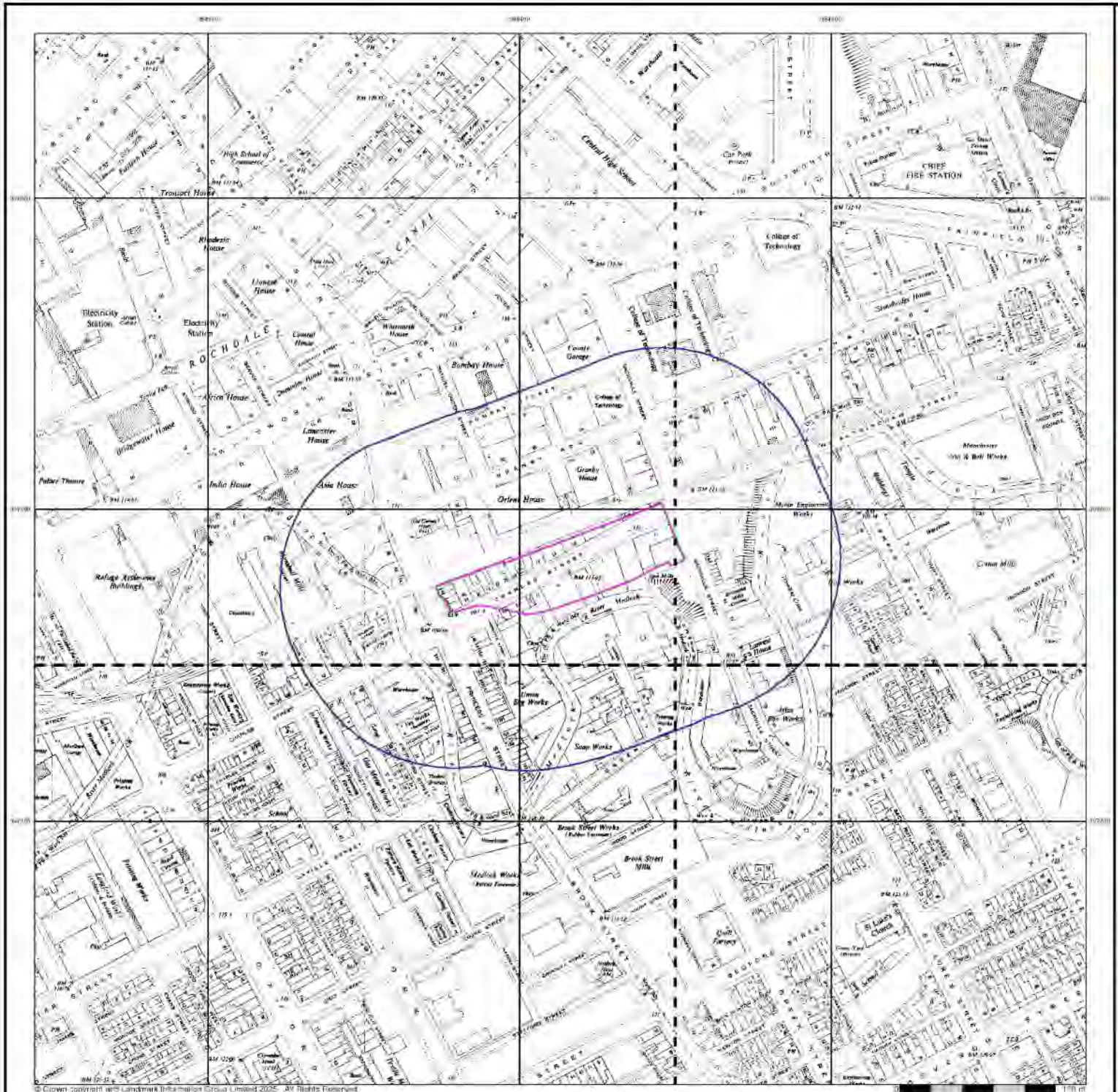


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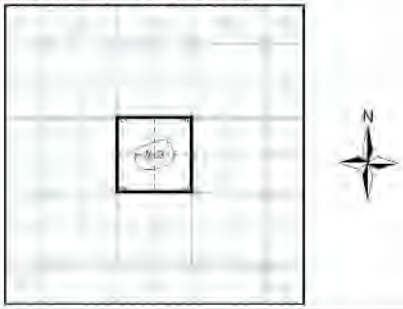
Ordnance Survey Plan
Published 1948
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	380510101_1_1
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Site Details

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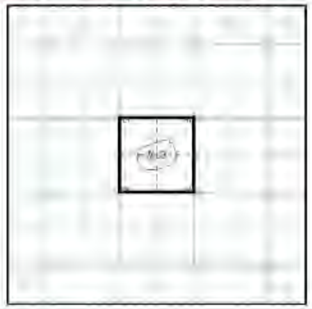
Ordnance Survey Plan
Published 1950
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



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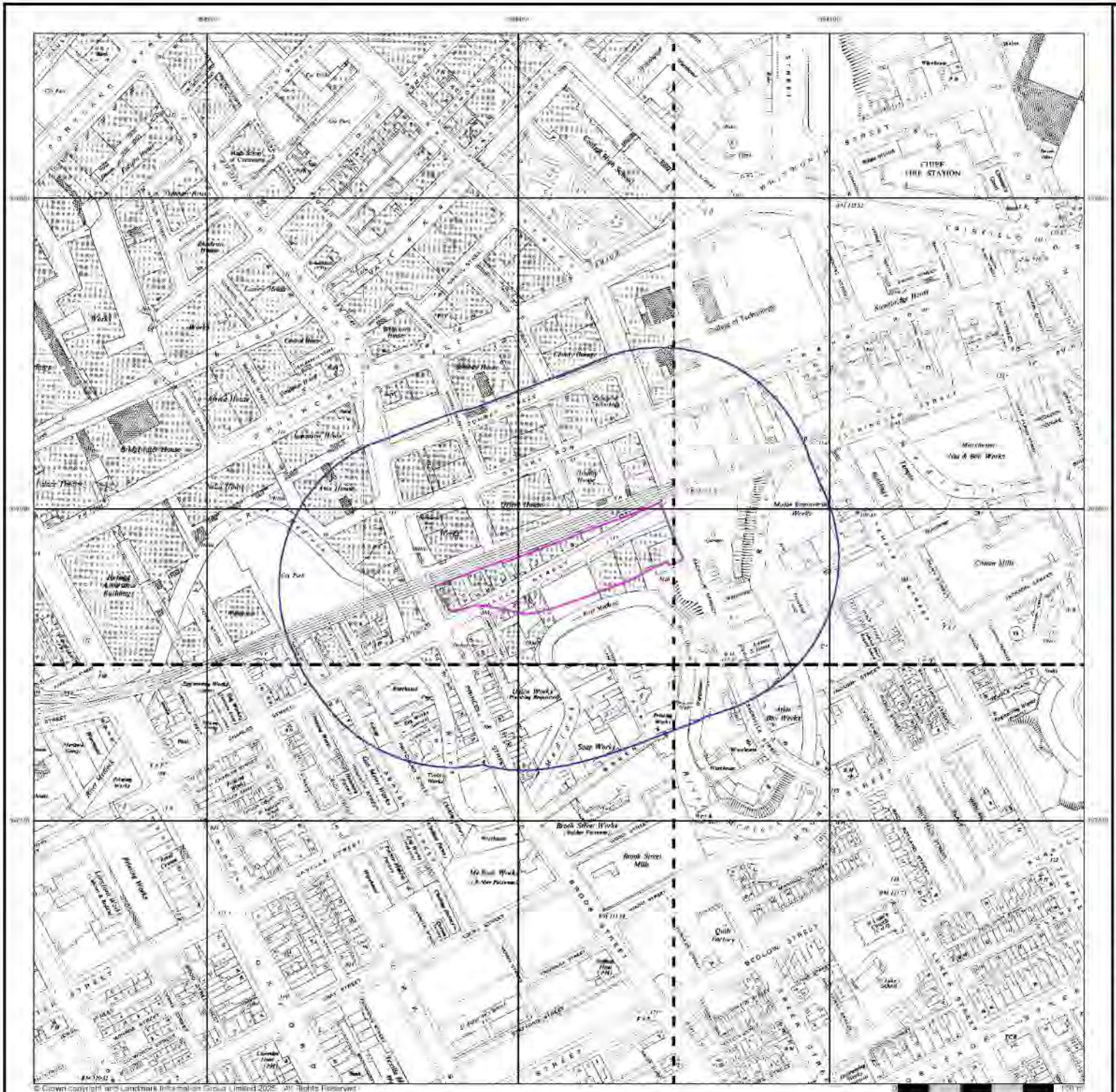
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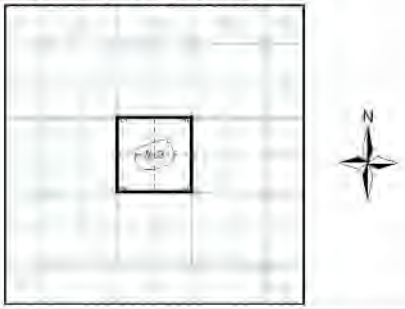
Ordnance Survey Plan
Published 1954 - 1964
Source map scale - 1:1,250

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Map Name(s) and Date(s)



Historical Map - Segment A13



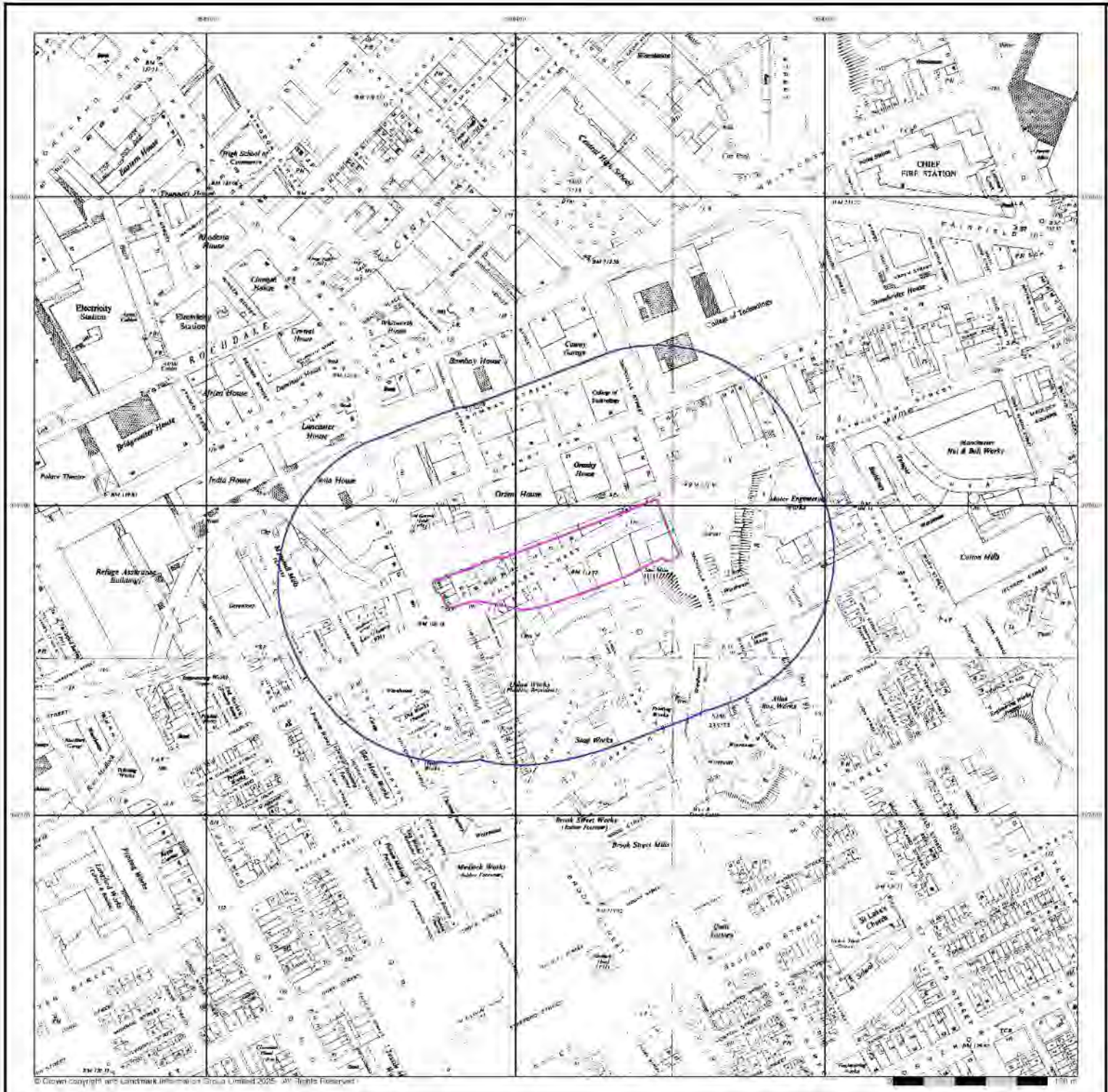
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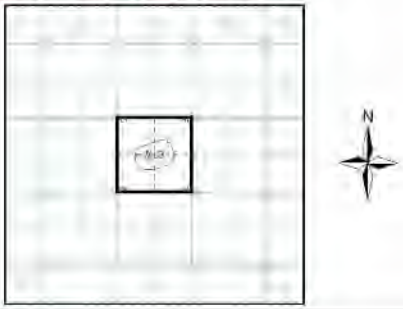
Ordnance Survey Plan
Published 1955
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



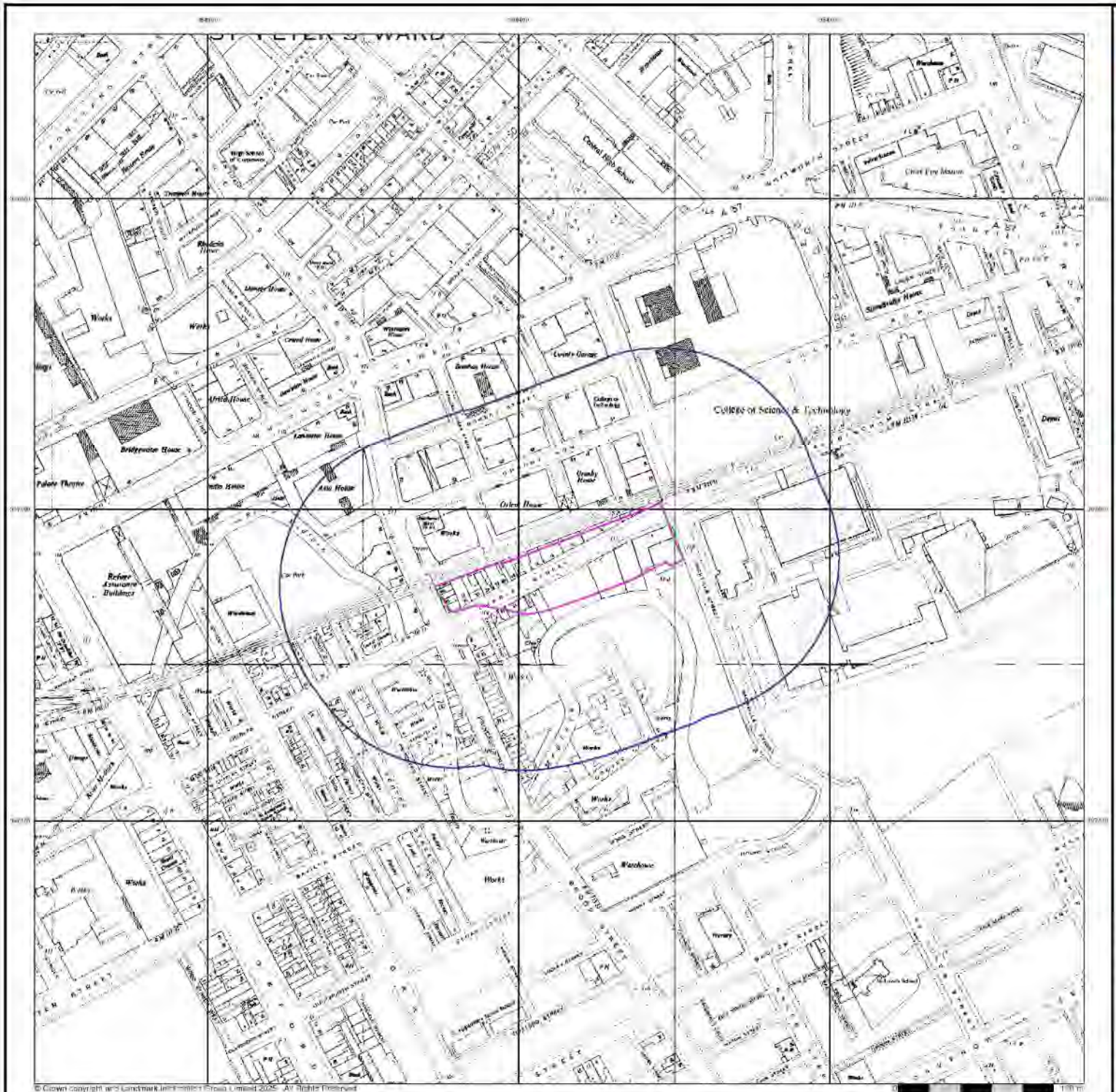
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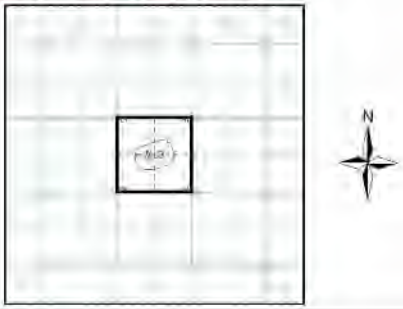
Ordnance Survey Plan
Published 1965
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13

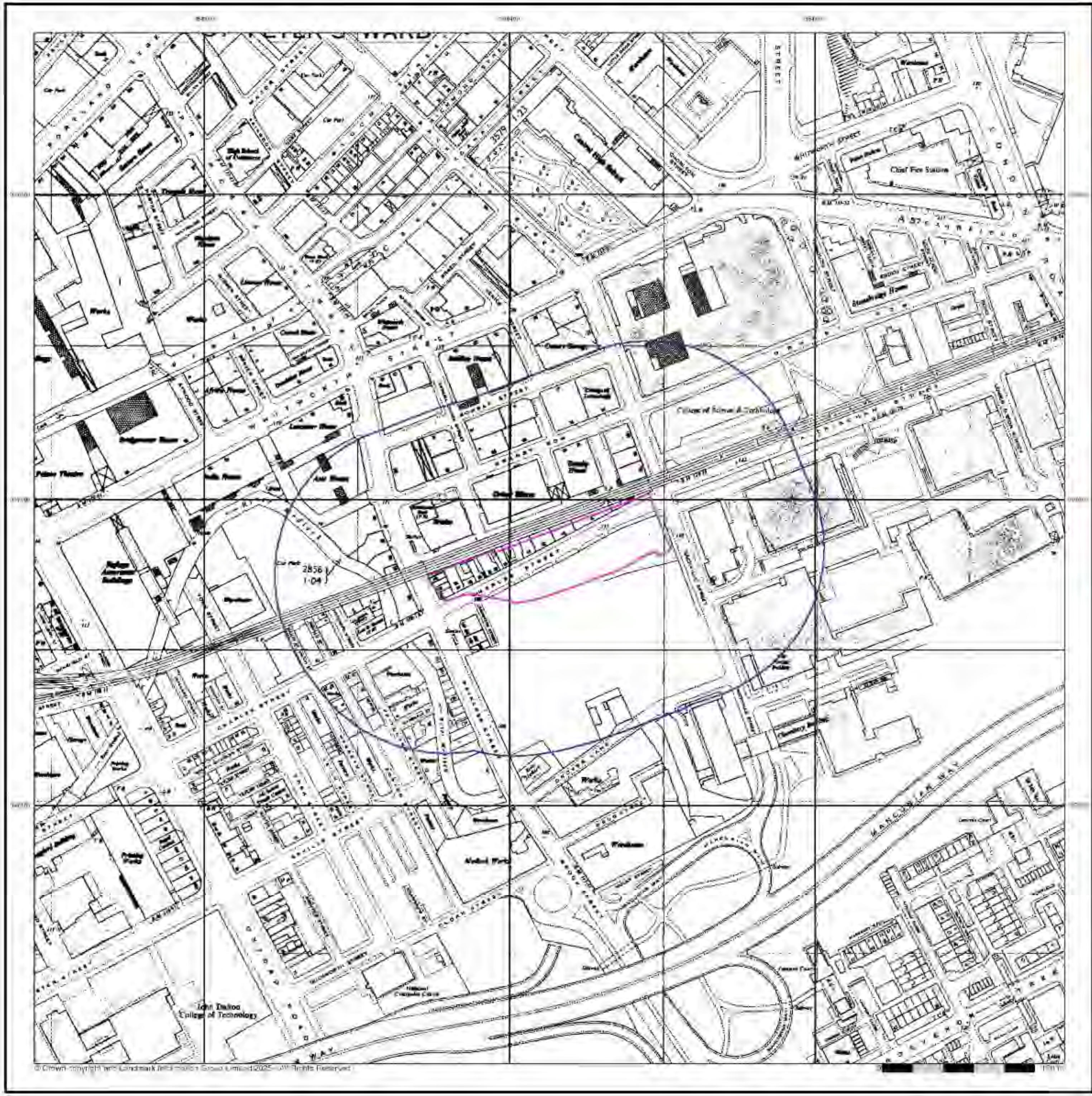


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Site at 384426,397568



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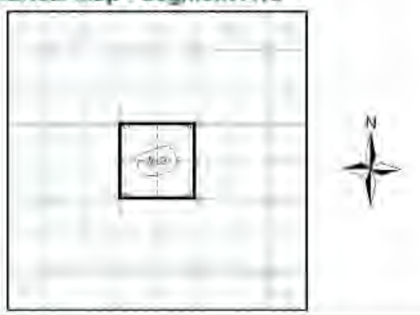
Ordnance Survey Plan
Published 1970
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



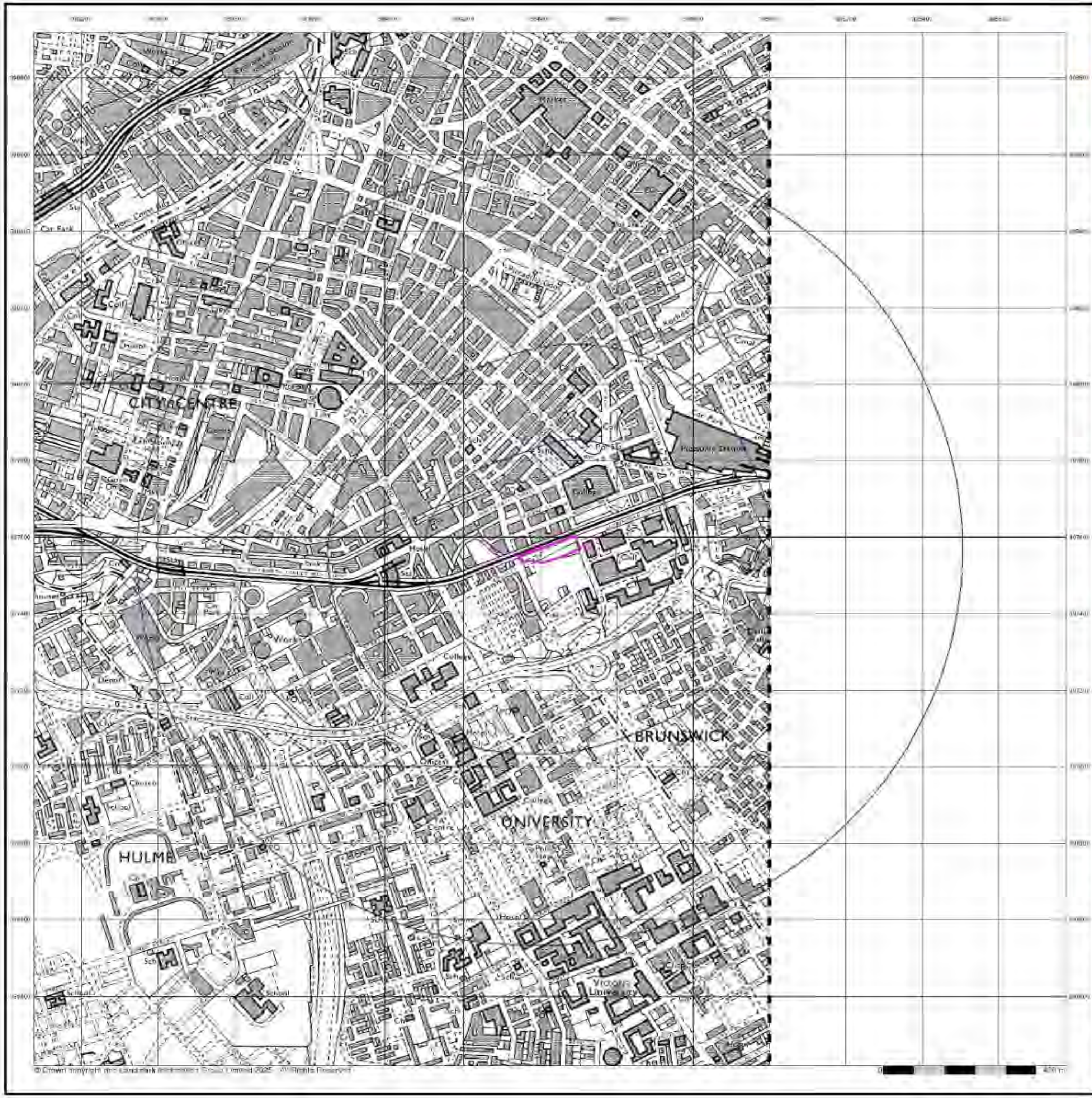
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Site Details

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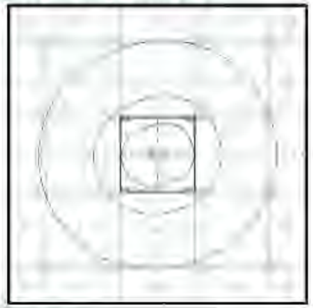
Ordnance Survey Plan
Published 1972
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas. These maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were usually overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



N

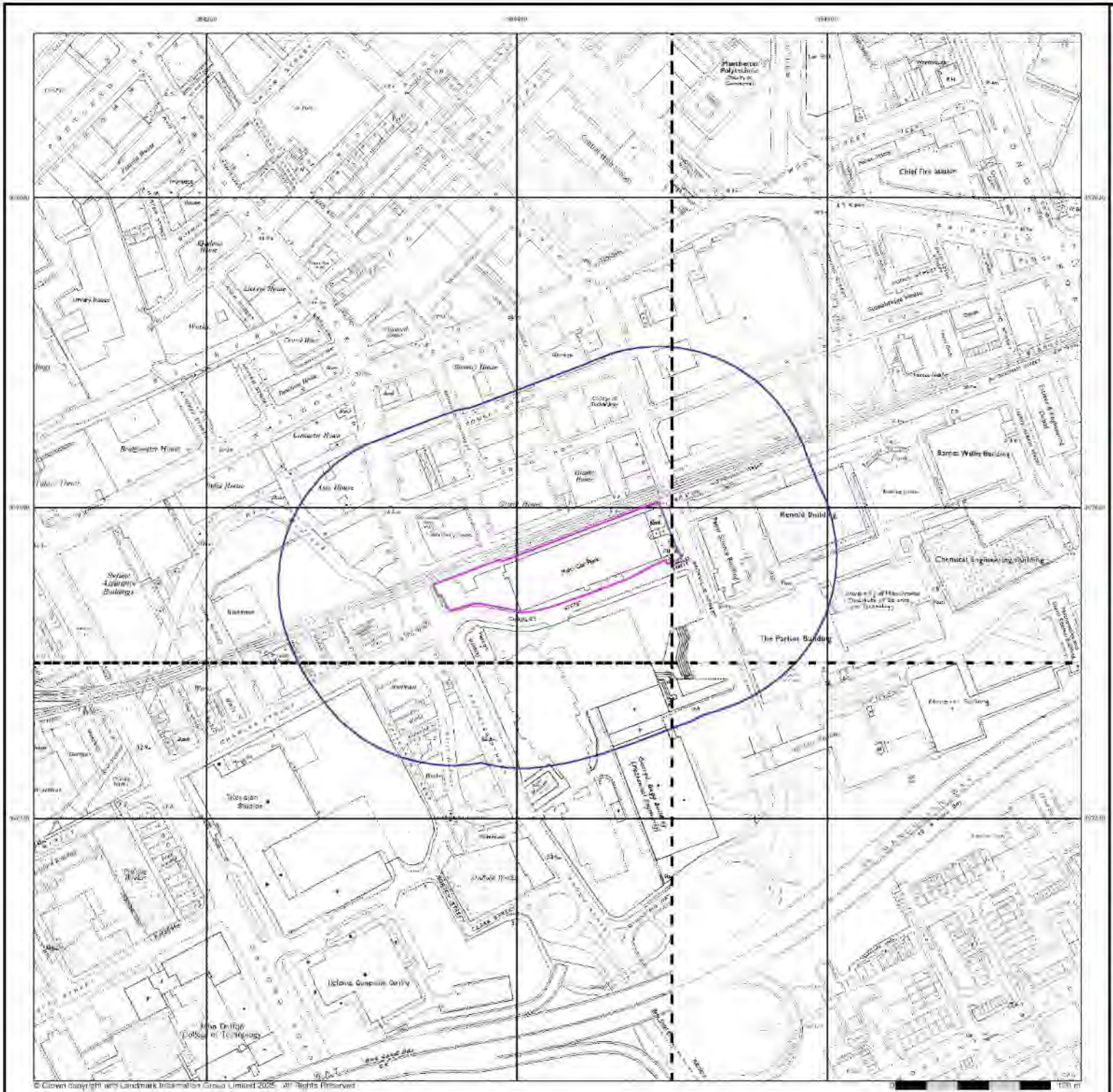
Order Details

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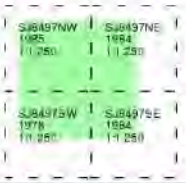
Additional SIMs

Published 1978 - 1985

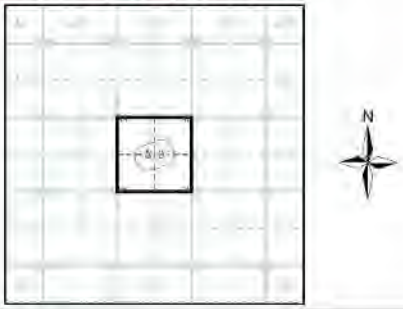
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13

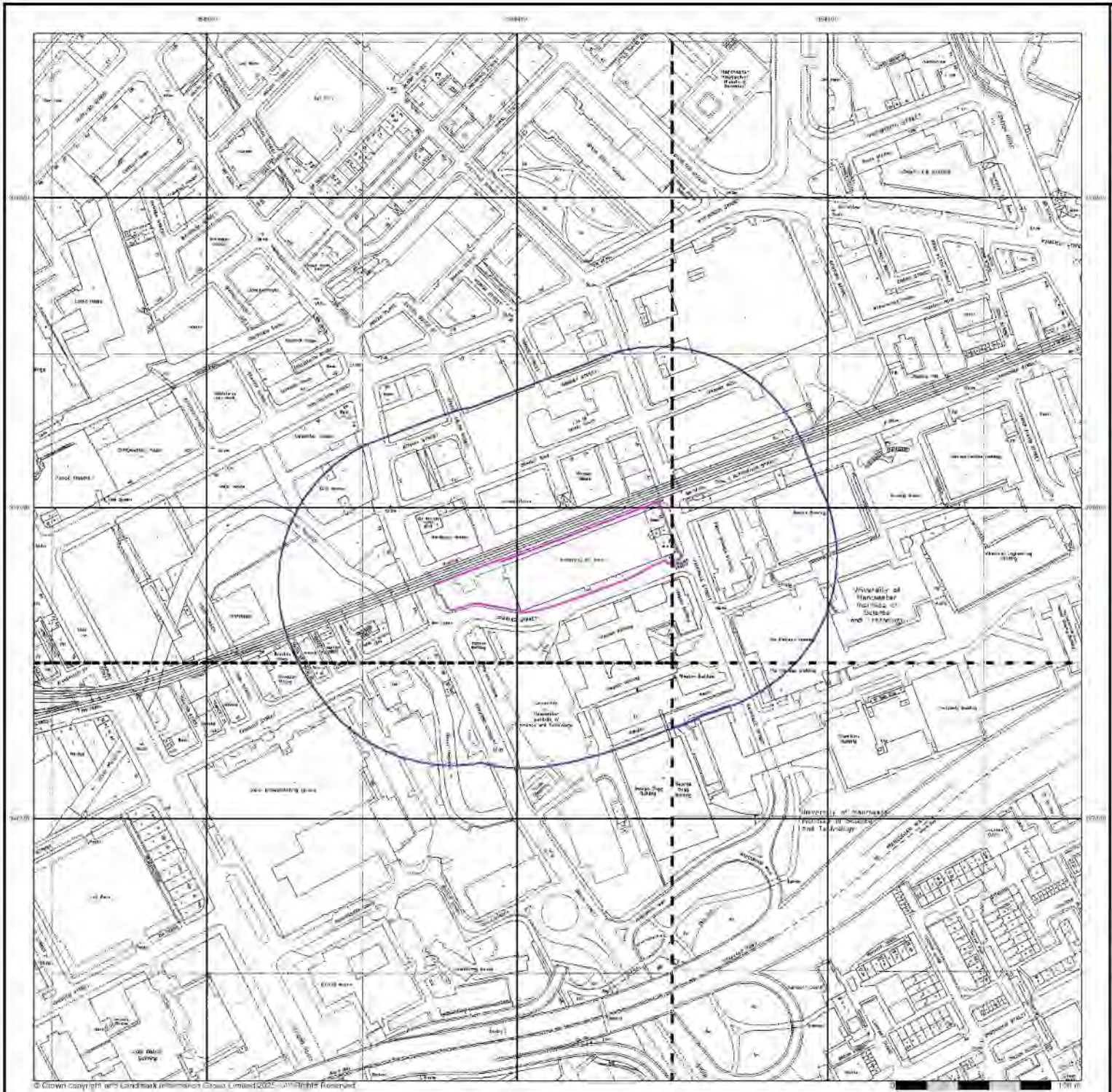


Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	100

Site Details

Site at 384426,397568



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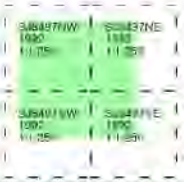
Large-Scale National Grid Data

Published 1992

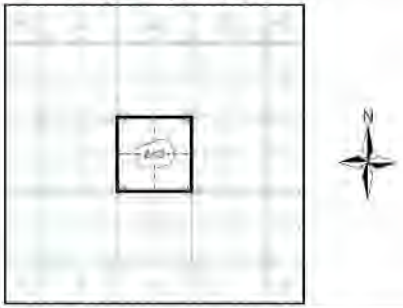
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



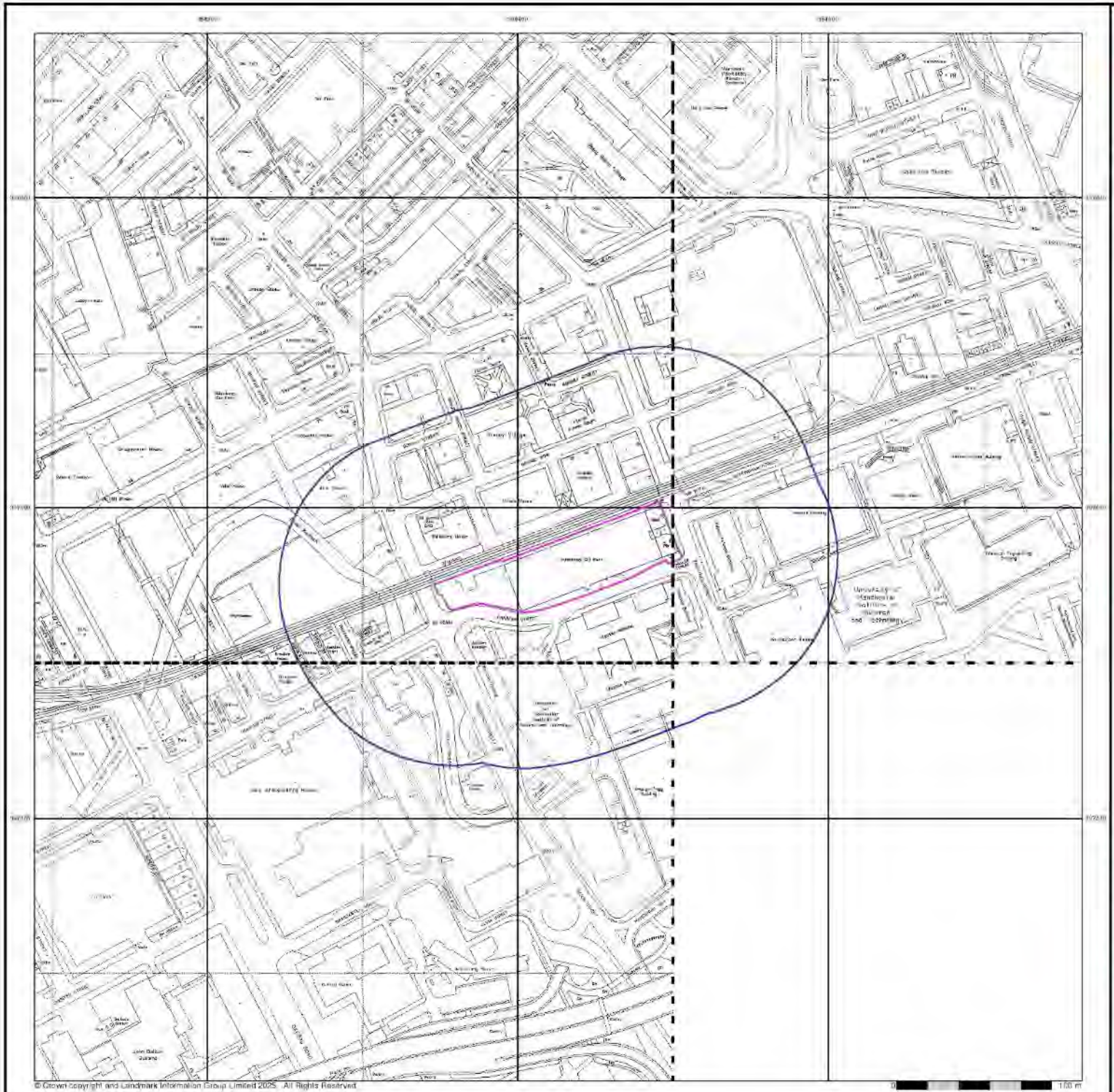
Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	100

Site Details

Site at 384426,397568

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Large-Scale National Grid Data

Published 1994 - 1995

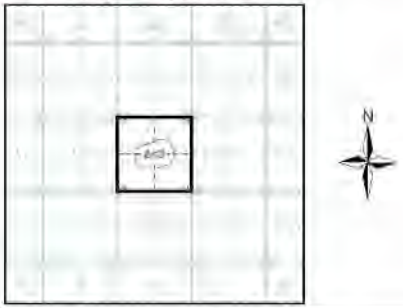
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	100

Site Details

Site at 384426,397568

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Web: www.envirocheck.co.uk

APPENDIX C	SEARCHES
Landmark	Envirocheck Report
Coal Authority	Consultants Mining Report
ZeticaUXO	UXO Risk Map
BGS	Archive Borehole Records



Envirocheck® Report:

Datasheet

Order Details:

Order Number:
380510101_1_1

Customer Reference:
7356

National Grid Reference:
384430, 397560

Slice:
A

Site Area (Ha):
0.53

Search Buffer (m):
1000

Site Details:

Site at 384426,397568

Client Details:

Mr R Hey
Calabrian Limited
9 Millwood
Ingleton
LA6 3HY

Prepared For:

Roscoe

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1		43	15	36
Prosecutions	pg 25				1
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control	pg 25				2
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 25				12
Local Authority Pollution Prevention and Control Enforcements	pg 27				1
Nearest Surface Water Feature	pg 27		Yes		
Pollution Incidents to Controlled Waters	pg 27		7	5	10
Historical Prosecutions					
Registered Radioactive Substances	pg 31		8	7	10
Substantiated Pollution Incident Register					
Water Abstractions	pg 35		2	8	3 (*56)
Water Industry Act Referrals					
Groundwater Vulnerability Map	pg 52	Yes	n/a	n/a	n/a
Groundwater Vulnerability - Soluble Rock Risk			n/a	n/a	n/a
Groundwater Vulnerability - Local Information			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 52	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 52	Yes	n/a	n/a	n/a
Source Protection Zones	pg 52			1	
Extreme Flooding from Rivers or Sea without Defences	pg 52	Yes		n/a	n/a
Flooding from Rivers or Sea without Defences	pg 52		Yes	n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 53	1	9	9	33
Water Framework Directive - Catchment	pg 59	Yes		Yes	
Water Framework Directive - Groundwater	pg 59	Yes			
Water Framework Directive - Surface Waters					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 60			2	5
Local Authority Landfill Coverage	pg 61	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)	pg 61		4	9	19
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites	pg 63				2
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

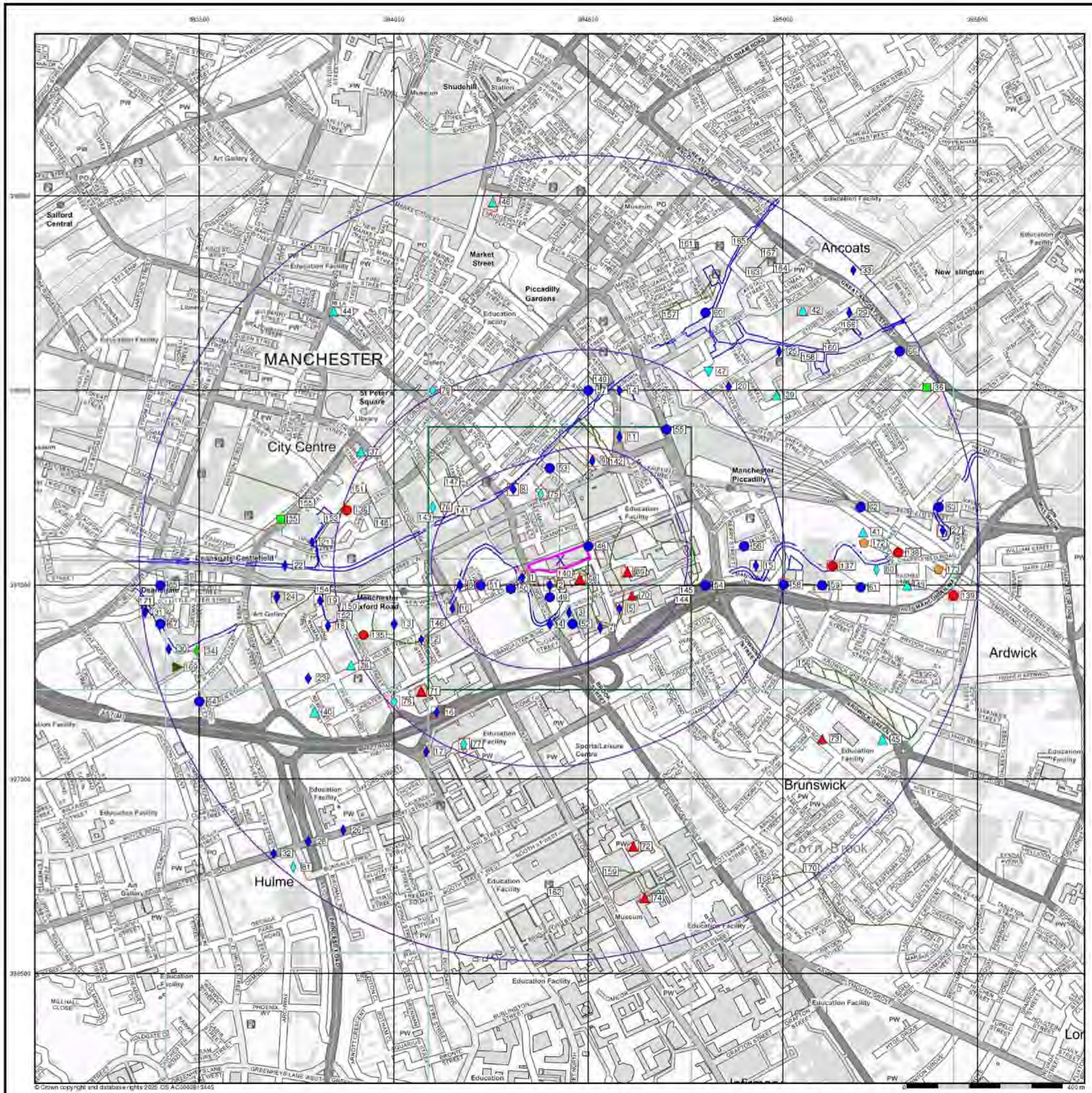
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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 64	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 64	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 66		Yes	Yes	Yes
BGS Urban Soil Chemistry Averages	pg 69	Yes			
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas	pg 69	Yes	n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities	pg 69				1
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 69	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 69	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 69	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 70	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 70	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 71		15	100	484
Fuel Station Entries	pg 122			1	2
Points of Interest - Commercial Services	pg 122		1	16	78
Points of Interest - Education and Health	pg 130			1	4
Points of Interest - Manufacturing and Production	pg 131		9	20	89
Points of Interest - Public Infrastructure	pg 141			15	27
Points of Interest - Recreational and Environmental	pg 144			1	11
Underground Electrical Cables					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 146				1
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					



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General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Map ID

Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Historical Prosecutions
- Prosecutions
- Registered Radioactive Substance
- River Network or Water Feature
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referrals

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

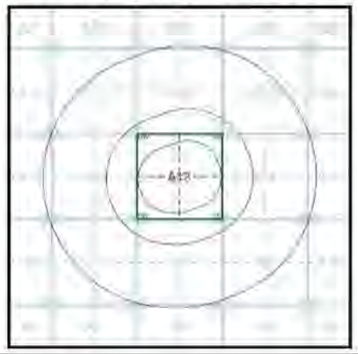
Geological

- BGS Recorded Mineral Site

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 0)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Slice A



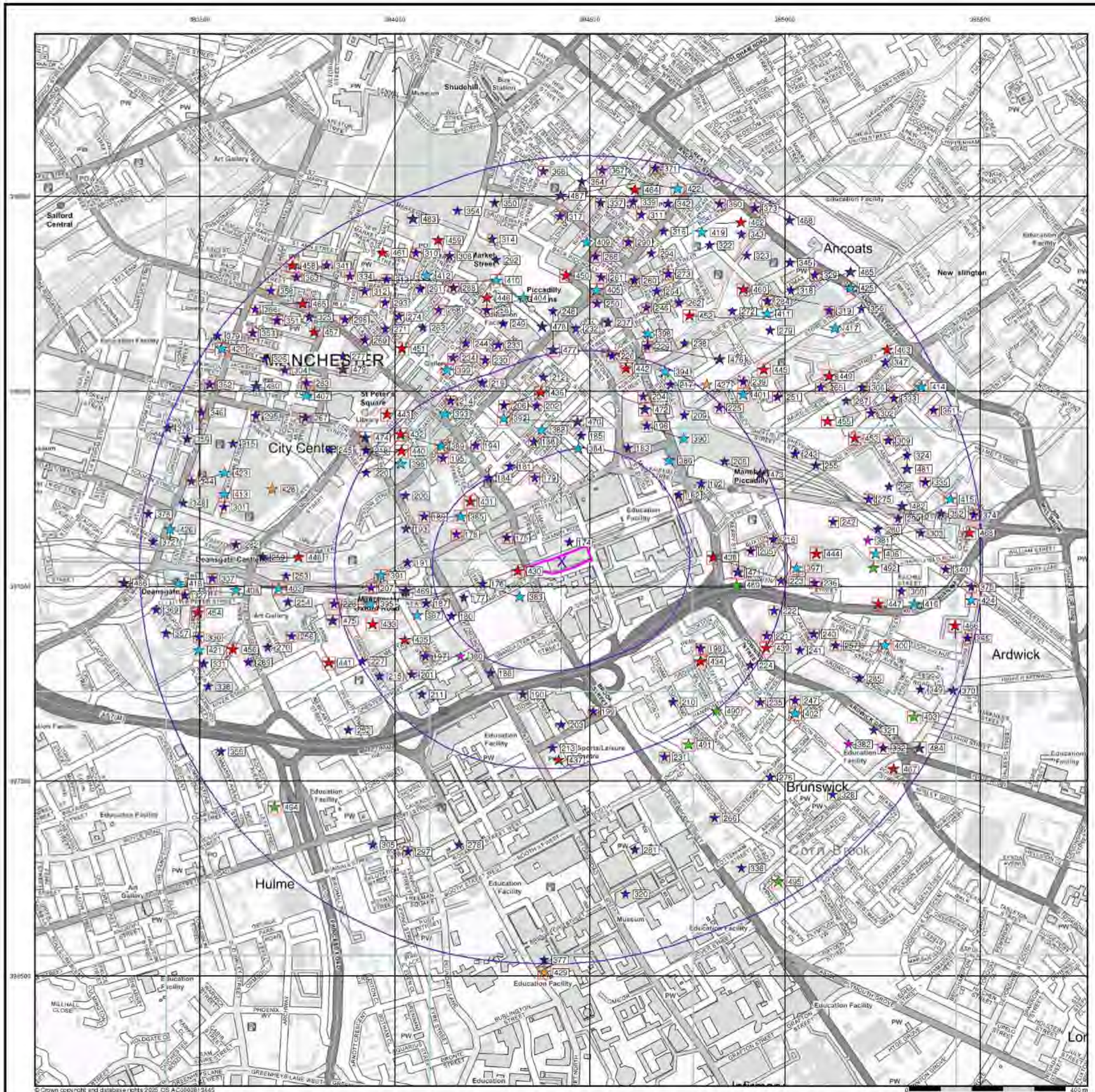
Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	1000

Site Details

Site at 384426,397568

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Web: www.environcheck.co.uk



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Industrial Land Use Map

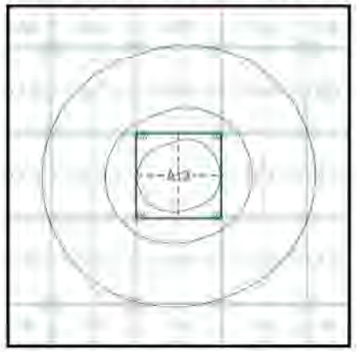
General

Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



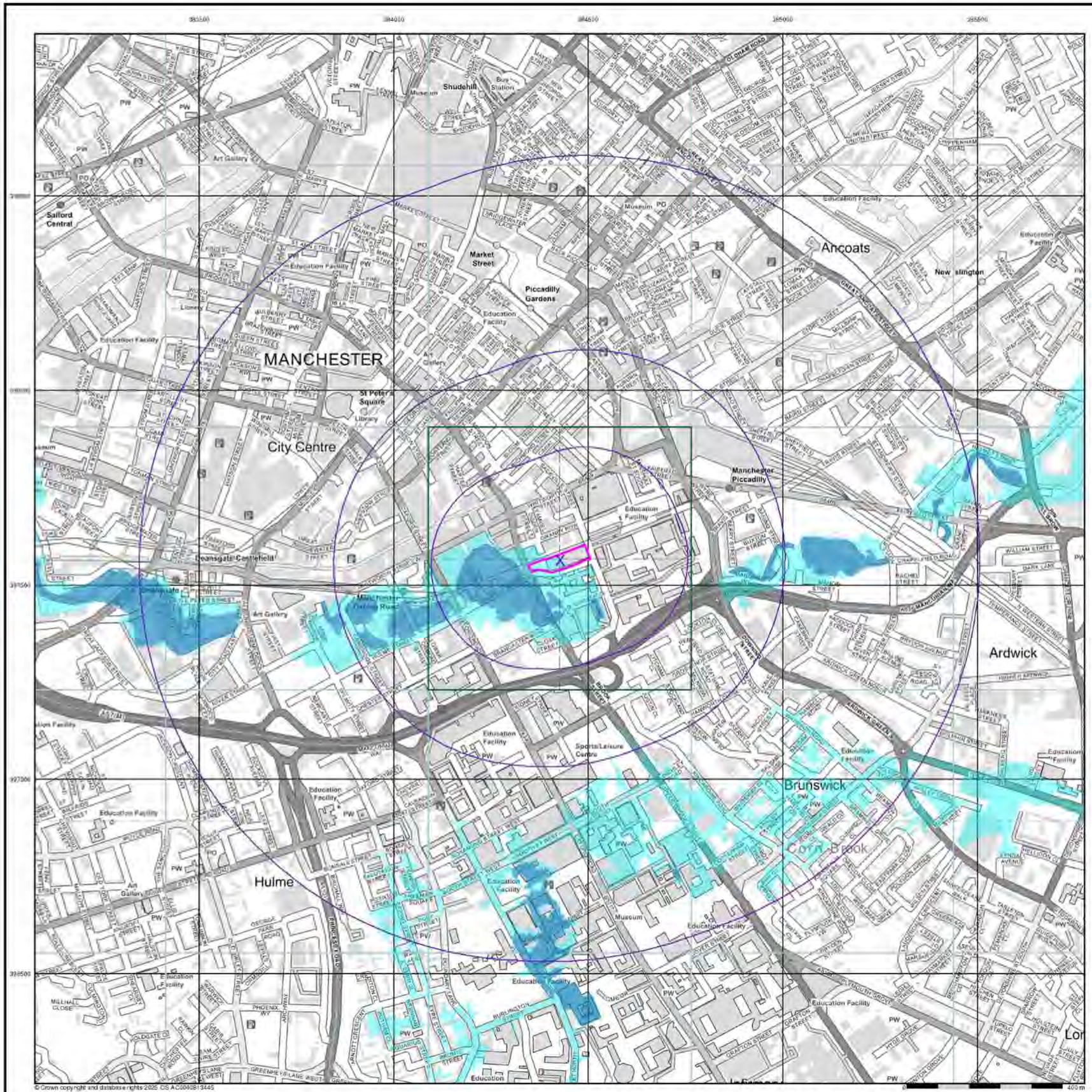
Order Details

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National Grid Reference:	384430, 397560
Slice:	A
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Site Details

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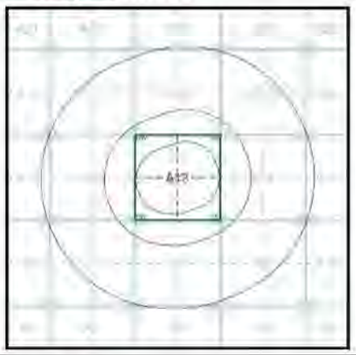
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



N

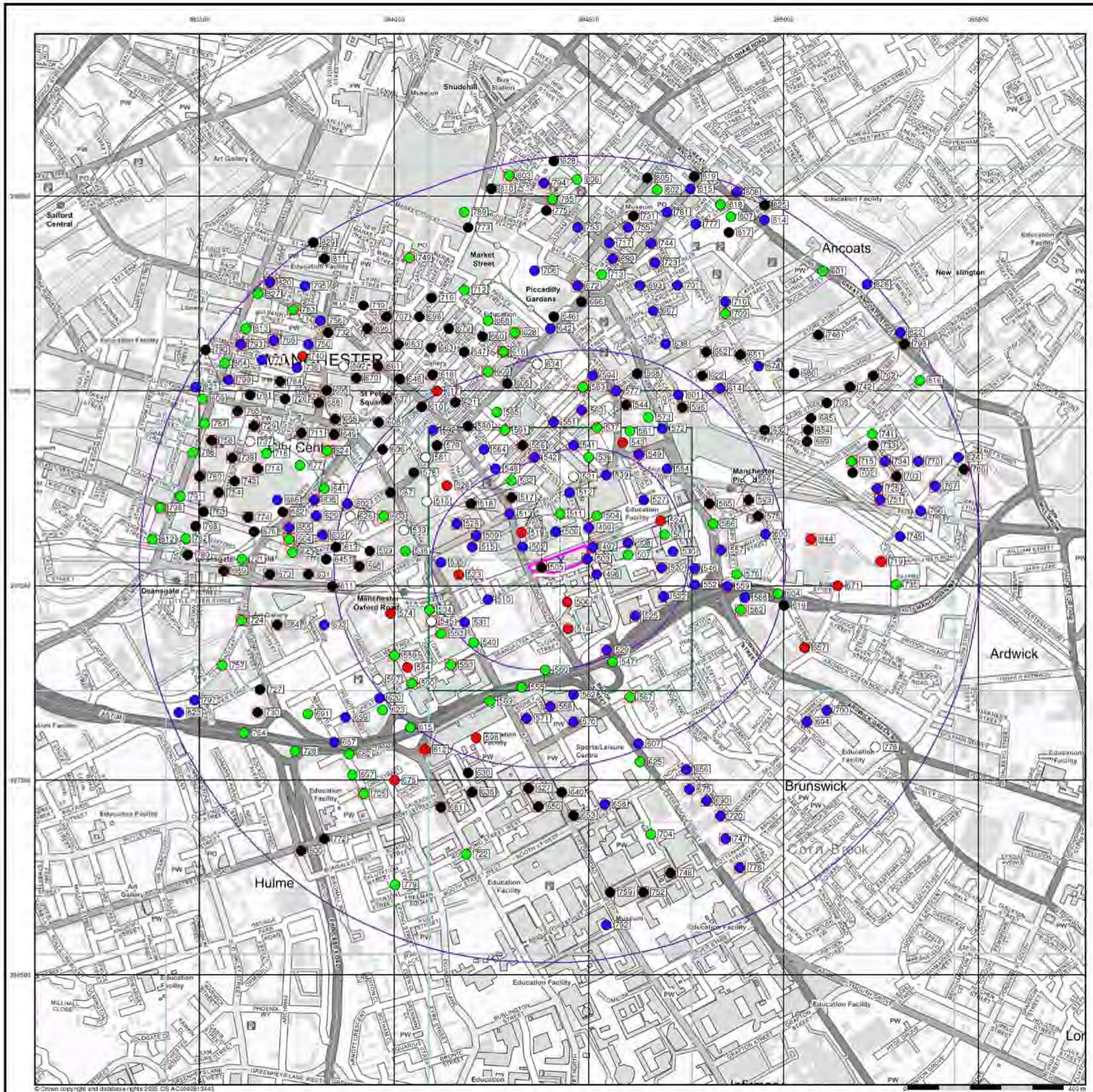
Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	1000

Site Details

Site at 384426,397568

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Web: www.environcheck.co.uk



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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

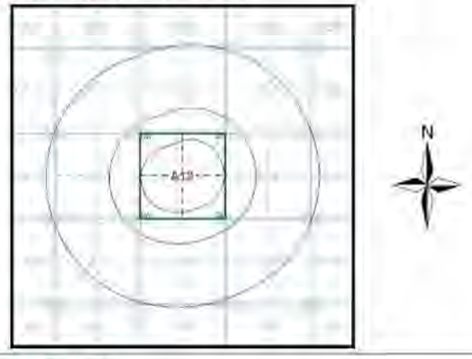
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A

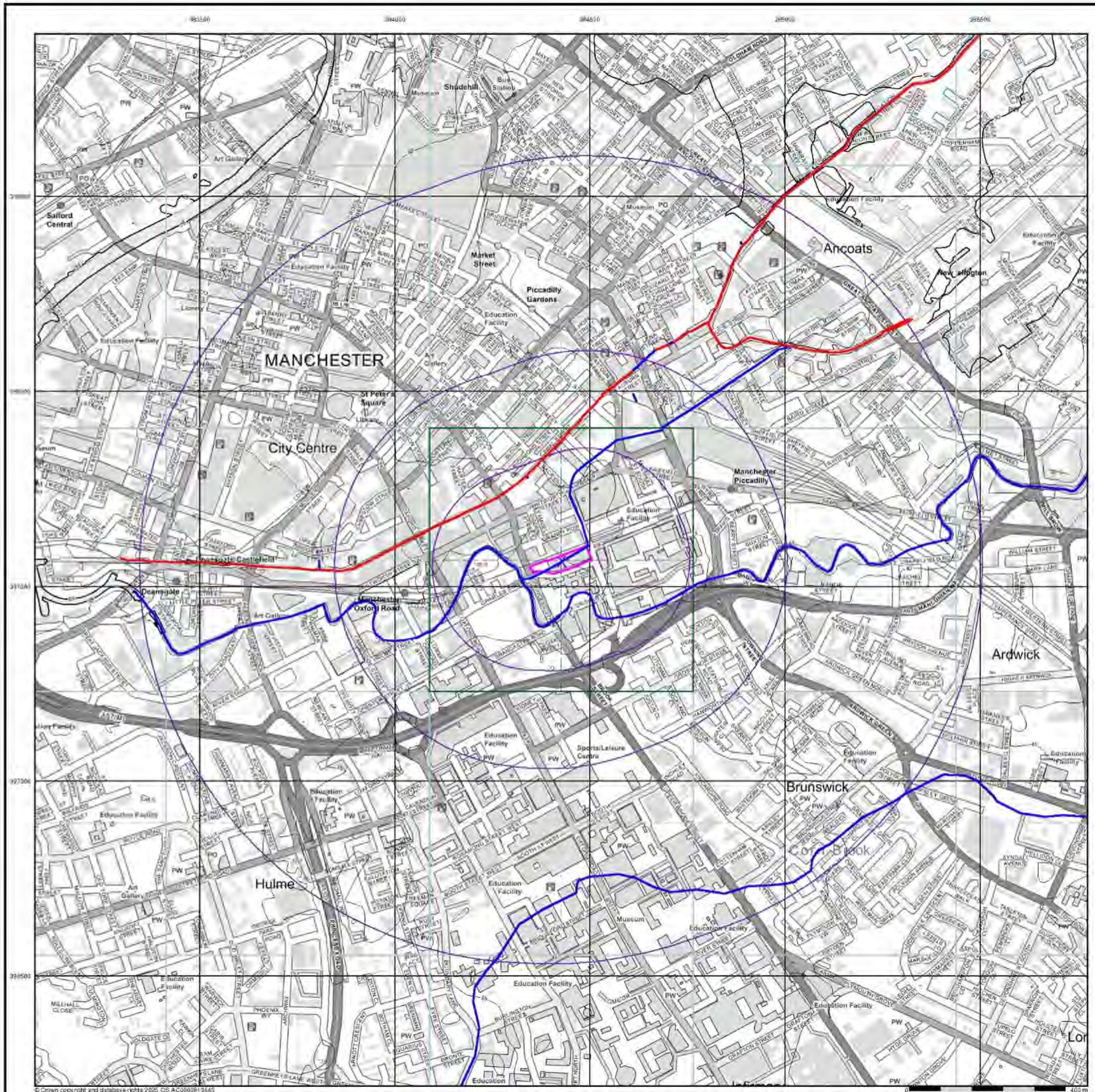


Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	1000

Site Details

Site at 384426,397568



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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

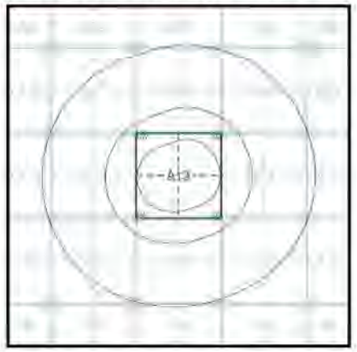
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

OS Water Network Map - Slice A



Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	1000

Site Details

Site at 384426,397568

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Web: www.envirocheck.co.uk



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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Risk of Flooding from Surface Water

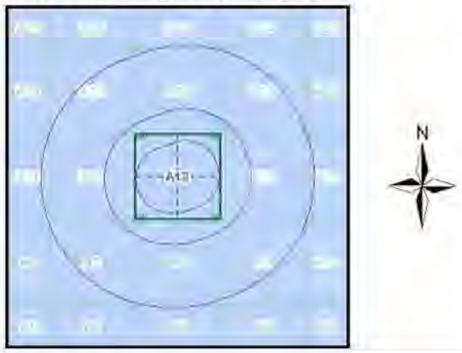
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



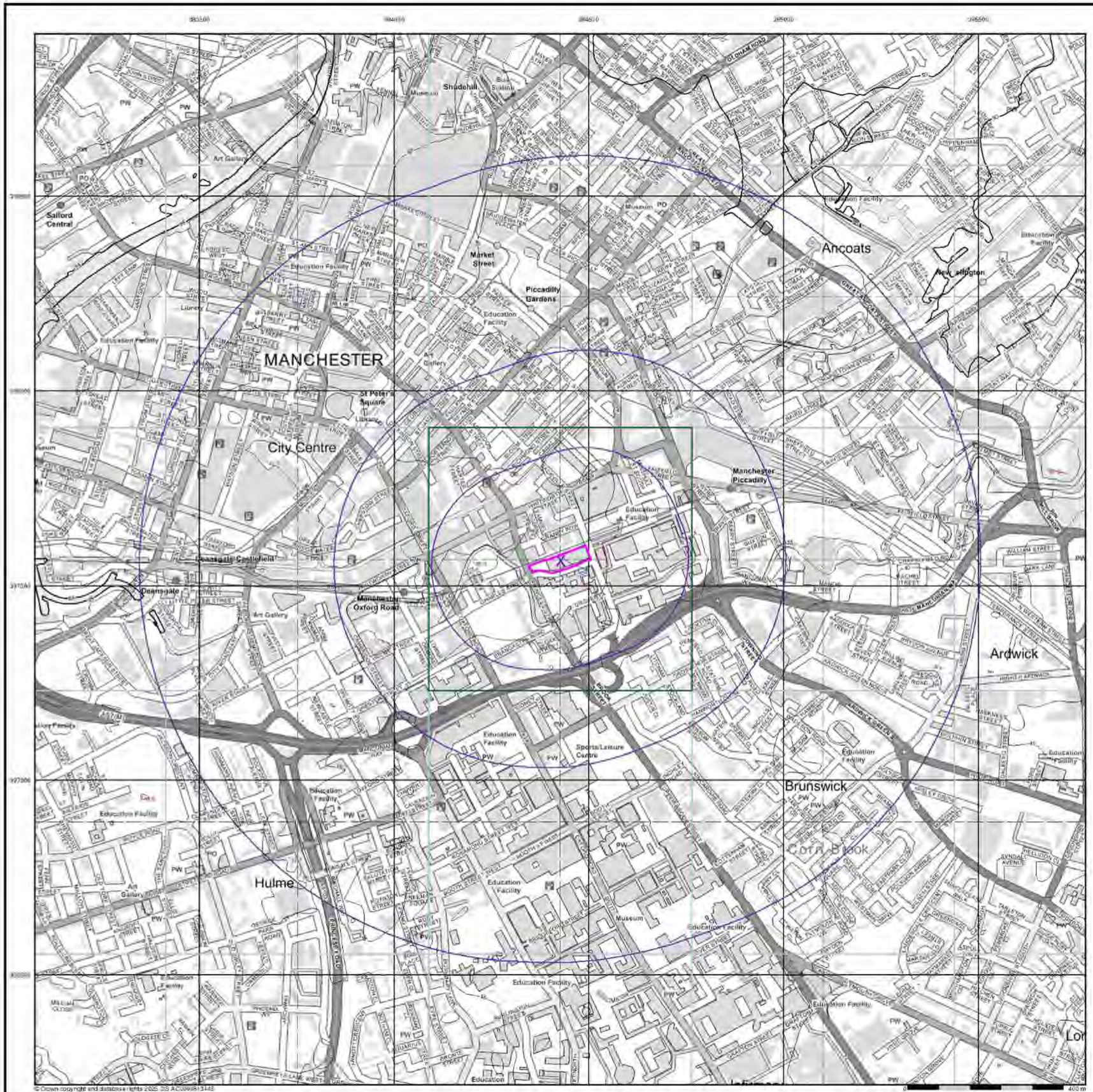
Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	1000

Site Details

Site at 384426,397568

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Web: www.envirocheck.co.uk



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WFD Surface Waters Map

General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

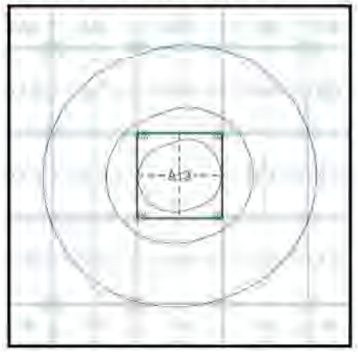
Water Framework Directive - Surface Water Quality

- High
- Good
- Moderate
- Poor
- Bad

Contours (height in metres)

Standard Contour
Master Contour
Spot Height
MLW Mean Low Water
MHW Mean High Water

WFD Surface Waters Map - Slice A



Order Details

Order Number:	380510101_1_1
Customer Ref:	7356
National Grid Reference:	384430, 397560
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	1000

Site Details

Site at 384426,397568

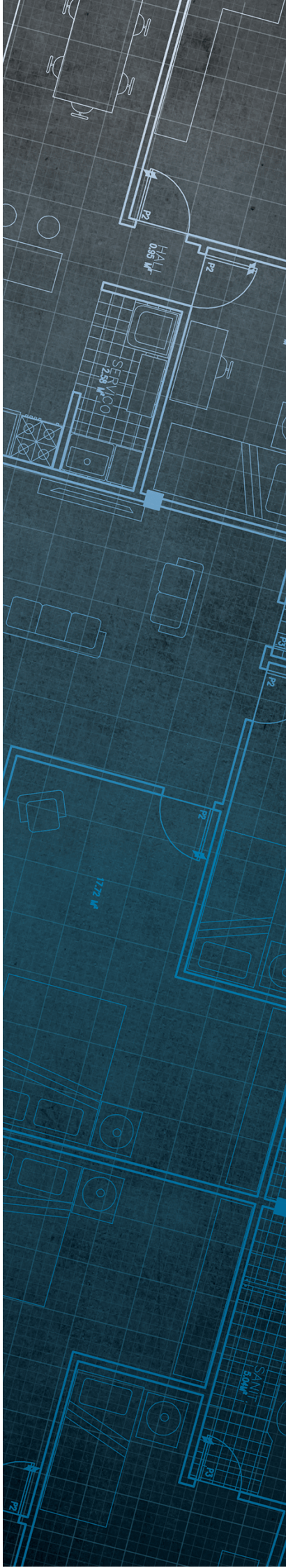
The Coal Authority

Consultants

Coal Mining Report

Orient House
Granby Row
Manchester
Greater Manchester

Date of enquiry:	**2 July 2025**
Date enquiry received:	**2 July 2025**
Issue date:	**2 July 2025**
Our reference:	**51003509281001**
Your reference:	**380510101_2**



Consultants
Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

NLIS Hub

Enquiry address

Orient House
Granby Row
Manchester
Greater Manchester



Approximate position of property

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How to contact us

0345 762 6848 (UK)
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200 Lichfield Lane
Mansfield
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NG18 4RG

www.groundstability.com

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/company/the-coal-authority
/thecoalauthority
/thecoalauthority

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Section 1 – Mining activity and geology

Past underground mining
No past mining recorded.

Probable unrecorded shallow workings
None.

Spine roadways at shallow depth
No spine roadway recorded at shallow depth.

Mine entries
None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers
None available.

Outcrops
No outcrops recorded.

Geological faults, fissures and breaklines
No faults, fissures or breaklines recorded.

Opencast mines
None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips
None recorded within 500 metres of the enquiry boundary.

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Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations
None recorded within 50 metres of the enquiry boundary.

Remediated sites
None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas
None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes
None recorded within 500 metres of the enquiry boundary.

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Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

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Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within 500m of the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

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Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

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Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded.

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Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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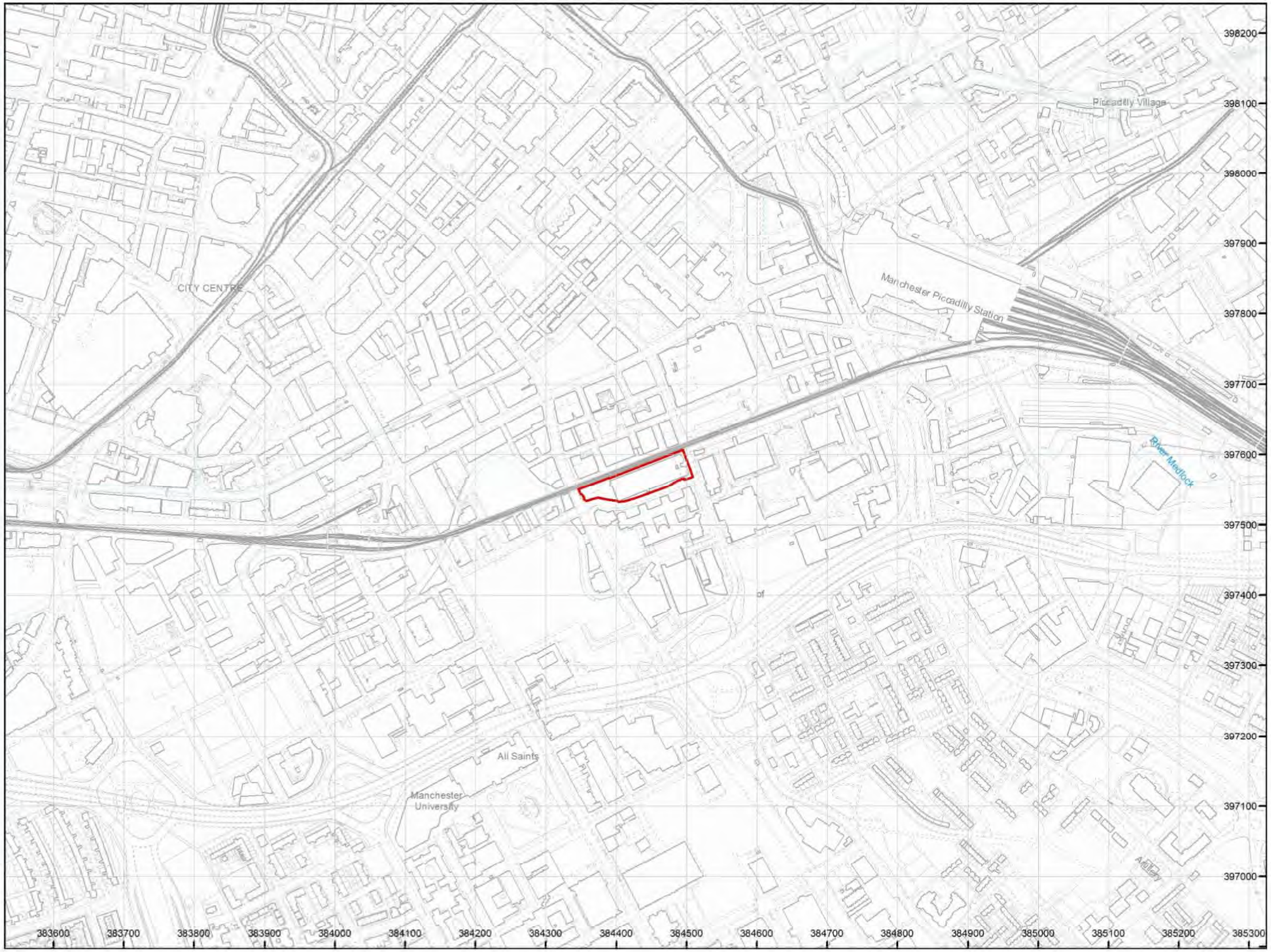
Summary of findings

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The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown



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www.groundstability.com

British Geological Survey

BGS ID: 1043693 : BGS Reference: SJ89NW1499
British National Grid (27700) : 384510,397600

MANCHESTER CITY COUNCIL

CITY ENGINEER AND SURVEYORS DEPARTMENT

SJ89NW 8451 9760 1499

INVESTIGATION FOR	Main Drainage	DATE COMMENCED	24.7.85.
TION	Sackville Street REF:	BORING METHOD	Cable Percussive
HOLE No.	3 (Sheet 1 of 2)	BORING DIAMETER	150 mm.
REFERENCE		SCALE:	1:50 approx.

E	CASING DEPTH (m)	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW GL	Reduced Level	DESCRIPTION	No. and Type of Sample	SAMPLE DEPTH PENETRATION From	To	No. of Blows
			0.05		Bituminous Surfacing				
			0.15		Setts				
			0.30		Concrete				
					Clayey ashes, cinders, brick pieces, sand, stones soft and firm silty and sandy CLAY Made Ground	D1	0.5		
						D2	1.25		
						P3	1.65	1.95	6
						D4	2.10		
						P5	2.65	2.95	8
						D6	3.10		
						P7	3.65	3.95	4
						D8	4.2		
						P9	4.65	4.95	8
						D10	5.20		
						P11	5.65	5.95	8
						D12	6.10		
			6.40						
			7.20		Medium dense silty and gravelly SAND	P13	6.75	7.05	24

OBSERVATIONS DURING BORING

OF ENTRY	ESTIMATED SEE PAGE	STANDING LEVEL (m)	DEPTH OF CASING WHEN SEALED (m)
ed			

WATER LEVEL IN CASED/UNCASED BOREHOLE ON COMPLETION

DATE	WATER LEVEL	DEPTH OF CASING

REMARKS: -

E TEST KEY

D – DISTURBED SAMPLE
B – BULK SAMPLE
U – UNDISTURBED SAMPLE
P – SPT SAMPLE
W – WATER SAMPLE

WHERE FULL 0.3 PENETRATION HAS NOT BEEN ACHIEVED, THE NUMBER OF BLOWS FOR THE QUOTED PENETRATION IS GIVEN (NOT N – VALUE)

PTHS AND REDUCED LEVELS IN (m) UNLESS OTHERWISE STATED

KS

Trial hole excavated to 1.50m below ground level
* SPT sample P16 proved 69 blows for 115mm within the initial 150MM penetration.

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British Geological Survey

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SJ89NW

1499

MANCHESTER CITY COUNCIL

CITY ENGINEER AND SURVEYORS DEPARTMENT

NVESTIGATION FOR	Main Drainage	DATE COMMENCED	24.7.85.
TION	Sackville Street REF:	BORING METHOD	Cable Percussive
HOLE No.	3(sheet 2 of 2)	BORING DIAMETER	150 MM
REFERENCE		SCALE:	1:50 approx.

E	CASING DEPTH (m)	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW GL	Reduced Level	DESCRIPTION	No. and Type of Sample	SAMPLE DEPTH PENETRATION From	SAMPLE DEPTH PENETRATION To	No. of Blows	Legend
					Medium dense to dense red/brown fine/medium grained SANDSTONE	B14 P15 P16	7.2 7.65 8.0	7.5 7.95 8.12	 27 69*	
85.	8.0	Dry	8.12							

OBSERVATIONS DURING BORING

OF NTRY	ESTIMATED SEE PAGE	STANDING LEVEL (m)	DEPTH OF CASING WHEN SEALED (m)

WATER LEVEL IN CASED/UNCASED BOREHOLE ON COMPLETION

DATE	WATER LEVEL	DEPTH OF CASING

REMARKS:

TEST KEY

D – DISTURBED SAMPLE B – BULK SAMPLE U – UNDISTURBED SAMPLE
P – SPT SAMPLE W – WATER SAMPLE

HERE FULL 0.3 PENETRATION HAS NOT BEEN ACHIEVED, THE NUMBER OF BLOWS FOR THE QUOTED ENETRATION IS GIVEN (NOT N – VALUE)

THS AND REDUCED LEVELS IN (m) UNLESS OTHERWISE STATED

S

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British Geological Survey

BGS ID: 1043694 : BGS Reference: SJ89NW1500
British National Grid (27700) : 384520,397530

ENGINEER AND SURVEYORS DEPARTMENT

SJ89NW

INVESTIGATION FOR	Main Drainage	DATE COMMENCED	23.7.85. 8452 9753
TION	Sackville Street REF:	BORING METHOD	Cable Percussive
HOLE No.	4	BORING DIAMETER	150MM 1500
REFERENCE		SCALE:	1:50 approx.

E	CASING DEPTH (m)	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW GL	Reduced Level	DESCRIPTION	No. and Type of Sample	SAMPLE DEPTH PENETRATION From	To	No. of Blows	Legen
			0.1		Bituminous Surfacing					
			0.3		Concrete					
					Soft and firm silty and sandy CLAY, ashes, sand, brick pieces etc. Made Ground	D1	0.5			
						P2	1.35	1.65	6	
						D3	1.8			
						P4	2.35	2.65	5	
						D5	2.90			
						U6	3.0	3.45		
						D7	4.0			
						P8	4.15	4.45	4	
						D9	4.8			
						P10	5.15	5.45	4	
						D11	5.7			
						P12	5.8	6.25	4	
35	5.80	Dry	6.25							

OBSERVATIONS DURING BORING

OF ENTRY	ESTIMATED SEE PAGE	STANDING LEVEL (m)	DEPTH OF CASING WHEN SEALED (m)

WATER LEVEL IN CASED/UNCASED BOREHOLE ON COMPLETION

DATE	WATER LEVEL	DEPTH OF CASING

REMARKS:-

TEST KEY

D – DISTURBED SAMPLE B – BULK SAMPLE U – UNDISTURBED SAMPLE
P – SPT SAMPLE W – WATER SAMPLE

HERE FULL 0.3 PENETRATION HAS NOT BEEN ACHIEVED, THE NUMBER OF BLOWS FOR THE QUOTED ENETRATION IS GIVEN (NOT N – VALUE)

THS AND REDUCED LEVELS IN (m) UNLESS OTHERWISE STATED

KS

Trial hole excavated to 1.20m below ground level

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BGS ID: 1045814 : BGS Reference: SJ89NW3620
British National Grid (27700) : 384430,397630

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CITY ENGINEER AND SURVEYORS DEPARTMENT

SJ89NW3620
8443 9763

SITE INVESTIGATION FOR	MAIN DRAINAGE	DATE COMMENCED	7/12/83
LOCATION	GRANBY ROW REF:	BORING METHOD	S.S Multi-Drill
BOREHOLE No.	3 (Sheet 1 of 2)	BORING DIAMETER	150 mm
GRID REFERENCE		SCALE:	1:50 approx.

DATE	CASING DEPTH (m)	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW GL	Reduced Level	DESCRIPTION	No. and Type of Sample	SAMPLE DEPTH PENETRATION From	To	No. of Blows	Legend
7/12/83			0.05		Bituminous surfacing					
			0.20		Setts					
					Topsoil, brick pieces, clay, ashes etc - Made Ground	D1	0.5			
						D2	1.0			
						P1	1.35	1.65	7	
						D3	1.80			
						P2	2.35	2.65	3	
						D4	2.70			
						P3	3.35	3.65	3	
						D5	3.80			
			3.90		Soft brown silty clay with sand lenses, stone & coal inclusions	D6	4.0			
			4.20		Very dense brown sandy GRAVEL	U1	4.2	4.65		
			5.0			P4	4.95	5.25	33	
					Very dense brown SAND and GRAVEL	B2	5.40			
						P5	5.90	6.09	50	
						B3	6.40			
			6.60							

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WATER OBSERVATIONS DURING BORING

DEPTH OF WATER ENTRY (m)	ESTIMATED SEE PAGE	STANDING LEVEL (m)	DEPTH OF CASING WHEN SEALED (m)
None			

WATER LEVEL IN CASED/UNCASED BOREHOLE ON COMPLETION

DATE	WATER LEVEL	DEPTH OF CASING

REMARKS:-

SAMPLE TEST KEY

D – DISTURBED SAMPLE
P – SPT SAMPLE
B – BULK SAMPLE
W – WATER SAMPLE
U – UNDISTURBED SAMPLE

NOTE: WHERE FULL 0.3 PENETRATION HAS NOT BEEN ACHIEVED, THE NUMBER OF BLOWS FOR THE QUOTED PENETRATION IS GIVEN (NOT N – VALUE)

ALL DEPTHS AND REDUCED LEVELS IN (m) UNLESS OTHERWISE STATED

REMARKS

Trial hole excavated to 1.2 m below ground level. Borehole backfilled on completion, no overnight standing water level observed. SPT sample P5 recorded 50 blows for 150 mm penetration including the initial 150 mm.

M/c 5931

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British Geological Survey

BGS ID: 1045814 : BGS Reference: SJ89NW3620
British National Grid (27700) : 384430,397630

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CITY ENGINEER AND SURVEYORS DEPARTMENT

SJ89NW3620

SITE INVESTIGATION FOR	MAIN DRAINAGE	DATE COMMENCED	7/12/83
LOCATION	GRANBY ROW REF:	BORING METHOD	S.S Multi-Drill
BOREHOLE No.	3 (sheet 2of 2)	BORING DIAMETER	150 mm
GRID REFERENCE		SCALE:	1:50 approx.

DATE	CASING DEPTH (m)	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW GL	Reduced Level	DESCRIPTION	No. and Type of Sample	SAMPLE DEPTH PENETRATION From	To	No. of Blows	Legend
					Very dense red/brown silty fine/MEDIUM grained	P6	6.7	6.9	50	
						D7	7.4			
						P7	7.9	8.75	50	
7/12/83	7.50	Dry			SAND	D8	8.40			
8/12/83		Dry			(Weathered SANDSTONE)	P8	8.7	8.85	50	
						D9	9.0			
						P9	9.3	9.425	50	
12/83	9.0	Dry	9.425							

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WATER OBSERVATIONS DURING BORING

DEPTH OF WATER ENTRY (m)	ESTIMATED SEE PAGE	STANDING LEVEL (m)	DEPTH OF CASING WHEN SEALED (m)

WATER LEVEL IN CASED/UNCASED BOREHOLE ON COMPLETION

DATE	WATER LEVEL	DEPTH OF CASING

REMARKS:–

SAMPLE TEST KEY

D – DISTURBED SAMPLE
P – SPT SAMPLE
B – BULK SAMPLE
W – WATER SAMPLE
U – UNDISTURBED SAMPLE

NOTE: WHERE FULL 0.3 PENETRATION HAS NOT BEEN ACHIEVED, THE NUMBER OF BLOWS FOR THE QUOTED PENETRATION IS GIVEN (NOT N – VALUE)

ALL DEPTHS AND REDUCED LEVELS IN (m) UNLESS OTHERWISE STATED

REMARKS

SPT sample P6 recorded 50 blows for 200 mm penetration including the initial 150mm penetrati
SPT sample P7 recorded 50 blows for 175 mm penetration including the initial 150mm penetrati
SPT sample P8 recorded 50 blows for 150 mm penetration within the initial 150mm penetratio
SPT sample P9 recorded 50 blows for 125 mm penetration within the initial 150 mm penetrati

M/c 5931

Contact BGS: ngdc@bgs.ac.uk

Appendix 8 – ID Manchester Preliminary Ground Investigation Interpretive Report and Final Factual Report

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 1

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I·D MANCHESTER

Preliminary Ground Investigation Interpretive Report

&

Final Factual Report

June 2020

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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 2

Preliminary Ground Investigation Interpretive Report (Arup)

The following report was commissioned by The University of Manchester and undertaken by Ove Arup and Partners Ltd (Arup), to assist in assessing the feasibility of redeveloping part of their university campus, formerly North Campus, now called ID Manchester.

The intrusive fieldwork was undertaken by AEG and is presented in the *Final Factual Report* at the rear of the document.

Prior to undertaking this Preliminary Ground Investigations Study, Arup carried out a desk-based review of the ground conditions and site history (this report is also available via the data room, titled *Ground Conditions Desk Study*) which identified a number of possible below ground constraints which have the potential to impact future redevelopment of the site. In particular the following were identified as warranting further investigation to help quantify the level of risk:

- Potential for unexploded ordnance (UXO);
- Presence of buried obstructions;
- Former channel of the River Medlock with potential for voids and soft ground;
- Shallow rockhead;
- Tunnels (specifically the BT tunnel);
- Potential contamination associated with past industry (specifically chemical and oil works with a higher contamination potential); and
- Retaining structures

This Preliminary Ground Investigations Interpretive Report was designed to target specific features (as above) to provide data to better quantify the level of risk to the expected activities associated with redevelopment on the site.

Final Factual Report (AEG)

The Final Factual Report is provided at the rear of this document and details the intrusive fieldwork undertaken by Allied Exploration and Geotechnics (AEG), designed and supervised by Arup. The investigation targeted specific below ground features across the Site and comprised:

- Seventeen boreholes;
- Three trial pits;
- Four horizontal cores;
- Thirteen monitoring installations;
- Geoenvironmental and geotechnical testing; and
- Gas and groundwater monitoring.

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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 3

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The University of Manchester

ID Manchester

Preliminary Ground Investigation Interpretive Report

UNMC-ARUP-ZZ-XX-RP-CG-0004

Issue 2 | 16 April 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 265190-00

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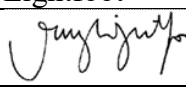
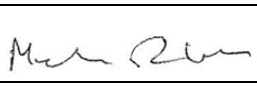
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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 4

Document verification

ARUP

Job title		ID Manchester			**Job number** 265190-00
Document title		Preliminary Ground Investigation Interpretive Report			**File reference** 04-05-11
Document ref		UNMC-ARUP-ZZ-XX-RP-CG-0004			
Revision	**Date**	**Filename**	Preliminary GI Report Draft Issue.docx		
Issue 1	29 Jan 2020	**Description**	Interim Issue: Monitoring works are ongoing and the relevant sections are to be updated in a subsequent revision		
			Prepared by	Checked by	Approved by
		Name	Jordan Weddepohl	Mark Griffiths / Lee Jordan / Jenny Lightfoot	Jane Collins
		Signature			
Issue 2	16 April 2020	**Filename**	Preliminary GI Report Issue 2.docx		
		Description	Final issue of Preliminary GI Report including completed groundwater and gas monitoring data		
			Prepared by	Checked by	Approved by
		Name	Jordan Weddepohl	Mark Griffiths / Lee Jordan / Jenny Lightfoot	Michael Wilton
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
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		Signature			
		Filename			
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		Signature			

Issue Document verification with document ✓

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Chemically Aggressive Ground Assessment

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HazWasteOnline Waste Assessment

Appendix H

Geotechnical Laboratory Data and Plots

Appendix I

Preliminary Ground Investigation Rationale

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Executive Summary

The ID Manchester site is part of the University of Manchester's estate. The site occupies around 11.8ha and is located in the centre of Manchester, southwest of Manchester Piccadilly rail station. The site had an industrial past prior to being cleared and redeveloped into the University campus which began in the 1960s.

Arup undertook a desk-based review of the ground conditions and site history which identified a number of possible below ground constraints which have the potential to impact future redevelopment of the site. In particular the following were identified as some of the potentially higher risk items compared to others and warranted further investigation to help quantify the level of risk:

- Potential for unexploded ordnance (UXO);
- Presence of buried obstructions;
- Former channel of the River Medlock with potential for voids and soft ground;
- Shallow rockhead;
- Tunnels (specifically the BT tunnel);
- Potential contamination associated with past industry (specifically chemical and oil works with a higher contamination potential); and
- Retaining structures.

Supplemental surveys and investigations were recommended to better define the risk posed by some of these below ground constraints. This included UXO risk assessment, a preliminary intrusive ground investigation (Preliminary GI), and additional desk study incorporating past ground investigation data provided by the University.

The table below provides a summary of the below ground constraints investigated as part of this study and the revised assessment of the hazard based on the findings of the additional assessments.

The Preliminary GI was designed to target specific features (see above) to provide data to better quantify the level of risk to the expected activities associated with redevelopment on the site. The investigation was constrained by the presence of existing operational buildings. In addition, the exact form of the development and building positions isn't defined at this stage. Given these points, further ground investigation will be needed in the future to provide an appropriate level of detail for earthworks design, foundation design, environmental risk assessment and discharge of associated ground related planning conditions. Given the site is heavily constrained by existing buildings and infrastructure it is probable that further ground investigation will need to be undertaken in phases as and when parcels of land become available for development.

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Hazard/ constraint	Description of hazard/ constraint	Development or construction activity	Assessment of hazard
UXO	A more detailed UXO risk assessment has concluded that some areas of the site are low risk with the central and southern areas only considered to be a moderate risk.	Piling or ground investigation	Zetica has recommended UXB detection in boreholes/ piles in moderate risk areas
		Earthworks/ excavations	Zetica has recommended UXO awareness briefings for shallow excavations in moderate risk areas
Buried obstructions	Former structures associated with past development and boulder sized obstructions of concrete and former brick structures may cause problems with activities such as piling, earthworks and temporary works. The ground investigation encountered concrete obstructions, intact brick walls as well as large brick and concrete within made ground.	Piling or ground investigation	Buried obstructions may restrict certain piling methods, such as driven or CFA piles, without prior removal of these obstructions.
		Earthworks/ excavations	Excavations may become unstable if ripping out large slabs and brick walls and may result in delays in earthworks whilst features are broken out, particularly if these obstructions extend below parts of the site that will remain operational. These brick and concrete structures are likely to form a suitable engineering material following their removal and processing.
Former channel of the River Medlock	The depth, composition of fill and presence of associated structures was previously unknown. The Preliminary GI found that the base of the River Medlock extends to the infill material and is compositionally similar to surrounding made ground, and no voids were encountered. The base of the river was found to be between 6.3 to 8.9mbgl (25.3 to 27.8mOD). No bridge structures over the former river were encountered.	Earthworks/ excavations	The material within the former channel of the River Medlock is likely to be suitable for use as an engineering fill but will require selection/processing and controlled backfilling. Buried structures associated with the former River Medlock may cause problems with earthworks - see buried obstructions above
		External works	Ground improvement is unlikely to be required for external areas but will need further validation through future phases of ground investigation.
		Foundations	For foundations to low rise structures it may be practical to undertake earthworks to remove obstructions and produce platforms with a suitable bearing capacity. However, if this is not possible then piling would be required and any risks associated with obstructions would need to be mitigated.
Shallow rockhead	Rockhead is generally shallow and was typically encountered between 5 and 6mbgl (28 to 30mOD).	Piling	At these depths shallow (c. 10m) piled foundations are likely the most suitable foundation solution. Ground improvement (eg using vibro stone columns) could be considered in areas where the obstruction risks and proposed loading are relatively low.

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Hazard/ constraint	Description of hazard/ constraint	Development or construction activity	Assessment of hazard
		Earthworks/ excavations	The uppermost sandstone (to circa 6m below rockhead) is highly weathered and is unlikely to require specialist excavation or blasting equipment to excavate within the uppermost 6m. The sandstone strength increases with depth and further assessment will be needed for deeper excavations.
BT Tunnel	The BT Tunnel is located beneath the site with associated restrictions regarding adjacent construction or over the tunnel. Boreholes positioned near the BT tunnel determined the rockhead ranged between 25.9 and 33.4mOD. The top of tunnel is around 6.5mOD. A single borehole investigating deeper rock found that the sandstone becomes stronger and less weathered with depth.	Masterplan	Future proposals to build over and adjacent to the tunnel will need to take cognisance of the restrictions placed by the owner of this asset (See section 5.6). If build over is required as part of the masterplan, it may be necessary to limit the magnitude of loading to accommodate these requirements or utilise foundations which transfer load below it.
		Piling	Further to the above points, vibration, additional loading, and clearance restrictions which accompany the BT Tunnel may influence which piling techniques are appropriate.
Contamination	The site has an industrial heritage and multiple sources of contamination were identified from historical maps. These include: The Ardwick Bridge Chemical Works and other chemical works; the Medlock Oil Works; other previous industrial activities (wood, iron, soap works, mills, and garages); and the former River Medlock and other infilled associated features.	Earthworks	Soils tested detected only a single, marginal, exceedance of lead (out of 49 lead tests) in borehole DS002. This sample was located within the footprint of the former chemical works). Asbestos was identified in 8 of 51 samples. Based on the findings of this Preliminary GI it is likely that a significant proportion of the site soils will be suitable for re-use with the development below a cover system (ie building slab, or hard and soft landscaping). Further investigation will be required to confirm this conclusion. Planning permission is likely to require a remediation strategy outlining the clean cover proposals and validation strategy as well as careful management of earthworks to minimise cross contamination and a verification report.
		Waste	If there is no opportunity to re-use site soils, or for logistical reasons it is not possible (e.g. limited land for storage), then the soil material will become a waste and will require appropriate transfer to a waste processing facility or disposal at landfill. Based on the findings of this Preliminary GI it is likely that a significant proportion of waste soils would be classified as non-hazardous waste. Further testing is required to determine if the material would be acceptable for disposal at an inert landfill.

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Hazard/ constraint	Description of hazard/ constraint	Development or construction activity	Assessment of hazard
		Groundwater remediation	Groundwater samples were collected from six locations. No extensive or gross contamination of groundwater has been identified. However locally elevated lead and cyanide and several other contaminants were identified. Whilst it is considered that extensive groundwater remediation will not be required to mitigate the risks to controlled waters, further sampling and assessment of the contaminants noted above is recommended to confirm concentrations and inform further risk assessment. Notwithstanding this assessment, it is likely that any piling works would require the completion of a Foundation Works Risk Assessment to satisfy planning conditions.
		Buildings	Across the site, ground gas levels were found to be consistent with CS1. No special precautions or protective measures are required for sites characterised as CS1.
Retaining structures		Earthworks/ excavations	Historical retaining structures may restrict certain piling methods, such as driven or CFA piles, and would require either avoidance of the pile groupings or prior removal. If these materials are removed then they could be crushed/processed to form a high quality engineering fill for reuse. However, the removal of any buried obstructions should be undertaken in a way that mitigates the undermining and destabilisation of adjacent properties and utilities.

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1 Introduction

Ove Arup and Partners Ltd (Arup) has been commissioned by CBRE on behalf of the University of Manchester to provide further assessment of the ground conditions at ID Manchester[1] (the Site). The assessments presented in this report focus on ground conditions identified through desk study and constraints identification which are generally atypical of Manchester brownfield sites. Further detail is presented within the Arup (2019) Geotechnical Desk Study [1] and should be read in conjunction with this report. The following features were identified in the desk study as specifically warranting further early investigation and assessment:

- Buried obstructions;
- Former channel of the River Medlock with potential for voids and soft ground;
- Tunnels (specifically the BT tunnel);
- Shallow rockhead;
- Potential contamination associated with past industry (specifically chemical and oil works with a higher contamination potential);
- Potential for UXO; and
- Old retaining structures.

This report builds upon the desk study work through a combination of additional archive data, desk-based assessments and intrusive investigations at the site. The ground conditions have been re-assessed and the level of risk re-evaluated based on these additional sources of data and information.

It should be noted that the extent of intrusive investigation was relatively limited and was focussed on specific high-risk items identified in the desk study. Supplementary intrusive investigation will be needed on a plot by plot basis once the form of each development and the specific requirements are known.

[1] previously referred to as the North Campus

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2 Additional surveys and data

This section provides a summary of the surveys and data that has been acquired since issue of the Arup Geotechnical Desk Study [1]. The additional data includes a combination of archive data provided by the University of Manchester as well as surveys commissioned in line with recommendations made in the desk study.

2.1 Unexploded Ordnance

Zetica Ltd (Zetica) was commissioned to prepare a UXO desk study and risk assessment for the Site. Zetica concluded that the central and southern parts of the site are classified as moderate risk for UXO [2]. Bomb strikes have been recorded in these areas, and there is a moderate risk for UXO for deep excavations (>1mbgl) and boreholes/piling. The remainder of the site was classified as low risk. The UXO risk zoning is shown in **Figure 2.1**.



Figure 2.1: Zetica UXO risk map

In moderate risk zones, Zetica recommended UXO awareness briefings for shallow ground works (such as excavations or trial pits) and deep UXB detection during construction of boreholes and piles. In low risk areas, a UXO awareness briefing may be provided however isn't required. Further details are presented in the Zetica report which is included in **Appendix A**.

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2.2 Ecological constraints assessment

An ecological constraints assessment was undertaken by Arup in September 2019 to support the Preliminary GI (see Section 3) for the site. This assessment is presented in **Appendix B**.

The assessment identified some ecologically valued features such as trees and scrub. These features have significance during the breeding bird season (March – August) and an ecologist should be consulted if works are to be carried out during this period. If trees are felled, they should be replaced at a ratio of 2:1. Prior to development a Preliminary Ecological Appraisal (PEA) should be undertaken.

2.3 Ground investigation data

The University of Manchester commissioned a targeted intrusive ground investigation designed specifically to provide data on some of the abnormal ground conditions identified in the Arup Geotechnical Desk Study. This ground investigation has been termed the Preliminary Ground Investigation (Preliminary GI). The Preliminary GI has been supplemented by ground investigation data for nearby University of Manchester sites:

- Geotechnics (2015); and
- Constructive Evaluation (2015).

Details of these investigations are briefly described below, and details of the Preliminary GI are expanded upon in **Section 3**.

A plan showing the investigation hole locations is presented below in **Figure 2.2**, and in **Drawing UNMC-ARUP-ZZ-XX-DR-CG-1001**.

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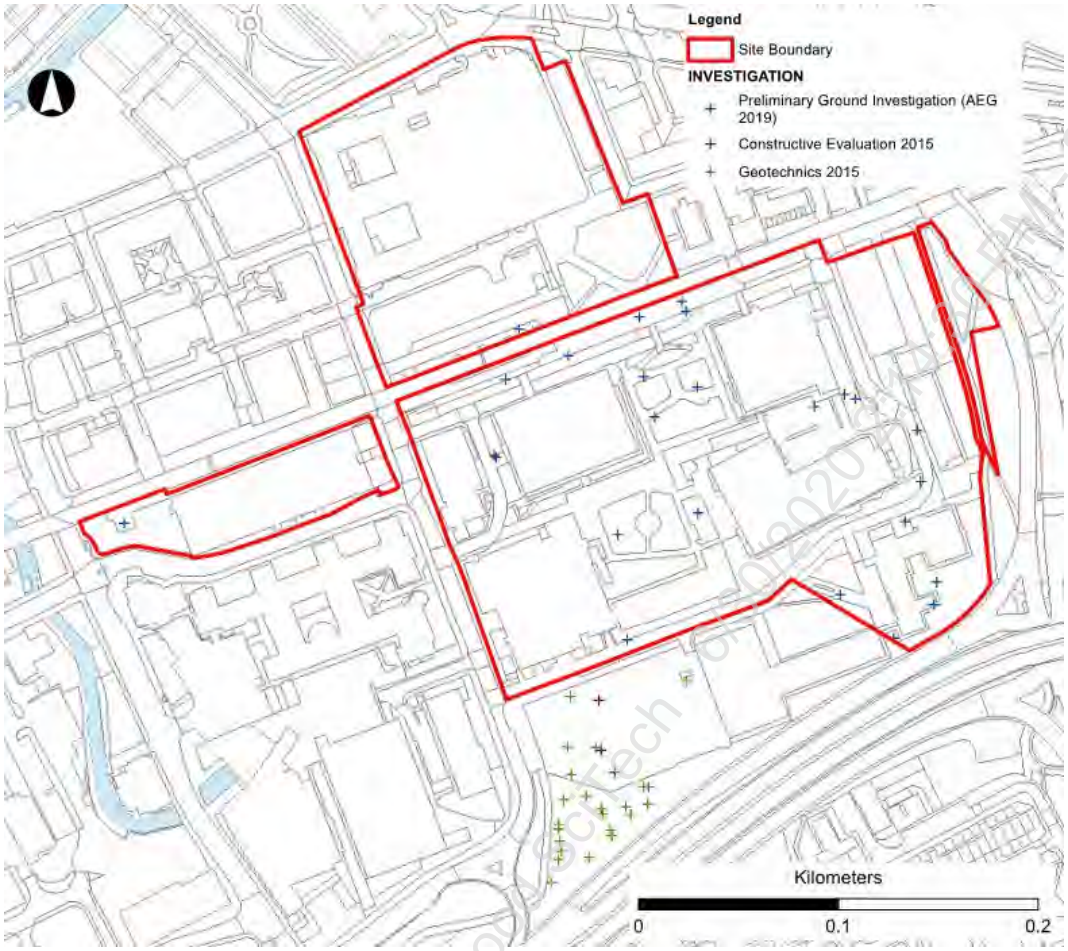


Figure 2.2: Ground investigation locations (**Drawing UNMC-ARUP-ZZ-XX-DR-CG-1001**)

2.3.1 Geotechnics, 2015

Geotechnics undertook a ground investigation between 28th April and 12th May 2015 to the south of the site. The investigation comprised:

- Six cable percussive boreholes to a maximum depth of 20.06 mbgl;
- Three window sample holes to a maximum depth of 6.45 mbgl;
- Fourteen trial pits to a maximum depth of 4.1 mbgl, some of which targeted locating the River Medlock culvert;
- Installation of seven monitoring installations;
- Geotechnical testing:
  - 15 No. Water content determination;
  - 16 No. Liquid and plastic limit determination;
  - 17 No. Wet sieving;
  - 6 No. Sedimentation;
  - 12 No. Sulphate analysis and pH determination;
  - 7 No. Dry density/ moisture content and compaction test (4.5kg hammer);
  - 3 No. California bearing ration measurement;
  - 2 No. one-dimensional consolidation test;

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- 2 No. shear strength measurement – 100mm undrained triaxial compaction test;
- Geoenvironmental testing:
  - Asbestos, metals, PAH, BTEX, VOC, SVOC, TPH;
- Gas and groundwater monitoring.

2.3.2 Constructive Evaluation, 2015

Constructive Evaluation undertook intrusive fieldwork between 17th and 18th March 2015 as part of the ground investigation for the Faraday Building, located to the south-west of the site, adjacent the Sackville Street. The ground investigation was undertaken within the building (prior to demolition) and comprised:

- Three vertical concrete cores to a maximum depth of 1.65mbgl (to establish concrete floor thickness);
- Four horizontal cores to a maximum length of 0.66m (to establish external basement wall thickness);
- Three shallow (<1.7mbgl) window sample holes (to assess ground conditions beneath the basement);
- Geotechnical testing:
  - 1 No. Particle size distribution;
  - 2 No. Moisture content testing; and
  - 2 No. Sulphate and pH determination;
- Geoenvironmental testing:
  - Asbestos, metals, PAH, BTEX, TPH.

2.3.3 ID Manchester Preliminary Ground Investigation, 2019

Allied Exploration and Geotechnics (AEG) undertook a ground investigation designed and supervised by Arup. The investigation targeted specific below ground features across the Site and comprised:

- Seventeen boreholes;
- Three trial pits;
- Four horizontal cores;
- Thirteen monitoring installations;
- Geoenvironmental and geotechnical testing; and
- Gas and groundwater monitoring.

Further details of the investigation can be found in **Section 3**.

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3 Preliminary ground investigation

3.1 Objectives and rationale

Arup recommended a ground investigation with a focus on collecting data for below ground features identified at desk study which were considered to have the biggest potential to impact ground related costs. The Preliminary GI was designed to collect data on:

- the depth to bedrock, in particular near to the BT tunnel which has specific requirements relating to construction over or adjacent to it;
- the infill within the former River Medlock;
- potential for contamination within the plots of the former chemical works;
- the material behind the Altrincham Street retaining wall; and
- infiltration potential in parts of the site not underlain by low permeability glacial till.

Further details can be found in the Preliminary GI rational document provided in **Appendix I**.

3.2 Scope of works

At this early stage in the project the scope of this Preliminary GI is considered appropriate to inform scheme design and provide greater understanding of some of the abnormal ground conditions. The ground conditions in between the investigation points could vary significantly. Additional phases of ground investigation will be required in the future to provide specific data for the design and costing of earthworks, foundations and remediation on a plot/ building specific basis.

3.3 Fieldwork

Intrusive fieldwork was undertaken by Allied Exploration and Geotechnics (AEG) between 26th October 2019 and 1st December 2019 and was predominantly carried out on weekends to minimise disruption to the university. The fieldwork was supervised by an Arup engineer.

3.4 Monitoring

Thirteen monitoring wells were installed in boreholes as part of the ground investigation.

3.4.1 Groundwater sampling

Groundwater samples were collected from six of the monitoring installations between 15th and 17th January 2020. A list of these boreholes is presented in

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Table 3.1. Chemical analysis of these samples is presented in the AEG 2020 factual report [7] and assessment of the data in **Section 6**.

Table 3.1: Summary of groundwater sample locations and strata

Borehole ID	Response zone (mbgl)	Strata
BH001	10 – 15.5	Sandstone
BH004	11 – 14	Sandstone
BH005	18.5 – 21.5	Sandstone
BH007	10.6 – 13.6	Sandstone
BH011	10 – 13	Sandstone
BH013	11 – 16.5	Sandstone

3.4.2 Gas and groundwater levels

Gas and groundwater monitoring included two rounds of groundwater monitoring during/ at the end of the intrusive fieldwork and four post fieldwork monitoring rounds. The dates of these monitoring rounds are presented in **Table 3.2**.

Table 3.2: Summary of monitoring rounds

Monitoring Round Number	Date
1	22/11/2019 (groundwater only)
2	03/12/2019 (groundwater only)
3	15/01/2020 - 17/01/2020
4	06/02/2020
5	20/02/2020
6	06/03/2020

The groundwater level data is presented in **Table 3.3**.

Table 3.3: Summary of groundwater level data

Borehole ID	Base of installation (mbgl)	Groundwater level (mbgl)					
		Round 1	Round 2	Round 3	Round 4	Round 5	Round 6
ARP-BH001	15.60	9.47	9.52	9.5	9.73	9.75	9.80
ARP-BH002 (s)	3.10	Wet at tip	Wet at tip	Dry	Dry	Dry	Wet at tip
ARP-BH002 (d)	3.95	Dry	Dry	Dry	Dry	Dry	Wet at tip
ARP-BH004	7.70	5.98	6.01	6.06	6.15	6.20	6.20
ARP-BH004A	4.20	Wet at tip	Wet at tip	Dry	Dry	Wet at tip	Wet at tip

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Borehole ID	Base of installation (mbgl)	Groundwater level (mbgl)					
		Round 1	Round 2	Round 3	Round 4	Round 5	Round 6
ARP-BH005	21.5	N/A	N/A	6.02	5.27	5.30	5.25
ARP-BH007	14.30	6.02	3	6.07	6.27	6.20	6.10
ARP-BH008	6.50	5.32	5.29	Wet at tip	5.51	5.50	5.50
ARP-BH009	1.80	Dry	Dry	Dry	Dry	Dry	Wet at tip
ARP-BH011	13	N/A	5.56	7.4	5.65	5.70	5.60
ARP-BH012A	6.25	5.99	5.98	Wet at tip	5.98	Wet at tip	Wet at tip
ARP-BH013	16.50	5.30	5.33	5.3	5.40	5.40	5.30
ARP-DS001	4	N/A	2.60	Wet at tip	3.17	3.05	3.00
ARP-DS002	10	N/A	5.32	9.7	5.51	5.45	5.40
Notes: N/A – borehole not complete at time of monitoring							

The depth to groundwater ranged from 2.6 to 9.7mbgl, however was typically encountered between 5 and 6mbgl (28 to 30mOD).

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4 Ground conditions

4.1 Ground model

Made ground was encountered in all exploratory holes across the site. Within the centre of the site, the base was typically around 4 to 4.6mbgl. However, deeper areas of made ground were found in the area of the former River Medlock and are inferred to represent infill of the former channel. This material was similar in composition to the other made ground but to a depth of between 6.3 to 8.9mbgl. The made ground was of similar composition to the natural superficial alluvium and glacial till and is likely to include some reworked natural superficial material.

Alluvium was encountered in some exploratory locations in the centre, east, and west of the site. It ranged in composition to a very dense clayey very gravelly sand to a loose medium dense clayey gravelly sand. The top of alluvium strata was found between 1 to 6mbgl and ranged in thickness between 0.2 to 2.7m. The locations where alluvium was encountered coincides with the former River Medlock valley. In several locations within the central areas of the site the alluvium was absent and made ground directly overlies the sandstone bedrock. It is noted that there is some uncertainty relating to the interface between weathered sandstone (see below) and alluvium where the latter is a red/orange sand which has similar properties to weathered sandstone.

Glacial till was encountered in the north of the site (north of the Network Rail viaduct) with a thickness of 4.2 to 7.2m, and in the south of the site with a thickness of 0.2 to 3.2m. Glacial till was absent in the central areas of the site.

The Sherwood Sandstone Group was encountered in all boreholes which fully penetrated superficial deposits with geological rockhead found between 3.1 to 4.6mbgl. Five boreholes (BH001, 04, 07, 11, 13) were rotary drilled 6m into the sandstone bedrock, and BH005 was drilled 18.5m into the bedrock. The upper 0.5 to 3m of the sandstone was recovered as a very dense clayey slightly gravely sand; had no core recovery; and was described as extremely to highly weathered. There is some uncertainty surrounding this rock. It could be interpreted either as an extremely weathered sandstone, or as alluvial deposits of the River Medlock.

Beyond the upper sand layer, the rock was described as a highly weathered weak fine to coarse grained sandstone and had occasional subhorizontal discontinuities and apertures. One borehole, BH005, was drilled to 21.5mbgl to provide data on the deeper sandstone. BH005 identified a weak to medium strong partially weathered sandstone from 14mbgl (19.4mOD), 10.9m below geological rockhead, indicating the weathering profile reduces with depth.

A summary of the ground conditions encountered is provided in **Table 4.1** below.

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Table 4.1: Summary of ground conditions

Stratum	Thickness (range) (m)	Typical thickness	Top of strata (mbgl)	Description and distribution
Made ground (general)	1.5 to 8.9	4 to 4.6	Ground level	Generally described as a clayey, gravelly, sand with clinker, and fragments of pottery, glass and wood. Present across the site, typically to a depth of 4 to 4.6mbgl. However, thicker layers are present associated with the former River Medlock and Altrincham Street retaining wall
Made ground (former Medlock infill)	1.8 to 4.5	2.5 to 4	2.2 to 4.6 (typically 4.6)	Similar composition to the other made ground. Soft to firm brown yellow grey sandy gravelly clay with bands of clayey sandy gravel. Sand and gravel is fine to coarse and includes ash, wood, brick and clinker
Alluvium	0.2 to 2.7	0.5 to 1	1 to 6	Alluvium was found in five locations (BH004, 005, 007, 013, and 014) and generally comprised of dense brown clayey very gravelly sand with subangular to rounded cobbles of sandstone Possible sand deposited by the river
Glacial till	4.2 to 7.2 (in the north) 0.2 to 3.2 (in the south)	5 to 6 (in the north) 0.4 to 1.5 (in the south)	0.5 to 3.8 (in the north) 1.3 to 4 (in the south)	Glacial till was identified in the north of the site to a significant thickness (up to 7.2m thick), and to the south of the site (to 1.5m thick). It was generally described as a stiff to very stiff high strength grey to brown slightly gravelly clay with stone inclusions and occasional sand lenses
Sherwood Sandstone Group	Not proven	Not proven	3.1 to 10.4	Rockhead is generally 3.1 to 4.6mbgl (27.5 to 30mOD) across most of the site. The upper section of the unit (top 6m) is an extremely weak to weak, moderately to highly weathered fine sandstone. The unit likely becomes stronger and more competent with depth and at one location (BH005) the sandstone was found to be a weak to moderately strong, partially weathered, coarse sandstone at 10.9m below rockhead

A summary geological cross section of the anticipated geology is shown in **Figure 4.1**.

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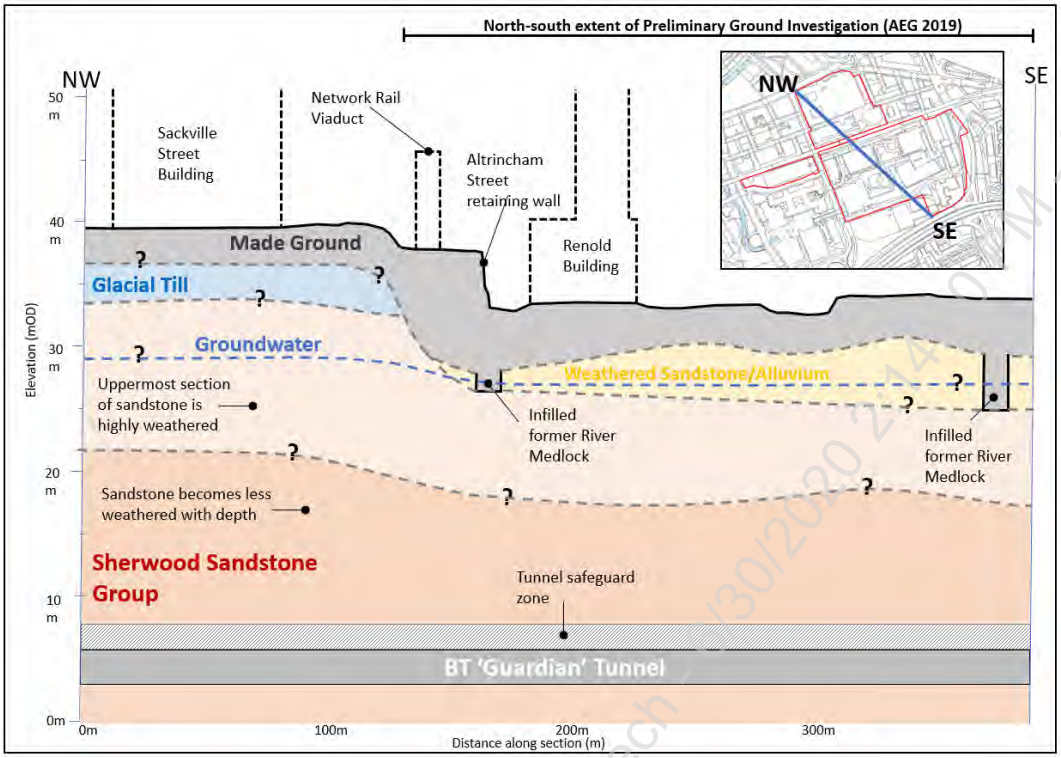


Figure 4.1: Inferred geological cross section NW to SE across the ID Manchester site.

4.2 Made ground

Made ground was encountered in all exploratory holes at the site to a typical depth of 4 to 4.6mbgl (28.6 to 29.6mOD). Locally, at locations BH004, BH007, BH008, DS001, and DS002, made ground was found at deeper depths, between 6.3 to 8.9mbgl (25.3 to 27.8mOD). These boreholes are located on the former River Medlock and the thicker made ground is thought to represent the infilled material of the Medlock. The infill material was found to have a similar composition to the surrounding made ground. BH012A, located north of the Altrincham Street retaining wall, encountered made ground to 10.4mbgl (25.3mOD).

The made ground composition varies but was generally described as a clayey, gravelly, fine to coarse sand. Gravel within the made ground was described as fine to course, subangular to angular and includes sandstone, brick, and limestone. Anthropogenic material within the made ground included fragments of pottery, glass, wood and clinker.

Concrete obstructions were encountered at 1.6mbgl, 1.3mbgl, and 0.7mbgl at BH006, BH006A, and BH006B respectively and are inferred to be linked to a single larger structure. Intact brick structures were encountered in TP002 and DS001 and represent former structures. These obstructions are discussed further in **Section 5.3**.

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4.3 Natural superficial deposits

4.3.1 Alluvium

Material interpreted to represent alluvium was encountered in five locations across the Site between 0.2 and 2.7m thick. At these locations the material was described as a dense brown clayey very gravelly sand with subangular to rounded cobbles of sandstone. It was also occasionally described as a loose medium dense clayey gravelly sand. The material has similarities to weathered sandstone and therefore it is possible that alluvium may have been recorded as weathered sandstone in places.

British Geological Survey (BGS) records indicate alluvium up to 1.2m thick was encountered in historical boreholes within the footprint of the Renold Building.

4.3.2 Glacial till

BGS historical borehole records identified glacial till in the north of the site (north of the Network Rail viaduct). The top of strata was found between 0.5 to 3.8mbgl and ranged in thickness from 4.2 to 7.2m. It was generally described as a very stiff brown silty and sandy clay with grey fissures and stone inclusions with occasional lenses of silt and sand. BH001 and BH012A, which are located near to the Network Rail viaduct did not encounter glacial till.

Glacial till was absent in the centre of the Site in the area indicated to represent the valley of the former River Medlock.

Historic BGS and the 2015 Geotechnics investigation encountered glacial till offsite to the South between 1.3 to 4mbgl and ranged in thickness from 0.4 to 1.5m. It was generally described as a stiff high strength slightly sandy gravelly clay.

4.4 Bedrock

4.4.1 Description

The upper portion of sandstone was found to be highly weathered. In the one borehole (BH005) which was advanced beyond 6m into rockhead, this weathered zone transitioned to a less weathered material from 10.9m below rockhead.

Most boreholes only extended into the upper 6m of the sandstone, within the upper highly weathered section. This rock was described as a very dense red extremely weak to weak and moderately to highly weathered fine-grained sandstone.

BH005 extended 18.4m into the sandstone (21.5mbgl). At 10.9m below geological rockhead the sandstone became a partially weathered weak to medium strong red brown coarse grained sandstone.

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4.4.2 Rockhead

The depth to geological rockhead ranged from 25.1mOD to 33.41mOD (2.4mbgl to 10.4mbgl) and varied as a function of ground elevation. The depths to rockhead identified as part of the 2019 AEG and 2015 Geotechnics investigations closely matched depths presented within the ca. 1960's rockhead contour drawing by CS Allott & Son [6]. Indicative rockhead surface contours have been generated by adapting the Allott & Son rockhead contour plan with more recent ground investigation data. These contour plans are presented in drawings **UNMC-ARUP-ZZ-XX-DR-CG-1002** and **UNMC-ARUP-ZZ-XX-DR-CG-1003**.

The rockhead contours represent the inferred natural variations in geological rockhead. However locally these may be deeper where excavations to form foundations, basements or other structures or where the former River Medlock has incised the bedrock.

4.5 Hydrogeology

4.5.1 General

The superficial glacial till, which can be found to the north and south of the site, is classified as a Secondary Aquifer (Undifferentiated). The superficial alluvium, which can be found in the centre of the site, is classified as a Secondary A aquifer. Secondary Aquifers are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The bedrock geology is classified as a Principal Aquifer. Principal Aquifers are defined as geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale.

The culverted River Medlock runs from east to west and is located between 10 and 65m south of the site.

4.5.2 Infiltration

A single soakaway test was attempted between 1.4 to 2.6mbgl (within made ground) in TP001 but it wasn't possible to fill the pit due to the high infiltration rate (i.e. water drained away quicker than it was introduced). The flow rate of 33 litres per minute was noted.

Hydraulic conductivity was calculated by applying particle size distribution data to published empirical formulae. This was completed using the HydroGeoSieve XL tool [16]. Multiple empirical relationships are suitable for undertaking this assessment, and hence the geometric and arithmetic mean for each results of each relationship were calculated. A summary of the findings is presented in **Table 4.2** below.

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Table 4.2: Summary of estimated hydraulic conductivity of made ground laboratory particle size distribution data

Sample	Geometric mean (m/s)	Arithmetic mean (m/s)
TP001, 0.8mbgl	5.08 x10^{-4}	2.68 x10^{-3}
TP001, 1.5mbgl	3.54 x10^{-3}	1.36 x10^{-2}
TP002, 1mbgl	4.95 x10^{-3}	1.83 x10^{-2}
TP002, 2.5mbgl	8.39 x10^{-3}	3.02 x10^{-2}
TP003, 1mbgl	1.71 x10^{-3}	1.28 x10^{-2}
TP003, 3mbgl	1.25 x10^{-4}	5.45 x10^{-4}

As can be seen from **Table 4.2**, the hydraulic conductivity of made ground ranged by two orders of magnitude from 5.45 x10^{-4} to 1.28x10^{-2} m/s. These values are consistent with published values for unconsolidated silty gravelly sand [17], which also matches soil descriptions of the made ground.

4.5.3 Groundwater levels

The depth to groundwater ranged from 2.6 to 9.7mbgl, however was typically encountered between 5 and 6mbgl (28 to 30mOD). Further details of groundwater levels are presented in **Section 3.4**.

4.6 Evidence of contamination

During the Preliminary GI, a photo ionisation detector (PID) was used to identify volatile compounds. Eighty-six measurements were taken from 19 positions (all boreholes and trial pits). The depth of the measurements ranged from 0.2 to 10mbgl, located primarily within the made ground. PID readings ranged from 0 to 0.4ppmV. These results are very low and infer that no volatile compounds are present.

No visual or olfactory evidence of contamination was encountered on site.

4.7 Typical material properties

In situ and laboratory testing of soils and rock has been undertaken as part of the AEG 2019 Preliminary GI and the Geotechnics and Constructive Evaluation 2015 investigations. It is noted that the Preliminary GI targeted areas of the site with potential for abnormal ground conditions and therefore the results presented in the following sections may not be typical of the wider site.

4.7.1 Soil

Geotechnical testing of soils was undertaken as part of the 2019 and 2015 investigations. A summary of in situ and lab test data is provided in **Table 4.3** below. Further details can be found in the factual report [7].

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Table 4.3: Summary of the geotechnical properties of made ground, alluvium, and glacial till

Stratum	SPT	PSD	MC[#]	Atterberg limits
Made ground	81 No. Range: 3 – 50* Highly variable across the site (See **Figure 005** in **Appendix H**)	32 No. Well distributed particle sizes, consistent with soil descriptions (See **Figure 001** in **Appendix H**)	35 No. Range: 8.3 – 29.2% Typical: 17.3% (See **Figure 007** in **Appendix H**)	12 No. Liquid limit: 15 to 47% Plastic limit: 15 to 24% Plasticity index: 0 to 23% Pass 425µm sieve: 27 to 75% (See **Figure 007** in **Appendix H**)
Alluvium	7 No. Range: 10 – 50* (See **Figure 005** in **Appendix H**)	5 No. Well distributed with larger clasts, consistent with descriptions (See **Figure 002** in **Appendix H**)	5 No. Range: 7.5 to 18.6% Typical: 17.6% (See **Figure 007** in **Appendix H**)	No data
Glacial Till	5 No. 6 – 33 Data from the 2015 Geotechnics investigation (south of site) (See **Figure 005** in **Appendix H**)	2 No. High proportion of clays and silts with some sand and gravels. Consistent with descriptions (See **Figure 003** in **Appendix H**)	No data	No data

[#] Moisture content typical value is the median value

* SPT values denoted with 50* represent refusal. Within 50 blows the SPT tool progressed less than 75mm.

4.7.2 Rock

Cores of the sandstone bedrock were collected from six locations (BH001, BH004, BH005, BH007, BH011, and BH013), however, core recovery was generally low due to the high degree of weathering. Total core recovery and rock quality designation generally increased with depth into the sandstone, this is likely to be a function of the reduced wreathing profile (See **Figure 008** and **Figure 009** in **Appendix H**). Furthermore, of the borehole samples that were recovered, all of them were unsuitable for laboratory testing other than point load and moisture content testing. Only one sample, from horizontal core HC004, was suitable and tested for uniaxial compressive strength (UCS). SPT testing was undertaken in situ. The results of geotechnical tests are presented in **Table 4.4** below.

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Table 4.4: Summary of the geotechnical properties of the sandstone bedrock

Stratum	**SPT**	**UCS[#]**	**PL[#]**	**MC[#]**
Sandstone	78 No. Typical: 50* (in 77 of 78 tests) Single N value of 25 at BH011 (See **Figure 006** in **Appendix H**)	No Data. All core samples tested were either found to be unsuitable or fractured prematurely during the test.	131 No. Range: 0 – 2.5MPa Typical: 0.1MPa	17 No. Range: 9.9 to 19.4% Typical: 15%
* SPT values denoted with 50* represent refusal. Within 50 blows the SPT tool progressed less than 75mm. [#] Obtaining cores for geotechnical testing proved challenging due to the highly weathered and non-cohesive nature of the rock. The samples were only suitable for point load and moisture content tests, and unsuitable for UCS tests.				

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5 Geotechnical considerations

5.1 Introduction

This section updates the high-level assessment of the geotechnical constraints and ground-related hazards at the site to reflect the findings of the additional surveys and investigations. The Preliminary GI aimed to provide further details regarding the River Medlock, Ardwick Bridge Chemical works, and BT Tunnel. Additional data has been obtained, however this was supplementary to the scope of this investigation. This section should be read in conjunction with the Geotechnical Desk Study [1], the geotechnical constraints drawing **UMNC-ARUP-ZZ-XX-DR-CG-0002** and constraints tracker **UMNC-ARUP-ZZ-XX-SH-CG-0018 Rev3**.

5.2 UXO

A preliminary UXO assessment identified a moderate UXO risk across the entire site. As part of the Preliminary GI, Zetica were commissioned to prepare a UXO desk study and risk assessment of the site. The Zetica UXO risk report concluded that some areas of the site are low risk with the central and southern areas only considered to be a moderate risk.

Zetica has recommended UXB detection in boreholes/piles, and UXO awareness briefings for shallow excavations in moderate risk areas. (The Zetica Report is included in **Appendix A.**)

5.3 Buried obstructions

There is a high potential for encountering buried obstructions at the site due to the site development history. Obstructions may include former basements, foundations, walls, utilities and made ground containing demolition rubble and large boulder sized obstructions of concrete and former brick structures [1].

These types of obstructions may affect activities such as piling, excavations and earthworks as well as the design and construction of new retaining structures. Refer to the desk study for further detail [1].

Obstructions were encountered in several of the exploratory holes at the site. The obstructions included very strong concrete in BH006, BH006A and BH006B (likely all linked to a larger structure) as well as intact weak brick walls (e.g. TP001). At DS001 the ground was found to contain lots of bricks. It is considered that these types of observations are generally typical of the wider site.

5.4 Voids

The desk study identified several potential sources of voids within the ground ranging from smaller scale voids resulting from uncontrolled backfill of historical features (such as basements, River Medlock and other water bodies) and larger voids due to incomplete backfill such as below old bridge structures. These voids

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may pose a hazard to shallow foundations, and potentially external works, without some form of treatment (such as excavation/replacement or other treatment such as grouting or ground improvement).

The Preliminary GI included five boreholes which targeted the former course of the River Medlock prior to it being infilled. This included a former bridge structure. No evidence of voids was encountered in these or any of the other exploratory location at the site. Whilst it is not possible to discount the possibility of voids the Preliminary GI suggests that voids are unlikely to be a widespread hazard. However, plot specific ground investigation is recommended to further quantify the risk and allow the design of appropriate mitigation if needed.

5.5 Shallow rockhead

Fourteen boreholes from the 2019 investigation and six from the 2015 Geotechnics investigation extended into the sandstone bedrock. The rockhead was identified to be shallow, typically between 3.1 and 4.6mbgl (27.5 to 30mOD) within the centre of the site. However deeper areas are present, such as the Charles Street Car Park where rockhead extended to 9.4mbgl. The implication of this variable rockhead is that a variety of foundation solutions may be required across the site. This is discussed in further detail in **Section 5.9.3** below.

5.6 Tunnels

Two tunnel networks were originally identified within the ID Manchester Site [1]. A telecommunications tunnel running approximately NNW to SSE through the centre of the site (BT Tunnel) and a former network of tunnels associated with an old dye works (UMIST tunnels). However, the site boundary has since been modified such that the UMIST tunnels are no longer within the site.

To reduce the potential for damage to the BT Tunnel a set of safeguard guidelines have been prepared by Halcrow Group Ltd on behalf of BT [6]. These include:

- A minimum clearance of 2m;
- New works and structures cannot cause variation in loading on the tunnel to vary by more than 10%;
- Piling and construction works cannot exceed vibrations of 20mm/sec;
- Tunnel condition surveys are to be carried out before and after the works are carried out;
- Piles proposed within 3m of the tunnel require detailed surveying of pile locations; and those within 2m additionally require continuous monitoring of the tunnel during piling.

The depth of the tunnel has been reviewed since the Geotechnical Desk Study was issued and the top of the tunnel is now understood to be around 6.5mOD, which is deeper than 15mOD initially thought. In addition, the ground investigations have provided greater certainty on the rockhead elevation adjacent to the tunnel as well as data on the rock condition and strength. An updated inferred geological rockhead contour drawing is presented in **Figure 4.1**.

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The depth to rockhead along the alignment of the tunnel ranged from 25.9mOD to 33.4mOD (3.1 to 8.15mbgl), as shown in **Drawing UNMC-ARUP-ZZ-XX-DR-CG-1002** and **UNMC-ARUP-ZZ-XX-DR-CG-1003**.

Much of the site located rockhead between 3 to 7.5mbgl. At this depth it is thought that shallow piles (to ca. 10mbgl) are likely the most suitable piling solution. The BT tunnel is now understood to be around 6.5mOD, which is deeper than previously thought. The additional depth will impact loading calculations for structural design. The sandstone was found to be weak and highly weathered in the upper section and partially weathered at 10.9m depth from the top of rockhead. The weak nature of the rock may impact pile design. Deeper or larger diameter piles may be required due to the weak nature of the rock.

5.7 Retaining walls

Due to the stepped topography of the site there are several retaining walls. Two retaining walls were investigated as part of Preliminary GI. These were the Altrincham Street retaining wall and the retaining wall for the ramp to the basement of the Pariser Building. The material behind the Altrincham Street retaining wall was also investigated.

Three, 2m long, horizontal cores (HC001 to HC003) were drilled in the Altrincham Street retaining wall. All three cores identified a strong orange red brick with moderately strong light grey mortar, well bonded facing brick between 0.19 to 0.33m thick. This became a moderately weak to moderately strong dark to light orange red brick with weak dark grey mortar, poorly bonded to 2m. The full thickness of the wall was not proven. In HC003, a strong grey concrete was also identified between 0.33m and 0.55m. The retaining wall includes a number of arches, used as leased storage areas, which extend beneath Altrincham Street.

BH012A, located above HC003 and approximately 4.7m north of the Altrincham Street retaining wall, encountered made ground from the surface to a depth of 10.4 mbgl. The made ground varied in composition between a loose slightly clayey gravelly sand to a very clayey gravelly sand and included brick fragments.

Therefore, the Altrincham Street retaining wall is quite extensive, measured to be greater than 2m, but less than 4.7m thick.

A further horizontal core, HC004, was drilled in the south of the site in the supporting wall of the Pariser Building basement access ramp. The core extended to 0.46m. The first 0.42m was comprised of an extremely strong light grey concrete with 5mm diameter reinforcing bars at 0.05m-0.1m and 8-10mm diameter reinforcing bars at 0.36m-0.42mm. The reminder of the core from 0.42 to 0.46m was found to be hardcore/ gravel behind the retaining wall.

Further details and core logs can be found in the factual report [7].

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5.8 Infiltration

The permeability of the superficial deposits and bedrock will determine drainage design. A single soakaway test was attempted at TP001 in the centre of the site, however due to the high infiltration rate the test couldn't be completed.

Permeability of the made ground was estimated using Particle Size distribution data. Samples collected from TP001, TP002, and TP003 between 0.8 to 3mbgl was found to range in hydraulic conductivity from 5.45 $x10^{-4}$ to 1.28$x10^{-2}$ m/s. The high estimated hydraulic conductivity of the made ground may impact drainage design and could cause rapid inflows in to any excavations adjacent to perched waters. Further details can be found in **Appendix H**.

5.9 Further geotechnical considerations

Whilst the Preliminary GI was designed specifically to provide data on the issues described above, the data collected has provided some additional data on other possible hazards and features identified at the site. These are summarised below.

5.9.1 Soft ground

Potential for soft ground within made ground and alluvium was identified in the Geotechnical Desk Study [1]. The made ground was found to vary in strength/density, with a range of SPT 'N' values from 3 to 50 (refusal). The average made ground was medium dense. Glacial till was found to be very stiff and firm, and therefore does not represent soft ground. Some alluvium was encountered. It was occasionally found to be loose, however it generally comprised a dense clayey gravelly sand. SPT 'N' values ranged from 10 to 50 (refusal)

While few areas of the site were found to be contain soft ground, it may still be present. Due to the low density of GI coverage and the targeted nature of the Preliminary GI, alluvium, which is thought to pose the greatest risk of soft ground, may be under represented in the available GI across the site.

5.9.2 Groundwater

Groundwater levels were found to range from 2.6 to 9.7mbgl but was typically found between 5 and 6mbgl (28 to 30mOD). The depth of groundwater will have implications for earthworks such as the requirement for pumping in deeper excavations or casing piles. Shallow groundwater will also increase the contaminative risk to aquifers. No perched water was encountered, however may still be present due to the limited scale of this investigation.

The depth to groundwater (generally 28 to 30mOD) is comparable to rockhead (28.7 to 30.3mOD across much of the site). Earthworks are likely to extend into the bedrock and therefore some dewatering is likely to be required. Where deeper excavations are required, where rockhead is deeper (such as the west of the site), dewatering is very likely to be required.

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5.9.3 Foundations

It is assumed that where rockhead is <3mbgl shallow footings will be suitable. Where the depth to rockhead is greater, piled foundation solutions are likely to be required with pile lengths assumed to be 3-5m below the top of geological rockhead. This is around 10 to 15mbgl.

Where new basements are proposed and the rock depths are relatively shallow, a combination of piled basement retaining walls (to carry vertical loads from the perimeter of the structure), and pads onto rock for the internal columns/cores could be considered.

An indicative rockhead and foundation plan has been produced from historical rockhead contour data and 2019 Preliminary GI data (**Drawing UNMC-ARUP-ZZ-XX-DR-CG-1005**). This plan shows that the centre of the site generally has rockhead at 3 to 7.5mbgl. Some areas with shallow rockhead (<3mbgl) are present in the centre/south of the site; and some areas of deeper rockhead (>7.5mbgl) are present in the east and west of the site.

5.9.4 Earthworks

The proposed development levels for the site are yet to be determined. However, adjacent developments and highways will limit significant changes in level at the site boundaries. It is currently assumed that the target for earthworks cut to fill balance will be zero, however this needs to be verified as the masterplan develops. Materials used in earthworks will need to be verified as suitable from both a geotechnical and geoenvironmental perspective; this includes both site won and imported soils.

The ground investigation identified that the upper (6m) of the sandstone unit is weak to very weak and extremely to highly weathered. The excavatability of a rock can be estimated based on point load and fracture index data. Within the sandstone cores tested, points load test results ranged from 0 to 0.3MPa, while average discontinuity spacing per core ranged from 0.07 to 0.36m This suggests that easy digging or hard digging excavation will be encountered across most of the site, and there is a small likelihood that 'easy ripping' type excavation might be required. From experience within the region there is a possibility that localised more strongly cemented sandstone is present requiring higher excavation effort than currently identified in the GI. A plot of excavatability is presented in **Appendix H**.

5.9.5 Medlock culvert

The River Medlock is now culverted, and the culvert is located to the south of the site. The exact position is not known however plans showing approximate location were obtained and included in the desk study [1]. The 2015 Geotechnics investigation included fourteen trail pits to locate the culvert. Seven intersected the culvert at a depth of between 1.9 to 3.55mbgl (32 to 33.6mOD).

A drawing showing the reported position of the culvert and the depth to the top of culvert is presented in **Drawing UNMC-ARUP-ZZ-XX-DR-CG-1004**.

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6 Contamination and surplus soil

6.1 Approach

This section presents an initial assessment of contamination and waste classification which is considered appropriate at this early stage of this project and the targeted nature of the Preliminary GI. The assessment is indicative and for use in providing qualitative judgements regarding remediation scope and waste disposal options. Additional assessment will be required once further design has been done in relation to building locations, building use, landscaping proposals and earthworks and foundation design.

6.2 Conceptual model

Arup has prepared a conceptual model following the guidance outlined in the Environment Agency's Contaminated Land: Risk Management framework [4]. The conceptual model is based on the masterplan presented in the Geotechnical Desk Study[1].

6.2.1 Possible sources of contamination

Possible sources of contamination have been identified at the site and are primarily associated with the former industrial land use. Historically the regulations regarding environmental protection measures (such as waste management and containment measures for spills and leaks) were much less stringent and therefore the older activities on site (especially those undertaken prior to the campus development) have a greater likelihood to have impacted soil and water quality.

The locations of these historical land use which are considered to have potential to act as a contaminant sources are shown in **UMNC-ARUP-ZZ-XX-DR-CG-0001**.

Made ground, where present, can contain a wide variety of potential contaminants depending on the source of the material (which is often unknown). Common contaminants in made ground can include heavy metals, asbestos and PAHs (particularly associated with ash and clinker fragments). Degradation of organic materials within made ground may also generate ground gases.

The former land uses with the highest potential to have caused extensive contamination are the Ardwick Bridge Chemical Works, in the southeast of the site, and the Medlock Oil Works, in the west of the site.

Historical land use immediately adjacent the site was primarily terraced housing. Minor industrial works were located north and west of the site, however due their size the influence of off-site contamination is likely to be minimal.

The Department of Environment (DoE) Industry Profiles [8] were used to identify potential contaminants associated with historical land uses. The potential sources of contamination are summarised below.

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Table 6.1: Potential sources of contamination

Potential Source	Potentially Contaminative Materials	Comments
Ardwick Bridge Chemical Works[1] and other chemical works	Metals, metalloids and their compounds Inorganic compounds Organic compounds Acids/bases Fuel oils Asbestos Dyes	Contamination likely associated with spills and leaks.
Medlock Oil Works[2]	Metals, metalloids and their compounds Inorganic compounds Hydrocarbons Other organic compounds Asbestos	Contamination likely associated with spills, leaks and fuelling/filling of tanks
Other previous industrial activities[3,4,5,6,7]	Heavy metals Hydrocarbons Lubricating oils Polycyclic Aromatic Hydrocarbons (PAH) Chlorinated solvents and non-chlorinated solvents Acids/bases Asbestos	Works include: wood works, garages, iron works, mills and soap works.
Former River Medlock and other infilled associated features	Asbestos Heavy metals Sulphate Acid/bases Inorganics Hydrocarbons	Possible infill with soils which pose a risk to human health and the environment, may also be a source of ground gas
DoE Industrial Profile document titles: [1] Textile works and dye works [2] Oil refineries and bulk storage of crude oil and petroleum products [3] Timber treatment works [4] Timber manufacturing works [5] Road vehicle fuelling, service and repair – garages and filling stations [6] Chemical works – soap detergent manufacturing works [7] Metal manufacturing, refining and finishing works – iron and steel works		

6.2.2 Receptors

The following receptors have been identified at the Site:

Construction phase:

- Ground workers;
- Users of nearby site;
- River Medlock (culvert); and

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- Sherwood Sandstone Principal Aquifer;

Post construction phase:

- Future site users;
- Future ground workers;
- River Medlock (culvert);
- Sherwood Sandstone Principal Aquifer;
- Buried structures in contact with chemically aggressive ground; and
- Buried water supply pipe.

6.2.3 Pathways

The following pathways may link sources of contamination to receptors at the Site during construction:

- Inhalation of soil dust;
- Inhalation of vapours;
- Ingestion of soil and soil dust;
- Dermal contact with soils and groundwater.

The following pathways may link sources of contamination to receptors at the Site during post-construction:

- Inhalation of soil dust;
- Inhalation of vapours;
- Ingestion of soil and soil dust;
- Dermal contact with soils and groundwater;
- Direct contact and lateral flow of groundwater;
- Ingress and accumulation of gases in confined spaces

6.2.4 Conceptual model

A summary of the initial conceptual site model for the construction phase and post construction of the site is presented in **Table 6.2** and Table 6.3 respectively.

Table 6.2: Conceptual model for the construction phase

Source		Pathway		Receptor
Demolition of existing building (with possible asbestos containing materials (ACM))	→	Inhalation of dust	→	Construction worker
			→	User of nearby site
Stockpiles of made ground (asbestos, metals, PAH, VOC, SVOC, hydrocarbons)	→	Inhalation of soil and soil dust	→	Construction work
			→	User of nearby site
		Dermal contact	→	Construction worker
		Ingestion	→	
		Inhalation of vapours	→	

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Source		Pathway		Receptor
		Leaching and runoff	→	River Medlock
		Leaching of soils	→	Sherwood Sandstone Principal Aquifer
Impacted shallow groundwater	→	Inhalation of vapours (in confined spaces)	→	Construction worker
		Dermal contact	→	
		Ingestion	→	

Table 6.3: Conceptual model post-construction

Source		Pathway		Receptor	Plausible Pollutant Linkage
Made ground (asbestos, metals, PAH, VOC, SVOC, hydrocarbons)	→	Direct contact, ingestion of soil/ soil dust, inhalation of soil/ soil dust	→	Future ground worker	PPL1
				Future site user	PPL2
		Inhalation of vapours	→	Future ground worker	PPL3
			→	Future site user	PPL4
		Leaching and infiltration through the unsaturated zone	→	Sherwood Sandstone Principal Aquifer	PPL5
		Leaching within the saturated zone	→	Sherwood Sandstone Principal Aquifer	PPL6
Impacted shallow groundwater	→	Lateral flow	→	River Medlock	PPL7
		Inhalation of vapours	→	Future site user	PPL8
Ground gases	→	Ingress and accumulation of gases in confined spaces to explosive/asphyxiating/ toxic concentrations	→	Future ground worker	PPL9
			→	Future site user	PPL10
Made ground/ impacted shallow groundwater	→	Direct contact and infiltration through cracks/ joints	→	Potable water supply pipes	PPL11
	→	Direct contact	→	Buried concrete	PPL12

6.3 Generic risk assessment of the data

6.3.1 Construction phase

Although the conceptual model for the construction phase had identified possible risks (**Table 6.2**), these temporary acute risks are not covered by the risk assessment presented in this section. Most of these acute risks will be controlled

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by good practice implemented through a Construction Environmental Management Plan.

6.3.2 Operational Phase

6.3.2.1 Human health

The human health risk assessment has been undertaken to assess the following pollutant linkages:

- PPL1 - exposure of future ground worker/ maintenance worker to soil via dermal contact, ingestion of soil/soil dust/inhalation of soil/soil dust
- PPL2 - exposure of future site users (in soft landscape area) to soil via dermal contact, ingestion of soil/soil dust/inhalation of soil/soil dust
- PPL3 - exposure of future ground workers via inhalation of vapours
- PPL4 - exposure of future site user via inhalation of vapours
- PPL8 - exposure of future users via inhalation of shallow groundwater vapours
- PPL9 - exposure of future ground worker to ground gases in confined spaces
- PPL10 - exposure of future site user to ground gases in confined spaces

6.3.2.2 Human health generic quantitative risk assessment (GQRA)

To simplify the assessment of ground contamination risks, the UK Statutory Guidance [10] endorses the use of generic quality guideline values for initial screening of contamination testing results. These generic assessment criteria (GAC) are based on conservative assumptions about exposure regarding intake and effect levels. Arup has developed GAC for various land use scenarios which cover a broad range of development scenarios. Further details on the development and justification of the Arup GAC can be provided upon request.

Contaminants which are below these scientific and appropriate guideline values, do not require further assessment if it is planned to retain these soils on the site.

A finalised masterplan for the proposed development has not been provided, however will likely comprise new commercial buildings and residential flats. Underlying assumptions for commercial GACs include human exposure to soil/water/gas contaminants during outdoor lunches. It is assumed that future residents of the proposed flats would have a similar exposure to this. This assumption is based on limited exposure to soils (with no gardens) and elevated positions (in high-rise apartments). Therefore, the primary pathways linking residents in apartments are via inhalation of soil dust/vapour pathways with minor contributions from exposure to soft landscaping areas. The use of commercial GACs is therefore appropriate for this assessment as the use of residential GACs would be too conservative and not representative of contaminant exposure pathways at the finished development. However, if the masterplan changes then this assumption should be re-evaluated.

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Soil organic matter (SOM) concentrations within soils can influence organic contaminant concentrations. The SOM within made ground was calculated to be 2.63% and was calculated from 51 total organic carbon results. Based on this, the appropriate screening criteria for this assessment is Commercial GAC at 2.5% SOM.

The screening identified a single sample where a contaminant exceeded the human health GAC. The contaminant was lead which was present in shallow soil (0.8mbgl) at a concentration of 2,400mg/kg, compared to the GAC of 2,300. The location of this exceedance, DS002, was within the footprint of the former Ardwick Bridge chemical works.

Asbestos was positively identified in 8 of 51 made ground samples tested for asbestos. Concentrations greater than 0.001% (the laboratory quantification limit) was detected in a sample collected from BH007 at 3.3mbgl, recording a concentration of 0.192wt%.

Full details of the assessment and screening spreadsheet can be found in **Appendix C**.

The Preliminary GI has provided soil chemical data for some of the areas of the site with highest potential for contamination (chemical works, infill of the River Medlock). Based on the data collected it is considered likely that a large proportion of the soils on site would be chemically suitable for use within this predominantly commercial scheme with minimal mitigation. This mitigation is likely to comprise a clean cover system (hard landscaping and validated clean soils in soft landscaping areas) to minimise exposure to soil contaminants such as asbestos. However, this conclusion will need to be validated through plot specific ground investigation.

6.4 Controlled waters

Controlled waters generic assessment criteria (CWGAC), suitable for controlled waters receptors comprising both groundwater in a Principal Aquifer (i.e. the Sherwood Sandstone bedrock) and freshwater watercourse (i.e. the River Medlock).

Several inorganic compounds detected above GWGAC are trace metals typical of mineral cements within the local aquifers. The Site data relative to aquifer baseline data is presented in **Table 6.4**. Metal concentrations found to be within baseline ranges are considered naturally occurring and not considered further within this assessment.

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Table 6.4: Summary of background contaminants within bedrock aquifer. Substances exceeding the baseline concentrations highlighted in red.

Contaminant detected in groundwater	Max Conc. in groundwater (µg/l)	Aquifer baseline range (µg/l)[2]	Comment
Arsenic	15	<0.05 to 215.5	Most metal concentrations are within baseline range
Cadmium	0.38	<0.05 to 42	
Chromium	9	<0.5 to 25	
Copper	2.4	<0.5 to 420	
Lead	3,100	<1 to 6.8	
Manganese	2600	0.3 to 6000	
Nickel	8.6	<0.2 to 59	
Selenium	22	<0.5 to 4.7	
Zinc	12.3	3.4 to 177.4	

Groundwater sampled from BH011 had a concentration of lead which exceeded the aquifer baseline values and CWGAC (3,100 µg/l). BH011 is located within the footprint of the former Ardwick Bridge Chemical Works which may be the source of the lead. Elevated concentrations of lead were reported in a sample of made ground at borehole DS001 which is also located within the footprint chemical works which may indicate leaching of these soils.

A single sample of selenium was also found to have a concentration which exceeded background values and CWGAC. The sample was from BH013, which is located in the west of the site, within the footprint of past industry.

Two cyanide samples were found in exceedance of CWGAC. One sample, from BH011, was found at 1,000µg/l, a concentration many times greater than CWGAC. This high concentration may again derive from the former Ardwick Bridge Chemical Works.

Two polycyclic aromatic hydrocarbons (PAH) contaminants were found to exceed CWGAC. PAH are very common in made ground and it is considered that the PAH detected in the groundwater is a result of leaching of made ground. This pathway is feasible as made ground was commonly found to directly overly sandstone, within which the groundwater sample was taken.

Leaching of made ground soils is considered to be the most likely cause of the elevated groundwater concentrations and these soils are likely to be discrete. Leaching will be minimised in the final development below buildings or hard surfacing (with surface water drainage system) which will mitigate the risk to controlled waters. Therefore, delineation of these soil sources and excavation and placement of the soils in appropriate areas of the development is considered appropriate.

[2] EA/BGS, 2003, Baseline Report Series: 8. The Permo-Triassic Sandstones of Manchester and East Cheshire

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Whilst it is considered that extensive groundwater remediation will not be required to mitigate the risks to controlled waters, further sampling and assessment of the contaminants noted above is recommended to confirm concentrations and inform further risk assessment (including Foundation Works Assessment).

A summary of the contaminants which exceeded their CWGAC is presented below in **Table 6.5**. The complete screening spreadsheet is found in **Appendix D**.

Table 6.5: Summary of controlled waters screening assessment

Contaminant Name	CWGAC (µg/l)	Source	No > GAC	Max concentration in groundwater (ug/l)
Metals				
Lead	1.2	EQS	1	3100
Selenium	10	DWS	1	22
Inorganics				
Cyanide	0.001	EQS	2	1000
Ammoniacal nitrogen	0.3	EQS	2	0.53
PAHs				
Naphthalene	2	EQS	1	4.9
Fluoranthene	0.0063	EQS	2	0.1

6.5 Ground gas

The conceptual model has identified risks to site receptors from exposure to ground gas via the following linkages:

- PPL9 - exposure of future ground worker to ground gases in confined spaces
- PPL10 - exposure of future site user to ground gases in confined spaces

Consequently, a ground gas risk assessment has been undertaken (in accordance with CIRIA C665 [18] and BS8485:2015+A1:2019) to estimate the level of risk posed to the future site users and determine the need for remedial action.

The gas monitoring was undertaken under a range of atmospheric pressures and included rising and falling pressure trends. The pressure ranged from 997 to 1031 mbar

The results of this gas monitoring have been assessed using the classification system presented within CIRIA C665. The classification system uses gas concentrations and recorded flow rates for methane and carbon dioxide to determine a gas screening value (GSV). The GSV is calculated by multiplying the maximum recorded flow rate (l/hr) against the maximum recorded gas concentration determining a value reflecting the worst-case scenario. The GSV is used in turn to determine a 'characteristic situation' (CS) for the Site which is used to inform the gas protection requirements.

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Based on the available data, the maximum gas concentrations and GSVs from standpipes located within the made ground are presented in **Table 6.6** below. The monitoring included four rounds over a seven-week period (see **Section 3.4.2**). The complete screening assessment from the recent monitoring rounds is presented in **Appendix E**.

Table 6.6: Summary of calculated maximum gas concentrations and flows from standpipes within the made ground

Borehole (response zone range mbgl)	Maximum Methane (%v/v)	Maximum Carbon Dioxide (%v/v)	Maximum Flow (l/hr)	Max GSV Methane	Max GSV Carbon Dioxide	Assessed gas situation
BH002 (0.5 to 2.5)	<0.1	0.3	0	0	0	CS1
BH002 (3.2 to 4)	<0.1	0.5	0	0	0	CS1
BH004A (1 to 4)	<0.1	1.3	0	0	0	CS1
BH008 (0.3 to 6.5)	<0.1	0.5	0	0	0	CS1
BH009 (0.5 to 1.7)	<0.1	0.1	0	0	0	CS1
BH012A (2 to 6)	<0.1	0.6	0	0	0	CS1
DS001 (2 to 4)	<0.1	0.4	0	0	0	CS1

The site is characterised as CS1.

6.6 Chemically aggressive ground

An assessment has been undertaken to evaluate the chemical environment for concrete in accordance with BRE Special Digest 1 [9] to assess the risks posed by concrete in contact with possibly chemically aggressive ground. The assessment is presented in **Appendix F** and a summary presented in **Table 6.7** below.

Characteristic values were determined from the arithmetic mean of the worst case 20% of pH and sulphate concentrations of soil and rock samples. The arithmetic mean was used, as opposed to using the single worst value, due to sufficiently large sample sets (greater than 10 samples).

At this preliminary stage the assessment has concluded a design sulphate class of DS-2 and an aggressive chemical environment for concrete of AC-1 for concrete placed in contact with made ground. A design sulphate class of DS-1 and an aggressive chemical environment for concrete of AC-1 is required for concrete placed in contact with sandstone.

Whilst the data collected as part of the Preliminary GI provides a good indication of the likely conditions, additional plot specific ground investigation is recommended to support the design of structural concrete.

Table 6.7: Summary of chemical aggressive ground assessment

Geology	No. Samples	Characteristic pH	Characteristic Sulphate	Design Sulphate Class	ACEC Class

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MG	19	7.97	717.5	DS-2	AC-1
SS	11	7.85	114	DS-1	AC-1

The pH from groundwater samples ranged from 4.8 to 7, however typically ranged from 6.7 to 7.

6.7 Surplus soil and waste

6.7.1 Approach

The most sustainable approach to managing surplus soils arising from construction excavation is to reuse suitable soils on site (in accordance with the CL:AIRE Definition of Waste Code of Practice). Where possible it is advisable to amend proposed levels to allow for reuse of surplus soils.

If surplus soil requires offsite disposal then it is likely to meet the legal definition of waste. Under current English waste regulatory requirements, there is a legal requirement to correctly classify material for disposal. For soils arising from brownfield sites soil test results are used to classify the material as hazardous or non-hazardous waste, following the procedure in the EA WM3 document [11]. The online waste classification tool (HazWasteOnline [12]) classifies material in line with WM3. A European Waste Catalogue (EWC) List of Waste code is then assigned, typically 17-05-03 for non-hazardous soils. Subsequently waste acceptance criteria (WAC) testing may be necessary if disposal at a landfill is intended.

This section summarises the results of an indicative screen of the made ground, to determine its waste classification using HazWasteOnline.

As there are currently no details in relation to earthworks and where waste may be generated it was considered inappropriate to undertake WAC analysis at this stage. However, this data could be collected as part of future plot specific ground investigation if it is likely that waste made ground requiring disposal at landfill will be generated as a result of construction.

6.7.2 Waste classification

An indicative waste classification exercise has been undertaken to provide information to assist in the assessment of the management of waste soils at the site.

As part of the investigation, 55 samples of made ground have been tested for a range of inorganic and organic contaminants of potential concern. The HazWasteOnline screening tool has been used to assess the hazardous properties of these materials. The results of the screening are presented in **Appendix G**. None of the samples screened were classified as hazardous.

The HazWasteOnline tool does not consider asbestos containing materials. However, ACM has been detected in 8 of soil samples of the 51 samples tested. As stated in WM3 guidance document, if the waste contains fibres that are free

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and dispersed then the waste will be hazardous if the waste as a whole contains 0.1% or more asbestos. Where the waste contains identifiable pieces of asbestos containing material (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then these pieces must be assessed separately. The waste is hazardous if the concentration of asbestos in the piece of asbestos containing material is 0.1% or more.

ACM has been detected in eight soil samples, however only one sample (BH007, 3.3mbgl) exceeded the hazardous waste threshold of 0.1%, recording 0.192wt%.

This assessment has concluded that a low proportion of the made ground soils at the site are likely to be classified as hazardous waste and this has resulted from asbestos above hazardous waste thresholds. Therefore, most of the made ground is likely to be classified as non-hazardous but requires further plot specific investigation to confirm this conclusion. Further analysis to determine whether the non-hazardous waste would be accepted at an inert waste landfill will be required in the future, if waste soils are likely to be generated, i.e. if the material is not planned to be re-used as part of the development.

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7 Conclusions

The University of Manchester commissioned additional investigation and assessments to help better define the risk posed by below ground constraints at the Site. This included:

- UXO risk assessment;
- Ground investigation data from adjacent sites; and
- A preliminary intrusive ground investigation specifically targeting features identified at desk study.

7.1 Summary of assessment findings

7.1.1 UXO

The desk study had identified a moderate risk of encountering UXO and therefore further assessment was warranted. Zetica was appointed to prepare a more detailed risk assessment. Zetica concluded that some areas of the site are low risk with the central and southern areas only considered to be a moderate risk (as seen in **Figure 2.1**). Zetica has recommended UXB detection in boreholes/ piles and UXO awareness briefings for shallow excavations in moderate risk areas.

7.1.2 Buried obstructions

Owing to the past industrial and more recent development history at the site there is high potential for buried obstructions. These obstructions fall into two categories, old obstructions resulting from historical foundations, basements, retaining walls for the River Medlock. More recent obstructions include buried service tunnels, foundations, basement slab, floor slabs which may remain following demolition.

Old obstructions

This may include features such as retaining walls associated with the former River Medlock, basements, foundations and old infrastructure. An old brick wall was encountered in TP001 and numerous observations of brick clasts within the made ground fill were observed during the Preliminary GI.

The fact that old buried obstructions were encountered as part of the Preliminary GI, given the limited scope, suggests further obstructions are likely to exist on-site. The risk of encountering historical obstructions is likely to be lower in the footprints of the existing buildings particularly where basements and deeper foundations have been constructed as these obstructions are likely to have been cleared for construction. In current external areas, the risk of encountering historical buried features is likely to be higher as removal of obstructions may not have been needed.

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Obstructions associated with the existing development

Buildings and infrastructure associated with the existing development will form obstructions if not removed prior to earthworks or foundation works. These will include existing foundations/ basements for the existing buildings, basement slabs and walls and utilities and utility tunnels.

Whilst these were not specifically targeted during the Preliminary GI, the ground investigation encountered an extensive concrete obstruction in the east of the site (BH006, BH006A, and BH006B) between 0.7 to 1.6mbgl. This may be a utility tunnel or a foundation.

Implications for new development

Earthworks and excavations will need to be carefully designed and managed to mitigate risks associated with instability when digging out large slabs or brick walls. However, there is high potential to re-use these obstructions as an engineering fill within site earthworks following crushing and processing. and may cause instability during earthworks or excavation, particularly where the obstruction overlaps boundaries of the development phases.

Where piling is required, piling and drilling methods will need to take into consideration these features. Where the obstructions remain in situ they are likely to restrict the use of driven and CFA bored piles.

Further plot specific investigations are likely to be needed to inform the design and construction methodology for any basement and piling works.

7.1.3 Former River Medlock

In the 1960's the River Medlock was culverted (see Drawing **UMNC-ARUP-ZZ-XX-DR-CG-0002**). The desk study identified uncertainty regarding the status and method of backfilling of the former Medlock channel and therefore potential for voids, soft ground and contamination.

The Preliminary GI found made ground within exploratory locations within the former Medlock was deeper (6.3 to 8.9 mbgl) than surrounding areas (4 to 4.6 mbgl). The composition of the infill was consistent with surrounding made ground, and no voids or soft spots were encountered. In situ soil density testing (SPT) indicates a range in soil strength/ density and with a range of particle sized which is typical of made ground deposits. The made ground was generally granular in nature suggesting that treatment by excavation and compaction or vibro ground improvement might be an option for treatment subject to proposed loading.

7.1.4 Shallow rockhead

The depth to the Sherwood Sandstone rockhead but is generally at 28 to 30mOD however the depth to rockhead from the ground surface varies as a function of the ground levels which vary significantly. South of Altrincham Street, where ground levels drop, rockhead is around 3.1 to 4.6 mbgl. A geological rockhead contour

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plan, produced in the 1960s by C.S. Allott & Son Consulting Engineers [6], was obtained during the Arup desk study. The recent ground investigation has been compared to the rockhead drawing. Generally, the rockhead levels encountered are consistent with those estimated. An updated rockhead drawing based on the latest data is presented in **Drawing UNMC-ARUP-ZZ-XX-DR-CG-1002** and **UNMC-ARUP-ZZ-XX-DR-CG-1002**.

As the rockhead is generally around 3 to 7.5mbgl shallow piled foundations are likely the most appropriate foundation solution. Areas of shallower and deeper rockhead are present and different foundation solutions may be more appropriate in these locations. The upper section of the sandstone bedrock was found to be highly weathered and weak, and likely to be excavatable without the need for specialist equipment.

7.1.5 BT tunnel

The BT/Guardian tunnel passes approximately NW-SE through the central part of Site (see **Drawing UMNC-ARUP-ZZ-XX-DR-CG-0002**) at a depth of around 6.5mOD [13]. This is between 26.5mbgl (in the centre/south of the site) and 31.5mbgl (in the north of the site) and 19.5 to 27mbgl.

Safeguard restrictions [5] have been identified which require more care to be taken during construction over or adjacent to the tunnels. This might restrict pile depths and locations.

The Preliminary GI included five boreholes located nearby to the BT tunnel to determine the nearby rockhead level including one deeper borehole to provide data on the rock properties around tunnel depth. This information should be used to inform the scheme designs of any structures on or adjacent to the tunnel.

7.1.6 Contamination associated with past industry

Several former industrial uses with contamination potential were located within the site, including a former chemical works and oil works.

As well as providing data on made ground across the site the Preliminary GI targeted areas of high contamination potential such as the Ardwick Bridge Chemical works and River Medlock infill. No visual or olfactory evidence of contamination was observed during the investigation fieldwork; no high PID readings were measured; only a single chemical soil exceedance was identified (at the site of the former Ardwick Bridge Chemical works). The ground investigation data suggests that gross contamination is not widespread and that the contamination potential at the former Ardwick Bridge Chemical Works and the infilled River Medlock is less than inferred at desk study.

Contaminant concentrations within groundwater generally suggest no gross contamination. However, groundwater from BH011, on the former Ardwick Bridge Chemical Works site, was found to have elevated lead and cyanide. Selenium, ammoniacal nitrogen and PAHs (naphthalene and fluoranthene) were also found to exceed CWGAC. Whilst it is considered that extensive groundwater remediation is unlikely to be required to mitigate the risks to controlled waters, it

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is recommended that further water samples are collected to confirm these measurements, and inform further risk assessment.

Across the site, ground gas levels were found to be consistent with CS1. No special precautions or protective measures are required for sites characterised as CS1 [18].

7.1.7 Retaining structures

The Altrincham Street retaining wall was found to be greater than 2m thick, but likely less than 4.3m thick. The wall is faced by newer stronger brick wall, occasional concrete, and an older weaker brick structure. The material behind the wall was identified as made ground comprised of a clayey gravelly sand.

The Pariser Building access ramp wall situated in the south of the site was found to be very strong, comprised of a 40cm concrete wall with rebar support. Behind the wall was a hardcore fill.

7.2 Updated risk register

The desk study identified key site risks which were documented within a risk register. Some of these risks were addressed as part of this preliminary investigation. These have been summarised above in **Section 7.1**, and further details can be found in the constraints tracker [15].

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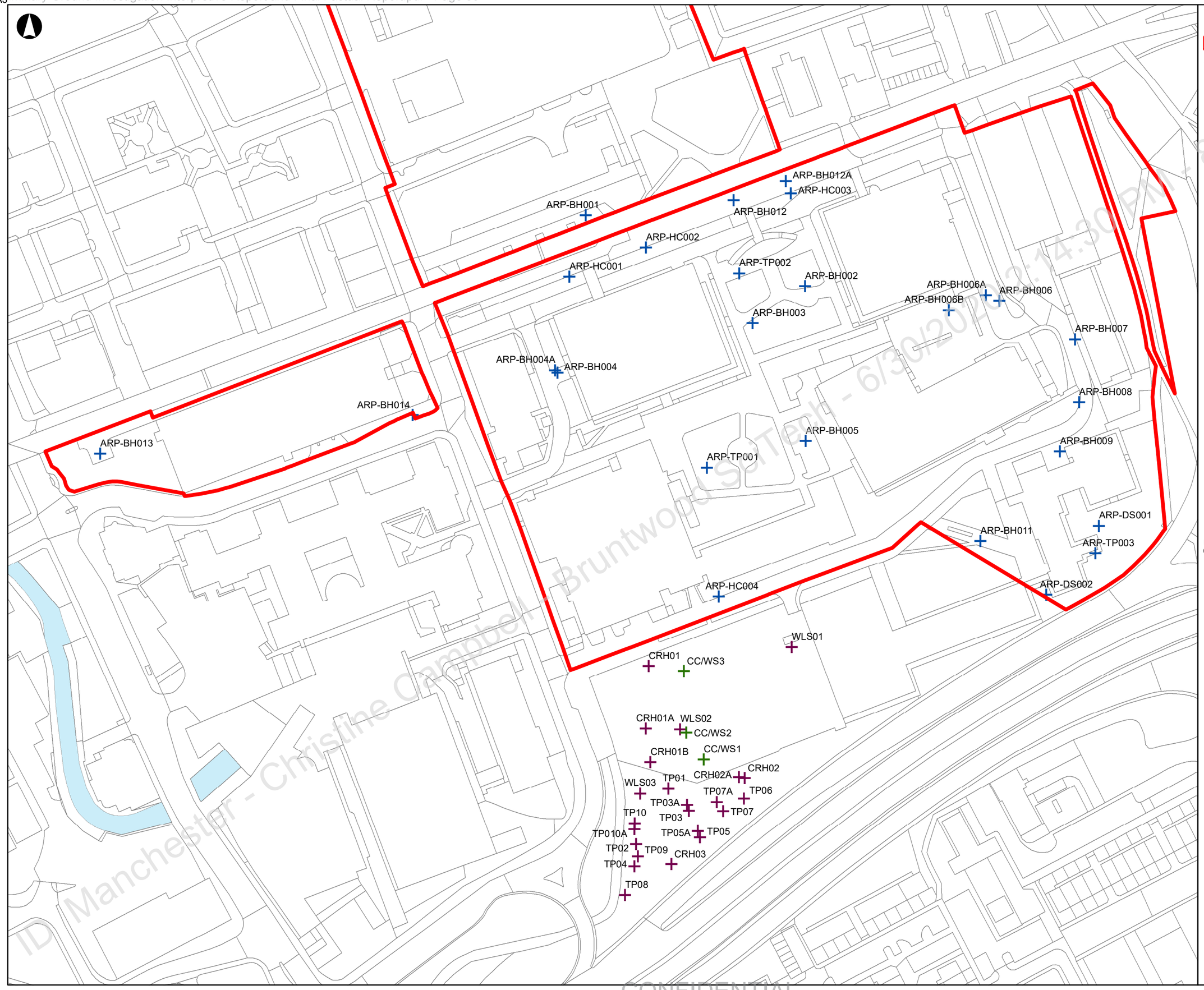
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Legend

- Site Boundary

Ground Investigation Locations

- Preliminary Ground Investigation (AEG 2019)
- Constructive Evaluation 2015
- Geotechnics 2015

Issue	Date	By	Chkd	Appd
P1	09/04/2020	JW	MG	MG

Metres

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Client
University of Manchester

Project Title
ID Manchester

Drawing Title
Ground Investigation Locations

Scale at A3
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Arup Job No	Suitability	Rev
265190-00	**Preliminary**	

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UNMC-ARUP-ZZ-XX-DR-CG-1001 | Rev **P1**

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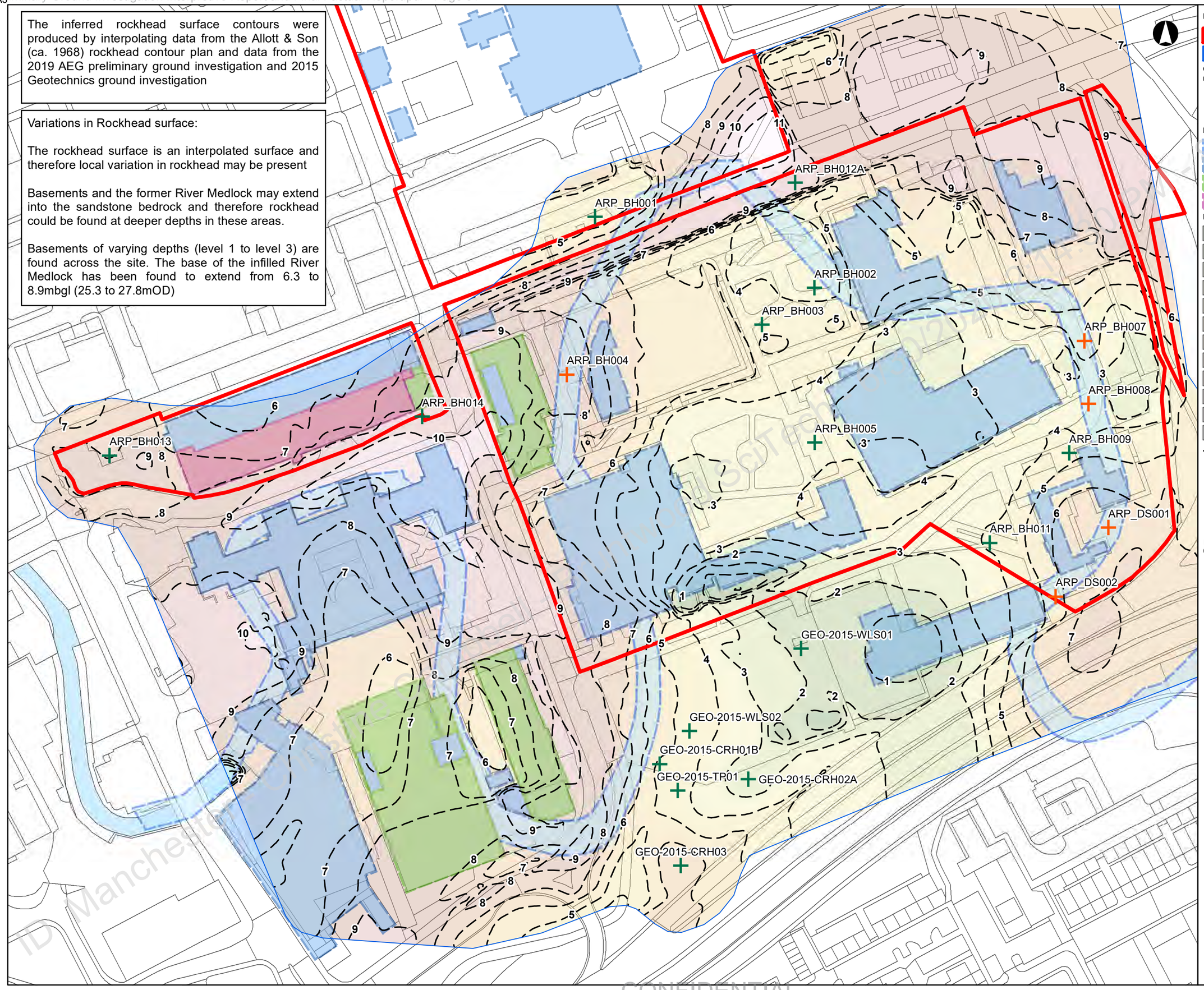
The inferred rockhead surface contours were produced by interpolating data from the Allott & Son (ca. 1968) rockhead contour plan and data from the 2019 AEG preliminary ground investigation and 2015 Geotechnics ground investigation

Variations in Rockhead surface:

The rockhead surface is an interpolated surface and therefore local variation in rockhead may be present

Basements and the former River Medlock may extend into the sandstone bedrock and therefore rockhead could be found at deeper depths in these areas.

Basements of varying depths (level 1 to level 3) are found across the site. The base of the infilled River Medlock has been found to extend from 6.3 to 8.9mbgl (25.3 to 27.8mOD)



Legend

- Site boundary
- Extent of rockhead data

Ground investigations which extended into rockhead

- GI Not located on former River Medlock
- GI located on former River Medlock

Basements and Former River Medlock

- GEO0005 Former River Medlock infill
- GEO0008a Basement (Level 1)
- GEO0008b Basement (Level 2)
- GEO0008c Basement (Level 3)

Depth to Rockhead (mbgl)

- <1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- 10 - 11
- >11
- Rockhead Contour (mbgl)

Issue	Date	By	Chkd	Appd
P2	09/04/2020	JW	MG	MG

Metres

0 20 40 80

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Client
University of Manchester

Project Title
ID Manchester

Drawing Title
Inferred Depth to Rockhead (mbgl)

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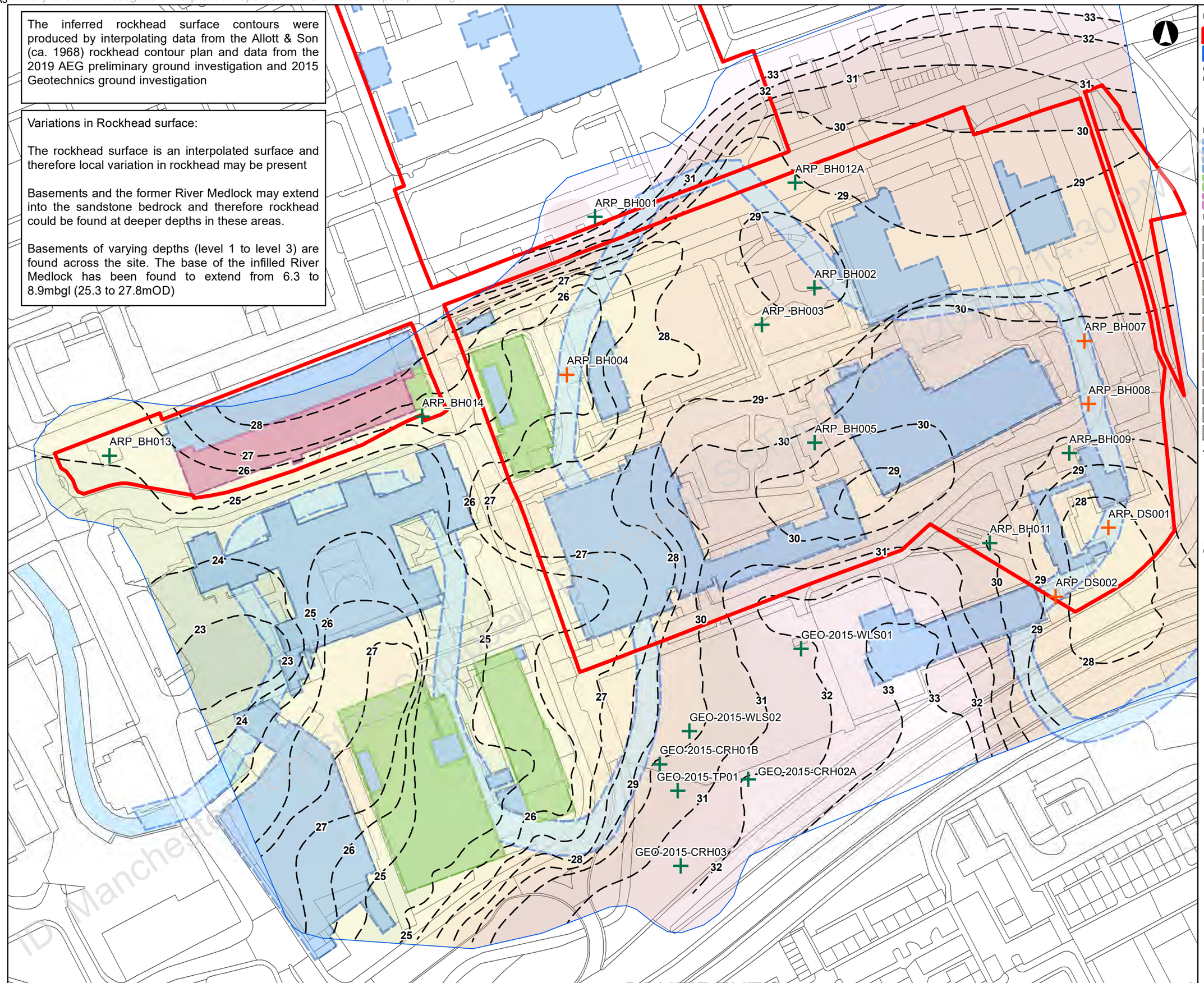
The inferred rockhead surface contours were produced by interpolating data from the Allott & Son (ca. 1968) rockhead contour plan and data from the 2019 AEG preliminary ground investigation and 2015 Geotechnics ground investigation

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Legend

- Site boundary
- Extent of rockhead data

Ground investigations which extended into rockhead

- GI Not located on former River Medlock
- GI located on former River Medlock

Basements and Former River Medlock

- GEO0005 Former River Medlock infill
- GEO0008a Basement (Level 1)
- GEO0008b Basement (Level 2)
- GEO0008c Basement (Level 3)

Depth to Rockhead (mOD)

- <23
- 23 - 24
- 24 - 25
- 25 - 26
- 26 - 27
- 27 - 28
- 28 - 29
- 29 - 30
- 30 - 31
- 31 - 32
- 32 - 33
- >33
- Rockhead Contours (mOD)

Issue	Date	By	Chkd	Appd
P2	09/04/2020	JW	MG	MG

Metres

0 20 40 80

ARUP

6th Floor, 3 Piccadilly Place
Manchester M1 3BN
Tel+44(0161) 228 2331 Fax+44(0161)228 6879
www.arup.com

Client
University of Manchester

Project Title
ID Manchester

Drawing Title
Inferred Depth to Rockhead (mOD)

Scale at A3
1:1,400

Arup Job No
265190-00

Suitability
Preliminary

Name
UNMC-ARUP-ZZ-XX-DR-CG-1003

Rev
P2

\\global.arup.com\europe\Manchester\Jobs\265000\265190-00 - University Of Manchester North Campus\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\1_GIR\Rockhead_Contour_Plan.mxd

ID Manchester - Construction Consultation Boundary

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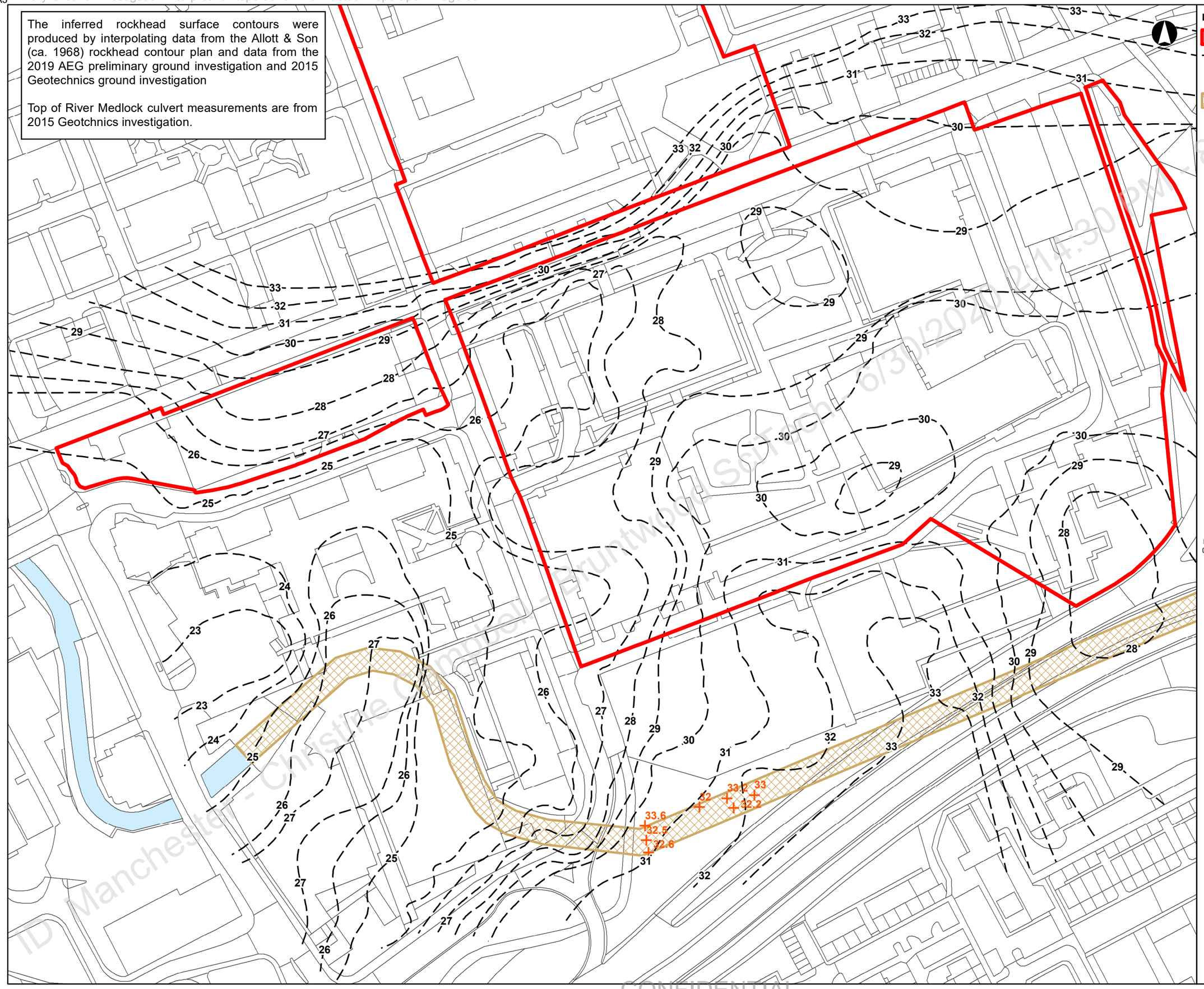
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A3

The inferred rockhead surface contours were produced by interpolating data from the Allott & Son (ca. 1968) rockhead contour plan and data from the 2019 AEG preliminary ground investigation and 2015 Geotechnics ground investigation

Top of River Medlock culvert measurements are from 2015 Geotchnics investigation.



Legend

- Site Boundary
- Rockhead Contours (mOD)
- Culvert Depth Trial Pit (Geotechnics 2015)
- GEO0001 Culverted River Medlock

Issue	Date	By	Chkd	Appd
P1	09/04/2020	JW	MG	MG

Metres

0 20 40 80

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www.arup.com

Client
University of Manchester

Project Title
ID Manchester

Drawing Title
Depth to top of River Medlock culvert (mOD)

Scale at A3
1:1,400

Arup Job No
265190-00

Suitability
Preliminary

Name
UNMC-ARUP-ZZ-XX-DR-CG-1004

Rev
P1

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A3

The inferred rockhead surface contours were produced by interpolating data from the Allott & Son (ca. 1968) rockhead contour plan and data from the 2019 AEG preliminary ground investigation and 2015 Geotechnics ground investigation

Top of River Medlock culvert measurements are from 2015 Geotchnics investigation.

Legend

- Site Boundary

Depth to Rockhead (mbgl)

- Rockhead <3mbgl - shallow foundations may be possible
- Rockhead >3mbgl <7.5mbgl - shallow piles (c. 10m) may be possible
- Rockhead >7.5mbgl - deeper piles (c.15m) may be required

Issue	Date	By	Chkd	Appd
P1	09/04/2020	JW	MG	MG

Metres

0 20 40 80

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Client
University of Manchester

Project Title
ID Manchester

Drawing Title
Indicative Rockhead and Foundation Plan

Scale at A3
1:1,400

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Suitability
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Name
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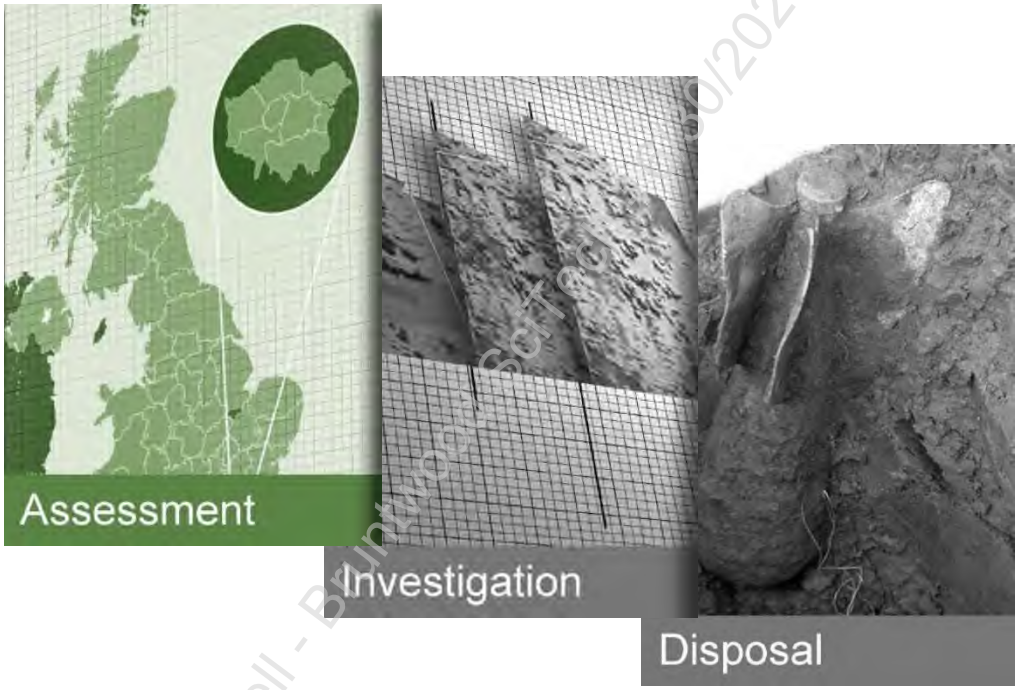
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Appendix A

UXO Desk Study and Risk Assessment

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ID Manchester - UXO Desk Study & Risk Assessment

Drafted by Joe Lingard
Checked by Lucy Warwick
Authorised by Stefan Lang

ID Manchester - Christine Campbell - Brunton - Sent on 30/6/2020 2:14:30 PM - 81.154.246.72

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Document Title	**UXO Desk Study & Risk Assessment**
Document Ref.	**P8155-19-R1**
Revision	**A**
Project Location	**ID Manchester**
Client	**Arup**
Date	**6th September 2019**

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UXO DESK STUDY & RISK ASSESSMENT

EXECUTIVE SUMMARY

Key findings: Potential hazard from Unexploded Bombs (UXB) on the central and southern parts of the Site.

Key actions: Deep UXB detection is required to clear borehole and pile locations and an Explosive Ordnance Clearance (EOC) Engineer is required to supervise excavations in the moderate risk areas.

UXO Hazard Assessment

Records have been found indicating that 12No. High Explosive (HE) bombs fell on the Site during World War Two (WWII). The bombing caused significant damage to buildings on the central and southern parts of the Site, which may have masked the impact of a UXB.

Given this, it is considered prudent to assign these parts of the Site a moderate UXO hazard level.

No significant bombing or other military activity is recorded on the remainder of the Site, which is assigned a low UXO hazard level.

It is considered that the UXO hazard level on the Site can be zoned from low to moderate, as shown in the following Figure, reproduced as Figure 4 in the main report.

Figure	UXO hazard zone plan of the Site



Source: Google Earth *Not to Scale*

Legend					
	Very Low		Low		Moderate
	High		Very High		Site boundary

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Note that the UXO hazard will have been mitigated within the depth and extents of any post-WWII intrusive works. Outside the footprint of these works, between piles and below shallow raft foundations and basements, the UXO hazard level remains unchanged to the maximum bomb penetration depth.

The main findings of the report are summarised below.

- No records of bombing or military activity on the Site during World War One (WWI) have been found.
- During WWII there were many strategic targets in the vicinity of the Site. These included iron and steel works, rubber works, munitions factories, major transport infrastructure and gas works.
- Records have been found indicating that 12No. HE bombs fell on the Site during WWII, in addition to several Incendiary Bombs (IBs).
- No records of any significant post-WWII military activity on the Site have been found.

Data Confidence Level

The findings of this report were based on good corroborative evidence of the military activity and bombing on the Site.

Proposed Works

It is understood that initial works on the Site will comprise an intrusive ground investigation, including boreholes and trial pits.

Future works on the Site are likely to include the demolition of existing structures, bulk excavations and piling.

Risk Assessment

The Table below, reproduced as Table 5 in the main report, provides a UXO risk assessment for the proposed works on the Site.

Further details on the methodology for the risk assessment are provided in Section 7.2 of the main report.

Table	UXO risk assessment for the Site								
Hazard Zone	**Potential UXO Hazard**	**Anticipated Works**	**PE**	**PD**	**P = PE x PD**	**Likelihood**	**Severity**	**Risk Rating**	**UXO Risk**
Moderate	UXB	Shallow Excavations	1	1	1	1	5	5	**Low**
		Deep Excavations	3	2	6	3	5	15	**Moderate**
		Boreholes/Piling	2	3	6	3	4	12	**Moderate**
	Other UXO	Shallow Excavations	1	1	1	1	4	4	**Low**
		Deep Excavations	1	1	1	1	4	4	**Low**
		Boreholes/Piling	1	1	1	1	3	3	**Low**
Low	UXB	Shallow Excavations	1	1	1	1	5	5	**Low**
		Deep Excavations	1	1	1	1	5	5	**Low**
		Boreholes/Piling	1	1	1	1	4	4	**Low**
	Other UXO	Shallow Excavations	1	1	1	1	4	4	**Low**
		Deep Excavations	1	1	1	1	4	4	**Low**
		Boreholes/Piling	1	1	1	1	3	3	**Low**
PE (Probability of Encounter), PD (Probability of Detonation), P (Overall Probability)									
Shallow Excavations defined as <1.0m bgl.									

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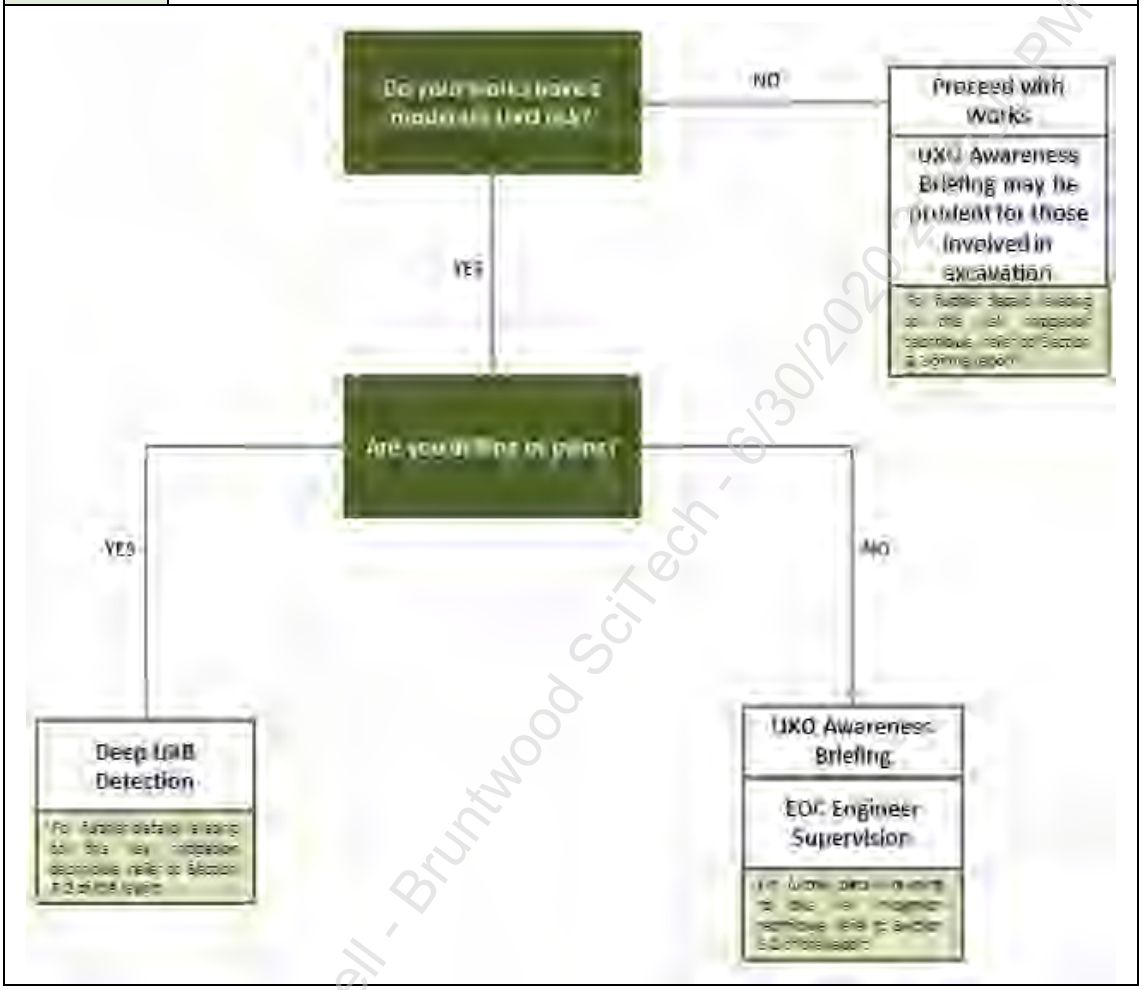
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Risk Mitigation Plan

The Figure below, reproduced as Figure 5 in the main report, provides a risk mitigation plan to ensure that the UXO risk for the proposed works is reduced to As Low As Reasonably Practicable (ALARP).

Figure	Recommended risk mitigation plan for the Site



Further details on the recommended risk mitigation techniques are given in Section 8.2 of this report.

The Table below, reproduced as Table 6 in the main report, summarises the UXO risk for proposed works on the Site and recommended techniques to mitigate the risk.

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Table	Summary of UXO risk and mitigation recommendations

Proposed Works	UXO Risk	Recommended Mitigation
Excavations		**Proceed with works** – if additional comfort is required to address the residual UXO hazard, a formal UXO awareness briefing can be provided.
Boreholes/Piling		**Proceed with works**
Excavations		**EOC Engineer Supervision** – to ensure safety and minimise delays, Explosive Ordnance Clearance (EOC) Engineer supervision is recommended.
Boreholes/Piling		**Deep UXB detection –** to clear borehole or pile locations of potential UXB, an intrusive magnetometer survey should be undertaken until either the maximum bomb penetration or maximum drilling/piling depth is reached.

In summary, it is recommended that the excavations proposed within the moderate risk areas are supervised by an EOC Engineer.

As part of borehole or pile construction, we recommend that deep UXB detection is undertaken to ensure the safety of those working on Site and in the surrounding area.

What Do I Do Next?

If you wish to proceed with UXO risk mitigation, Zetica would be happy to assist. Just contact us via phone (01993 886682) or email (uxo@zetica.com) and we can provide a proposal with options and prices.

If you have other requirements (such as utility services mapping or mapping buried obstructions) we can also provide these surveys, often saving costs if combined with a UXO survey.

If proposed works on the Site change, or additional works are planned, contact Zetica for a re-assessment of the UXO risk and the risk mitigation requirements.

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Appendix 2 Sources of UXO Hazard

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Appendix 4 Glossary and Definitions

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Appendix 5 WWII Bombing Incident List

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Figures, Plates, Tables & Drawings

Figure 1 Site location map

Figure 2 Compiled bomb impact map for the vicinity of the Site

Figure 3 Potential burial setting of UXB on the Site

Figure 4 UXO hazard zone plane of the Site

Figure 5 Recommended risk mitigation plan for the Site

Plate 1 Recent aerial photograph of the Site

Plate 2 Luftwaffe target photograph of central Manchester, 4th October 1940

Plate 3 Aerial photograph, 16th May 1948

Plate 4 Aerial photograph, 13th May 1953

Table 1 Luftwaffe targets in the vicinity of the Site

Table 2 Bombing statistics

Table 3 Estimated average maximum bomb penetration depths (north-west and south)

Table 4 Estimated average maximum bomb penetration depths (south-east and central)

Table 5 UXO risk assessment for the Site

Table 6 Summary of UXO risk and mitigation recommendations

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ABBREVIATIONS

AA	Anti-Aircraft
ACPO	Association of Chief Police Officers
ALARP	As Low As Reasonably Practicable
ARP	Air Raid Precaution
AXO	Abandoned Explosive Ordnance
BD	Bomb Disposal
BDO	Bomb Disposal Officer
BDU	Bomb Disposal Unit
CMD	Conventional Munitions Disposal
DCLG	Department of Communities and Local Government
EO	Explosive Ordnance
EOC	Explosive Ordnance Clearance
EOR	Explosive Ordnance Reconnaissance
ERW	Explosive Remnants of War
ESA	Explosive Substances and Articles
FFE	Free From Explosives
GUTE	Guardian Underground Telephone Exchange
HAA	Heavy Anti-Aircraft
HE	High Explosive
HSE	Health and Safety Executive
JSEODOC	Joint Services EOD Operations Centre
IB	Incendiary Bomb
IED	Improvised Explosive Device
IEDD	Improvised Explosive Device Disposal
LAA	Light Anti-Aircraft
MoD	Ministry of Defence
PM	Parachute Mine
PUCA	Pick Up and Carry Away
RAF	Royal Air Force
TEP	Time Expired Pyrotechnics
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
WWI	World War One
WWII	World War Two

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UXO DESK STUDY & RISK ASSESSMENT

Please read: Zetica has colour coded each paragraph. Paragraphs with black text on a white background are paragraphs that provide site-specific information or information specifically researched as part of this project.

Boxed paragraphs in a dark green text with a green background are paragraphs providing general information and, where appropriate, links to online resources giving further detail. These are all available at www.zeticauxo.com. If you cannot gain access to these resources, Zetica can forward them on request.

1 INTRODUCTION

1.1 Project Outline

Zetica Ltd was commissioned by Arup to carry out a detailed Unexploded Ordnance (UXO) Desk Study and Risk Assessment for an area of approximately 11.6 hectares (ha) centred on Sackville Street in Manchester ('the Site').

The aim of this report is to gain a fair and representative view of the UXO hazard for the Site and its immediate surrounding area in accordance with the Construction Industry Research and Information Association (CIRIA) C681 'Unexploded Ordnance (UXO), a Guide for the Construction Industry'.

Where appropriate, this hazard assessment includes:

- Likelihood of ordnance being present.
- Type of ordnance (size, filling, fuze mechanisms).
- Quantity of ordnance.
- Potential for live ordnance.
- Probable location.
- Ordnance condition.

It should be noted that some military activity providing a source of UXO hazard may not be recorded and therefore there cannot be any guarantee that all UXO hazards affecting the Site have been identified in this report.

1.2 Sources of Information

Zetica Ltd researched the military history of the Site and its surrounding area using a range of information sources. The main sources of information are detailed in the following sections and referenced at the end of this report.

1.2.1 Zetica Ltd Defence Related Site Records

Zetica Ltd's in-house records were consulted, including reference books and archived materials from past work in the region. Relevant documents have been cited within the bibliography of this report.

1.2.2 Zetica Ltd Bombing Density Records and Maps

Reference has been made to the Zetica Ltd bomb risk maps located on Zetica's website (http://zeticauxo.com/downloads-and-resources/risk-maps/

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1.2.3 Ministry of Defence and Government Records

Government departments and units within the Ministry of Defence (MoD) were approached for information of past and present military activity in the area. These included the Department of Communities and Local Government (DCLG) records of abandoned bombs.

1.2.4 Other Historical Records, Maps and Drawings

Numerous reference documents including historical maps, aerial photographs and drawings have been consulted from sources such as the National Archives, the US National Archives & Records Administration (NARA), the Imperial War Museum (IWM), Historic England and the Defence of Britain Project.

The British Geological Survey (BGS) was consulted for borehole information.

1.2.5 Local Authority Records

Information has been obtained from Manchester City Council.

1.2.6 Local Record Offices and Libraries

Information was obtained from The Greater Manchester County Record Office, Manchester Central Library Archive and Manchester University.

1.2.7 Local Historical and Other Groups

Local history groups and archaeological societies were consulted, including the Greater Manchester Historic Environment Record (HER).

1.3 Data Confidence Level

In general, there is a high level of confidence in the researched information sources used for this report.

It should be noted that a small number of the WWII Manchester Bomb Damage cards are missing.

Various other sources (including bomb census maps, anecdotal accounts and historical aerial photographs) have been used to provide a corroborative assessment of the UXO hazard level on the Site.

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2 THE SITE

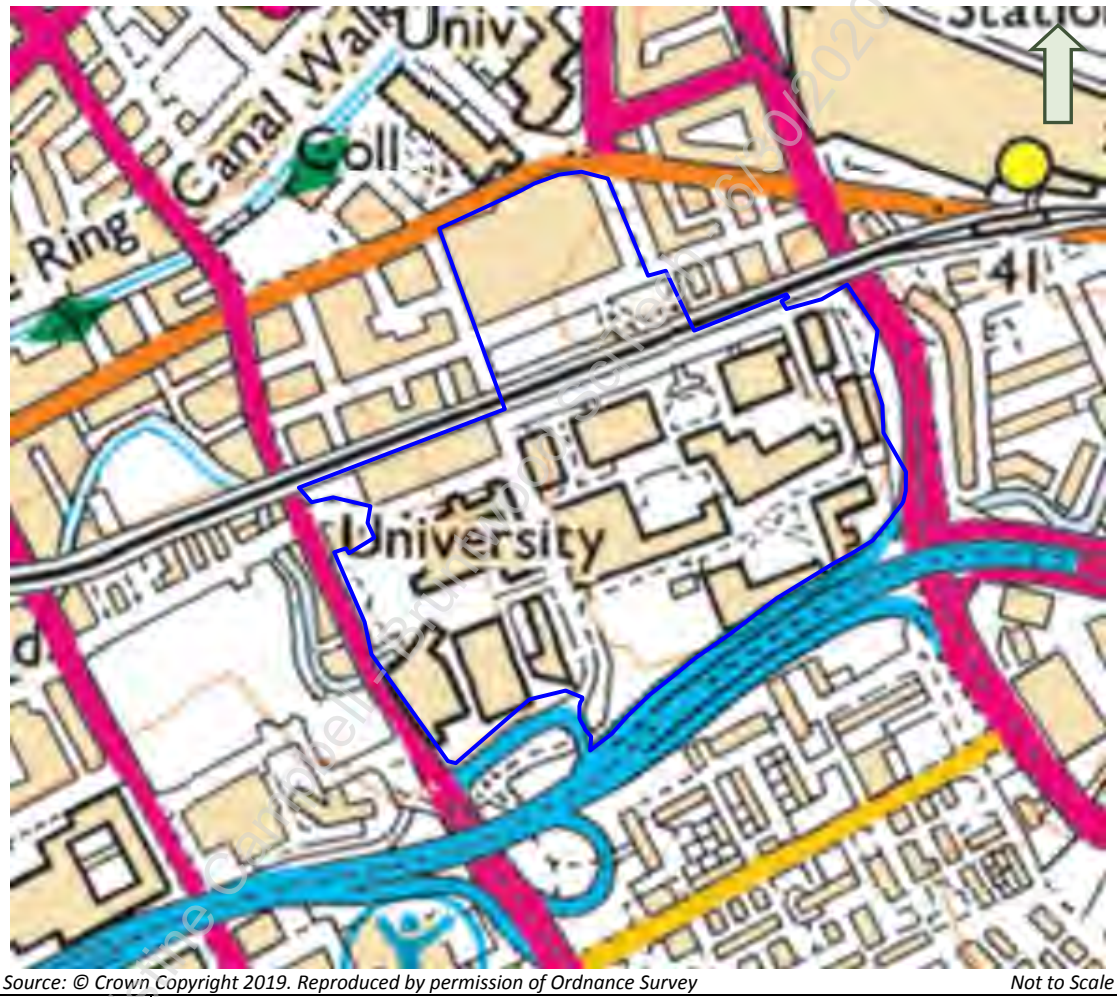
2.1 Site Location

The Site is centred on Ordnance Survey National Grid Reference (OSNGR) SJ 845975. It is centred on Sackville Street, Manchester, approximately 0.2km southwest of Manchester Piccadilly railway station and approximately 3.1km east of Salford Quays.

The Site comprises University of Manchester premises, railway and residential buildings. It is bounded to the north by Aytoun Street, to the east by London Road, to the south by Mancunian Way and to the west by Princess Street.

Figure 1 is a Site location map and Plate 1 is a recent aerial photograph of the Site.

Figure 1	Site location map



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Legend	Site boundary

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Plate 1	Recent aerial photograph of the Site



Source: Google Earth *Not to Scale*

Legend	Site boundary

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3 MILITARY ACTIVITY

The following sections outline the recorded military activity in the vicinity of the Site. The potential UXO hazard from WWI and WWII bombing is detailed in Section 4.

Each sub-section provides hyperlinks to further information on potential sources of UXO hazard. These are also available at www.zeticauxo.com. If you cannot gain access to these resources, Zetica can forward them on request.

3.1 Defences

For further information on military defences, and the potential UXO hazards associated with them, follow the links below:

- Anti-Aircraft Guns
- Anti-Invasion Defences
- Barrage Balloons
- Bombing Decoys
- Home Guard
- Mined Locations
- Mortar & Gun Emplacements
- Pillboxes

No military defences have been identified on the Site.

3.1.1 Anti-Aircraft Guns

Records indicate that there were at least 10No. Anti-Aircraft (AA) gun batteries within 10km of the Site during WWI. The nearest was located at Pendleton (SJ 812991), approximately 3.5km northwest of the Site. It was armed with 1No. 18-pounder (-pdr) gun.

During WWII there were 27No. Heavy AA (HAA) and ZAA rocket batteries within 10km of the Site. The nearest was located in Fallowfield (SJ 858948), approximately 2.8km south of the Site.

The nearest recorded WWII AA shell incidents to the Site are described below.

22nd-23rd December 1940

1No. AA shell fell on Pritchard Street, adjacent to the western boundary of the Site.

1No. AA shell fell on Russel Street, approximately 0.1km south of the Site.

Potential UXO Hazard

Given the number of HAA gun batteries in the surrounding area during WWII, the potential for a UXAA shell to have fallen on the Site unnoticed cannot be totally discounted.

3.1.2 Bombing Decoys

The nearest recorded bombing decoy was located at Reddish (SJ 912939), approximately 7.3km southeast of the Site.

Bombing decoys are not considered to provide a source of UXO hazard to the Site.

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3.2 Military Airfields

For further information on military airfields, and the potential UXO hazards associated with them, follow the links below:

- Military Airfields

No records of any military airfields on or in close proximity to the Site have been found.

Between 1918 and 1924 an aerodrome was operational at Alexandra Park (SJ 835950), approximately 2.9km south of the Site. This was used as a testing station for aircraft produced at the Avro works at Trafford Park, including Avian, Cadet, Tudor and Anson types. The airfield closed in 1924, the buildings were demolished and the area was converted into a public park.

The nearest military airfield during WWII was Royal Air Force (RAF) Ringway (SJ 815844), approximately 12.6km south of the Site. This was an aircraft assembly airfield used by the Fairey and Avro companies, in addition to No. 1 Parachute Training School.

Military airfields are not considered to provide a source of UXO hazard to the Site.

3.3 Aircraft Crashes

For further information on military aircraft crashes, and the potential UXO hazards associated with them, follow the links below:

- Aircraft Crashes

No records of any aircraft crashes on or in close proximity to the Site have been found.

3.4 Explosives Factories, Munitions Depots and Disposal Areas

For further information on explosives factories, munitions depots and disposal areas, and the potential UXO hazards associated with them, follow the links below:

- Explosives Factories
- Munitions Depots
- Munitions Disposal Areas

No records of any explosives factories, munitions depots or munitions disposal areas on or in close proximity to the Site have been found.

3.5 Firing Ranges and Military Training Areas

For further information on firing ranges and military training areas, and the potential UXO hazards associated with them, follow the links below:

- Artillery Ranges
- Bombing Ranges
- Military Training Areas
- Small Arms Ranges

No records of any firing ranges or military training areas on or in close proximity to the Site have been found.

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3.6 Other Military Establishments

Military establishments have been identified on and in close proximity to the Site.

3.6.1 Guardian Underground Telephone Exchange

During the 1950s a secure tunnel was established underneath the Site as part of the Guardian Underground Telephone Exchange (GUTE), a cable system designed to maintain communications in the event of a nuclear attack. The tunnels were established at a depth of approximately 30 metres.

GUTE is not considered to provide a source of UXO hazard to the Site.

3.6.2 Ardwick Barracks

The Ardwick Barracks were established in 1886, approximately 0.3km south of the Site. They were home to the 5th (Ardwick) Volunteer Battalion, becoming the 8th battalion Manchester Regiment in 1908.

During WWII the barracks were used as a detention centre for deserters before being returned to 8th battalion in 1945.

Ardwick Barracks is not considered to provide a source of UXO hazard to the Site.

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4 BOMBING

4.1 WWI Bombing

For further information on WWI bombing in the UK, and the potential UXO hazard associated with it, see Appendix 2.1. Alternatively, use the following link.

- WWI Bombing

No records have been found indicating that the Site was bombed during WWI.

4.2 WWII Bombing

For further information on WWII bombing in the UK, and the potential UXO hazard associated with it, see Appendix 2.2. Alternatively, use the following link.

- WWII Bombing

4.2.1 Bombing in Manchester

Manchester's industrial conurbations and port made it a principal target for enemy bombers. The Luftwaffe possessed detailed target photographs of many industrial complexes from as early as 1937.

Air raids on Manchester began in August 1940 and continued until 1945. The heaviest raid on the city occurred between the 22nd and 24th December 1940, the 'Manchester Blitz', during which more than 400No. HE bombs fell on the city.

More than 1,710No. High Explosive (HE) bombs and 115No. Parachute Mines (PMs) fell across the Manchester region during WWII.

Bombing was concentrated on the city centre and in West Manchester, where the Salford Docks and major industrial works at Trafford Park attracted heavy raids.

Bombing densities generally decreased away from the city centre and far less damage was sustained by properties in these areas.

4.2.2 Strategic Targets

The Site was located in an area which contained several strategic targets, including iron and steel works, rubber works, munitions factories, major transport infrastructure and gas works.

Plate 2 is a Luftwaffe target photograph of central Manchester, dated the 4th September 1940.

It identifies several targets in the vicinity of the Site, including Victoria Station (A), approximately 1.2km north of the Site, and Central Station (B), approximately 0.6km west of the Site.

Other identified targets are listed in Table 1.

Table 1 Luftwaffe targets in the vicinity of the Site

Target No.	Target
A	Victoria Station
B	Central Station
GB 717	Copper Works
GB 829	Foundry
GB 52 86	Gas Works

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Plate 2	Luftwaffe target photograph of central Manchester, 4th October 1940



Source: NARA *Not to Scale*

4.2.3 Bombing Densities and Incidents

Table 2 gives details of the overall bombing statistics recorded for the Local Authority Districts of the Site and surrounding districts. These were categorised as Rural Districts (RD), Urban Districts (UD), Municipal or Metropolitan Boroughs (MB) and County Boroughs (CB). WWII bomb density levels are defined below:

<5 bombs per 405ha is a Very Low regional bombing density.

5-15 bombs per 405ha is Low.

15-50 bombs per 405ha is Moderate.

50-250 bombs per 405ha is High.

>250 bombs per 405ha is Very High.

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Table 2	Bombing statistics				
Area	Bombs Recorded				
	High Explosive	Parachute Mines	Other	Total	Bombs per 405ha (1000 acres)
Manchester CB	**712**	**18**	**7**	**737**	**27.0**
Stretford MB	456	64	0	520	147.3
Salford CB	406	29	16	451	86.7

Note that Table 2 excludes the figures for V1s (Pilotless Aircraft or Flying Bombs), V2s (Long Range Rockets) and Incendiary Bombs (IBs). Discrepancies between this list and other records, such as bomb clearance records, demonstrate that this data is likely to under-represent actual bombing.

Details of the nearest recorded bombing incidents to the Site are given in the following section.

31st August 1940

1No. HE bomb fell on the College of Technology, on the Site.

1No. HE bomb fell on 53 Sackville Street, on the north-western boundary of the Site.

1No. HE bomb fell on the corner of Bombay Street and Venice Street, approximately 60m west of the Site.

22nd-23rd December 1940

Manchester and Salford were heavily bombed between the 22nd and 24th December 1940 (the 'Manchester Blitz'). Over 400No. HE bombs and more than 30,000No. IBs fell across the region.

1No. HE bomb fell on the East India Finishing Works, on the Site.

2No. HE bombs fell near The Albion Inn, Temple Street, on the Site.

1No. HE bomb fell on the junction of Jackson Street and Temple Street, on the Site.

1No. HE bomb fell on 85 Sackville Street, on the Site.

IBs (unspecified number) fell across Sackville Street, on the Site.

HE bombs (unspecified number) fell between Cooke Street, Gray Street and Grosvenor Street, adjacent to the south-western boundary of the Site.

IBs (unspecified number) fell on Whitworth Street, adjacent to the northern boundary of the Site.

IBs (unspecified number) fell on Princess Street, adjacent to the north-western boundary of the Site.

1No. HE bomb fell on the Manchester South and Altrincham Railway Viaduct, adjacent to the north-eastern boundary of the Site.

IBs (unspecified number) fell on Cooke Street, adjacent to the south-western boundary of the Site.

1No. HE bomb fell on 17 Cooke Street, adjacent to the south-western boundary of the Site.

1No. HE bomb and 1No. IB fell on 4 Whitworth Street, approximately 40m northwest of the Site.

1No. HE bomb and IBs (unspecified number) fell on 10 Charles Street, on the north-western boundary of the Site.

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11th March 1941

1No. HE bomb fell on 2 Cooke Street, adjacent to the south-western boundary of the Site.

1st-2nd June 1941

Approximately 110No. bomber aircraft attacked Manchester, dropping 42No. HE bombs and many IBs.

1No. HE bomb fell on 20 Temple Street, on the Site.

2No. HE bombs and 2No. IBs fell on Mount Street, on the Site.

1No. HE bomb fell on the Jackson Street Cotton Mills, on the Site.

1No. HE bomb and 1No. IB fell on the College of Technology, on the Site.

1No. HE bomb fell at the junction of London Road and Jackson Street, adjacent to the south-eastern boundary of the Site.

1No. HE bomb fell on Princess Street, adjacent to the north-western boundary of the Site.

1No. HE bomb fell on 63 Sackville Street, adjacent to the north-western boundary of the Site.

1No. HE bomb fell on 25 Granby Row, adjacent to the north-eastern boundary of the Site.

1No. HE bomb fell on the Police Headquarters, approximately 60m northeast of the Site.

It should be noted that during WWII, many UXB were mapped and subsequently removed as and when conditions and demands on Bomb Disposal teams allowed. Their removal was not always accurately recorded and sometimes records were later destroyed. In practice, most UXB were probably removed and only a much smaller number were actually registered as officially abandoned bombs.

Figure 2 is a map showing the approximate location of recorded bomb impacts in the immediate vicinity of the Site. IBs shown are indicative of larger numbers of similar devices that fell within the given area.

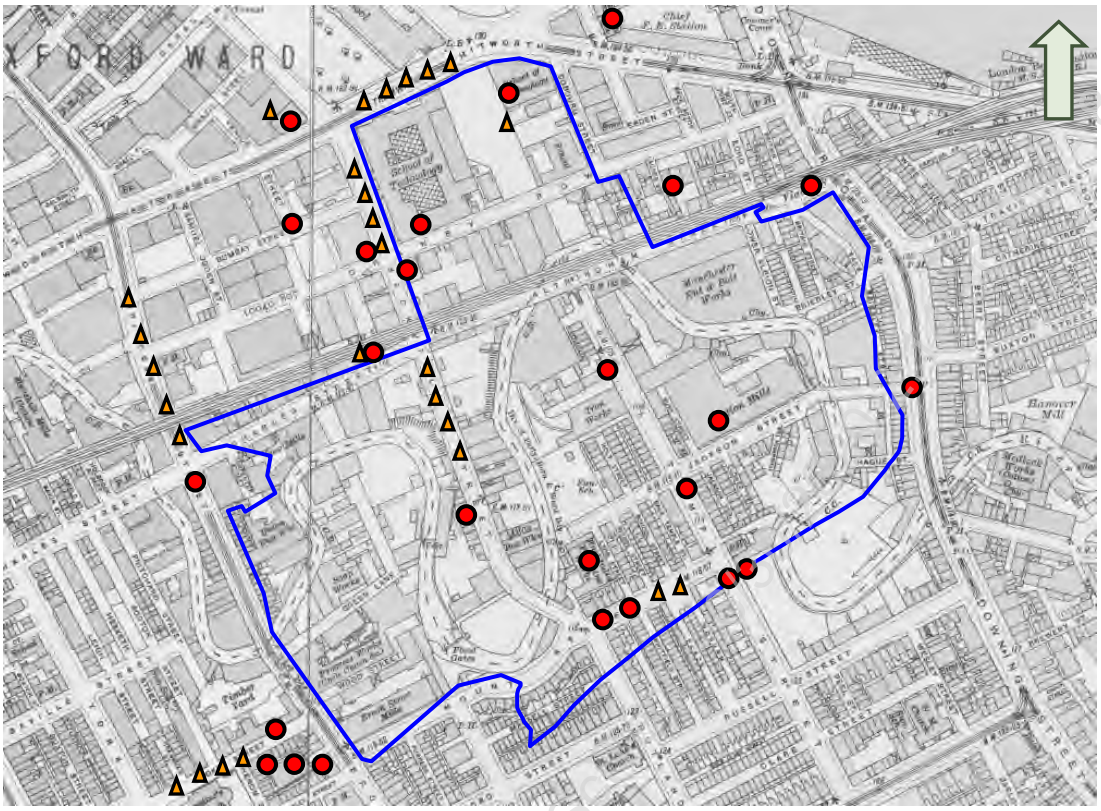
The map has been compiled from a number of different sources including air raid incident reports, historical aerial photographs and bomb census maps.

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Figure 2	Compiled bomb impact map for the vicinity of the Site



Source: © Crown Copyright 2019. Reproduced by permission of Ordnance Survey *Not to Scale*

Legend	Site boundary	HE bomb	IBs

Plates 3 and 4 are aerial photographs, dated the 16th May 1948 and 13th May 1953 respectively.

Extensive areas of demolished buildings have been identified on the Site. Some of these relate to damage sustained during WWII air raids and others are likely to be the result of pre-WWII slum clearance.

An evaluation of historical maps from before and after WWII has enabled an estimation of which demolished areas are more likely to be due to planned slum clearance.

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Plate 3	Aerial photograph, 16th May 1948



Source: Historic England *Not to Scale*

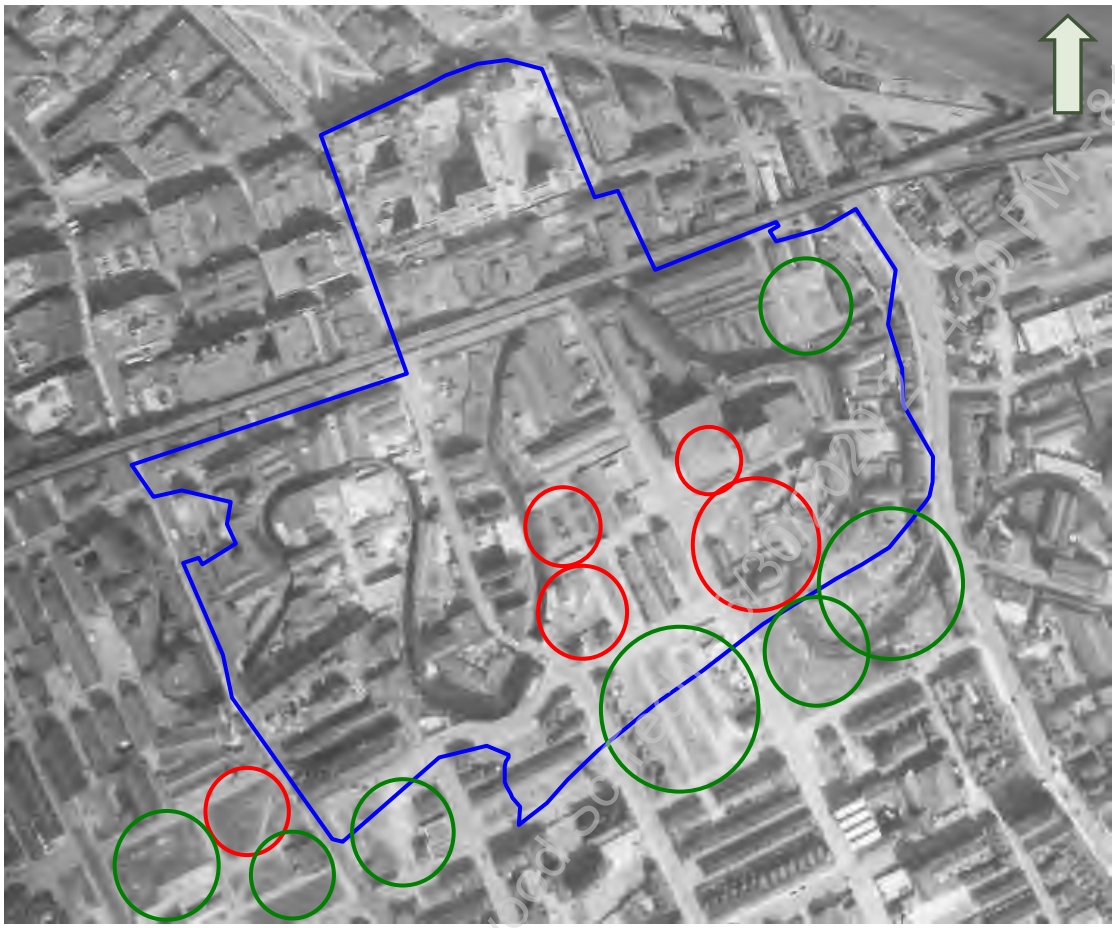
Legend	Site boundary	Possible bomb damage	Possible slum clearance

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Plate 4	Aerial photograph, 13th May 1953



Source: Historic England *Not to Scale*

Legend	Site boundary	Possible bomb damage	Possible slum clearance

Potential UXO Hazard

Records indicate that at least 12No. HE bombs fell on the Site. Most of these fell during the very heavy 'Christmas Blitz' of December 1940 and the remainder fell during another heavy air raid in June 1941.

The bombing resulted in significant damage being caused to buildings on the central and southern parts of the Site.

Given the intensity of the raids on central Manchester, the conflagrations caused by numerous IBs, and the extent of the damage, it is possible that a UXB may have fallen on these parts of the Site unnoticed.

No significant bomb damage likely to mask the impact of a UXB has been identified on the remainder of the Site.

WWII bombing is considered to provide a possible source of UXO hazard to the central and southern parts of the Site.

4.2.4 Geology and Bomb Penetration Depths

It is important to consider the geological materials present at the time that a bomb was dropped in order to establish its maximum penetration depth.

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British Geological Survey (BGS) 1:50,000 Sheet 85, Manchester (Solid & Drift) and BGS borehole records from nearby investigations have been consulted to get an indicative overview of the Site geology.

The geology of the north-western and southern parts of the Site is understood to consist of Made Ground, over Glacial Till overlying the Sherwood Sandstone Group.

Table 3 provides an estimate of average maximum bomb penetration depths assuming ground conditions during WWII of 3m of Made Ground, over 4m of stiff to very stiff clay and 2m of weathered sandstone, overlying thick deposits of weak sandstone.

Table 3	Estimated average maximum bomb penetration depths (north-west and south)	
Estimated average bomb penetration depths for anticipated geology		
Bomb Weight	50kg	2.5m
	250kg	4.0m
	500kg	8.0m

The geology of the south-eastern and central parts of the Site is understood to consist of Made Ground, over Alluvium, overlying the Sherwood Sandstone Ground.

Table 4 provides an estimate of average maximum bomb penetration depths assuming ground conditions during WWII of 2m of Made Ground, over 1m of soft to firm clay and 1m of loose gravely sand, over 2m of weathered sandstone overlying thick deposits of weak sandstone.

Table 4	Estimated average maximum bomb penetration depths (south-east and central)	
Estimated average bomb penetration depths for anticipated geology		
Bomb Weight	50kg	3.0m
	250kg	5.0m
	500kg	8.0m

These calculations can be refined on receipt of further Site-specific borehole logs.

The estimated bomb penetration depths given in Tables 3 and 4 are from the WWII ground level and are based on the following assumptions:

a) High level release of the bomb resulting in an impact velocity of 260m/s (>5,000m altitude).

b) A strike angle of 10 to 15 degrees to the vertical.

c) That the bomb is stable, both in flight and on penetration.

d) That no retarding units are fitted to the bomb.

e) That the soil type is homogenous.

A high altitude release of a bomb will result in ground entry at between 10° and 15° to the vertical with the bomb travelling on this trajectory until momentum is nearly lost. The bomb will then turn abruptly to the horizontal before coming to rest. The distance between the centre of the entry hole and the centre of the bomb at rest is known as the 'offset'. A marked lateral movement from the original line of entry is common.

Low-level attacks may have an impact angle of 45° or more, which will frequently lead to a much greater amount of offset movement during soil penetration.

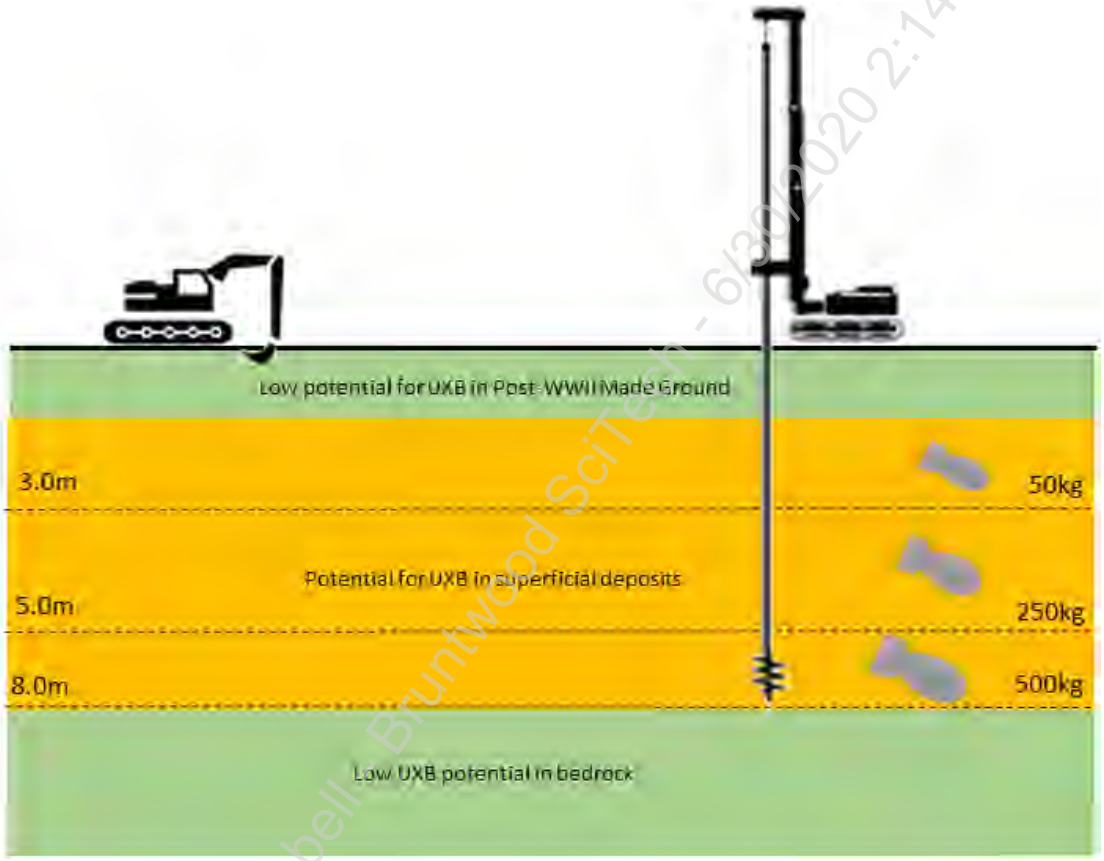
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The average offset is one third of the penetration depth, i.e. an offset of 2m may be expected for a 50kg bomb in dry silts and clays. If hard standings or Made Ground were present during WWII, bomb penetration depths would have been significantly reduced but offset distances may have been up to four times greater.

Figure 3 demonstrates the potential burial setting for a UXB in the moderate hazard zone on the Site, based on the anticipated ground conditions and average maximum bomb penetration depth.

Figure 3 Potential burial setting of UXB on the Site



Source: Zetica *Not to Scale*

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5 EXPLOSIVE ORDNANCE CLEARANCE ACTIVITIES

Official UK bombing statistics have been compiled from both British and German sources. There were differences in the way the figures were originally reported and collated which has led to discrepancies in the summary data.

Based on data from 1939 to 1945, War Office statistics indicate that 200,195No. HE bombs exploded within Great Britain. Additionally, 25,195No. HE bombs (representing 11%) were recorded as UXBs. However, records from the Royal Engineers who were responsible for bomb disposal at the time indicate that as of 27th February 1946 upwards of 45,000No. UXBs were disposed of.

On average 8.5% of UXBs later self-exploded. In some cases the bombs had delayed action fuzes or were never intended to explode, their purpose being to cause inconvenience and fear. Given the discrepancy in records and the fact that UXBs are still being found unexpectedly, it is clear that the original figures are understated and provide only an approximation of the number of potential UXBs in the UK.

War Office statistics also show that between October 1940 and May 1941 most of the UXBs (93%) were either 50kg or 250kg. It should be noted that details of the recovery and the size of the UXB were not always accurately reported. The larger WWII UXBs are often difficult to recover due to both penetration depths and the presence of two or more fuzes, combined with more sensitive fillings of explosive mixtures including Amatol and Trialen.

5.1 Abandoned Bombs

For further information on abandoned bombs, and the potential UXO hazard associated with them, follow the link below:

- Abandoned Bombs

No records have been found indicating that any officially abandoned bombs are located on the Site.

5.2 EOC Tasks

Records held by Zetica Ltd show that the following post-WWII EOC tasks have taken place in the vicinity of the Site.

1960

1No. 1kg IB was discovered on the roof of St Ann's Church, approximately 0.9km northwest of the Site. It was removed.

3rd April 2007

1No. WWII mortar bomb was found on a building site in Cambridge Street, approximately 0.5km west of the Site. It was removed.

8th October 2007

1No. suspected UXB was found on a building site in Middlewood Street, Salford, approximately 1.9km west of the Site. It was made safe and removed.

24th October 2018

1No. WWII anti-tank round was found on a building site in Newquay Street, Salford, approximately 1.5km northwest of the Site. It was removed.

The MoD has provided no additional information on official EOC tasks on the Site.

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6 UXO HAZARD ASSESSMENT

6.1 UXO Hazard Level

The definitions for the levels of UXO hazard are provided below.

Definitions of UXO Hazard Level for a Site	
Hazard Level	**Definition**
Very Low	There is positive evidence that UXO is not present, e.g. through physical constraints or removal.
Low	There is no positive evidence that UXO is present, but its occurrence cannot be totally discounted.
Moderate	There is positive evidence that ordnance was present or that other uncharted ordnance may be present as UXO.
High	There is positive evidence that UXO is present.
Very High	As high, but requires immediate or special attention due to the potential hazard.

Records have been found indicating that 12No. HE bombs fell on the Site during WWII. The bombing caused significant damage to buildings on the central and southern parts of the Site, which may have masked the impact of a UXB.

Given this, it is considered prudent to assign these parts of the Site a moderate UXO hazard level.

No significant bombing or other military activity is recorded on the remainder of the Site, which is assigned a low UXO hazard level.

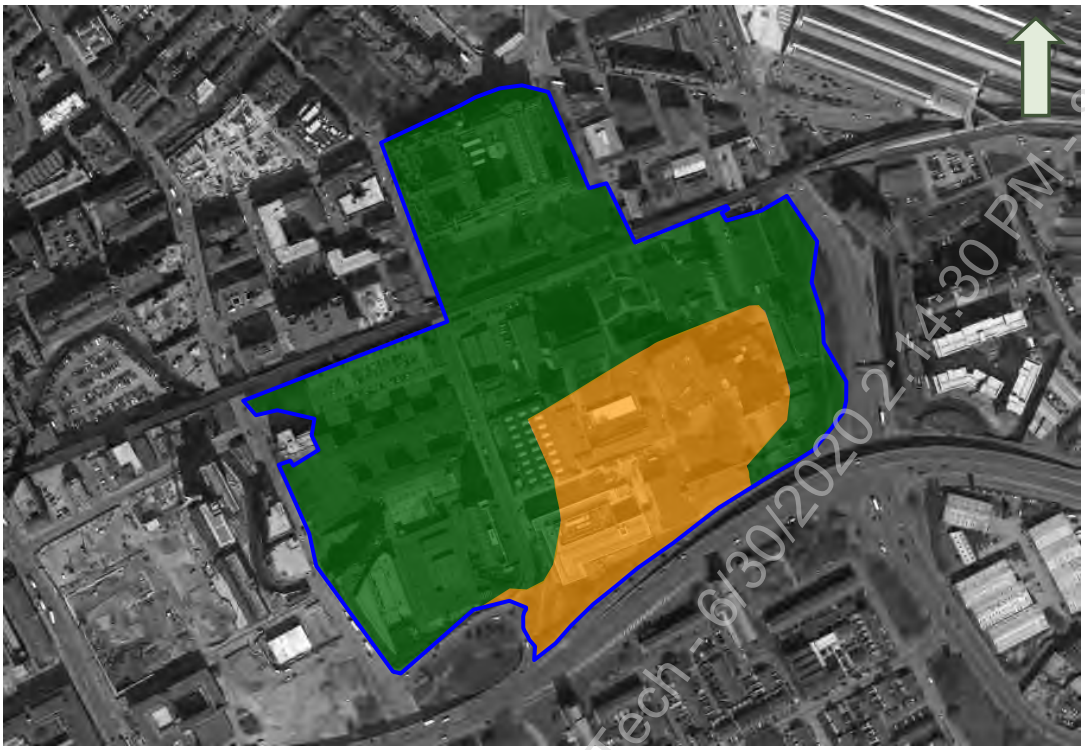
It is considered that the UXO hazard level on the Site can be zoned from low to moderate, as shown in Figure 4 below.

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Figure 4	UXO hazard zone plan of the Site



Source: Google Earth *Not to Scale*

Legend					
	Very Low		Low		Moderate
	High		Very High		Site boundary

Note that the UXO hazard will have been mitigated within the depth and extents of any post-WWII intrusive works. Outside the footprint of these works, between piles and below shallow raft foundations and basements, the UXO hazard level remains unchanged to the maximum bomb penetration depth.

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7 UXO RISK ASSESSMENT

7.1 Proposed Works

It is understood that initial works on the Site will comprise an intrusive ground investigation, including boreholes and trial pits.

Future works on the Site are likely to include the demolition of existing structures, bulk excavations and piling.

7.2 Risk Assessment Methodology

A UXO risk assessment has been undertaken for the proposed works, taking into consideration the identified UXO hazard.

Firstly, the probability of encountering UXO (PE) has been considered and rated for the different construction techniques, as detailed below.

Probability of Encounter (PE)	Rating
Frequent, highly likely, almost certain.	5
Probable, more likely to happen than not.	4
Occasional, increased chance or probability.	3
Remote, unlikely to happen but could.	2
Improbable, highly unlikely.	1
Impossible	0

Secondly, the probability of detonating a UXO (PD) has been considered and rated for the different construction techniques, as detailed below.

Probability of Detonation (PD)	Rating
Frequent, highly likely, almost certain.	5
Probable, more likely to happen than not.	4
Occasional, increased chance or probability.	3
Remote, unlikely to happen but could.	2
Improbable, highly unlikely.	1
Impossible	0

Next, the probability of encountering and detonating the UXO (PE x PD) have been used to generate an overall likelihood rating (P).

P = PE x PD	LIKELIHOOD of Encounter and Detonation	Rating
21 to 25	Frequent, highly likely, almost certain.	5
16 to 20	Probable, more likely to happen than not.	4
6 to 15	Occasional, increased chance or probability.	3
2 to 5	Remote, unlikely to happen but could.	2
1	Improbable, highly unlikely.	1
0	Impossible	0
P ranges from 25, a certainty of UXO being encountered and detonated on the Site by engineering activity, to 0, a certainty that UXO does not occur on the Site and will not be detonated by engineering activity.		

The likelihood of encountering and detonating UXO during site works is multiplied by the severity of such an event occurring (P x S), in order to provide a risk level using the following matrix.

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Severity (S)	Rating
Multiple fatalities	5
Major injury, long term health issues, single fatality.	4
Minor injury, short term health issues, no fatalities.	3
First aid case but no lost time or ill health.	2
Minor injuries, no first aid.	1
No injuries.	0

UXO Risk Matrix							
	SEVERITY (S)						
LIKELIHOOD (P)		5	4	3	2	1	0
	5	25	20	15	10	5	0
	4	20	16	12	8	4	0
	3	15	12	9	6	3	0
	2	10	8	6	4	2	0
	1	5	4	3	2	1	0
	0	0	0	0	0	0	0

7.3 UXO Risk Level

The UXO risk assessment for proposed works on the Site is given in Table 5.

Table 5 UXO risk assessment for the Site

Hazard Zone	Potential UXO Hazard	Anticipated Works	PE	PD	P = PE x PD	Likelihood	Severity	Risk Rating	UXO Risk
Moderate	UXB	Shallow Excavations	1	1	1	1	5	5	Low
		Deep Excavations	3	2	6	3	5	15	Moderate
		Boreholes/Piling	2	3	6	3	4	12	Moderate
	Other UXO	Shallow Excavations	1	1	1	1	4	4	Low
		Deep Excavations	1	1	1	1	4	4	Low
		Boreholes/Piling	1	1	1	1	3	3	Low
Low	UXB	Shallow Excavations	1	1	1	1	5	5	Low
		Deep Excavations	1	1	1	1	5	5	Low
		Boreholes/Piling	1	1	1	1	4	4	Low
	Other UXO	Shallow Excavations	1	1	1	1	4	4	Low
		Deep Excavations	1	1	1	1	4	4	Low
		Boreholes/Piling	1	1	1	1	3	3	Low

PE (Probability of Encounter), PD (Probability of Detonation), P (Overall Probability)

Shallow Excavations defined as <1.0m bgl.

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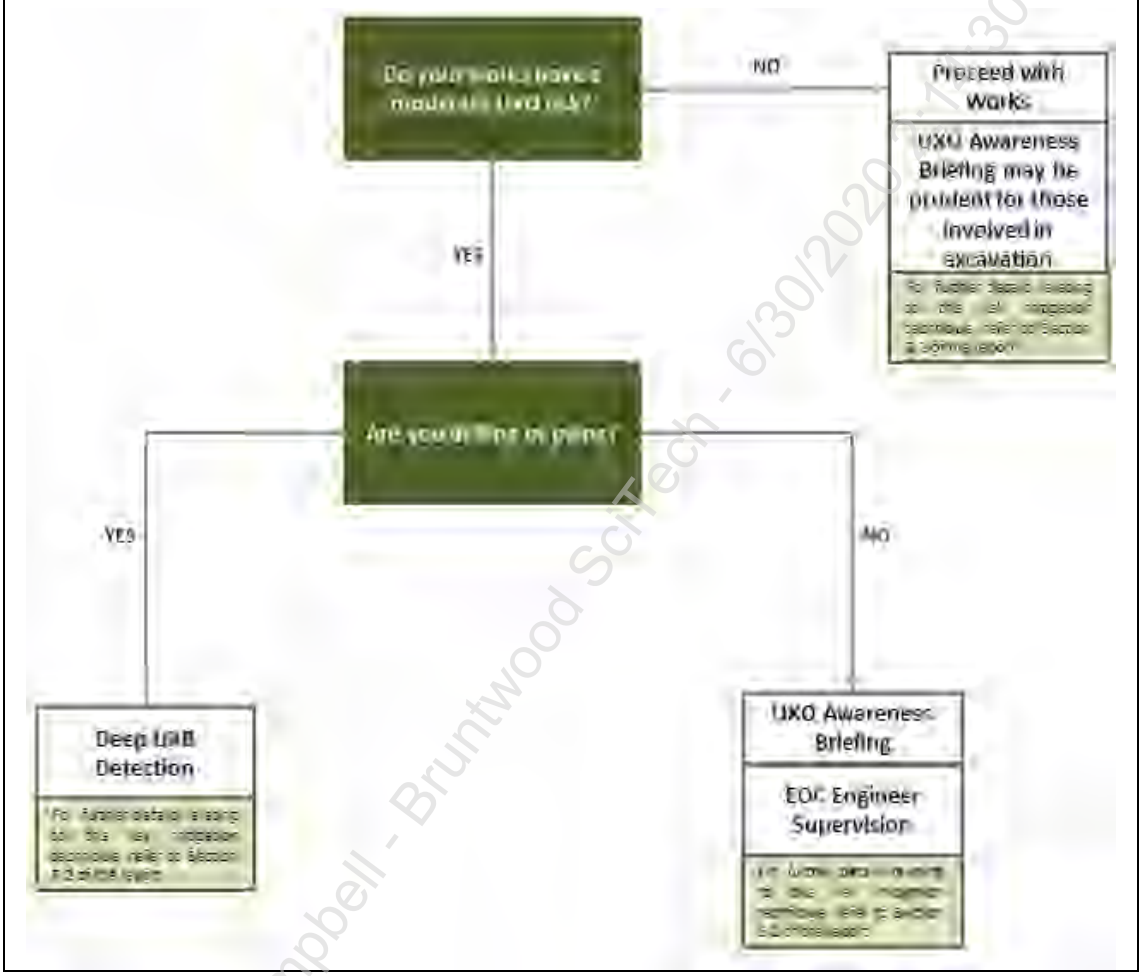
8 RISK MITIGATION PLAN

Key findings: Potential hazard from UXB on the central and southern parts of the Site.

Key actions: Deep UXB detection is required to clear borehole and pile locations and an EOC Engineer is required to supervise excavations in the moderate risk areas.

Figure 5 outlines the recommended steps to reduce the UXO risk to ALARP.

Figure 5	Recommended risk mitigation plan for the Site



8.1 UXO Risk Summary

Table 6 summarises the most appropriate risk mitigation recommendations for the proposed works on the Site.

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Table 6	Summary of UXO risk and mitigation recommendations	
Proposed Works	**UXO Risk**	**Recommended Mitigation**
Excavations		**Proceed with works** – if additional comfort is required to address the residual UXO hazard, a formal UXO awareness briefing can be provided.
Boreholes/Piling		**Proceed with works**
Excavations		**EOC Engineer Supervision** – to ensure safety and minimise delays, Explosive Ordnance Clearance (EOC) Engineer supervision is recommended.
Boreholes/Piling		**Deep UXB detection –** to clear borehole or pile locations of potential UXB, an intrusive magnetometer survey should be undertaken until either the maximum bomb penetration or maximum drilling/piling depth is reached.

In summary, it is recommended that the excavations proposed within the moderate risk areas are supervised by an EOC Engineer.

As part of borehole or pile construction, we recommend that deep UXB detection is undertaken to ensure the safety of those working on Site and in the surrounding area.

8.2 Risk Mitigation Techniques

The section below provides further details of the recommended techniques for mitigating the UXO risk on the Site.

8.2.1 UXO Awareness Briefing

Typically ~1hour in duration, these briefings will be expected to provide site workers with:-

- Background to the potential UXO hazards that could be encountered.
- Awareness of how the UXO hazard could present a risk.
- Knowledge of what to do in the event that a suspect item is encountered.

The briefing is to be provided along with back-up materials such as UXO awareness posters, emergency contact numbers and other background information to assist site workers in becoming familiar with what potential UXO can look like.

The materials can also be used by key staff to pass on the relevant points of the induction to others who visit or work on the Site.

By providing the UXO awareness briefing, it ensures that in the unlikely event that UXO is encountered:-

- All site staff take appropriate action.
- A support mechanism and points of contact are established.
- The likelihood of harm to people or property is reduced.
- Significant delays to site work are prevented.

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8.2.2 EOC Engineer Supervision

Given the amount of Made Ground and the increased potential for buried obstructions on the Site, the effectiveness of a non-intrusive UXO detection survey is likely to be reduced.

It is considered more practical for an EOC Engineer to attend site and supervise during excavation works if required.

The EOC Engineer will carry out a visual assessment on any suspect items uncovered during the excavation works and classify them as potential UXO or other material.

If an item of UXO is uncovered, the EOC Engineer will liaise with the authorities and arrange for its disposal as appropriate.

8.2.3 Deep UXB Detection

To clear borehole or pile positions of potential UXB, an intrusive magnetometer survey should be undertaken.

The survey should be carried out to either the maximum bomb penetration depth or maximum drilling/piling depth, whichever is shallower.

There are two main systems available:-

MagDrill (Boreholes) – this is a system that is suitable for working with ground investigation drillers.

It allows a magnetometer to be lowered into the borehole to ensure the route is clear of potential UXB.

MagCone (Piles) – this is a CPT-based system that facilitates the pushing of a magnetometer into the ground at the proposed location of a pile.

MagCone is suitable for cohesive/loose soils and has a much higher speed of operation compared to MagDrill. It should be noted that where dense soils or buried obstructions are encountered, MagCone is unlikely to be able to penetrate to the required depth.

Detection - Typical radius of detection should be assumed as approximately 1.0m for a 50kg UXB until site conditions are confirmed.

Assuming no objects comparable to the UXB detection range are identified, then the borehole or pile position can be considered clear of UXB.

If any ferrous anomalies are identified at the borehole or pile position, then it may need to be relocated or the anomaly investigated.

It should be noted that in Made Ground or close to buried/adjacent structures, effective UXB detection is compromised due to geophysical noise.

A clearance report should be issued on completion of the site works.

8.3 What Do I Do Next?

If you wish to proceed with UXO risk mitigation, Zetica would be happy to assist. Just contact us via phone (01993 886682) or email (uxo@zetica.com) and we can provide a proposal with options and prices.

If you have other requirements (such as utility services mapping or mapping buried obstructions) we can also provide these surveys, often saving costs if combined with a UXO survey.

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If proposed works on the Site change, or additional works are planned, contact Zetica for a re-assessment of the UXO risk and the risk mitigation requirements.

APPENDICES

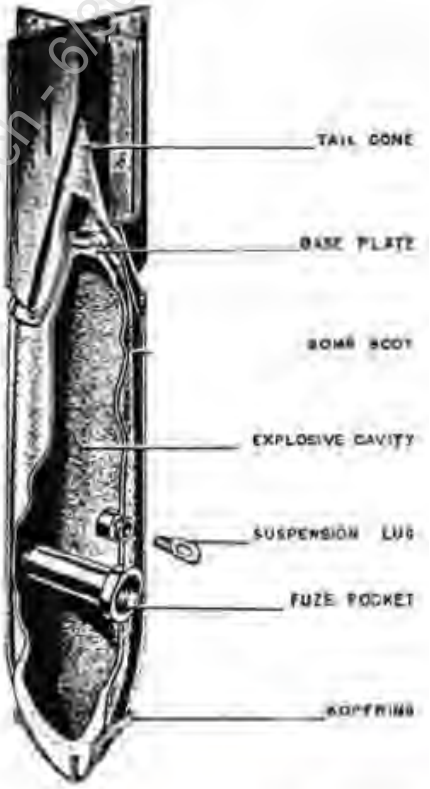
Appendix 1 Anticipated Ordnance Types

The most likely ordnance types to be encountered on the Site are detailed below. For a more comprehensive set of ordnance data sheets, see http://zeticauxo.com/downloads-and-resources/ordnance-data-sheets/.

Information Data Sheet

Category Bomb (Luftwaffe)
Type Sprengbombe-Cylindrisch (SC) 50kg

Variants	8
Body Dimensions	762 x 200mm (30" x 7.9")
Weight	55kg (122lbs)
Charge Weight	25kg (54lbs)
Fuze	Single electric impact fuze. Some have short time delay
Composition	Sheet steel
Description	Thick nose welded to a steel body. Nose may be attached to Kopfring (a triangular section steel ring) or spike. Suspension bolt in eye/body and sheet metal tail attached to body with rivets/screws. Originally painted green-grey with a yellow stripe on the tail. Cast TNT, Amatol or Trialen filling.
Function	Designed to maximise shock waves through air, water and earth and for general demolition. Used against easily damageable targets, including roads, aircraft hangars, rolling stock and small buildings. Spike bombs/ 'Stabo' (SC 50 with spikes attached to nose) were used against rail lines and country roads, with Kopfring used against naval targets.







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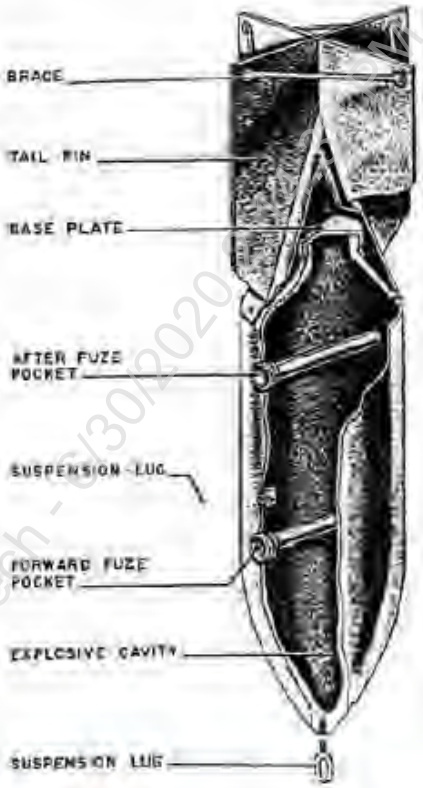
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Information Data Sheet

Category Bomb
Type Sprengbombe-Cylindrisch (SC) 250kg

Variants	6
Body Dimensions	1194mm x 368mm (47" x 14.5")
Weight	249-264 kg (549-582lbs)
Charge Weight	130-145 kg (287-320lbs)
Fuze	Electric impact fuze/electric clockwork time fuse & electric anti-disturbance fuze
Composition	Sheet steel with stays
Description	Thick nose welded to steel body. Nose may be attached to Kopfring (triangular section steel ring) or spike. Sheet metal tail attached to body with rivets/ screws. Suspension eye bolt in the nose/body. Originally painted green-grey with a yellow stripe on the tail. TNT, amatol; TNT and aluminium powder, naphthalene, ammonium nitrate and wax/ wood meal filling.
Function	Designed to maximize shock waves through air, water and earth and general demolition. Used against railway installations, large buildings, ammunition depots and below-ground installations (to 8m). Spike bombs/ 'Stabo' (SC 50 with spikes attached to nose) used against rail lines and country roads.







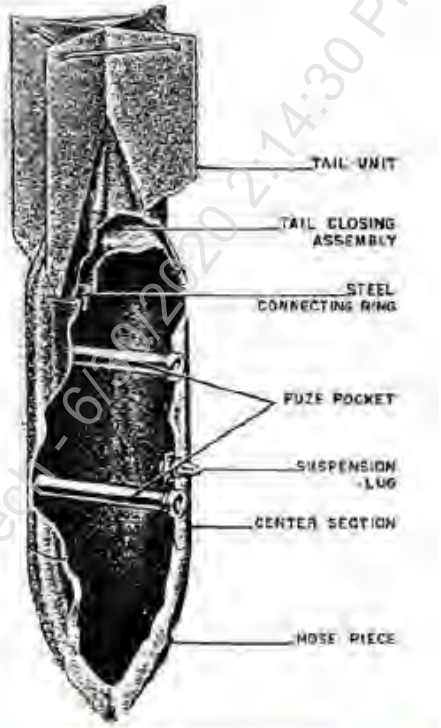
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Information Data Sheet

Category Bomb
Type Sprengbombe-Cylindrisch (SC) 500kg

Variants	-
Body Dimensions	1414–1486mm x 470mm (55.7-58.5" x 18.5")
Weight	500kg (1,100lbs)
Charge Weight	220kg (484lbs)
Fuze	Electric impact fuze/electric clockwork time fuse & electric anti-disturbance fuze.
Composition	Sheet steel with stays or drum
Description	Thick nose welded to steel body. Nose may be attached to Kopfring (triangular section steel ring). Tail either steel sheet or drum-shaped. Suspension band. Originally painted green-grey/ buff (some later versions sky blue) with yellow stripe on tail. Filled with amatol, TNT or trialen.
Function	Designed to maximise shock waves through air, water and earth and for general demolition. Used against railway property, large buildings, shipping and below-ground installations.







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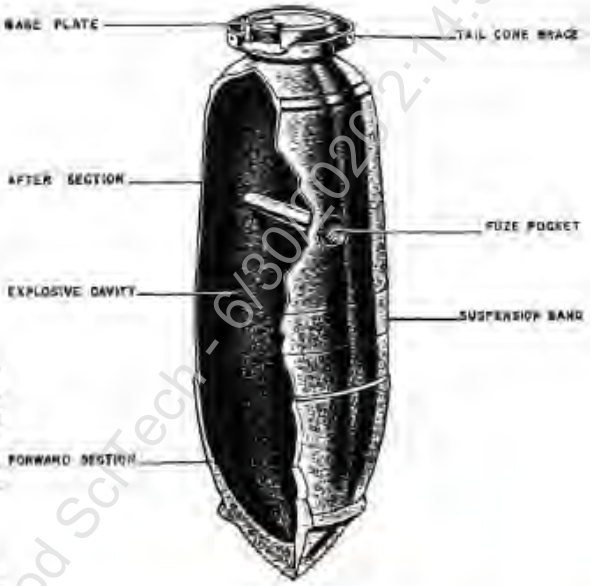
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Information Data Sheet

Category Bomb
Type Sprengbombe-Cylindrisch (SC) 1,000kg (HERMANN)

Variants	3
Body Dimensions	1742-1905mm x 648–660mm (68.6-75" x 25.5-26")
Weight	1,000-1,088kg (2,204-2,398lbs)
Charge Weight	529-619kg (1,166-1,364lbs)
Fuze	Electric impact fuze/ electric clockwork time fuze & electric anti-disturbance fuze
Composition	Magnesium alloy with drum
Description	Thick nose welded to steel body. Nose attached to Kopfring (triangular section steel ring). Drum-shaped tail made of magnesium alloy. Suspension band. Originally painted sky-blue. Filled with amatol, TNT/aluminium/wood meal or trialen.
Function	Designed to maximise shock waves through air, water and earth and for general demolition.







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Information Data Sheet

Category Projectile
Type 3.7" Anti-Aircraft Shell



Variants	6
Body Dimensions	94mm x 360mm (3.7 x 14.7")
Weight	12.7kg (28lb)
Fuze	Mechanical time fuze
Composition	Cast steel
Description	Brass cartridge case. Square-based shell with tapered nose, filled with Amatol, TNT or RDX/TNT. MK6 had forward centring bands and a wider driving band.
Function	Used as a defence against enemy aircraft, fired from fixed batteries and mobile mountings. Could fire approximately 20 rounds per minute with a maximum ceiling of 41,000ft and horizontal range of 20,600 yards.





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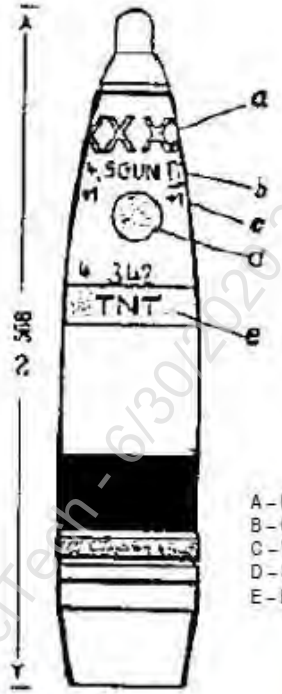
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Information Data Sheet

Category Projectile
Type 4.5" Shell (Mark II – Anti-Aircraft)

Variants	-
Body Dimensions	114mm x 566mm (4.5" x 21.9")
Weight	24.9kg (55lb)
Fuze	Mechanical time fuze
Composition	Cast steel
Description	Square-based, tapered-nosed shell filled with TNT or Amatol. Steel casing, rotating band of either copper or gilding metal located 3.5" in front of the base end with single groove.
Function	Used as field artillery and adapted for use in anti-aircraft defence from fixed batteries. Rate of fire of 8 rounds per minute, maximum ceiling of 44,000ft and horizontal range of 22,800 yards.









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Appendix 2 Sources of UXO Hazard

The sections below provide background information on the most likely sources of UXO hazard affecting the Site. For a more comprehensive set of UXO information sheets, see http://zeticauxo.com/downloads-and-resources/uxo-information-sheets/.

Appendix 2.1 WWI Bombing

It is not generally realised that during World War One (WWI) significant bombing took place across some areas of the UK. An estimated 9,000No. German bombs were dropped on Britain during the course of 51No. airship and 52No. aircraft raids. It was the first time that strategic aerial bombardment had been used. More than 1,400No. people were killed during these raids.

Most air raids were carried out on London and Southeast England. Areas along the East Coast were also targeted regularly due to their proximity to the European continent. Bombing raids further inland were rare and West England and Wales were out of reach for German aircraft of the time.

Aerial bombing during WWI initially relied on visual aiming, with bombsights not developed until later in the war. The inaccuracy inherent in this method meant that bombs often fell some way from their intended targets.

The first recorded raid against England occurred on the 21st December 1914 when 2No. high explosive bombs fell near the Admiralty Pier at Dover. Zeppelin raids intensified during 1915 and 1916, with aircraft raids becoming more frequent after 1917. The last raid of WWI took place on the 19th May 1918, when 38 Gotha and 3 Giant aircraft bombed London and surrounding districts, dropping a total of more than 2,500lbs of bombs.



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The potential of coming across an Unexploded Bomb (UXB) from WWI is far less likely than a WWII UXB given the lower bombing densities during raids in the Great War.

Some areas which were subjected to sustained bombing raids, such as parts of London and coastal towns, recorded a higher number of UXB. In these areas, where there has been no significant development for the last century, the potential of a UXB remaining from WWI cannot be totally discounted.

Appendix 2.2 WWII Bombing

Bombing raids began in the summer of 1940 and continued until the end of WWII. Bombing densities generally increased towards major cities or strategic targets such as docks, harbours, industrial premises, power stations and airfields. In addition to London, industrial cities and ports, including Birmingham, Coventry, Southampton, Liverpool, Hull and Glasgow, were heavily targeted, as well as seaside towns such as Eastbourne and cathedral cities such as Canterbury.

The German bombing campaign saw the extensive use of both High Explosive (HE) bombs and Incendiary Bombs (IBs). The most common HE bombs were the 50kg and 250kg bombs, although 500kg were also used to a lesser extent. More rarely 1,000kg, 1,400kg and 1,800kg bombs were dropped.

The HE bombs tended to contain about half of their weight in explosives and were fitted with one or sometimes two fuzes. Not all HE bombs were intended to explode on impact. Some contained timing mechanisms where detonation could occur more than 70 hours after impact.

Incendiary devices ranged from small 1kg thermite filled, magnesium bodied Incendiary Bombs (IBs) to a 250kg 'Oil Bomb' (OB) and a 500kg 'C300' IB. In some cases the IBs were fitted with a bursting charge. This exploded after the bomb had been alight for a few minutes causing burning debris to be scattered over a greater area. The C300 bombs were similar in appearance to 500kg HE bombs, although their design was sufficiently different to warrant a specially trained unit of the Royal Engineers to deal with their disposal.



Anti-Personnel (AP) bombs and Parachute Mines (PMs) were also deployed. 2No. types of anti-personnel bombs were in common use, the 2kg and the 12kg bomb. The 2kg bomb could inflict injury across an area up to 150m away from the impact. PMs (which were up to 4m in length) could be detonated either magnetically or by noise/vibration.

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Anti-shipping parachute mines were commonly dropped over navigable rivers, dockland areas and coastlines. The Royal Navy was responsible for ensuring that the bombs were made safe. Removal and disposal was still the responsibility of the Bomb Disposal Unit of the Royal Engineers.

In 1944, the Germans introduced new weapons; the V1, a 'flying bomb' and guided missile, and the V2, a ballistic missile rocket that travelled at such speed that no one could see or hear its approach. London was the main target for these attacks.

WWII bomb targeting was inaccurate, especially in the first year of the war. A typical bomb load of 50kg HE bombs mixed with IBs which was aimed at a specific location might not just miss the intended target but fall some considerable distance away.



It is understood that the local Civil Defence authorities in urban areas had a comprehensive system for reporting bomb incidents and dealing with any Unexploded Bombs (UXB) or other UXO. In more rural areas, fewer bombing raids occurred. It is known that Air Raid Precaution (ARP) records under-represent the number and frequency of bombs falling in rural and coastal areas. Bombs were either released over targets or as part of 'tip and run' raids where bomber crews would drop their bombs to avoid anti-aircraft fire or Allied fighter aircraft on the route to and from other strategic targets. Bombs dropped as a result of poor targeting or 'tip and run' raids on rural and coastal areas often went unrecorded or entered as 'fell in open country' or 'fell in the sea'. The Luftwaffe are thought to have dropped approximately 75,000 tons of bombs on Britain throughout the Second World War and an estimated 11% of all bombs dropped during the war failed to detonate.

The potential for a UXB hazard to exist on a site depends on a variety of factors. Were there strategic targets in the surrounding area? Was the site bombed? Could a UXB impact have been missed? Even in rural areas, the potential for UXB cannot be totally discounted and therefore it is essential that detailed local bombing records are obtained when assessing the UXB hazard on any site.

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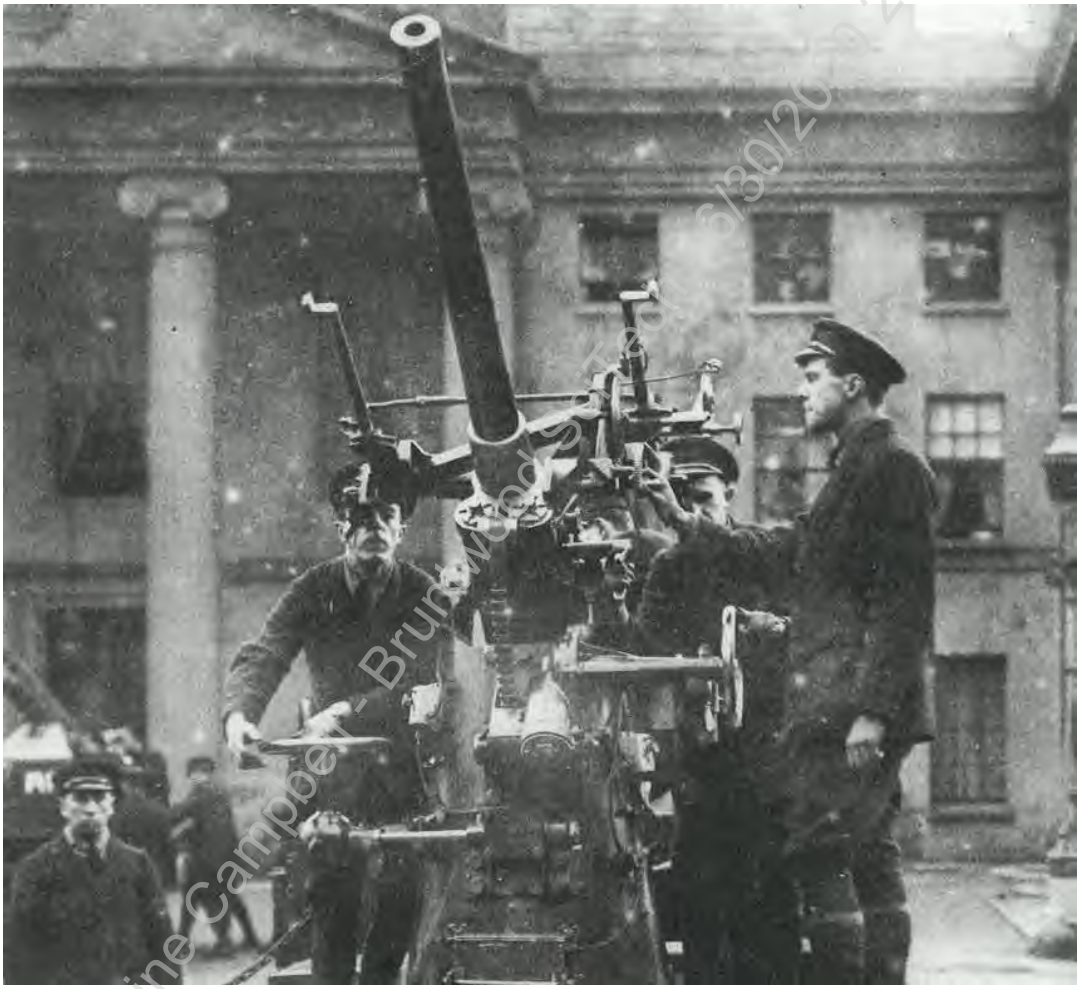
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Appendix 2.3 Anti-Aircraft Guns

As aerial bombardment first began during WWI, Anti-Aircraft (AA) gun batteries were established were gradually established throughout much of England to counter German bombing raids. By June 1916, there were approximately 271No. AA guns and 258No. searchlight installations defending London alone.

Common AA defences during WWI included 3-inch, 75 millimetre, 6-pounder and 1-pounder guns. Many of these guns were mobile, being mounted on lorry chassis. They were driven about following the course of an airship and fired from any area of open land.

During WWI, Unexploded AA (UXAA) shells, could land up to 13km from the firing point, although more typically fell within 10km.



AA gun batteries were used extensively during WWII to counter the threat posed by enemy aircraft. In many instances, AA shells caused damage to Allied territory and in some areas caused significant numbers of civilian fatalities.

During WWII, AA shells could land up to 27km from the firing point, although more typically fell within 15km. These could be distributed over a wide area.

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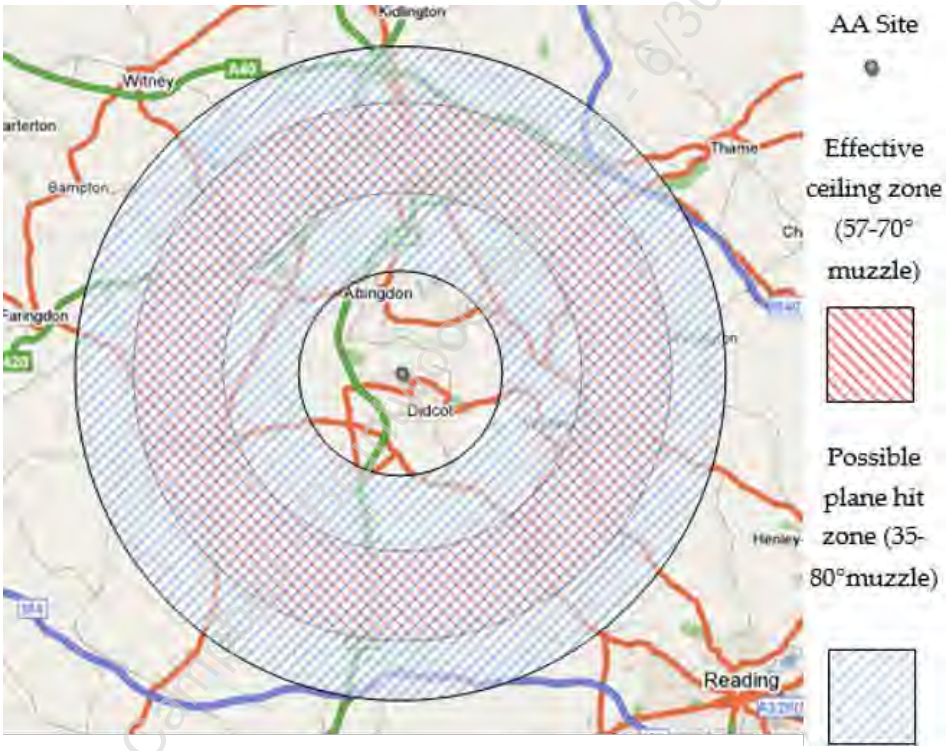
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3No. types of AA batteries existed:

- **Heavy Anti-Aircraft (HAA)** batteries of large guns (typically 3.7", 4.5" and 5.25" calibre) designed to engage high flying bomber aircraft. These tended to be relatively permanent gun emplacements.
- **Light Anti-Aircraft (LAA)** weaponry, designed to counter low flying aircraft. These were often mobile and were moved periodically to new locations around strategic targets such as airfields. They typically fired 40mm shells and machine gun ammunition.
- **Rocket batteries (ZAA)** firing 3" or 3.7" AA rockets with a maximum altitude of 5,800m and a ground range of 9km were typically permanent emplacements.

Unexploded AA (UXAA) shells were a common occurrence during WWII. As the figure below demonstrates, shells were unlikely to fall in the immediate vicinity of a gun battery but in the surrounding area. This would be dependent upon the angle of fire and the flight height of the attacking aircraft.



AA batteries were deliberately targeted by the Luftwaffe and therefore areas surrounding a gun battery may have a greater risk of UXB being present.

Munitions stores were also established around AA batteries. These stored the shells for the batteries and small arms ammunition for troops manning the position. Such stores were typically removed at the end of WWII, although some disposal may have occurred in the immediate vicinity of the gun battery.

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Appendix 3 Recent UXO Finds

UXO finds in the UK are a regular occurrence, although they almost never result in an accidental detonation.

It is still important to note that explosives rarely lose effectiveness with age. In some instances, mechanisms such as fuzes and gaines can become more sensitive and more prone to detonation, regardless of whether the device has been submersed in water or embedded in silt, clay or similar materials.

The effects of an accidental UXO detonation are usually extremely fast, often catastrophic and invariably traumatic to any personnel involved. Such occurrences are largely restricted to current theatres of war and overseas minefields, with occasional events in mainland Europe.

The sections below provide a brief summary of recent significant UXO finds in the UK. To keep up to date with the latest UXO finds, visit http://zeticauxo.com/news/.

On the 15th May 2017, 1No. suspected 250kg German UXB was found on a building site in Aston, Birmingham. Due to the corrosion of the fuzes, the UXB was destroyed in situ on the 17th May 2017.

On the 4th September 2017, 1No. 50kg UXB was found in a ragstone quarry at Kings Hill near West Malling in Kent. It was destroyed in situ in a controlled explosion by an EOD team.

On the 11th February 2018, 1No. 500kg UXB was found in King George V Dock in London, resulting in the temporary closure of the adjacent London City Airport. The UXB was freed from a silt bed and towed along the River Thames to Shoeburyness where it was destroyed in a controlled explosion.

On the 26th February 2018, an EOD team destroyed numerous items of ordnance including shells and 20mm ammunition which had been exposed by storms on Selsey beach. A similar operation was required after more UXO finds on the beach in April 2018.

On the 31st March 2018, 2No. 870lb British PMs were found in waters off Guernsey. They were destroyed in controlled explosions.

On the 20th May 2018, a 1,000kg German sea mine washed ashore at Elmer beach near Bognor Regis, West Sussex. A 1 mile exclusion zone was enforced before an EOD team towed the device out to sea for a controlled explosion.

On the 24th May 2018, numerous ordnance-related items were found on a proposed residential development in Burntwood, Staffordshire.

On the 10th July 2018, a suspected 1,000kg German UXB was found by scuba divers near Teignmouth Pier in Devon. The UXB was towed out into open sea by a RN EOD team for a controlled explosion.

On the 30th August 2018, a 2,000lb German PM was trawled up by a fishing vessel off Mersea in Essex. The PM was moved to an area of open sea where it was destroyed in a controlled explosion by a RN EOD team.

On the 29th November 2018 a large naval projectile was found at Wembury Point, Plymouth. It was destroyed in a controlled explosion.

During January and February 2019 a military EOD was called out to deal with several items of UXO washed up at Medmerry Beach in Selsey. The site of a former gunnery range, it followed on from several similar incidents in 2018.

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On the 21st January 2019 a suspected 1,000lb torpedo was brought into Brixham Harbour by a fishing trawler. It was towed back out to sea and destroyed by a Naval EOD team.

On the 6th February 2019 3No. WWII projectiles were found on Chalkwell Beach near Southend-on-Sea, Essex. They were destroyed in a controlled explosion.

On the 19th February 2019 6No. projectiles were found on the beach at Lilstock, Somerset.

On the 14th March 2019 an unexploded pipe mine was found at the former RAF Manston airfield near Ramsgate, Kent. It was destroyed in a controlled explosion.

On the 21st March 2019 2No. unexploded shells were found on a building site in Brighton. They were removed by an EOD team.

On the 25th March 2019 an unexploded shell was found in Stechford, Birmingham. It was removed to a field and destroyed in a controlled explosion.

On the 22nd May 2019 70No. Self-Igniting Phosphorus (SIP) grenades were found during development works at Tongland Dam in Dumfries & Galloway, Scotland. They were destroyed in a controlled explosion.

On the 23rd May 2019 a 250kg German UXB was found by workers on a building site at Kingston University in London (see plate below). The UXB could not be safely removed and was consequently destroyed in situ by an EOD team.



On the 27th May 2019 24No. SIP grenades were found in a field near Sibton in Suffolk. An EOD team constructed a 2ft deep trench into which the grenades were placed before being destroyed in a controlled explosion.

On the 7th June 2019 a 50kg German fragmentation UXB was found at a building site in Kings Hill at the former RAF West Malling airfield. It was destroyed in a controlled explosion by an EOD team the following day.

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Appendix 4 Glossary and Definitions

Abandoned Explosive Ordnance (AXO)	Abandoned Explosive Ordnance is explosive ordnance that has not been used during an armed conflict, that has been left behind or disposed of by a party to an armed conflict, and which is no longer under control of that party. Abandoned explosive ordnance may or may not have been primed, fuzed, armed or otherwise prepared for use.
Conflagration	A very large self-sustaining destructive fire.
Demil	Derived from the term 'Demilitarisation', it refers to the break down and the recycling or disposal of ordnance components.
Detonation	The high-speed chemical breakdown of an energetic material producing heat, pressure, flame and a shock wave.
Device	This term is used for any component, sub-assembly or completed ordnance, which may or may not have an explosive risk. It can apply to detonators, primers, gaines, fuzes, shells or bombs.
Explosive	The term explosive refers to compounds forming energetic materials that under certain conditions chemically react, rapidly producing gas, heat and pressure. Obviously, these are extremely dangerous and should only be handled by qualified professionals.
Explosive Ordnance (EO)	Explosive Ordnance is all munitions containing explosives, nuclear fission or fusion materials and biological and chemical agents. This includes bombs and warheads, guided and ballistic missiles, artillery, mortar, rocket, small arms ammunition, mines, torpedoes, depth charges, pyrotechnics, cluster bombs & dispensers, cartridge & propellant actuated devices, electro-explosive devices, clandestine & improvised explosive devices, and all similar or related items or components explosive in nature.
Explosive Ordnance Clearance (EOC)	Explosive Ordnance Clearance is a term used to describe the operation of ordnance detection, investigation, identification and removal, with EOD being a separate operation.
Explosive Ordnance Disposal (EOD)	Explosive Ordnance Disposal is the detection, identification, on-site evaluation, rendering safe, recovery and final disposal of unexploded explosive ordnance.
Explosive Ordnance Reconnaissance (EOR)	Explosive Ordnance Reconnaissance is the detection, identification and on-site evaluation of unexploded explosive ordnance before Explosive Ordnance Disposal.
Explosive Remnants of War (ERW)	Explosive Remnants of War are Unexploded Ordnance (UXO) and Abandoned Explosive Ordnance (AXO), excluding landmines.

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Explosive Substances and Articles (ESA)	Explosive substances are solid or liquid substances (or a mixture of substances), which are either: • capable by chemical reaction in itself of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. • designed to produce an effect by heat, light, sound, gas or smoke, or a combination of these as a result of a non-detonative, self-sustaining, exothermic reaction. Explosive article is an article containing one or more explosive substances.
Fuze	A fuze is the part of an explosive device that initiates the main explosive charge to function. In common usage, the word fuze is used indiscriminately, but when being specific (and in particular in a military context), fuze is used to mean a more complicated device, such as a device within military ordnance.
Gaine	Small explosive charge that is sometimes placed between the detonator and the main charge to ensure ignition.
Geophysical survey	A geophysical survey is essentially a range of methods that can be used to detect objects or identify ground conditions without the need for intrusive methods (such as excavation or drilling). This is particularly suited to ordnance as disturbance of ordnance items is to be avoided where ever possible.
Gold line	This is the estimated limit of blast damage from an explosive storage magazine. It usually means that development within this zone is restricted.
High Explosive	Secondary explosives (commonly known as High Explosives (HE)) make up the main charge or filling of an ordnance device. They are usually less sensitive than primary explosives. Examples of secondary explosives are: Nitro glycerine (NG), Trinitrotoluene (TNT), AMATOL (Ammonia nitrate + TNT), Gunpowder (GP), and Cyclotrimethylenetrinitramine (RDX).
Munition	Munition is the complete device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological or chemical material for use in military operations, including demolitions. This includes those munitions that have been suitably modified for use in training, ceremonial or non-operational purposes. These fall into three distinct categories:- • inert - contain no explosives whatsoever. • live - contain explosives and have not been fired. • blind - have fired but failed to function as intended.

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Primary Explosive	Primary explosives are usually extremely sensitive to friction, heat, and pressure. These are used to initiate less sensitive explosives. Examples of primary explosives are: Lead Azide, Lead Styphnate, and Mercury Fulminate. Primary explosive are commonly found in detonators.
Propellants	Propellants provide ordnance with the ability to travel in a controlled manner and deliver the ordnance to a predetermined target. Propellants burn rapidly producing gas, pressure and flame. Although usually in solid form they can be produced in liquid form. Examples of propellants are: Ballistite often found in a flake form and Cordite used in small arms ammunition.
Pyrotechnic	A pyrotechnic is an explosive article or substance designed to produce an effect by heat, light, sound, gas or smoke, or a combination of any of these, as a result of non-detonative, self-sustaining, exothermic chemical reactions.
Small Arms Ammunition (SAA)	SAA includes projectiles around 12mm or less in calibre and no longer than approximately 100mm. They are fired from a variety of weapons, including rifles, pistols, shotguns and machine guns.
Unexploded Anti-Aircraft (UXAA) Shell	UXAA shells are army ordnance commonly containing HE, though they can also contain pyrotechnic compounds that produce smoke. Most commonly, these were 3.7" and 4.5" HE shells, although they ranged from 2" to 5.25" calibre.
Unexploded Bomb (UXB)	UXB is a common term for unexploded air-dropped munitions.
Unexploded Ordnance (UXO)	UXO is explosive ordnance that has been either primed, fuzed, armed or prepared for use and has been subsequently fired, dropped, launched, projected or placed in such a manner as to present a hazard to operations, persons or objects and remains unexploded either by malfunction or design.
V1	The Vergeltungswaffe-1, V-1, also designated Fieseler Fi 103/FZG-76, known colloquially in English as the Flying Bomb, Buzz Bomb or Doodlebug, was the first guided missile used in WWII and the forerunner of today's cruise missile.
V2	The Vergeltungswaffe 2 (V-2) ('Reprisal Weapon 2') was the first ballistic missile. It was used by the German Army primarily against Belgian and British targets during the later stages of WWII. The V-2 was the first man-made object launched into space, during test flights that reached an altitude of 189km (117 miles) in 1944.

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Appendix 5 WWII Bombing Incident List

31st August 1940

1No. HE bomb fell on the College of Technology, on the Site.

1No. HE bomb fell on 53 Sackville Street, on the north-western boundary of the Site.

1No. HE bomb fell on the corner of Bombay Street and Venice Street, approximately 60m west of the Site.

1No. HE bomb fell on the south-west end of Bridgwater House, Whitworth Street, approximately 0.2km northwest of the Site.

1st October 1940

IBs (unspecified number) fell between Ardwick Green North and Dolphin Street, within approximately 0.3km southeast of the Site.

11th October 1940

1No. HE bomb fell on 36 Sackville Street, approximately 0.1km northwest of the Site.

1No. HE bomb fell on the junction of Sackville Street and Richmond Street, approximately 0.1km northwest of the Site.

1No. HE bomb fell on 60 Richmond Street, approximately 0.1km northwest of the Site.

22nd-23rd December 1940

Manchester and Salford were heavily bombed between the 22nd and 24th December 1940 (the 'Manchester Blitz'). Over 400No. HE bombs and more than 30,000No. IBs fell across the region.

1No. HE bomb fell on the East India Finishing Works, on the Site.

1No. HE bomb fell on The Albion Inn, Temple Street, on the Site.

1No. HE bomb fell on the junction of Jackson Street and Temple Street, on the Site.

1No. HE bomb fell on 85 Sackville Street, on the Site.

IBs (unspecified number) fell across Sackville Street, on the Site.

HE bombs (unspecified number) fell between Cooke Street, Gray Street and Grosvenor Street, adjacent to the south-western boundary of the Site.

IBs (unspecified number) fell on Whitworth Street, adjacent to the northern boundary of the Site.

IBs (unspecified number) fell on Princess Street, adjacent to the north-western boundary of the Site.

1No. HE bomb fell on the Manchester South and Altrincham Railway Viaduct, adjacent to the north-eastern boundary of the Site.

IBs (unspecified number) fell on Cooke Street, adjacent to the south-western boundary of the Site.

1No. HE bomb fell on 17 Cooke Street, adjacent to the western boundary of the Site.

1No. HE bomb and 1No. IB fell on 4 Whitworth Street, approximately 40m northwest of the Site.

1No. HE bomb and IBs (unspecified number) fell on 10 Charles Street, approximately 60m west of the Site.

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1No. PM fell on 77 Temple Street, approximately 0.1km south of the Site.

1No. HE bomb fell on 93 Temple Street, approximately 0.1km south of the Site.

1No. HE bomb fell on 17 Sackville Street, approximately 0.1km north of the Site.

1No. PM and 1No. HE bomb fell on 36 Richmond Street, approximately 0.1km north of the Site.

1No. HE bomb fell on Russel Street, approximately 0.1km south of the Site.

1No. HE bomb fell on 27 Richmond Street, approximately 0.1km north of the Site.

1No. PM fell between Penley Street and Buxton Street, approximately 0.1km east of the Site.

1No. HE bomb fell on the Neptune Hotel, Temple Street, approximately 0.1km south of the Site.

IBs (unspecified number) fell on Greek Street, within approximately 0.1km south of the Site.

1No. HE bomb fell on the Charles Street engineering works, approximately 0.2km west of the Site.

IBs (unspecified number) fell on 6 Chorlton Street, approximately 0.2km north of the Site.

1No. HE bomb fell on 13 Sackville Street, approximately 0.2km north of the Site.

1No. HE bomb fell on 22 Sackville Street, approximately 0.2km north of the Site.

1No. PM and 1No. HE bomb fell on Greek Street, approximately 0.2km south of the Site.

1No. PM fell on the Chapelfield India Rubber Works, approximately 0.2km southeast of the Site.

1No. HE bomb fell on Sheffield Street, approximately 0.2km northeast of the Site

2No. HE bombs fell on the junction of Oxford Road and Grosvenor Street, approximately 0.2km south of the Site.

1No. HE bomb fell on 36 Silver Street, approximately 0.3km north of the Site.

Several HE bombs and IBs were recorded falling between 30 and 50 Major Street, within approximately 0.3km north of the Site.

1No. HE bomb fell on Rushmore Road, Mortuary Chapel, approximately 0.3km south of the Site.

1No. HE bomb fell on 44 Downing Street, approximately 0.3km southeast of the Site.

1No. IB fell on Mayfield Station approximately 0.3km east of the Site.

1No. HE bomb fell on 36 Silver Street, approximately 0.3km north of the Site.

1No. PM fell to the north of Mayfield Station, approximately 0.3km east of the Site.

11th March 1941

1No. HE bomb fell on 2 Cooke Street, adjacent to the south-western boundary of the Site.

1st-2nd June 1941

Approximately 110No. bomber aircraft attacked Manchester, dropping 42No. HE bombs and many IBs.

1No. HE bomb fell on 20 Temple Street, on the Site.

2No. HE bombs and 2No. IBs fell on Mount Street, on the Site.

1No. HE bomb fell on the Jackson Street Cotton Mills, on the Site.

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1No. HE bomb and 1No. IB fell on the College of Technology, on the Site.

1No. HE bomb fell at the junction of London Road and Jackson Street, adjacent to the south-eastern boundary of the Site.

1No. HE bomb fell on Princess Street, adjacent to the north-western boundary of the Site.

1No. HE bomb fell on 63 Sackville Street, adjacent to the north-western boundary of the Site.

1No. HE bomb fell on 25 Granby Row, adjacent to the north-eastern boundary of the Site.

1No. HE bomb fell on the Police Headquarters, approximately 60m northeast of the Site.

1No. HE bomb fell on Grosvenor Street, within approximately 0.1km south of the Site. This was recorded as UXB.

1No. HE bomb fell on Russel Street, approximately 0.1km south of the Site.

1No. HE bomb fell on the Bulls head hotel, Whitworth Street, approximately 0.1km west of the Site.

1No. IB fell on 3 Greek Street, approximately 0.2km south of the Site.

1No. HE bomb fell on a Church and Sunday School, Rusholme Road, approximately 0.3km south of the Site.

1No. HE bomb fell on Rusholme Road Cemetery, approximately 0.3km south of the Site.

1No. HE bomb fell on 61 Rusholme Road, approximately 0.3km south of the Site.

27th July 1942

HE bombs (unspecified number) fell on Russel Street, approximately 0.1km south of the Site.

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Appendix B

Ecological Constraints Assessment

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Memorandum

ARUP

To	Paul Roberts Oliver Cottam	Date	12 September 2019
Copies	Rory Canavan Victoria Newlove Lee Jordan Jordan Weddepohl Bill Wilkins	Reference number	265190-00
From	Joseph Shepherdson	File reference	4-05-14
Subject	ID Manchester (previously called The University of Manchester North Campus), Ecological Constraints Assessment		

ID Manchester Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

1 Introduction

Ove Arup and Partners (Arup) was commissioned by CBRE on behalf of The University of Manchester (UoM) to undertake an ecological constraints assessment of an 11.8ha parcel of The UoM estate (the site).

The site is located in an urban setting in central Manchester. It is bounded by London Road (A6) to the east, Mancunian Way (A57(M)) to the south, Princess Street (A34) to the west and Whitworth Street (B6469) to the north.

2 Methodology

The ecological constraints study assessed 23 locations, which have been identified for ground investigations (see Table 2 and Drawing UMNC-ARUP-ZZ-XX-DR-CG-0006). A Preliminary Ecological Appraisal and a desk study were not undertaken at this stage.

During the ecological constraints assessment, signs of protected/notable species were recorded if observed. In addition, the habitats adjacent to proposed ground investigation were assessed as to their potential to support protected species. The protected species groups sought/assessed included:

- Mammals.
- Birds.
- Herpetofauna (amphibians and reptiles).
- Invertebrates.

An external bat roost suitability assessment of all buildings and trees adjacent to ground investigation locations was undertaken to determine their suitability to support roosting bats. The survey was conducted externally from the ground using binoculars. The survey followed standard

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methodology detailed within the Bat Conservation Trust Good Practice Guidelines[1]. Each tree adjacent to proposed ground investigations were inspected for signs of bat presence including:

- bat droppings;
- scratch and grease marks;
- live or dead bats; and
- noises of bats calling from within the roost.

In addition, features searched for on buildings adjacent to the proposed ground investigations included:

- cracked, missing or lifted roof tiles;
- missing mortar in walls;
- gaps in soffits, fascia or barge boards;
- presence of a cavity wall, and
- any cracks or gaps at least 10mm in size.

The assessment categories used are explained in Table 1.

Table 1: Bat roost suitability categories.

Bat Roost Suitability[1]	Roosting Habitats Description
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only).
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity of hibernation). A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only very limited roosting potential.
Negligible	Buildings or trees with no potential to support bats.

[1] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

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2.1 Invasive Species

The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) (WCA) is extensive and these plants are found in a range of different environments, including aquatic habitats. The survey checked, in particular, for the presence of Japanese knotweed *Reynoutria japonica*, giant knotweed *Reynoutria sachalinensis*, *Reynoutria japonica* x *Reynoutria sachalinensis,* (a hybrid knotweed), giant hogweed *Heracleum mantegazzianum,* and Himalayan balsam *Impatiens glandulifera*.

3 Results

The site predominantly comprises buildings and hardstanding, with areas of amenity grassland and scattered broadleaved trees and scrub.

No waterbodies are present on the site and no waterbodies were identified within 250m of the site.

The results of the ecological constraints assessment at each proposed ground investigation location is detailed in Table 2.

Table 2: Ecological constraints associated with proposed ground investigation.

Proposed Borehole/Trial Pit	Ground Investigation	Approx. Location	Value to Ecology	Ecological Constraint Present (Y/N)
BH001	Percussive borehole with rotary coring	SJ84559764	None.	N
BH002	Percussive borehole	SJ84669762	Located adjacent to silver birch *Betula pendula* tree.	Y
BH003	Percussive borehole	SJ84639760	Located adjacent to ornamental scrub.	Y
BH004	Percussive borehole with rotary coring	SJ84559755	None.	N
BH005	Percussive borehole with rotary coring	SJ84659755	Three beech *Fagus sylvatica* and one Japanese maple *Acer japonicum* present in proximity to the borehole.	Y
BH006	Percussive borehole	SJ84739761	Located adjacent to two sycamore *Acer pseudoplatanus* trees and ornamental scrub.	Y
BH007	Percussive borehole with rotary coring	SJ84769759	None.	N
BH008	Percussive borehole	SJ84769756	None.	N
BH009	Percussive borehole	SJ84759755	None.	N

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BH010	Percussive borehole with rotary coring	SJ84589746	None.	N
BH011	Percussive borehole with rotary coring	SJ84719750	Ten sycamore and one rowan *Sorbus aucuparia* tree present in close proximity to the borehole. In addition, two bird boxes were observed on the sycamore trees.	Y
BH012	Percussive borehole	SJ84619764	None.	N
BH013	Percussive borehole with rotary coring	SJ84389754	Four sycamore trees present.	Y
BH014	Percussive borehole	SJ84499756	None.	N
HC001	Horizontal core	SJ84569762	There is a large cavity present in the wall at approximately SJ84569762. Cavity is approximately 30cm x 30cm square hole and looks to extend behind the clad wall.	Y
HC002	Horizontal core	SJ84599763	None.	N
HC003	Horizontal core	SJ84629765	None.	N
HC004	Horizontal core	SJ84629749	None.	N
TP001	Trial pit	SJ84619754	Three London plane *Platanus x hispanica* trees present.	Y
TP002	Trial pit	SJ84629761	None.	N
TP003	Trial pit	SJ84789751	Located adjacent to approximately five sycamore trees.	Y
DS001	Dynamic sample with rotary core	SJ84779752	None.	N
DS002	Dynamic sample with rotary core	SJ84759749	None.	N

4 Recommendations

Ecological constraints were recorded in proximity to nine locations proposed for ground investigation. It is recommended that all boreholes/trial pits are repositioned to avoid the features detailed in Table 2. An ecologist should be consulted to agree a suitable alternative location for these boreholes. Where this is not feasible, alternative recommendations are outlined in Table 3.

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Table 3: Ecological recommendations for proposed ground investigation.

Point ID	Recommendation
BH002	BH002is located adjacent to a semi-mature silver birch tree. The tree is spindly and was recorded to provide negligible suitability for roosting bats. However, the tree is suitable for breeding birds. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way (CRoW) Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is scheduled within these months, an ecologist should be consulted prior to commencement. If a tree must be felled to allow for ground investigation, this should take place outside of the breeding bird season and the tree should be replaced at a ratio of 2:1.
BH003	BH003 is located adjacent to scrub, which provides suitable opportunities for breeding birds. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is scheduled within these months, an ecologist should be consulted prior to commencement.
BH005	BH005 is located in close proximity to three beech and one Japanese maple trees. The trees did not provide potential roost features (PRFs) for bats and consequently were deemed to have negligible suitability for roosting bats. However, the trees provided suitable opportunities for breeding birds. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is scheduled within these months, an ecologist should be consulted prior to commencement. If a tree must be felled to allow for ground investigation, and the tree should be replaced at a ratio of 2:1.
BH006	BH006 is located adjacent to two sycamore trees and ornamental scrub. The trees were of negligible suitability for roosting bats. However, the trees and scrub are suitable for breeding birds. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is scheduled within these months, an ecologist should be consulted prior to commencement. If a tree must be felled to allow for ground investigation, the tree should be replaced at a ratio of 2:1.
BH011	BH011 is located adjacent to approximately ten sycamore trees and one rowan tree. The trees were deemed to be suitable for breeding birds. In addition, two bird boxes were observed on the sycamore trees. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is scheduled within these months, an ecologist should be consulted prior to commencement. If a tree must be felled to allow for ground investigation should be replaced at a ratio of 2:1. It is recommended that bird nest boxes are removed prior to works commencing, and re-located on site, following consultation with an ecologist.
BH013	BH013 is located adjacent to four sycamore trees. Although all have negligible suitability to roosting bats, they are of value to breeding birds. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is

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	scheduled these months, an ecologist should be consulted prior to commencement. If a tree must be felled to allow for ground investigation, and the tree should be replaced at a ratio of 2:1.
HC001	A large cavity approximately 30cm x 30cm is present in the wall at approximately SJ84569762. This was identified as having moderate suitability for roosting bats. British bat species are fully protected through their inclusion in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and in Schedule 2 of The Conservation of Habitats and Species Regulations 2010 (as amended). Under the legislation, it is an offence to intentionally kill, injure or take a bat as well as intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a bat or disturb an animal while it is occupying a structure or place which it uses for that purpose. It is recommended that ground investigation within 30m of the cavity are avoided to prevent disturbance to this potential roost. If a 30m buffer cannot be applied, an ecologist should be consulted as further surveys for bats will be required (May-September).
TP001	TP001 is located adjacent to three London plane trees. Although all have negligible suitability to roosting bats, they are of value to breeding birds. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is scheduled within these months, an ecologist should be consulted prior to commencement. If a tree must be felled to allow for ground investigation, and the tree should be replaced at a ratio of 2:1.
TP003	TP003 is located adjacent to approximately five sycamore trees. All five were deemed to have negligible bat roost suitability. However, they are of value to breeding birds. All wild birds, their nests, and their eggs are afforded legal protection through the provisions in the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000. Consequently, works which are likely to disturb breeding birds must be carried out outside of the breeding bird season (March – August inclusive). If work is scheduled within these months, an ecologist should be consulted prior to commencement. If a tree must be felled to allow for ground investigation, and the tree should be replaced at a ratio of 2:1.

This memo is the result of survey work undertaken in September 2019. This report refers, within the limitations stated, to the condition of the proposed scheme site at the time of the inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. It is also advised that if there is a delay of over a year in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the site.

This report is produced solely for the benefit of CBRE and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

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A3

384400 384600 384800

397600

BH001
HC003
BH012
HC002
HC001
BH002
TP002
BH006
BH003
BH007
BH014
BH008
BH005
BH004
BH009
TP001
BH013
DS001
TP003
BH011
HC004
DS002
BH010

Key

- Percussive borehole
- Percussive borehole with rotary coring
- Dynamic sample with rotary coring
- Horizontal core
- Trial pit
- Site Boundary

Issue	Date	By	Chkd	Appd
P2	22/08/2019	MG	CL	MW

Metres

0 20 40 80

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University of Manchester

Project Title
North Campus

Drawing Title
Preliminary Ground Investigation: Aerial Imagery of Site

Scale at A3
1:1,400

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Suitability
Preliminary

Name
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Appendix C

Human Health Screening Assessment

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Commercial (1% SOM)

Soil concentration exceeds GAC 100

Hole Ref	ARP-BH001	ARP-BH001	ARP-BH002	ARP-BH002	ARP-BH003	ARP-BH003	ARP-BH004	ARP-BH004	ARP-BH005	ARP-BH006	ARP-BH006A
Easting	384566.052	384566.052	384655.294	384655.294	384633.942	384633.942	384554.516	384554.516	384655.497	384734.367	384728.887
Northing	397646.557	397646.557	397617.594	397617.594	397602.655	397602.655	397582.476	397582.476	397554.645	397611.677	397614.035
Elevation (mOD)	37.81	37.81	33.265	33.265	33.095	33.095	34.223	34.223	33.424	33.967	33.996
Sample Top (m)	1.00	3.00	1.00	2.50	1.00	3.50	2.30	5.30	1.00	1.20	1.00
Sample Elevation (mOD)	36.81	34.81	32.27	30.77	32.10	29.60	31.92	28.92	32.42	32.77	33.00
Sample Date	43764	43765	43771	43771	43771	43771	43771	43771	43785	43771	43786
Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
Geology	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG

Contaminant Name	GAC	Test Units	Total > LOD	Total > GAC	Max											
Asbestos (Presence of)	Presence	---	0 of 51	0	0.0		NAD	NAD	NAD	NAD	Amosite	NAD	NAD	NAD	NAD	Amosite	NAD
Asbestos Analysts Comments	None	---	0 of 51	2	0.0		na	na	na	na	Small bundle	na	na	na	na	Small bundle	na
Asbestos quantification	None	%	3 of 8	0	0.2						<0.001					<0.001	
pH	None	pH Units	47 of 47	0	11.7		8.1	8.4	10.8	8.1	11.5	9.5	10.8	10.7	8.4	8.5	9.0
Cyanide	16200	mg/kg	25 of 47	0	11.0		< 0.1	0.1	< 0.1	1.0	0.2	0.3	0.4	9.0	0.1	1.0	11.0
Antimony	7350	mg/kg	26 of 30	0	260.0		1.5	1.4	1.9	5.8	1.4	1.1	2.4	2.0	3.0	3.2	9.1
Arsenic	635	mg/kg	48 of 49	0	87.0		9.1	10.0	7.7	21.0	10.0	8.2	9.4	13.0	35.0	20.0	25.0
Barium	22100	mg/kg	19 of 19	0	578.0												
Beryllium	11.7	mg/kg	47 of 49	0	2.1		0.9	0.7	0.6	1.1	0.3	0.3	0.5	0.5	1.1	1.3	0.8
Cadmium	190	mg/kg	39 of 49	0	1.2		0.3	0.2	< 0.1	0.4	0.2	< 0.1	1.2	0.5	0.2	0.7	0.8
Chromium	8570	mg/kg	49 of 49	0	210.0		23.0	17.0	14.0	210.0	10.0	11.0	12.0	20.0	25.0	21.0	17.0
Chromium - Hexavalent	49	mg/kg	1 of 47	0	0.3		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	68300	mg/kg	48 of 49	0	440.0		38.0	35.0	24.0	77.0	180.0	110.0	120.0	46.0	130.0	100.0	76.0
Lead	2300	mg/kg	48 of 49	1	2400.0		39.0	200.0	110.0	150.0	88.0	59.0	400.0	98.0	110.0	270.0	180.0
Mercury	289	mg/kg	37 of 49	0	1.6		< 0.05	0.2	0.1	0.2	1.6	0.1	0.4	< 0.05	0.1	0.5	0.4
Nickel	983	mg/kg	49 of 49	0	34.0		30.0	18.0	15.0	30.0	9.5	8.7	9.8	13.0	31.0	28.0	19.0
Selenium	12261	mg/kg	13 of 49	0	2.0		< 0.5	< 0.5	< 0.5	1.3	0.9	< 0.5	1.1	0.7	< 0.5	1.5	< 0.5
Vanadium	6360	mg/kg	49 of 49	0	48.0		29.0	25.0	21.0	32.0	16.0	18.0	23.0	18.0	35.0	39.0	27.0
Zinc	730000	mg/kg	49 of 49	0	620.0		60.0	43.0	43.0	100.0	74.0	31.0	310.0	91.0	96.0	180.0	130.0
Phenol	26000	mg/kg	0 of 47	0	0.0		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 0.1	<5.0	< 0.1
Total Organic Carbon	None	%	48 of 51	0	7.8		0.7	0.7	0.4	2.1	1.0	0.4	0.8	0.5	1.7	3.5	1.4
Benzene	26.5978811	mg/kg	0 of 39	0	0.0		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	5706.00	mg/kg	0 of 39	0	0.0		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m,p xylenes	5923	mg/kg	1 of 9	0	0.009												
O-Xylene	6603	mg/kg	0 of 9	0	0.0												
Toluene	56294	mg/kg	0 of 39	0	0.0		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	5923	mg/kg	0 of 30	0	0.0		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH,Total	None	mg/kg	38 of 49	0	120.0		< 0.10	< 0.10	5.9	0.2	9.6	55.0	49.0	1.4	0.5	3.6	6.9
Acenaphthene	83700	mg/kg	26 of 53	0	4.6		< 0.03	< 0.03	0.1	< 0.03	0.1	2.4	1.2	< 0.03	< 0.03	< 0.03	0.2
Acenaphthylene	83200	mg/kg	20 of 53	0	1.1		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.1	0.1	< 0.03	< 0.03	< 0.03	0.1
Dibenz-a-h-anthracene	3.53	mg/kg	19 of 53	0	1.0		< 0.03	< 0.03	< 0.03	< 0.03	0.1	0.2	0.3	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	523000	mg/kg	31 of 53	0	6.3		< 0.03	< 0.03	0.2	< 0.03	0.2	3.2	1.4	< 0.03	< 0.03	0.1	0.3
Benzo (g,h,i) perylene	3930	mg/kg	34 of 53	0	7.3		< 0.03	< 0.03	0.1	< 0.03	0.6	0.8	1.2	0.0	< 0.03	0.1	0.1
Benzo(a)anthracene	167	mg/kg	39 of 53	0	11.0		< 0.03	< 0.03	0.4	< 0.03	0.6	2.7	3.5	0.1	0.1	0.2	0.4
Benzo(a)pyrene	35.2	mg/kg	36 of 53	0	12.0		< 0.03	< 0.03	0.2	< 0.03	1.1	1.8	2.4	0.1	< 0.03	0.2	0.3
Benzo(b)fluoranthene	44.3	mg/kg	39 of 53	0	12.0		< 0.03	< 0.03	0.4	< 0.03	1.1	2.4	3.6	0.2	0.0	0.5	0.4
benzo(b,k)fluoranthene	44.3	mg/kg	15 of 21	0	6.2												
Benzo(k)fluoranthene	1170	mg/kg	35 of 53	0	6.9		< 0.03	< 0.03	0.1	< 0.03	0.4	0.8	1.4	0.1	< 0.03	0.3	0.2
Chrysene	346	mg/kg	40 of 53	0	9.3		< 0.03	< 0.03	0.5	< 0.03	0.7	2.9	3.7	0.1	0.1	0.3	0.5
Dibenzofuran	35.2	mg/kg	4 of 7	0	0.2										< 0.1		0.2
Fluoranthene	22600	mg/kg	45 of 53	0	21.0		0.0	< 0.03	1.5	0.1	1.9	9.5	9.8	0.3	0.1	0.7	1.5
Fluorene	63000	mg/kg	25 of 53	0	3.7		< 0.03	< 0.03	0.1	< 0.03	0.1	2.5	1.0	< 0.03	< 0.03	< 0.03	0.1
Indeno(1,2,3-cd)pyrene	501	mg/kg	34 of 53	0	5.0		< 0.03	< 0.03	0.1	< 0.03	0.5	0.7	1.0	0.0	< 0.03	0.1	0.1
Napthalene	193	mg/kg	22 of 53	0	5.7		< 0.03	< 0.03	0.1	< 0.03	< 0.03	3.7	0.6	< 0.03	< 0.03	< 0.03	0.1
Phenanthrene	21900	mg/kg	44 of 53	0	24.0		0.1	0.0	0.8	0.1	0.7	12.0	8.5	0.2	0.1	0.3	1.0
Pyrene	54200	mg/kg	44 of 53	0	21.0		< 0.03	< 0.03	1.3	0.1	1.5	8.8	9.8	0.3	0.1	0.7	1.6
PCB-101 2,2',4,5,5' - Pentachlorobiphenyl	None	mg/kg	0 of 5	0	0.0												
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	None	mg/kg	0 of 5	0	0.0												
PCB-138 2,2',3,4,4',5' - Hexachlorobiphenyl	None	mg/kg	0 of 5	0	0.0												
PCB-153 2,2',4,4',5,5' - Hexachlorobiphenyl	None	mg/kg	0 of 5	0	0.0												
PCB-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	None	mg/kg	0 of 5	0	0.0												
PCB-52 2,2',5,5' - Tetrachlorobiphenyl	None	mg/kg	0 of 5	0	0.0												
Aliphatics & Aromatics >C5-35	None	mg/kg	2 of 5	0	545.0												
Aliphatics >C5-6	3190	mg/kg	0 of 5	0	0.0												
Aliphatics >C6-8	7780	mg/kg	1 of 5	0	0.1												
Aliphatics >C8-10	2000	mg/kg	0 of 5	0	0.0												
Aliphatics >C10-12	9690	mg/kg	0 of 5	0	0.0												
Aliphatics >C12-16	58800	mg/kg	0 of 5	0	0.0												
Aliphatics >C16-21	648000	mg/kg	0 of 5	0	0.0												
Aliphatics >C21-35	648000	mg/kg	1 of 5	0	151.0												
Aliphatics >C5-35	None	mg/kg	1 of 5	0	151.0												
Aromatics >C5-7	27	mg/kg	0 of 5	0	0.0												
Aromatics >C7-8	56294	mg/kg	0 of 5	0	0.0												
Aromatics >C8-10	3460	mg/kg	0 of 5	0	0.0												
Aromatics >C10-12	16200	mg/kg	0 of 5	0	0.0												
Aromatics >C12-16	36200	mg/kg	0 of 5	0	0.0												
Aromatics >C16-21	26600	mg/kg	2 of 5	0	27.0												
Aromatics >C21-35	28400	mg/kg	2 of 5	0	367.0												
Aromatics >C5-35	None	mg/kg	2 of 5	0	394.0												

ID Manchester - Christine Slough Brunwick Sq, Rec - 6350620 - 14.30PM - 16/01/2020 - 13946.72

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Commercial (1% SOM)

Soil concentration exceeds GAC 100

Contaminant Name	GAC	Test Units	Total > LOD	Total > GAC	Max	ARP-BH006B 384713.826 397607.847 33.497 0.60 32.90 43786 AEG 2019 MG	ARP-BH007 384765.207 397596.049 34.684 1.00 33.68 43777 AEG 2019 MG	ARP-BH007 384765.207 397596.049 34.684 3.30 31.38 43778 AEG 2019 MG	ARP-BH008 384766.896 397570.397 34.051 5.20 28.85 43779 AEG 2019 MG	ARP-BH008 384766.896 397570.397 34.051 2.20 31.85 43779 AEG 2019 MG	ARP-BH009 384759.087 397550.391 34.203 2.60 31.60 AEG 2019 MG	ARP-BH011 384726.701 397513.893 34.051 3.60 30.45 43778 AEG 2019 MG	ARP-BH011 384726.701 397513.893 34.051 1.00 33.05 43778 AEG 2019 MG	ARP-BH012A 384647.478 397660.412 38.269 7.50 30.77 43765 AEG 2019 MG	ARP-BH012A 384647.478 397660.412 38.269 2.60 35.67 43764 AEG 2019 MG	ARP-BH013 384368.382 397549.44 33.078 1.00 32.08 43766 AEG 2019 MG	ARP-BH013 384368.382 397549.44 33.078 3.50 29.58 43766 AEG 2019 MG	ARP-BH014 384495.592 397565.295 35.705 0.70 35.01 43766 AEG 2019 MG
Asbestos (Presence of)	Presence	---	0 of 51	0	0.0	NAD	NAD	Chrysotile	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Analysts Comments	None	---	0 of 51	2	0.0	na	na	Chrysotile	na	na	na	na	na	na	na	na	na	na	na
Asbestos quantification	None	%	3 of 8	0	0.2			0.192											
pH	None	pH Units	47 of 47	0	11.7	11.1	7.9	11.6	9.2	9.6	8.6	7.7	11.7	7.9	8.5	8.1	10.8	8.4	
Cyanide	16200	mg/kg	25 of 47	0	11.0	0.5	0.4	0.3	0.4	0.3	0.5	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	3.5	
Antimony	7350	mg/kg	26 of 30	0	260.0	< 1.0	< 1.0	2.2	3.9	2.9	1.7	< 1.0	1.5	1.2	< 1.0	1.7	1.5	7.4	
Arsenic	635	mg/kg	48 of 49	0	87.0	7.8	7.7	18.0	28.0	22.0	18.0	16.0	12.0	7.2	6.4	19.0	7.4	32.0	
Barium	22100	mg/kg	19 of 19	0	578.0														
Beryllium	11.7	mg/kg	47 of 49	0	2.1	0.2	0.3	0.6	0.9	0.9	1.0	1.2	0.4	0.7	0.5	0.9	0.6	0.6	
Cadmium	190	mg/kg	39 of 49	0	1.2	0.8	0.4	0.4	0.5	0.4	0.7	0.4	0.9	0.2	0.1	0.3	0.5	0.9	
Chromium	8570	mg/kg	49 of 49	0	210.0	8.2	11.0	20.0	29.0	33.0	15.0	11.0	18.0	18.0	12.0	18.0	11.0	24.0	
Chromium - Hexavalent	49	mg/kg	1 of 47	0	0.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Copper	68300	mg/kg	48 of 49	0	440.0	22.0	24.0	56.0	87.0	65.0	30.0	440.0	32.0	25.0	23.0	36.0	46.0	430.0	
Lead	2300	mg/kg	48 of 49	1	2400.0	30.0	100.0	140.0	250.0	160.0	120.0	290.0	150.0	42.0	34.0	51.0	73.0	230.0	
Mercury	289	mg/kg	37 of 49	0	1.6	0.1	0.1	0.2	0.4	0.3	0.1	< 0.05	0.2	0.1	0.1	0.1	0.2	0.2	
Nickel	983	mg/kg	49 of 49	0	34.0	6.1	7.9	16.0	20.0	22.0	11.0	17.0	9.2	18.0	13.0	22.0	13.0	34.0	
Selenium	12261	mg/kg	13 of 49	0	2.0	0.5	< 0.5	< 0.5	0.5	< 0.5	< 0.5	1.1	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Vanadium	6360	mg/kg	49 of 49	0	48.0	11.0	14.0	17.0	25.0	29.0	16.0	23.0	15.0	25.0	17.0	29.0	21.0	24.0	
Zinc	730000	mg/kg	49 of 49	0	620.0	35.0	36.0	86.0	130.0	100.0	170.0	150.0	60.0	48.0	37.0	75.0	84.0	560.0	
Phenol	26000	mg/kg	0 of 47	0	0.0	< 0.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Total Organic Carbon	None	%	48 of 51	0	7.8	0.4	1.6	0.9	2.1	2.4	0.5	0.2	0.3	1.2	0.7	0.8	0.9	1.2	
Benzene	26.5978811	mg/kg	0 of 39	0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Ethylbenzene	5706.00	mg/kg	0 of 39	0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
m,p xylenes	5923	mg/kg	1 of 9	0	0.009														
O-Xylene	6603	mg/kg	0 of 9	0	0.0														
Toluene	56294	mg/kg	0 of 39	0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Xylene	5923	mg/kg	0 of 30	0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
PAH,Total	None	mg/kg	38 of 49	0	120.0	3.7	110.0	7.6	120.0	120.0	0.5	0.1	9.4	< 0.10	< 0.10	15.0	12.0	54.0	
Acenaphthene	83700	mg/kg	26 of 53	0	4.6	0.1	0.5	0.2	4.6	4.2	< 0.03	< 0.03	0.1	< 0.03	< 0.03	0.5	0.3	2.3	
Acenaphthylene	83200	mg/kg	20 of 53	0	1.1	< 0.03	1.1	< 0.03	0.2	0.4	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.1	0.1	
Dibenz-a-h-anthracene	3.53	mg/kg	19 of 53	0	1.0	< 0.03	1.0	< 0.03	0.4	0.5	< 0.03	< 0.03	0.1	< 0.03	< 0.03	0.1	< 0.03	0.2	
Anthracene	523000	mg/kg	31 of 53	0	6.3	0.1	1.4	0.4	6.3	5.7	< 0.03	< 0.03	0.3	< 0.03	< 0.03	0.9	0.5	2.5	
Benzo (g,h,i) perylene	3930	mg/kg	34 of 53	0	7.3	0.1	7.3	0.1	2.7	2.3	< 0.03	< 0.03	0.2	< 0.03	< 0.03	0.2	0.2	0.9	
Benzo(a)anthracene	167	mg/kg	39 of 53	0	11.0	0.3	11.0	0.6	8.6	9.6	0.1	0.0	0.8	< 0.03	< 0.03	0.9	0.8	3.2	
Benzo(a)pyrene	35.2	mg/kg	36 of 53	0	12.0	0.2	12.0	0.4	6.3	6.7	< 0.03	< 0.03	0.6	< 0.03	< 0.03	0.5	0.5	2.1	
Benzo(b)fluoranthene	44.3	mg/kg	39 of 53	0	12.0	0.2	12.0	0.5	6.7	6.4	0.0	0.0	0.7	< 0.03	< 0.03	0.7	0.7	2.8	
benzo(b,k)fluoranthene	44.3	mg/kg	15 of 21	0	6.2														
Benzo(k)fluoranthene	1170	mg/kg	35 of 53	0	6.9	0.1	6.9	0.2	2.8	3.0	< 0.03	< 0.03	0.3	< 0.03	< 0.03	0.3	0.3	1.0	
Chrysene	346	mg/kg	40 of 53	0	9.3	0.3	9.3	0.4	6.9	7.3	0.1	< 0.03	0.7	< 0.03	< 0.03	0.8	0.8	3.0	
Dibenzofuran	35.2	mg/kg	4 of 7	0	0.2	< 0.1													
Fluoranthene	22600	mg/kg	45 of 53	0	21.0	0.8	20.0	1.5	21.0	21.0	0.1	0.0	1.9	< 0.03	< 0.03	3.4	2.9	11.0	
Fluorene	63000	mg/kg	25 of 53	0	3.7	0.0	0.4	0.1	3.6	3.7	< 0.03	< 0.03	0.1	< 0.03	< 0.03	0.5	0.2	1.4	
Indeno(1,2,3-cd)pyrene	501	mg/kg	34 of 53	0	5.0	0.1	5.0	0.1	2.0	1.7	< 0.03	< 0.03	0.2	< 0.03	< 0.03	0.2	0.2	0.7	
Napthalene	193	mg/kg	22 of 53	0	5.7	< 0.03	0.5	0.3	4.2	5.7	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.2	0.1	0.4	
Phenanthrene	21900	mg/kg	44 of 53	0	24.0	0.5	5.6	1.4	24.0	24.0	0.1	0.0	1.6	< 0.03	< 0.03	2.9	1.6	13.0	
Pyrene	54200	mg/kg	44 of 53	0	21.0	0.8	21.0	1.4	20.0	21.0	0.1	0.0	1.8	< 0.03	< 0.03	2.8	2.6	9.9	
PCB-101 2,2',4,5,5' - Pentachlorobiphenyl	None	mg/kg	0 of 5	0	0.0														
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	None	mg/kg	0 of 5	0	0.0														
PCB-138 2,2',3,4,4',5' - Hexachlorobiphenyl	None	mg/kg	0 of 5	0	0.0														
PCB-153 2,2',4,4',5,5' - Hexachlorobiphenyl	None	mg/kg	0 of 5	0	0.0														
PCB-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	None	mg/kg	0 of 5	0	0.0														
PCB-52 2,2',5,5' - Tetrachlorobiphenyl	None	mg/kg	0 of 5	0	0.0														
Aliphatics & Aromatics >C5-35	None	mg/kg	2 of 5	0	545.0														
Aliphatics >C5-6	3190	mg/kg	0 of 5	0	0.0														
Aliphatics >C6-8	7780	mg/kg	1 of 5	0	0.1														
Aliphatics >C8-10	2000	mg/kg	0 of 5	0	0.0														
Aliphatics >C10-12	9690	mg/kg	0 of 5	0	0.0														
Aliphatics >C12-16	58800	mg/kg	0 of 5	0	0.0														
Aliphatics >C16-21	648000	mg/kg	0 of 5	0	0.0														
Aliphatics >C21-35	648000	mg/kg	1 of 5	0	151.0														
Aliphatics >C5-35	None	mg/kg	1 of 5	0	151.0														
Aromatics >C5-7	27	mg/kg	0 of 5	0	0.0														
Aromatics >C7-8	56294	mg/kg	0 of 5	0	0.0														
Aromatics >C8-10	3460	mg/kg	0 of 5	0	0.0														
Aromatics >C10-12	16200	mg/kg	0 of 5	0	0.0														
Aromatics >C12-16	36200	mg/kg	0 of 5	0	0.0														
Aromatics >C16-21	26600	mg/kg	2 of 5	0	27.0														
Aromatics >C21-35	28400	mg/kg	2 of 5	0	367.0														
Aromatics >C5-35	None	mg/kg	2 of 5	0	394.0														

ID Matches Tester - Chrissie Cook Date/Time Matches Collection 17/01/2020 12:14:30 PM - Unique Number: 1246.72

CONFIDENTIAL

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 123

Commercial (1% SOM)

Soil concentration exceeds GAC 100

Contaminant Name	GAC	Test Units	Total > LOD	Total > GAC	Max	ARP-BH014	ARP-DS001	ARP-DS002	ARP-TP001	ARP-TP002	ARP-TP002	CE-2015-CC/WS2	CE-2015-CC/WS3	GEO-2015-CRH01	GEO-2015-CRH01	GEO-2015-CRH01
						384495.592	384774.985	384753.487	384615.418	384628.47	384628.47	384607	384606	384591.66	384591.66	384591.66
						397565.295	397520.083	397492.025	397543.899	397622.871	397622.871	397436	397461	397462.97	397462.97	397462.97
						35.705	34.217	34.087	33.208	32.851	32.851	27.87	30.13	34.29	34.29	34.29
						4.00	0.60	0.80	0.80	1.00	2.50	0.68	0.56	0.20	0.50	2.00
						31.71	33.62	33.29	32.41	31.85	30.35	27.19	29.57	34.09	33.79	32.29
						43771	43799	43800	43766	43767	43767	42080	42080	42193	42193	42193
						AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	nstructive Evaluati	nstructive Evaluati	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015
						MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Asbestos (Presence of)	**Presence**	**---**	**0 of 51**	**0**	**0.0**	NAD	Amosite	NAD	NAD	NAD	NAD	Not Detected	Not Detected	Chrysotile	None	
Asbestos Analysts Comments	**None**	**---**	**0 of 51**	**2**	**0.0**	na	Bundle of	na	na	na	na	na	na	Fibre Bundles	na	
Asbestos quantification	**None**	**%**	**3 of 8**	**0**	**0.2**		0.001							0.0		
pH	**None**	**pH Units**	**47 of 47**	**0**	**11.7**	8.6	10.7	8.2	8.4	7.7	9.0	7.6	7.8	8.2	8.8	
Cyanide	**16200**	**mg/kg**	**25 of 47**	**0**	**11.0**	0.3	0.6	1.6	2.9	1.8	0.3	< 2	< 2	<0.5	<0.5	
Antimony	**7350**	**mg/kg**	**26 of 30**	**0**	**260.0**	2.3	3.5	260.0	4.8	6.1	3.3					
Arsenic	**635**	**mg/kg**	**48 of 49**	**0**	**87.0**	13.0	32.0	56.0	87.0	44.0	20.0	< 2	2.0	14.9	10.1	
Barium	**22100**	**mg/kg**	**19 of 19**	**0**	**578.0**							25.0	274.0	212.0	578.0	
Beryllium	**11.7**	**mg/kg**	**47 of 49**	**0**	**2.1**	0.5	0.8	1.3	0.7	1.3	0.6	< 0.5	0.6	1.0	1.3	
Cadmium	**190**	**mg/kg**	**39 of 49**	**0**	**1.2**	0.3	1.2	1.2	0.3	0.3	0.8	< 0.2	0.3	0.9	0.9	
Chromium	**8570**	**mg/kg**	**49 of 49**	**0**	**210.0**	25.0	27.0	33.0	20.0	22.0	15.0	6.0	23.0	17.2	33.3	
Chromium - Hexavalent	**49**	**mg/kg**	**1 of 47**	**0**	**0.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2	< 2	<0.3	<0.3	
Copper	**68300**	**mg/kg**	**48 of 49**	**0**	**440.0**	79.0	80.0	160.0	110.0	230.0	100.0	< 4	18.0	73.0	47.0	
Lead	**2300**	**mg/kg**	**48 of 49**	**1**	**2400.0**	82.0	330.0	2400.0	300.0	530.0	250.0	< 3	10.0	170.0	191.0	
Mercury	**289**	**mg/kg**	**37 of 49**	**0**	**1.6**	0.1	0.4	1.1	0.5	1.6	0.7	< 1	< 1	0.4	0.3	
Nickel	**983**	**mg/kg**	**49 of 49**	**0**	**34.0**	20.0	17.0	26.0	17.0	32.0	16.0	4.0	25.0	18.2	20.7	
Selenium	**12261**	**mg/kg**	**13 of 49**	**0**	**2.0**	< 0.5	< 0.5	< 0.5	< 0.5	1.3	< 0.5	< 3	< 3	<1	1.0	
Vanadium	**6360**	**mg/kg**	**49 of 49**	**0**	**48.0**	27.0	28.0	36.0	31.0	37.0	18.0	11.0	26.0	26.0	31.0	
Zinc	**730000**	**mg/kg**	**49 of 49**	**0**	**620.0**	110.0	210.0	470.0	140.0	620.0	220.0	16.0	47.0	177.0	93.0	
Phenol	**26000**	**mg/kg**	**0 of 47**	**0**	**0.0**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 2	< 2	<0.01	<0.01	
Total Organic Carbon	**None**	**%**	**48 of 51**	**0**	**7.8**	0.3	1.1	1.8	1.1	3.6	1.5	0.1	0.4	NDP	1.1	0.8
Benzene	**26.5978811**	**mg/kg**	**0 of 39**	**0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		<0.002			<0.005
Ethylbenzene	**5706.00**	**mg/kg**	**0 of 39**	**0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		<0.002			<0.005
m,p xylenes	**5923**	**mg/kg**	**1 of 9**	**0**	**0.009**								<0.002			<0.005
O-Xylene	**6603**	**mg/kg**	**0 of 9**	**0**	**0.0**								<0.002			<0.005
Toluene	**56294**	**mg/kg**	**0 of 39**	**0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		<0.005			<0.005
Xylene	**5923**	**mg/kg**	**0 of 30**	**0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01					
PAH,Total	**None**	**mg/kg**	**38 of 49**	**0**	**120.0**	0.7	1.8	16.0	< 0.10	1.0	2.6	< 1.6	< 1.6	11.2	3.6	
Acenaphthene	**83700**	**mg/kg**	**26 of 53**	**0**	**4.6**	< 0.03	0.0	0.3	< 0.03	< 0.03	0.1	< 0.1	< 0.1	0.1	<0.05	<0.05
Acenaphthylene	**83200**	**mg/kg**	**20 of 53**	**0**	**1.1**	< 0.03	< 0.03	0.1	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	0.1	0.1	<0.03
Dibenz-a-h-anthracene	**3.53**	**mg/kg**	**19 of 53**	**0**	**1.0**	< 0.03	< 0.03	0.1	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	<0.04	<0.04	<0.04
Anthracene	**523000**	**mg/kg**	**31 of 53**	**0**	**6.3**	< 0.03	0.0	0.6	< 0.03	< 0.03	0.1	< 0.1	< 0.1	0.3	0.1	<0.04
Benzo (g,h,i) perylene	**3930**	**mg/kg**	**34 of 53**	**0**	**7.3**	< 0.03	0.1	0.4	< 0.03	0.0	0.1	< 0.1	< 0.1	0.6	0.2	<0.04
Benzo(a)anthracene	**167**	**mg/kg**	**39 of 53**	**0**	**11.0**	0.1	0.1	1.0	< 0.03	0.1	0.2	< 0.1	< 0.1	0.9	0.4	<0.06
Benzo(a)pyrene	**35.2**	**mg/kg**	**36 of 53**	**0**	**12.0**	0.0	0.1	0.9	< 0.03	0.1	0.2	< 0.1	< 0.1	1.0	0.3	<0.04
Benzo(b)fluoranthene	**44.3**	**mg/kg**	**39 of 53**	**0**	**12.0**	0.1	0.1	1.1	< 0.03	0.1	0.2	< 0.1	< 0.1	1.2	0.4	<0.05
benzo(b,k)fluoranthene	**44.3**	**mg/kg**	**15 of 21**	**0**	**6.2**									1.6	0.5	<0.07
Benzo(k)fluoranthene	**1170**	**mg/kg**	**35 of 53**	**0**	**6.9**	< 0.03	0.1	0.4	< 0.03	0.0	0.1	< 0.1	< 0.1	0.5	0.1	<0.02
Chrysene	**346**	**mg/kg**	**40 of 53**	**0**	**9.3**	0.1	0.2	1.2	< 0.03	0.1	0.2	< 0.1	< 0.1	1.0	0.3	0.0
Dibenzofuran	**35.2**	**mg/kg**	**4 of 7**	**0**	**0.2**											
Fluoranthene	**22600**	**mg/kg**	**45 of 53**	**0**	**21.0**	0.1	0.4	3.4	0.0	0.2	0.6	< 0.1	< 0.1	2.2	0.6	0.0
Fluorene	**63000**	**mg/kg**	**25 of 53**	**0**	**3.7**	< 0.03	< 0.03	0.3	< 0.03	< 0.03	0.0	< 0.1	< 0.1	0.1	<0.04	<0.04
Indeno(1,2,3-cd)pyrene	**501**	**mg/kg**	**34 of 53**	**0**	**5.0**	< 0.03	0.1	0.3	< 0.03	0.0	0.1	< 0.1	< 0.1	0.5	0.2	<0.04
Napthalene	**193**	**mg/kg**	**22 of 53**	**0**	**5.7**	0.0	< 0.03	0.2	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	<0.04	<0.04	<0.04
Phenanthrene	**21900**	**mg/kg**	**44 of 53**	**0**	**24.0**	0.1	0.2	2.7	< 0.03	0.1	0.4	< 0.1	< 0.1	1.1	0.4	<0.03
Pyrene	**54200**	**mg/kg**	**44 of 53**	**0**	**21.0**	0.1	0.4	3.2	0.0	0.2	0.6	< 0.1	< 0.1	1.9	0.6	0.0
PCB-101 2,2',4,5,5' - Pentachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**											<0.005
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**											<0.005
PCB-138 2,2',3,4,4',5' - Hexachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**											<0.005
PCB-153 2,2',4,4',5,5' - Hexachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**											<0.005
PCB-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**											<0.005
PCB-52 2,2',5,5' - Tetrachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**											<0.005
Aliphatics & Aromatics >C5-35	**None**	**mg/kg**	**2 of 5**	**0**	**545.0**								< 42			
Aliphatics >C5-6	**3190**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 0.01			
Aliphatics >C6-8	**7780**	**mg/kg**	**1 of 5**	**0**	**0.1**								0.1			
Aliphatics >C8-10	**2000**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 2			
Aliphatics >C10-12	**9690**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 2			
Aliphatics >C12-16	**58800**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 3			
Aliphatics >C16-21	**648000**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 3			
Aliphatics >C21-35	**648000**	**mg/kg**	**1 of 5**	**0**	**151.0**								< 10			
Aliphatics >C5-35	**None**	**mg/kg**	**1 of 5**	**0**	**151.0**								< 21			
Aromatics >C5-7	**27**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 0.01			
Aromatics >C7-8	**56294**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 0.05			
Aromatics >C8-10	**3460**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 2			
Aromatics >C10-12	**16200**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 2			
Aromatics >C12-16	**36200**	**mg/kg**	**0 of 5**	**0**	**0.0**								< 2			
Aromatics >C16-21	**26600**	**mg/kg**	**2 of 5**	**0**	**27.0**								< 3			
Aromatics >C21-35	**28400**	**mg/kg**	**2 of 5**	**0**	**367.0**								< 10			
Aromatics >C5-35	**None**	**mg/kg**	**2 of 5**	**0**	**394.0**								< 21			

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CONFIDENTIAL

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Commercial (1% SOM)

Soil concentration exceeds GAC 100

Contaminant Name	GAC	Test Units	Total > LOD	Total > GAC	Max	GEO-2015-CRH01	GEO-2015-CRH01	GEO-2015-CRH01	GEO-2015-CRH02	GEO-2015-CRH03	GEO-2015-TP01	GEO-2015-TP02	GEO-2015-TP03	GEO-2015-TP04	GEO-2015-TP05
						384591.66	384592.36	384592.36	348630.83	384600.92	384599.67	384586.51	384608.06	384585.8	384612.57
						397462.97	397423.86	397423.86	397417.52	397382.43	397413.11	397390.56	397404.11	397381.42	397393.36
						34.29	35	35	34.62	38.16	34.76	35.86	34.57	35.97	36.83
						1.00	1.00	2.00	1.00	3.00	0.30	0.50	0.70	0.20	2.00
						33.29	34.00	33.00	33.62	35.16	34.46	35.36	33.87	35.77	34.83
						42193	42193	42193	42193	42193	42193	42193	42193	42193	42193
						Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015
						MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Asbestos (Presence of)	**Presence**	**---**	**0 of 51**	**0**	**0.0**		None		None	None	Amosite	Chrysotile	None	None	None
Asbestos Analysts Comments	**None**	**---**	**0 of 51**	**2**	**0.0**		na		na	na	Fibre Bundles	Fibre Bundles	na	na	na
Asbestos quantification	**None**	**%**	**3 of 8**	**0**	**0.2**						<0.001	<0.001			
pH	**None**	**pH Units**	**47 of 47**	**0**	**11.7**		8.0			8.6		8.5	8.9	7.5	8.9
Cyanide	**16200**	**mg/kg**	**25 of 47**	**0**	**11.0**		<0.5			<0.5		<0.5	<0.5	<0.5	<0.5
Antimony	**7350**	**mg/kg**	**26 of 30**	**0**	**260.0**										
Arsenic	**635**	**mg/kg**	**48 of 49**	**0**	**87.0**		13.3			5.9	16.5	10.4	2.9	40.4	2.5
Barium	**22100**	**mg/kg**	**19 of 19**	**0**	**578.0**		100.0			351.0	105.0	120.0	38.0	148.0	59.0
Beryllium	**11.7**	**mg/kg**	**47 of 49**	**0**	**2.1**		1.0			1.0	0.8	0.9	0.7	1.1	0.7
Cadmium	**190**	**mg/kg**	**39 of 49**	**0**	**1.2**		<0.1			<0.1	0.4	0.8	<0.1	0.4	<0.1
Chromium	**8570**	**mg/kg**	**49 of 49**	**0**	**210.0**		43.6			49.2	34.2	15.5	10.4	18.0	47.5
Chromium - Hexavalent	**49**	**mg/kg**	**1 of 47**	**0**	**0.3**		<0.3			<0.3		<0.3	<0.3	<0.3	<0.3
Copper	**68300**	**mg/kg**	**48 of 49**	**0**	**440.0**		37.0			24.0	49.0	44.0	11.0	52.0	14.0
Lead	**2300**	**mg/kg**	**48 of 49**	**1**	**2400.0**		78.0			17.0	139.0	83.0	16.0	110.0	24.0
Mercury	**289**	**mg/kg**	**37 of 49**	**0**	**1.6**		0.6			<0.1	0.5	0.2	<0.1	0.2	<0.1
Nickel	**983**	**mg/kg**	**49 of 49**	**0**	**34.0**		21.3			16.0	24.1	17.3	7.5	22.3	8.3
Selenium	**12261**	**mg/kg**	**13 of 49**	**0**	**2.0**		<1			<1	<1	<1	<1	2.0	<1
Vanadium	**6360**	**mg/kg**	**49 of 49**	**0**	**48.0**		25.0			29.0	23.0	22.0	16.0	27.0	21.0
Zinc	**730000**	**mg/kg**	**49 of 49**	**0**	**620.0**		57.0			28.0	98.0	79.0	25.0	100.0	30.0
Phenol	**26000**	**mg/kg**	**0 of 47**	**0**	**0.0**		<0.01			<0.01		<0.01	<0.01	<0.01	<0.01
Total Organic Carbon	**None**	**%**	**48 of 51**	**0**	**7.8**	1.5	2.7	4.4		5.0		NDP	0.3	7.8	0.6
Benzene	**26.5978811**	**mg/kg**	**0 of 39**	**0**	**0.0**	<0.005	<0.005	<0.005							
Ethylbenzene	**5706.00**	**mg/kg**	**0 of 39**	**0**	**0.0**	<0.005	<0.005	<0.005							
m,p xylenes	**5923**	**mg/kg**	**1 of 9**	**0**	**0.009**	<0.005	<0.005	0.009							
O-Xylene	**6603**	**mg/kg**	**0 of 9**	**0**	**0.0**	<0.005	<0.005	<0.005							
Toluene	**56294**	**mg/kg**	**0 of 39**	**0**	**0.0**	<0.005	<0.005	<0.005							
Xylene	**5923**	**mg/kg**	**0 of 30**	**0**	**0.0**										
PAH,Total	**None**	**mg/kg**	**38 of 49**	**0**	**120.0**		<0.6			17.7	7.0	42.3	2.0	21.0	5.0
Acenaphthene	**83700**	**mg/kg**	**26 of 53**	**0**	**4.6**	<0.05	<0.05	<0.05		0.2	<0.05	0.4	<0.05	0.2	<0.05
Acenaphthylene	**83200**	**mg/kg**	**20 of 53**	**0**	**1.1**	<0.03	<0.03	<0.03		0.2	0.0	0.2	<0.03	0.1	0.1
Dibenz-a-h-anthracene	**3.53**	**mg/kg**	**19 of 53**	**0**	**1.0**	<0.04	<0.04	<0.04		0.1	0.1	0.3	<0.04	0.2	<0.04
Anthracene	**523000**	**mg/kg**	**31 of 53**	**0**	**6.3**	<0.04	<0.04	<0.04		0.6	0.1	0.9	0.1	0.6	0.2
Benzo (g,h,i) perylene	**3930**	**mg/kg**	**34 of 53**	**0**	**7.3**	0.1	<0.04	<0.04		0.7	0.4	2.2	0.1	1.1	0.2
Benzo(a)anthracene	**167**	**mg/kg**	**39 of 53**	**0**	**11.0**	0.2	<0.06	<0.06		1.6	0.8	4.3	0.2	1.7	0.5
Benzo(a)pyrene	**35.2**	**mg/kg**	**36 of 53**	**0**	**12.0**	0.2	<0.04	<0.04		1.3	0.7	3.6	0.2	1.9	0.4
Benzo(b)fluoranthene	**44.3**	**mg/kg**	**39 of 53**	**0**	**12.0**	0.2	<0.05	<0.05		1.5	0.8	4.5	0.2	2.1	0.4
benzo(b,k)fluoranthene	**44.3**	**mg/kg**	**15 of 21**	**0**	**6.2**	0.3	<0.07	<0.07		2.0	1.1	6.2	0.2	2.9	0.6
Benzo(k)fluoranthene	**1170**	**mg/kg**	**35 of 53**	**0**	**6.9**	0.1	<0.02	<0.02		0.6	0.3	1.7	0.1	0.8	0.2
Chrysene	**346**	**mg/kg**	**40 of 53**	**0**	**9.3**	0.2	<0.02	<0.02		1.5	0.7	4.2	0.2	1.8	0.5
Dibenzofuran	**35.2**	**mg/kg**	**4 of 7**	**0**	**0.2**										
Fluoranthene	**22600**	**mg/kg**	**45 of 53**	**0**	**21.0**	0.3	<0.03	<0.03		2.9	1.1	7.1	0.4	3.9	0.9
Fluorene	**63000**	**mg/kg**	**25 of 53**	**0**	**3.7**	<0.04	<0.04	<0.04		0.3	<0.04	0.3	<0.04	0.1	<0.04
Indeno(1,2,3-cd)pyrene	**501**	**mg/kg**	**34 of 53**	**0**	**5.0**	0.1	<0.04	<0.04		0.7	0.4	2.1	0.1	1.1	0.2
Napthalene	**193**	**mg/kg**	**22 of 53**	**0**	**5.7**	<0.04	<0.04	<0.04		0.4	0.1	0.2	<0.04	0.1	<0.04
Phenanthrene	**21900**	**mg/kg**	**44 of 53**	**0**	**24.0**	0.2	<0.03	<0.03		2.4	0.6	3.6	0.3	2.0	0.6
Pyrene	**54200**	**mg/kg**	**44 of 53**	**0**	**21.0**	0.3	<0.03	<0.03		2.8	1.1	6.8	0.4	3.5	0.9
PCB-101 2,2',4,5,5' - Pentachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.005		<0.005							
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.005		<0.005							
PCB-138 2,2',3,4,4',5' - Hexachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.005		<0.005							
PCB-153 2,2',4,4',5,5' - Hexachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.005		<0.005							
PCB-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.005		<0.005							
PCB-52 2,2',5,5' - Tetrachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.005		<0.005							
Aliphatics & Aromatics >C5-35	**None**	**mg/kg**	**2 of 5**	**0**	**545.0**		<38								
Aliphatics >C5-6	**3190**	**mg/kg**	**0 of 5**	**0**	**0.0**		<0.1								
Aliphatics >C6-8	**7780**	**mg/kg**	**1 of 5**	**0**	**0.1**		<0.1								
Aliphatics >C8-10	**2000**	**mg/kg**	**0 of 5**	**0**	**0.0**		<0.1								
Aliphatics >C10-12	**9690**	**mg/kg**	**0 of 5**	**0**	**0.0**		<0.2								
Aliphatics >C12-16	**58800**	**mg/kg**	**0 of 5**	**0**	**0.0**		<4								
Aliphatics >C16-21	**648000**	**mg/kg**	**0 of 5**	**0**	**0.0**		<7								
Aliphatics >C21-35	**648000**	**mg/kg**	**1 of 5**	**0**	**151.0**		<7								
Aliphatics >C5-35	**None**	**mg/kg**	**1 of 5**	**0**	**151.0**		<19								
Aromatics >C5-7	**27**	**mg/kg**	**0 of 5**	**0**	**0.0**		<0.1								
Aromatics >C7-8	**56294**	**mg/kg**	**0 of 5**	**0**	**0.0**		<0.1								
Aromatics >C8-10	**3460**	**mg/kg**	**0 of 5**	**0**	**0.0**		<0.1								
Aromatics >C10-12	**16200**	**mg/kg**	**0 of 5**	**0**	**0.0**		<0.2								
Aromatics >C12-16	**36200**	**mg/kg**	**0 of 5**	**0**	**0.0**		<4								
Aromatics >C16-21	**26600**	**mg/kg**	**2 of 5**	**0**	**27.0**		<7								
Aromatics >C21-35	**28400**	**mg/kg**	**2 of 5**	**0**	**367.0**		<7								
Aromatics >C5-35	**None**	**mg/kg**	**2 of 5**	**0**	**394.0**		<19								

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Commercial (1% SOM)

Soil concentration exceeds GAC 100

Contaminant Name	GAC	Test Units	Total > LOD	Total > GAC	Max	GEO-2015-TP05	GEO-2015-TP06	GEO-2015-TP07	GEO-2015-TP08	GEO-2015-TP08	GEO-2015-WLS01	GEO-2015-WLS02	GEO-2015-WLS02	GEO-2015-WLS03	GEO-2015-WLS03
						384612.57	384630.44	384622.03	384582.1	384582.1	384649.9	384604.43	384604.43	384588.26	384588.26
						397393.36	397409.03	397403.88	397369.81	397369.81	397470.74	397437.32	397437.32	397411.22	397411.22
						36.83	35.44	35.27	35.61	35.61	33.7	34.36	34.36	37.76	37.76
						1.40	0.30	1.80	0.80	0.30	1.00	2.00	1.00	3.50	2.50
						35.43	35.14	33.47	34.81	35.31	32.70	32.36	33.36	34.26	35.26
						42193	42193	42193	42193	42193	42193	42193	42193	42193	42193
						Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015
						MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Asbestos (Presence of)	**Presence**	**---**	**0 of 51**	**0**	**0.0**	None	Chrysotile	None	None	None	None	None		None	None
Asbestos Analysts Comments	**None**	**---**	**0 of 51**	**2**	**0.0**	na	Fibre Bundles	na	na	na	na	na		na	na
Asbestos quantification	**None**	**%**	**3 of 8**	**0**	**0.2**		<0.001								
pH	**None**	**pH Units**	**47 of 47**	**0**	**11.7**	8.6	8.1	8.8			10.2	8.8		8.5	8.8
Cyanide	**16200**	**mg/kg**	**25 of 47**	**0**	**11.0**	<0.5	1.9	<0.5			<0.5	<0.5		<0.5	0.6
Antimony	**7350**	**mg/kg**	**26 of 30**	**0**	**260.0**										
Arsenic	**635**	**mg/kg**	**48 of 49**	**0**	**87.0**	53.3	19.5	2.9	5.4		4.7	10.5		8.1	2.2
Barium	**22100**	**mg/kg**	**19 of 19**	**0**	**578.0**	271.0	184.0	43.0	189.0		50.0	136.0		84.0	70.0
Beryllium	**11.7**	**mg/kg**	**47 of 49**	**0**	**2.1**	2.1	1.3	0.7	1.2		0.6	1.3		0.9	<0.5
Cadmium	**190**	**mg/kg**	**39 of 49**	**0**	**1.2**	0.4	0.7	<0.1	<0.1		<0.1	0.2		0.1	0.2
Chromium	**8570**	**mg/kg**	**49 of 49**	**0**	**210.0**	45.8	31.2	11.8	47.8		52.8	11.1		19.0	57.3
Chromium - Hexavalent	**49**	**mg/kg**	**1 of 47**	**0**	**0.3**	<0.3	<0.3	0.3			<0.3	<0.3		<0.3	<0.3
Copper	**68300**	**mg/kg**	**48 of 49**	**0**	**440.0**	57.0	80.0	11.0	28.0		14.0	82.0		37.0	21.0
Lead	**2300**	**mg/kg**	**48 of 49**	**1**	**2400.0**	32.0	289.0	15.0	12.0		11.0	190.0		56.0	55.0
Mercury	**289**	**mg/kg**	**37 of 49**	**0**	**1.6**	<0.1	0.8	<0.1	<0.1		<0.1	0.2		0.2	1.0
Nickel	**983**	**mg/kg**	**49 of 49**	**0**	**34.0**	32.3	22.9	9.6	33.4		19.6	15.5		22.9	6.6
Selenium	**12261**	**mg/kg**	**13 of 49**	**0**	**2.0**	1.0	<1	<1	<1		<1	<1		<1	<1
Vanadium	**6360**	**mg/kg**	**49 of 49**	**0**	**48.0**	48.0	28.0	17.0	31.0		19.0	18.0		21.0	11.0
Zinc	**730000**	**mg/kg**	**49 of 49**	**0**	**620.0**	55.0	186.0	28.0	76.0		37.0	56.0		62.0	42.0
Phenol	**26000**	**mg/kg**	**0 of 47**	**0**	**0.0**	<0.01	<0.01	<0.01			<0.01	<0.01		<0.01	<0.01
Total Organic Carbon	**None**	**%**	**48 of 51**	**0**	**7.8**	7.4	NDP	0.3			0.8	3.2	0.1	1.1	0.3
Benzene	**26.5978811**	**mg/kg**	**0 of 39**	**0**	**0.0**	<0.005							<0.005	<0.005	<0.005
Ethylbenzene	**5706.00**	**mg/kg**	**0 of 39**	**0**	**0.0**	<0.003							<0.005	<0.005	<0.003
m,p xylenes	**5923**	**mg/kg**	**1 of 9**	**0**	**0.009**	<0.004							<0.005	<0.005	<0.004
O-Xylene	**6603**	**mg/kg**	**0 of 9**	**0**	**0.0**	<0.004							<0.005	<0.005	<0.004
Toluene	**56294**	**mg/kg**	**0 of 39**	**0**	**0.0**	<0.003							<0.005	<0.005	<0.003
Xylene	**5923**	**mg/kg**	**0 of 30**	**0**	**0.0**										
PAH,Total	**None**	**mg/kg**	**38 of 49**	**0**	**120.0**	59.4	18.9	25.9	<0.6		<0.6	40.3		<0.6	49.9
Acenaphthene	**83700**	**mg/kg**	**26 of 53**	**0**	**4.6**	2.5	0.2	0.3	<0.05		<0.05	0.3	<0.05	<0.05	1.6
Acenaphthylene	**83200**	**mg/kg**	**20 of 53**	**0**	**1.1**	0.8	0.1	0.4	<0.03		<0.03	0.2	<0.03	<0.03	<0.03
Dibenz-a-h-anthracene	**3.53**	**mg/kg**	**19 of 53**	**0**	**1.0**	0.2	0.2	0.2	<0.04		<0.04	0.3	<0.04	<0.04	0.4
Anthracene	**523000**	**mg/kg**	**31 of 53**	**0**	**6.3**	2.6	0.4	1.0	<0.04		<0.04	1.1	<0.04	<0.04	1.9
Benzo (g,h,i) perylene	**3930**	**mg/kg**	**34 of 53**	**0**	**7.3**	1.1	1.0	0.9	<0.04		<0.04	1.8	<0.04	<0.04	1.7
Benzo(a)anthracene	**167**	**mg/kg**	**39 of 53**	**0**	**11.0**	4.1	1.5	2.3	<0.06		<0.06	4.2	<0.06	0.1	4.1
Benzo(a)pyrene	**35.2**	**mg/kg**	**36 of 53**	**0**	**12.0**	2.3	1.7	1.7	<0.04		<0.04	3.1	<0.04	0.1	3.0
Benzo(b)fluoranthene	**44.3**	**mg/kg**	**39 of 53**	**0**	**12.0**	2.4	1.9	1.8	<0.05		<0.05	3.9	<0.05	0.1	4.1
benzo(b,k)fluoranthene	**44.3**	**mg/kg**	**15 of 21**	**0**	**6.2**	3.4	2.7	2.5	<0.07		<0.07	5.4	<0.07	0.1	5.7
Benzo(k)fluoranthene	**1170**	**mg/kg**	**35 of 53**	**0**	**6.9**	1.0	0.8	0.7	<0.02		<0.02	1.5	<0.02	0.0	1.6
Chrysene	**346**	**mg/kg**	**40 of 53**	**0**	**9.3**	3.0	1.7	1.9	0.0		<0.02	3.6	<0.02	0.1	3.7
Dibenzofuran	**35.2**	**mg/kg**	**4 of 7**	**0**	**0.2**	0.0					<0.01	0.1			0.0
Fluoranthene	**22600**	**mg/kg**	**45 of 53**	**0**	**21.0**	9.7	3.2	4.1	0.0		<0.03	7.2	0.0	0.1	9.9
Fluorene	**63000**	**mg/kg**	**25 of 53**	**0**	**3.7**	2.2	0.1	0.6	<0.04		<0.04	0.3	<0.04	<0.04	0.8
Indeno(1,2,3-cd)pyrene	**501**	**mg/kg**	**34 of 53**	**0**	**5.0**	1.1	1.0	0.8	<0.04		<0.04	1.9	<0.04	<0.04	2.0
Napthalene	**193**	**mg/kg**	**22 of 53**	**0**	**5.7**	1.5	0.2	0.4	<0.04		<0.04	0.2	<0.04	<0.04	0.1
Phenanthrene	**21900**	**mg/kg**	**44 of 53**	**0**	**24.0**	16.0	1.9	4.6	0.0		<0.03	4.1	0.0	0.1	7.8
Pyrene	**54200**	**mg/kg**	**44 of 53**	**0**	**21.0**	8.8	2.9	4.2	0.0		<0.03	6.7	0.0	0.1	7.2
PCB-101 2,2',4,5,5' - Pentachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**						<0.005		<0.005		
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**						<0.005		<0.005		
PCB-138 2,2',3,4,4',5' - Hexachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**						<0.005		<0.005		
PCB-153 2,2',4,4',5,5' - Hexachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**						<0.005		<0.005		
PCB-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**						<0.005		<0.005		
PCB-52 2,2',5,5' - Tetrachlorobiphenyl	**None**	**mg/kg**	**0 of 5**	**0**	**0.0**						<0.005		<0.005		
Aliphatics & Aromatics >C5-35	**None**	**mg/kg**	**2 of 5**	**0**	**545.0**	545.0								<38	76.0
Aliphatics >C5-6	**3190**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.1								<0.1	<0.1
Aliphatics >C6-8	**7780**	**mg/kg**	**1 of 5**	**0**	**0.1**	<0.1								<0.1	<0.1
Aliphatics >C8-10	**2000**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.1								<0.1	<0.1
Aliphatics >C10-12	**9690**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.2								<0.2	<0.2
Aliphatics >C12-16	**58800**	**mg/kg**	**0 of 5**	**0**	**0.0**	<4								<4	<4
Aliphatics >C16-21	**648000**	**mg/kg**	**0 of 5**	**0**	**0.0**	<7								<7	<7
Aliphatics >C21-35	**648000**	**mg/kg**	**1 of 5**	**0**	**151.0**	151.0								<7	<7
Aliphatics >C5-35	**None**	**mg/kg**	**1 of 5**	**0**	**151.0**	151.0								<19	<19
Aromatics >C5-7	**27**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.1								<0.1	<0.1
Aromatics >C7-8	**56294**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.1								<0.1	<0.1
Aromatics >C8-10	**3460**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.1								<0.1	<0.1
Aromatics >C10-12	**16200**	**mg/kg**	**0 of 5**	**0**	**0.0**	<0.2								<0.2	<0.2
Aromatics >C12-16	**36200**	**mg/kg**	**0 of 5**	**0**	**0.0**	<4								<4	<4
Aromatics >C16-21	**26600**	**mg/kg**	**2 of 5**	**0**	**27.0**	27.0								<7	20.0
Aromatics >C21-35	**28400**	**mg/kg**	**2 of 5**	**0**	**367.0**	367.0								<7	56.0
Aromatics >C5-35	**None**	**mg/kg**	**2 of 5**	**0**	**394.0**	394.0								<19	76.0

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Commercial (1% SOM)

Soil concentration exceeds GAC 100
Soil concentration exceeds theoretical NAPL saturation limit 20

Hole Ref	CE-2015-CC/WS3	CE-2015-CC/WS2	GEO-2015-CRH01	GEO-2015-TP03	GEO-2015-WLS03	GEO-2015-WLS03	GEO-2015-WLS02	GEO-2015-WLS01	GEO-2015-TP02	GEO-2015-CRH01	GEO-2015-CRH01B	GEO-2015-TP07
Easting	384606	384607	384591.66	384608.06	384588.26	384588.26	384604.43	384649.9	384586.51	384591.66	384592.36	384622.03
Northing	397461	397436	397462.97	397404.11	397411.22	397411.22	397437.32	397470.74	397390.56	397462.97	397423.86	397403.88
Elevation (mOD)	30.13	27.87	34.29	34.57	37.76	37.76	34.36	33.7	35.86	34.29	35	35.27
Sample Top (m)	0.56	0.68	0.20	0.70	3.50	2.50	2.00	1.00	0.50	0.50	1.00	1.80
Sample Elevation (mOD)	29.57	27.19	34.09	33.87	34.26	35.26	32.36	32.70	35.36	33.79	34.00	33.47
Sample Date	42080	42080	42193	42193	42193	42193	42193	42193	42193	42193	42193	42193
Investigation	Constructive Evaluation	Constructive Evaluation	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015
Geology	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG

Contaminant Name	GAC	Test Units	Total > LOD	Total > GAC	Max													
1,1,1,2-Tetrachloroethane	108	mg/kg	0 of 2	0	0.0						<0.005							
1,1,1-Trichloroethane	660	mg/kg	0 of 2	0	0.0						<0.005							
1,1,2,2-Tetrachloroethane	274	mg/kg	0 of 2	0	0.0						<0.003							
1,1,2-Trichloroethane	89.1	mg/kg	0 of 2	0	0.0						<0.004							
1,1-Dichloroethane	263	mg/kg	0 of 2	0	0.0						<0.006							
1,1-Dichloroethene	24.3	mg/kg	0 of 2	0	0.0						<0.006							
1,1-Dichloropropene	27	mg/kg	0 of 2	0	0.0						<0.003							
1,2,3 Trichlorobenzene	102	mg/kg	0 of 2	0	0.0						<0.007							
1,2,3-Trichloropropane	26.5978811	mg/kg	0 of 2	0	0.0						<0.004							
1,2,4-Trichlorobenzene	215	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
1,2,4-Trimethylbenzene	39.4	mg/kg	0 of 2	0	0.0						<0.006							
1,2-Dibromo-3-Chloropropane	None	mg/kg	0 of 2	0	0.0						<0.004							
1,2-Dibromoethane	1.96	mg/kg	0 of 2	0	0.0						<0.003							
1,2-Dichlorobenzene	2020	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
1,2-Dichloroethane	0.671	mg/kg	0 of 2	0	0.0						<0.005							
1,2-Dichloropropane	3.13	mg/kg	0 of 2	0	0.0						<0.004							
1,3,5-Trimethylbenzene	39.4	mg/kg	0 of 2	0	0.0						<0.003							
1,3-Dichlorobenzene	29.9	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
1,3-Dichloropropane	None	mg/kg	0 of 2	0	0.0						<0.004							
1,4-Dichlorobenzene	4220	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2,2-Dichloropropane	None	mg/kg	0 of 2	0	0.0						<0.004							
2,4,5-Trichlorophenol	3850	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2,4,6-Trichlorophenol	3850	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2,4-Dichlorophenol	3420	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2,4-Dimethylphenol	15700	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2,4-Dinitrotoluene	3720	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2,6-Dinitrotoluene	1850	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2-Chloronaphthalene	370	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2-Chlorophenol	3500	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2-Chlorotoluene	55.6	mg/kg	0 of 2	0	0.0						<0.003							
2-Methylnaphthalene	193	mg/kg	3 of 4	0	0.1						0.05	0.06	<0.01					
2-Methylphenol	160000	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2-Nitroaniline	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
2-Nitrophenol	3500	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
3-Nitroaniline	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
4-Bromophenyl Phenyl Ether	26.5978811	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
4-Chloro-3-Methylphenol	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
4-Chlorophenyl Phenyl Ether	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
4-Chlorotoluene	55.6	mg/kg	0 of 2	0	0.0						<0.003							
4-Isopropyltoluene	16200	mg/kg	0 of 2	0	0.0						<0.004							
4-Methylphenol	162000	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
4-Nitroaniline	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
4-Nitrophenol	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Azobenzene	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Bis(2-chloroethoxy)methane	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Bis(2-chloroethyl)ether	0.671	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Bis(2-chloroisopropyl)ether	None	mg/kg	0 of 0	0	0.0													
Bis(2-ethylhexyl)phthalate	85163	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Bromobenzene	91.5	mg/kg	0 of 2	0	0.0						<0.002							
Bromochloromethane	None	mg/kg	0 of 2	0	0.0						<0.004							
Bromodichloromethane	1.96	mg/kg	0 of 2	0	0.0						<0.004							
Bromomethane	714	mg/kg	0 of 2	0	0.0						<0.001							
Butylbenzylphthalate	940280	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Carbazole	None	mg/kg	3 of 4	0	0.1						0.06	0.12	<0.01					
Chlorobenzene	55.6	mg/kg	0 of 2	0	0.0						<0.004							
Chloroethane	904	mg/kg	0 of 2	0	0.0						<0.006							
Chloroethene	0.0594	mg/kg	0 of 2	0	0.0						<0.002							
Chloroform	99.1	mg/kg	0 of 2	0	0.0						<0.005							
Chloromethane	0.956	mg/kg	0 of 2	0	0.0						<0.003							
cis-1,2-Dichloroethene	13.6	mg/kg	0 of 2	0	0.0						<0.007							
cis1,3-Dichloropropene	None	mg/kg	0 of 2	0	0.0						<0.004							
Dibromochloromethane	None	mg/kg	0 of 2	0	0.0						<0.005							
Dibromomethane	1.96	mg/kg	0 of 2	0	0.0						<0.004							
Dichlorodifluoromethane	None	mg/kg	0 of 2	0	0.0						<0.002							
Dichloromethane	257	mg/kg	0 of 2	0	0.0						<0.007							
Diethylphthalate	144000	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Dimethylphthalate	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Di-N-Butyl Phthalate	15400	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Di-N-Octyl Phthalate	89100	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Hexachlorobenzene (HCB)	104	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Hexachlorobutadiene (HCBD)	30.7	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Hexachlorocyclopentadiene	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Hexachloroethane	20.9	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Isophorone	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Isopropylbenzene	1300	mg/kg	0 of 2	0	0.0						<0.003							
Methyl tert-butyl ether (MTBE)	7480	mg/kg	0 of 9	0	0.0		<0.005			<0.005	<0.006						<0.005	
n-Butylbenzene	26.5978811	mg/kg	0 of 2	0	0.0						<0.004							
Nitrobenzene	26.5978811	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
N-Nitroso-Di-N-Propylamine	None	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
n-propylbenzene	3860	mg/kg	0 of 2	0	0.0						<0.004							
Pentachlorophenol (PCP)	399	mg/kg	0 of 4	0	0.0						<0.01	<0.01	<0.01					
Phenol	26000	mg/kg	0 of 17	0	0.0		< 2	< 2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sec-Butylbenzene	26.5978811	mg/kg	0 of 2	0	0.0						<0.004							
Styrene	3170	mg/kg	0 of 2	0	0.0						<0.003							
Tert-Butylbenzene	26.5978811	mg/kg	0 of 2	0	0.0						<0.005							
Tetrachloroethene	18.6	mg/kg	0 of 2	0	0.0						<0.003							
Tetrachloromethane (Carbon Tetra Chloride)	2.87	mg/kg	0 of 2	0	0.0						<0.004							
trans-1,2-Dichloroethene	20.7	mg/kg	0 of 2	0	0.0						<0.003							
trans-1,3-Dichloropropene	None	mg/kg	0 of 2	0	0.0						<0.003							
Tribromomethane	None	mg/kg	0 of 2	0	0.0						<0.004							
Trichloroethene	1.23	mg/kg	0 of 2	0	0.0						<0.005							
Trichlorofluoromethane	1.96	mg/kg	0 of 2	0	0.0						<0.003							

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Commercial (1% SOM)

Soil concentration exceeds GAC 100
Soil concentration exceeds theoretical NAPL saturation limit 20

Contaminant Name	GAC	Test Units	Total > LOD	Total > GAC	Max	GEO-2015-TP06	GEO-2015-TP05	GEO-2015-TP05	GEO-2015-CRH03	GEO-2015-TP04	GEO-2015-CRH01B	GEO-2015-WLS02	GEO-2015-CRH01	GEO-2015-CRH01
						384630.44	384612.57	384612.57	384600.92	384585.8	384592.36	384604.43	384591.66	384591.66
						397409.03	397393.36	397393.36	397382.43	397381.42	397423.86	397437.32	397462.97	397462.97
						35.44	36.83	36.83	38.16	35.97	35	34.36	34.29	34.29
						0.30	2.00	1.40	3.00	0.20	2.00	1.00	2.00	1.00
						35.14	34.83	35.43	35.16	35.77	33.00	33.36	32.29	33.29
						42193	42193	42193	42193	42193	42193	42193	42193	42193
						Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015	Geotechnics 2015
						MG	MG	MG	MG	MG	MG	MG	MG	MG
1,1,1,2-Tetrachloroethane	108	mg/kg	0 of 2	0	0.0			<0.005						
1,1,1-Trichloroethane	660	mg/kg	0 of 2	0	0.0			<0.005						
1,1,2,2-Tetrachloroethane	274	mg/kg	0 of 2	0	0.0			<0.003						
1,1,2-Trichloroethane	89.1	mg/kg	0 of 2	0	0.0			<0.004						
1,1-Dichloroethane	263	mg/kg	0 of 2	0	0.0			<0.006						
1,1-Dichloroethene	24.3	mg/kg	0 of 2	0	0.0			<0.006						
1,1-Dichloropropene	27	mg/kg	0 of 2	0	0.0			<0.003						
1,2,3 Trichlorobenzene	102	mg/kg	0 of 2	0	0.0			<0.007						
1,2,3-Trichloropropane	26.5978811	mg/kg	0 of 2	0	0.0			<0.004						
1,2,4-Trichlorobenzene	215	mg/kg	0 of 4	0	0.0			<0.01						
1,2,4-Trimethylbenzene	39.4	mg/kg	0 of 2	0	0.0			<0.006						
1,2-Dibromo-3-Chloropropane	None	mg/kg	0 of 2	0	0.0			<0.004						
1,2-Dibromoethane	1.96	mg/kg	0 of 2	0	0.0			<0.003						
1,2-Dichlorobenzene	2020	mg/kg	0 of 4	0	0.0			<0.01						
1,2-Dichloroethane	0.671	mg/kg	0 of 2	0	0.0			<0.005						
1,2-Dichloropropane	3.13	mg/kg	0 of 2	0	0.0			<0.004						
1,3,5-Trimethylbenzene	39.4	mg/kg	0 of 2	0	0.0			<0.003						
1,3-Dichlorobenzene	29.9	mg/kg	0 of 4	0	0.0			<0.01						
1,3-Dichloropropane	None	mg/kg	0 of 2	0	0.0			<0.004						
1,4-Dichlorobenzene	4220	mg/kg	0 of 4	0	0.0			<0.01						
2,2-Dichloropropane	None	mg/kg	0 of 2	0	0.0			<0.004						
2,4,5-Trichlorophenol	3850	mg/kg	0 of 4	0	0.0			<0.01						
2,4,6-Trichlorophenol	3850	mg/kg	0 of 4	0	0.0			<0.01						
2,4-Dichlorophenol	3420	mg/kg	0 of 4	0	0.0			<0.01						
2,4-Dimethylphenol	15700	mg/kg	0 of 4	0	0.0			<0.01						
2,4-Dinitrotoluene	3720	mg/kg	0 of 4	0	0.0			<0.01						
2,6-Dinitrotoluene	1850	mg/kg	0 of 4	0	0.0			<0.01						
2-Chloronaphthalene	370	mg/kg	0 of 4	0	0.0			<0.01						
2-Chlorophenol	3500	mg/kg	0 of 4	0	0.0			<0.01						
2-Chlorotoluene	55.6	mg/kg	0 of 2	0	0.0			<0.003						
2-Methylnaphthalene	193	mg/kg	3 of 4	0	0.1			0.05						
2-Methylphenol	160000	mg/kg	0 of 4	0	0.0			<0.01						
2-Nitroaniline	None	mg/kg	0 of 4	0	0.0			<0.01						
2-Nitrophenol	3500	mg/kg	0 of 4	0	0.0			<0.01						
3-Nitroaniline	None	mg/kg	0 of 4	0	0.0			<0.01						
4-Bromophenyl Phenyl Ether	26.5978811	mg/kg	0 of 4	0	0.0			<0.01						
4-Chloro-3-Methylphenol	None	mg/kg	0 of 4	0	0.0			<0.01						
4-Chlorophenyl Phenyl Ether	None	mg/kg	0 of 4	0	0.0			<0.01						
4-Chlorotoluene	55.6	mg/kg	0 of 2	0	0.0			<0.003						
4-Isopropyltoluene	16200	mg/kg	0 of 2	0	0.0			<0.004						
4-Methylphenol	162000	mg/kg	0 of 4	0	0.0			<0.01						
4-Nitroaniline	None	mg/kg	0 of 4	0	0.0			<0.01						
4-Nitrophenol	None	mg/kg	0 of 4	0	0.0			<0.01						
Azobenzene	None	mg/kg	0 of 4	0	0.0			<0.01						
Bis(2-chloroethoxy)methane	None	mg/kg	0 of 4	0	0.0			<0.01						
Bis(2-chloroethyl)ether	0.671	mg/kg	0 of 4	0	0.0			<0.01						
Bis(2-chloroisopropyl)ether	None	mg/kg	0 of 0	0	0.0									
Bis(2-ethylhexyl)phthalate	85163	mg/kg	0 of 4	0	0.0			<0.01						
Bromobenzene	91.5	mg/kg	0 of 2	0	0.0			<0.002						
Bromochloromethane	None	mg/kg	0 of 2	0	0.0			<0.004						
Bromodichloromethane	1.96	mg/kg	0 of 2	0	0.0			<0.004						
Bromomethane	714	mg/kg	0 of 2	0	0.0			<0.001						
Butylbenzylphthalate	940280	mg/kg	0 of 4	0	0.0			<0.01						
Carbazole	None	mg/kg	3 of 4	0	0.1			0.052						
Chlorobenzene	55.6	mg/kg	0 of 2	0	0.0			<0.004						
Chloroethane	904	mg/kg	0 of 2	0	0.0			<0.006						
Chloroethene	0.0594	mg/kg	0 of 2	0	0.0			<0.002						
Chloroform	99.1	mg/kg	0 of 2	0	0.0			<0.005						
Chloromethane	0.956	mg/kg	0 of 2	0	0.0			<0.003						
cis-1,2-Dichloroethene	13.6	mg/kg	0 of 2	0	0.0			<0.007						
cis1,3-Dichloropropene	None	mg/kg	0 of 2	0	0.0			<0.004						
Dibromochloromethane	None	mg/kg	0 of 2	0	0.0			<0.005						
Dibromomethane	1.96	mg/kg	0 of 2	0	0.0			<0.004						
Dichlorodifluoromethane	None	mg/kg	0 of 2	0	0.0			<0.002						
Dichloromethane	257	mg/kg	0 of 2	0	0.0			<0.007						
Diethylphthalate	144000	mg/kg	0 of 4	0	0.0			<0.01						
Dimethylphthalate	None	mg/kg	0 of 4	0	0.0			<0.01						
Di-N-Butyl Phthalate	15400	mg/kg	0 of 4	0	0.0			<0.01						
Di-N-Octyl Phthalate	89100	mg/kg	0 of 4	0	0.0			<0.01						
Hexachlorobenzene (HCB)	104	mg/kg	0 of 4	0	0.0			<0.01						
Hexachlorobutadiene (HCBD)	30.7	mg/kg	0 of 4	0	0.0			<0.01						
Hexachlorocyclopentadiene	None	mg/kg	0 of 4	0	0.0			<0.01						
Hexachloroethane	20.9	mg/kg	0 of 4	0	0.0			<0.01						
Isophorone	None	mg/kg	0 of 4	0	0.0			<0.01						
Isopropylbenzene	1300	mg/kg	0 of 2	0	0.0			<0.003						
Methyl tert-butyl ether (MTBE)	7480	mg/kg	0 of 9	0	0.0			<0.006			<0.005	<0.005	<0.005	<0.005
n-Butylbenzene	26.5978811	mg/kg	0 of 2	0	0.0			<0.004						
Nitrobenzene	26.5978811	mg/kg	0 of 4	0	0.0			<0.01						
N-Nitroso-Di-N-Propylamine	None	mg/kg	0 of 4	0	0.0			<0.01						
n-propylbenzene	3860	mg/kg	0 of 2	0	0.0			<0.004						
Pentachlorophenol (PCP)	399	mg/kg	0 of 4	0	0.0			<0.01						
Phenol	26000	mg/kg	0 of 17	0	0.0	<0.01	<0.01	<0.01	<0.01	<0.01				
Sec-Butylbenzene	26.5978811	mg/kg	0 of 2	0	0.0			<0.004						
Styrene	3170	mg/kg	0 of 2	0	0.0			<0.003						
Tert-Butylbenzene	26.5978811	mg/kg	0 of 2	0	0.0			<0.005						
Tetrachloroethene	18.6	mg/kg	0 of 2	0	0.0			<0.003						
Tetrachloromethane (Carbon Tetra Chloride)	2.87	mg/kg	0 of 2	0	0.0			<0.004						
trans-1,2-Dichloroethene	20.7	mg/kg	0 of 2	0	0.0			<0.003						
trans-1,3-Dichloropropene	None	mg/kg	0 of 2	0	0.0			<0.003						
Tribromomethane	None	mg/kg	0 of 2	0	0.0			<0.004						
Trichloroethene	1.23	mg/kg	0 of 2	0	0.0			<0.005						
Trichlorofluoromethane	1.96	mg/kg	0 of 2	0	0.0			<0.003						

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Appendix D

Controlled Waters Risk Assessment

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GACs apply to CSM1 - Principal Aquifer and fresh water receptor

Shallow Groundwater concentration exceeds GAC	100
Limit of Detection Value exceeds GAC	**<0.1**

Contaminant Name	GAC	Source	LOD	Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	BH001	BH004	BH005	BH007	BH011	BH013
										Easting	384566.052	384554.516	384655.497	384765.207	384726.701	384368.382
										Northing	397646.557	397582.476	397554.645	397596.049	397513.893	397549.44
										Sample Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020	16/01/2020
										Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
Metals																
Antimony, Dissolved	5	DWS	0.17	ug/l	6 of 6	0	0.18	0.53			0.25	0.18	0.23	0.18	0.28	0.53
Arsenic, Dissolved	10	EQS	0.16	ug/l	6 of 6	1	0.54	15			0.82	4.7	0.54	**15**	0.57	0.78
Beryllium, Dissolved			0.1	ug/l	2 of 6	0	0.2	0.5			< 0.1	< 0.1	0.2	< 0.1	0.5	< 0.1
Cadmium, Dissolved	0.00008	EQS	0.03	ug/l	3 of 6	3	0.04	0.38			**< 0.03**	**< 0.03**	**0.26**	**< 0.03**	**0.38**	**0.04**
Calcium, Dissolved			0.09	mg/l	6 of 6	0	11	140			43	140	11	83	130	140
Chromium, Dissolved	4.7	EQS	0.25	ug/l	4 of 6	1	0.32	9			0.63	< 0.25	< 0.25	0.32	1.1	**9**
Copper, Dissolved	1	EQS	0.4	ug/l	4 of 6	2	0.5	2.4			**2**	< 0.4	1	< 0.4	0.5	**2.4**
Lead, Dissolved	1.2	EQS	0.09	ug/l	6 of 6	1	0.12	3100			0.21	0.12	0.26	0.31	**3100**	0.33
Manganese, Dissolved	50	EQS	0.22	ug/l	6 of 6	6	52	2600			**780**	**1900**	**170**	**2600**	**210**	**52**
Mercury, Dissolved	1	DWS	0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	4	EQS	0.5	ug/l	6 of 6	2	1	8.6			**4.3**	1	**8.6**	2.3	3.7	1.5
Selenium, Dissolved	10	DWS	0.25	ug/l	6 of 6	1	0.81	22			2.6	1.5	0.87	0.81	2.4	**22**
Tin, Dissolved			0.4	ug/l	0 of 5	0					< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	
Vanadium, Dissolved	20	EQS	0.6	ug/l	5 of 6	0	0.6	1.3			1.3	0.6	1	< 0.6	0.9	0.8
Zinc, Dissolved	12.3	EQS	1.3	ug/l	6 of 6	2	3.9	45			7.8	3.9	8.8	**13**	**45**	10
Inorganics																
pH	6 to 9	EQS		pH	6 of 6	0	4.8	7			6.7	6.7	6.9	6.8	**4.8**	7
Cyanide, Total	0.001	EQS	40	ug/l	2 of 6	2	78	1000			**< 40**	**< 40**	**< 40**	**< 40**	**1000**	**78**
Dissolved Organic Carbon			2	mg/l	2 of 6	0	2.3	2.6			< 2.0	2.3	< 2.0	< 2.0	< 2.0	2.6
Hardness			0.1	mg/l	6 of 6	0	39.6	420			170	420	39.6	246	349	405
Ammoniacal Nitrogen as N	0.3	EQS	0.015	mg/l	4 of 6	2	0.025	0.53			< 0.015	**0.53**	0.027	< 0.015	**0.31**	0.025
Chloride	250	EQS	0.1	mg/l	6 of 6	0	24	180			26	32	30	24	180	36
Petroleum Hydrocarbons																
Aliphatic C5-C6	15000	WHO	0.1	ug/l	2 of 6	0	2.1	2.7			< 0.1	2.7	2.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	15000	WHO	0.1	ug/l	0 of 6	0					< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	300	WHO	0.1	ug/l	4 of 6	0	3.4	9.7			3.9	< 0.1	< 0.1	7.9	9.7	3.4
Aliphatic C10-C12	300	WHO	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	300	WHO	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C35-C44			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35			10	ug/l	0 of 6	0					< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	10	WHO	0.1	ug/l	0 of 6	0					< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	700	WHO	0.1	ug/l	0 of 6	0					< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	300	WHO	0.1	ug/l	0 of 6	0					< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	90	WHO	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	90	WHO	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	90	WHO	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	90	WHO	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C35-C44			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35			10	ug/l	0 of 6	0					< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total			10	ug/l	0 of 6	0					< 10	< 10	< 10	< 10	< 10	< 10
Benzene	1	EQS	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	74	EQS	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	20	EQS	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	30	EQS	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PAHs																
Naphthalene	2	EQS	0.05	ug/l	3 of 6	1	0.12	4.9			< 0.05	**4.9**	< 0.05	0.42	0.12	< 0.05
Acenaphthylene			0.01	ug/l	2 of 6	0	0.02	0.09			< 0.01	0.09	< 0.01	0.02	< 0.01	< 0.01
Acenaphthene	2000	USEPA	0.01	ug/l	3 of 6	0	0.01	0.37			< 0.01	0.37	< 0.01	0.36	< 0.01	0.01
Fluorene			0.01	ug/l	3 of 6	0	0.01	0.27			0.01	0.27	< 0.01	0.15	< 0.01	< 0.01
Phenanthrene			0.01	ug/l	4 of 6	0	0.01	0.56			0.01	0.56	< 0.01	0.42	0.01	< 0.01
Anthracene	0.1	EQS	0.01	ug/l	2 of 6	0	0.07	0.08			< 0.01	0.08	< 0.01	0.07	< 0.01	< 0.01
Fluoranthene	0.0063	EQS	0.01	ug/l	2 of 6	2	0.09	0.1			**< 0.01**	**0.1**	**< 0.01**	**0.09**	**< 0.01**	**< 0.01**
Pyrene			0.01	ug/l	3 of 6	0	0.01	0.08			< 0.01	0.08	< 0.01	0.07	< 0.01	0.01
Benzo(a)anthracene			0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene			0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene			0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene			0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	0.00017	EQS	0.01	ug/l	0 of 6	0					**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**
Indeno(1,2,3-c,d)pyrene			0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene			0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene			0.01	ug/l	0 of 6	0					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total			0.2	ug/l	2 of 6	0	1.6	6.4			< 0.20	6.4	< 0.20	1.6	< 0.20	< 0.20
Phenols																
Phenols, Total			2	ug/l	0 of 6	0					< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
VOCs																
Dichlorodifluoromethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Chloromethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	0.5	DWS	1	ug/l	0 of 6	0					**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**
Bromomethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Chloroethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethylene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-dichloroethylene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Cis-1,2-dichloroethylene			1	ug/l	1 of 6	0	1	1			< 1	< 1	< 1	1	< 1	< 1
2,2-dichloropropane			2	ug/l	0 of 6	0					< 2	< 2	< 2	< 2	< 2	< 2
Bromochloromethane			4	ug/l	0 of 6	0					< 4	< 4	< 4	< 4	< 4	< 4

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GACs apply to CSM1 - Principal Aquifer and fresh water receptor

Shallow Groundwater concentration exceeds GAC	100
Limit of Detection Value exceeds GAC	<0.1

Contaminant Name	GAC	Source	LOD	Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	BH001	BH004	BH005	BH007	BH011	BH013
										Easting	384566.052	384554.516	384655.497	384765.207	384726.701	384368.382
										Northing	397646.557	397582.476	397554.645	397596.049	397513.893	397549.44
										Sample Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020	16/01/2020
										Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
Chloroform			1	ug/l	1 of 6	0	1	1			< 1	< 1	1	< 1	< 1	< 1
1,1,1-trichloroethane	100	EQS	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,1-dichloropropene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Carbon tetrachloride			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Benzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethane	3	EQS	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethylene			1	ug/l	1 of 6	0	1	1			< 1	< 1	< 1	1	< 1	< 1
1,2-dichloropropane	40	WHO	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Dibromomethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Bromodichloromethane	60	WHO	4	ug/l	0 of 6	0					< 4	< 4	< 4	< 4	< 4	< 4
cis-1,3-dichloropropene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Toluene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
trans-1,3-dichloropropene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,1,2-trichloroethane	400	EQS	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethylene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane	100	WHO	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,2-dibromoethane	0.4	WHO	1	ug/l	0 of 6	0					**< 1**	< 1	**< 1**	**< 1**	**< 1**	**< 1**
Chlorobenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,1,1,2-tetrachloroethane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Ethylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
m+p-Xylene			2	ug/l	0 of 6	0					< 2	< 2	< 2	< 2	< 2	< 2
o-Xylene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Styrene	50	EQS	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Bromoform	100	WHO	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Isopropylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,1,2,2-tetrachloroethane	400	USEPA	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Bromobenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,2,3-trichloropropane			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
n-propylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
2-chlorotoluene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,3,5-trimethylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
4-chlorotoluene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Tert-butylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-trimethylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
sec-butylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
p-isopropyltoluene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,3-dichlorobenzene	3000	USEPA	2	ug/l	0 of 6	0					< 2	< 2	< 2	< 2	< 2	< 2
1,4-dichlorobenzene	300	WHO	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
n-butylbenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,2-dichlorobenzene	1000	WHO	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,2-dibromo-3-chloropropane	1	WHO	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-trichlorobenzene	70	USEPA	1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
Hexachlorobutadiene	0.6	WHO	1	ug/l	0 of 6	0					**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**
1,2,3-trichlorobenzene			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
MTBE			1	ug/l	0 of 6	0					< 1	< 1	< 1	< 1	< 1	< 1
SVOCs																
Phenol	7.7	EQS	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aniline			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorophenol	50	EQS	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzyl Alcohol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Methylphenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-chloroisopropyl)ether			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
3&4-Methylphenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-chloroethoxy)methane			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	70	USEPA	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chloro-3-methylphenol	40	EQS	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Methylnaphthalene			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorocyclopentadiene	50	USEPA	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chloronaphthalene			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitroaniline			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dinitrotoluene	100	USEPA	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
3-Nitroaniline			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Nitrophenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibenzofuran			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,3,4,6-Tetrachlorophenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorophenylphenylether			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Nitroaniline			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diphenylamine			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Bromophenylphenylether			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobenzene	1	USEPA	1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-ethylhexyl)ester			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Pentachlorophenol	0.4	EQS	1	ug/l	0 of 6	0					**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**
Di-n-butylphthalate			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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GACs apply to CSM1 - Principal Aquifer and fresh water receptor

Shallow Groundwater concentration exceeds GAC	100
Limit of Detection Value exceeds GAC	<0.1

Contaminant Name	GAC	Source	LOD	Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	BH001	BH004	BH005	BH007	BH011	BH013
										Easting	384566.052	384554.516	384655.497	384765.207	384726.701	384368.382
										Northing	397646.557	397582.476	397554.645	397596.049	397513.893	397549.44
										Sample Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020	16/01/2020
										Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
Butylbenzylphthalate			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-ethylhexyl)phthalate			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dinitrobenzene			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dinitrobenzene			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,3,5,6-Tetrachlorophenol			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Azobenzene			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1-Methylnaphthalene			1	ug/l	0 of 6	0					< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Appendix E

Ground Gas Risk Assessment

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Water Depth (mbgl)	1.5	Water depth < top of piezometer (can be discounted)
Carbon Dioxide (%)	5.8	CO2 concentration >5% (extra consideration required)
Methane (%)	1.9	CH4 concentration >1% (extra consideration required)
GSV	0.006	Characteristic situation 1: GSV < 0.07
GSV	0.4	Characteristic situation 2: 0.07 > GSV < 0.7

Hole ID	Easting	Northing	Elevation (mOD)	Response zone top (mbgl)	Response zone base (mbgl)	Date	Geology	Gas Monitoring Round		Water Depth	Flow	Pressure	Carbon Dioxide Peak	Carbon Dioxide Steady	Methane Peak	Methane Steady	Carbon Monoxide	Hydrogen Sulphide	Methane Peak	Methane Steady	Oxygen Low Decline	Oxygen Steady	CO2 GSV	CH4 GSV
									Parameter	Water Depth	Flow	Pressure	Carbon Dioxide Peak	Carbon Dioxide Steady	Methane Peak	Methane Steady	Carbon Monoxide	Hydrogen Sulphide	Methane Peak	Methane Steady	Oxygen Low Decline	Oxygen Steady	CO2 GSV	CH4 GSV
									Units	mbgl	l/hr	mbar	% v/v	% v/v	% v/v	% v/v	ppm	ppm	% LEL	% LEL	%	%		
BH001	384566.1	397646.6	37.81	10	15.5	16/01/20	SS	1		9.50	0.0	997	0.2	0.2	<0.1	<0.1	<1.0	1	<2.0	<2.0	20.4	20.4	0	0
BH001	384566.1	397646.6	37.81	10	15.5	06/02/20	SS	2		9.73	0.0	1031	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.5	20.5	0	0
BH001	384566.1	397646.6	37.81	10	15.5	20/02/20	SS	3		9.75	0.0	1001	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.4	20.4	0	0
BH001	384566.1	397646.6	37.81	10	15.5	06/03/20	SS	4		9.80	0.0	1001	0.3	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.2	20.8	0	0
BH002	384655.3	397617.6	33.27	0.5	2.5	21/01/20	MG	1		Dry	0.0	1000	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.7	20.7	0	0
BH002	384655.3	397617.6	33.27	0.5	2.5	06/02/20	MG	2		Dry	0.0	1030	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.1	20.1	0	0
BH002	384655.3	397617.6	33.27	0.5	2.5	20/02/20	MG	3		Dry	0.0	1001	0.2	0.1	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.3	20.3	0	0
BH002	384655.3	397617.6	33.27	0.5	2.5	06/03/20	MG	4		Wet at Tip	0.0	1001	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.3	20.4	0	0
BH002	384655.3	397617.6	33.27	3.2	4	21/01/20	MG	1		Dry	0.0	1000	0.5	0.5	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.5	20.5	0	0
BH002	384655.3	397617.6	33.27	3.2	4	06/02/20	MG	2		Dry	0.0	1031	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.0	20.0	0	0
BH002	384655.3	397617.6	33.27	3.2	4	20/02/20	MG	3		Dry	0.0	1001	0.4	0.4	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.0	20.1	0	0
BH002	384655.3	397617.6	33.27	3.2	4	06/03/20	MG	4		Wet at Tip	0.0	1001	0.2	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.2	20.2	0	0
BH004	384554.5	397582.5	34.22	11	14	21/01/20	SS	1		6.06	0.0	1000	0.3	0.3	<0.1	<0.1	<1.0	1	<2.0	<2.0	20.4	20.4	0	0
BH004	384554.5	397582.5	34.22	11	14	06/02/20	SS	2		6.15	0.0	1030	0.2	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.3	20.3	0	0
BH004	384554.5	397582.5	34.22	11	14	20/02/20	SS	3		6.20	0.0	1001	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.6	20.6	0	0
BH004	384554.5	397582.5	34.22	11	14	06/03/20	SS	4		6.20	0.0	1001	0.2	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.5	20.5	0	0
BH004A	384553.6	397583.4	34.19	1	4	21/01/20	MG	1		Dry	0.0	999	1.3	1.3	<0.1	<0.1	<1.0	1	<2.0	<2.0	19.6	19.6	0	0
BH004A	384553.6	397583.4	34.19	1	4	06/02/20	MG	2		Dry	0.0	1029	0.4	0.4	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.1	20.1	0	0
BH004A	384553.6	397583.4	34.19	1	4	20/02/20	MG	3		Wet at Tip	0.0	1001	0.5	0.2	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.3	20.3	0	0
BH004A	384553.6	397583.4	34.19	1	4	06/03/20	MG	4		Wet at Tip	0.0	1001	0.6	0.4	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.4	20.5	0	0
BH005	384655.5	397554.6	33.42	18.5	21.5	21/01/20	SS	1		5.60	0.0	1000	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.4	20.4	0	0
BH005	384655.5	397554.6	33.42	18.5	21.5	06/02/20	SS	2		5.27	0.0	1030	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.4	20.4	0	0
BH005	384655.5	397554.6	33.42	18.5	21.5	20/02/20	SS	3		5.30	0.0	1001	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.1	20.1	0	0
BH005	384655.5	397554.6	33.42	18.5	21.5	06/03/20	SS	4		5.25	0.0	1001	0.3	0.2	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.2	20.3	0	0
BH007	384765.2	397596.0	34.68	10.6	13.6	21/01/20	SS	1		6.07	0.0	1000	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.6	20.6	0	0
BH007	384765.2	397596.0	34.68	10.6	13.6	06/02/20	SS	2		6.27	0.0	1030	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.6	20.6	0	0
BH007	384765.2	397596.0	34.68	10.6	13.6	20/02/20	SS	3		6.20	0.0	1001	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.3	20.3	0	0
BH007	384765.2	397596.0	34.68	10.6	13.6	06/03/20	SS	4		6.10	0.0	1001	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.3	20.4	0	0
BH008	384766.9	397570.4	34.05	0.3	6.5	21/01/20	MG	1		Wet at Tip	0.0	1000	0.5	0.5	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.2	20.2	0	0
BH008	384766.9	397570.4	34.05	0.3	6.5	06/02/20	MG	2		5.51	0.0	1030	0.4	0.4	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.1	20.1	0	0
BH008	384766.9	397570.4	34.05	0.3	6.5	20/02/20	MG	3		5.50	0.0	1001	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.4	20.4	0	0
BH008	384766.9	397570.4	34.05	0.3	6.5	06/03/20	MG	4		5.50	0.0	1001	0.1	<0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.5	20.5	0	0
BH009	384759.1	397550.4	34.20	0.5	1.7	21/01/20	MG	1		Dry	0.0	1000	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.6	20.6	0	0
BH009	384759.1	397550.4	34.20	0.5	1.7	06/02/20	MG	2		Dry	0.0	1030	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.7	20.7	0	0
BH009	384759.1	397550.4	34.20	0.5	1.7	20/02/20	MG	3		Dry	0.0	1001	0.1	<0.1	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.7	20.8	0	0
BH009	384759.1	397550.4	34.20	0.5	1.7	06/03/20	MG	4		Wet at Tip	0.0	1001	0.1	<0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.4	20.5	0	0
BH011	384726.7	397513.9	34.05	10	13	21/01/20	SS	1		7.40	0.0	1000	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.6	20.6	0	0
BH011	384726.7	397513.9	34.05	10	13	06/02/20	SS	2		5.65	0.0	1029	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.7	20.7	0	0
BH011	384726.7	397513.9	34.05	10	13	20/02/20	SS	3		5.70	0.0	1001	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.6	20.7	0	0
BH011	384726.7	397513.9	34.05	10	13	06/03/20	SS	4		5.60	0.0	1001	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.5	20.5	0	0
BH012A	384647.5	397660.4	38.27	2	6	21/01/20	MG	1		Wet at Tip	0.0	1000	0.6	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.5	20.6	0	0
BH012A	384647.5	397660.4	38.27	2	6	06/02/20	MG	2		5.98	0.0	1029	0.3	0.2	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.5	20.5	0	0
BH012A	384647.5	397660.4	38.27	2	6	20/02/20	MG	3		Wet at Tip	0.0	1001	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.2	20.2	0	0
BH012A	384647.5	397660.4	38.27	2	6	06/03/20	MG	4		Wet at Tip	0.0	1001	0.4	0.2	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.2	20.3	0	0
BH013	384368.4	397549.4	33.08	11	16.5	15/01/20	SS	1		5.30	0.2	999	0.5	0.5	<0.1	<0.1	<1.0	1	<2.0	<2.0	20.3	20.3	0.001	0.0002
BH013	384368.4	397549.4	33.08	11	16.5	06/02/20	SS	2		5.40	0.1	1029	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.3	20.3	0.0003	0.0001
BH013	384368.4	397549.4	33.08	11	16.5	20/02/20	SS	3		5.40	0.0	1001	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.6	20.6	0	0
BH013	384368.4	397549.4	33.08	11	16.5	06/03/20	SS	4		5.30	0.0	1001	0.1	0.1	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.6	20.6	0	0
DS001	384775.0	397520.1	34.22	2	4	21/01/20	MG	1		Wet at Tip	0.0	1000	0.4	0.4	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.2	20.2	0	0

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Water Depth (mbgl)	1.5	Water depth < top of piezometer (can be discounted)
Carbon Dioxide (%)	5.8	CO2 concentration >5% (extra consideration required)
Methane (%)	1.9	CH4 concentration >1% (extra consideration required)
GSV	0.006	Characteristic situation 1: GSV < 0.07
GSV	0.4	Characteristic situation 2: 0.07 > GSV < 0.7

Hole ID	Easting	Northing	Elevation (mOD)	Response zone top (mbgl)	Response zone base (mbgl)	Date	Geology	Gas Monitoring Round	Parameter / Units	Water Depth mbgl	Flow l/hr	Pressure mbar	Carbon Dioxide Peak % v/v	Carbon Dioxide Steady % v/v	Methane Peak % v/v	Methane Steady % v/v	Carbon Monoxide ppm	Hydrogen Sulphide ppm	Methane Peak % LEL	Methane Steady % LEL	Oxygen Low Decline %	Oxygen Steady %	CO2 GSV	CH4 GSV
DS001	384775.0	397520.1	34.22	2	4	06/02/20	MG	2		3.17	0.0	1029	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.4	20.4	0	0
DS001	384775.0	397520.1	34.22	2	4	20/02/20	MG	3		3.05	0.0	1001	0.4	0.4	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.5	20.4	0	0
DS001	384775.0	397520.1	34.22	2	4	06/03/20	MG	4		3.00	0.0	1001	0.2	0.2	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.2	20.2	0	0
DS002	384753.5	397492.0	34.09	8.15	9.9	21/01/20	SS	1		9.70	0.0	1000	0.6	0.6	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.1	20.1	0	0
DS002	384753.5	397492.0	34.09	8.15	9.9	06/02/20	SS	2		5.51	0.0	1029	0.5	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.1	20.1	0	0
DS002	384753.5	397492.0	34.09	8.15	9.9	20/02/20	SS	3		5.45	0.0	1001	0.4	0.4	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	20.2	20.2	0	0
DS002	384753.5	397492.0	34.09	8.15	9.9	06/03/20	SS	4		5.40	0.0	1001	0.3	0.3	<0.1	<0.1	<1.0	<1.0	<2.0	<2.0	20.4	20.4	0	0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 131.111.154.246.72

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Appendix F

Chemically Aggressive Ground Assessment

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					Borehole ID	BH001	BH001	BH001	BH001	BH002	BH003	BH003	BH004	BH004	BH004	BH005	BH006A	BH007
					East	384566.05	384566.05	384566.05	384566.05	384655.29	384633.94	384633.94	384554.52	384554.52	384554.52	384655.5	384728.89	384765.21
					North	397646.56	397646.56	397646.56	397646.56	397617.59	397602.66	397602.66	397582.48	397582.48	397582.48	397554.65	397614.04	397596.05
					Sample Depth (mbgl)	1.65	5.5	8-9.50	12.5	1.2	1.2	4.7	9.5-11	6	0.8	0.5	0.5	7.5-8.1
					Date	27/11/19	27/11/19	29/10/19	29/10/19	27/11/19	27/11/19	27/11/19	16/11/19	02/11/19	21/11/19	16/11/19	17/11/19	17/11/19
Contaminant	**LOD**	**Units**	**Min**	**Max**	**Geology**	MG	SS	SS	SS	MG	MG	SS	SS	MG	MG	MG	MG	SS
pH	-	pH	7.6	11.4		9.4	8.9	8.9	8.3	10.3	9.3	10.2	8.2	10	8.3	8.4	10.7	8.1
Sulphate as SO4	10	mg/l	14	1100		430	22	18	16	340	210	160	59	1100	80	89	710	14

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					Borehole ID	BH007	BH007	BH007	BH008	BH008	BH009	BH011	BH011	BH011	BH012A	BH012A	BH013	BH013
					East	384765.21	384765.21	384765.21	384766.9	384766.9	384759.09	384726.7	384726.7	384726.7	384647.48	384647.48	384368.38	384368.38
					North	397596.05	397596.05	397596.05	397570.4	397570.4	397550.39	397513.89	397513.89	397513.89	397660.41	397660.41	397549.44	397549.44
					Sample Depth (mbgl)	4.5	1.2	7.2	2.1	5.5	0.8	7.5-8.5	1.2	5.5	1.7	10	1.5	8
					Date	09/11/19	08/11/19	09/11/19	10/11/19	10/11/19	09/11/19	23/11/19	09/11/19	09/11/19	27/11/19	27/10/19	27/11/19	27/11/19
Contaminant	**LOD**	**Units**	**Min**	**Max**	**Geology**	MG	MG	SS	MG	MG	MG	SS	MG	SS	MG	MG	MG	SS
pH	-	pH	7.6	11.4		10.2	10.6	8.3	11.4	7.8	10.7	7.6	11.2	8.4	8.3	8.1	8.4	8.4
Sulphate as SO4	10	mg/l	14	1100		630	120	39	120	200	410	51	120	68	62	61	120	31

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					Borehole ID	BH013	BH014	TP001	TP002
					East	384368.38	384495.59	384615.42	384628.47
					North	397549.44	397565.3	397543.9	397622.87
					Sample Depth (mbgl)	10.5-12	0.7	0.8	1.5
					Date	30/10/19	27/11/19	27/11/19	27/11/19
Contaminant	**LOD**	**Units**	**Min**	**Max**	**Geology**	SS	MG	MG	MG
pH	-	pH	7.6	11.4		8.4	9.5	8	9.3
Sulphate as SO4	10	mg/l	14	1100		21	42	16	40

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Appendix G

HazWasteOnline Waste Assessment

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

ARUP

HazWasteOnline™

Waste Classification Report

T4BCC-MR4SU-PW7SE

Job name

ID Manchester

Description/Comments

Asbestos was not included in this assessment.

Project

ID Manchester

Site

University of Manchester

Related Documents

#	Name	Description
None		

Waste Stream Template

ID Manchester

Classified by

Name:
Mark Griffiths
Date:
15 Jan 2020 11:36 GMT
Telephone:
0161 228 2331

Company:
Ove Arup & Partners International
8th Floor, St James's Buildings
Oxford Street
Manchester
M1 6EL

Report

Created by: Mark Griffiths
Created date: 15 Jan 2020 11:36 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	ARP-BH001	1	Non Hazardous		3
2	ARP-BH001[2]	3	Non Hazardous		5
3	ARP-BH002	1	Non Hazardous		7
4	ARP-BH002[2]	2.5	Non Hazardous		9
5	ARP-BH003	1	Non Hazardous		11
6	ARP-BH003[2]	3.5	Non Hazardous		13
7	ARP-BH004	2.3	Non Hazardous		15
8	ARP-BH004[2]	5.3	Non Hazardous		17
9	ARP-BH005	1	Non Hazardous		19
10	ARP-BH006	1.2	Non Hazardous		21
11	ARP-BH006A	1	Non Hazardous		23
12	ARP-BH006B	0.6	Non Hazardous		25

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#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
13	ARP-BH007	1	Non Hazardous		27
14	ARP-BH007[2]	3.3	Non Hazardous		29
15	ARP-BH008	5.2	Non Hazardous		31
16	ARP-BH008[2]	2.2	Non Hazardous		33
17	ARP-BH009	2.6	Non Hazardous		35
18	ARP-BH011	3.6	Non Hazardous		37
19	ARP-BH011[2]	1	Non Hazardous		39
20	ARP-BH012A	7.5	Non Hazardous		41
21	ARP-BH012A[2]	2.6	Non Hazardous		43
22	ARP-BH013	1	Non Hazardous		45
23	ARP-BH013[2]	3.5	Non Hazardous		47
24	ARP-BH014	0.7	Non Hazardous		49
25	ARP-BH014[2]	4	Non Hazardous		51
26	ARP-DS001	0.6	Non Hazardous		53
27	ARP-DS002	0.8	Non Hazardous		55
28	ARP-TP001	0.8	Non Hazardous		57
29	ARP-TP002	1	Non Hazardous		59
30	ARP-TP002[2]	2.5	Non Hazardous		61
31	CE-2015-CC/WS2	0.68	Non Hazardous		63
32	CE-2015-CC/WS3	0.56	Non Hazardous		65
33	GEO-2015-CRH01	0.2	Non Hazardous		67
34	GEO-2015-CRH01[2]	0.5	Non Hazardous		69
35	GEO-2015-CRH01[3]	2	Non Hazardous		71
36	GEO-2015-CRH01[4]	1	Non Hazardous		73
37	GEO-2015-CRH01B	1	Non Hazardous		75
38	GEO-2015-CRH01B[2]	2	Non Hazardous		77
39	GEO-2015-CRH03	3	Non Hazardous		79
40	GEO-2015-TP01	0.3	Non Hazardous		81
41	GEO-2015-TP02	0.5	Non Hazardous		83
42	GEO-2015-TP03	0.7	Non Hazardous		85
43	GEO-2015-TP04	0.2	Non Hazardous		87
44	GEO-2015-TP05	2	Non Hazardous		89
45	GEO-2015-TP05[2]	1.4	Non Hazardous		91
46	GEO-2015-TP06	0.3	Non Hazardous		93
47	GEO-2015-TP07	1.8	Non Hazardous		95
48	GEO-2015-TP08	0.8	Non Hazardous		97
49	GEO-2015-WLS01	1	Non Hazardous		99
50	GEO-2015-WLS02	2	Non Hazardous		101
51	GEO-2015-WLS02[2]	1	Non Hazardous		103
52	GEO-2015-WLS03	3.5	Non Hazardous		105
53	GEO-2015-WLS03[2]	2.5	Non Hazardous		107

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Classification of sample: ARP-BH001

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH001
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3	anthracene		204-371-1	120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	1.5 mg/kg		1.5 mg/kg	0.00015 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	9.1 mg/kg		9.1 mg/kg	0.00091 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.9 mg/kg	2.775	2.498 mg/kg	0.00025 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.3 mg/kg		0.3 mg/kg	0.00003 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
			215-160-9	1308-38-9									
14		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				38	mg/kg	1.252	47.568	mg/kg	0.00476 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	39	mg/kg		39	mg/kg	0.0039 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				<0.05	mg/kg	1.16	<0.058	mg/kg	<0.0000058 %		<LOD
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				30	mg/kg	1.545	46.356	mg/kg	0.00464 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			201-581-5	85-01-8									
26		pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				29	mg/kg	1.785	51.77	mg/kg	0.00518 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				60	mg/kg	1.245	74.683	mg/kg	0.00747 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0308 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH001[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH001[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
3 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	1.4 mg/kg		1.4 mg/kg	0.00014 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	10 mg/kg		10 mg/kg	0.001 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.7 mg/kg	2.775	1.943 mg/kg	0.000194 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.2 mg/kg		0.2 mg/kg	0.00002 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
			215-160-9	1308-38-9									
14		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				35	mg/kg	1.252	43.812	mg/kg	0.00438 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.1	mg/kg	1.884	0.188	mg/kg	0.0000188 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	200	mg/kg		200	mg/kg	0.02 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.16	mg/kg	1.16	0.186	mg/kg	0.0000186 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				18	mg/kg	1.545	27.813	mg/kg	0.00278 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			201-581-5	85-01-8									
26		pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				25	mg/kg	1.785	44.63	mg/kg	0.00446 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				43	mg/kg	1.245	53.523	mg/kg	0.00535 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.041 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH002

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH002
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.12 mg/kg		0.12 mg/kg	0.000012 %		
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3	anthracene		204-371-1	120-12-7		0.17 mg/kg		0.17 mg/kg	0.000017 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	1.9 mg/kg		1.9 mg/kg	0.00019 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	7.7 mg/kg		7.7 mg/kg	0.00077 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.14 mg/kg		0.14 mg/kg	0.000014 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.35 mg/kg		0.35 mg/kg	0.000035 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.21 mg/kg		0.21 mg/kg	0.000021 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.41 mg/kg		0.41 mg/kg	0.000041 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.14 mg/kg		0.14 mg/kg	0.000014 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.6 mg/kg	2.775	1.665 mg/kg	0.000167 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				14	mg/kg	1.462	20.462	mg/kg	0.00205 %		
			215-160-9	1308-38-9									
14		chrysene				0.51	mg/kg		0.51	mg/kg	0.000051 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				24	mg/kg	1.252	30.043	mg/kg	0.003 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
			205-912-4	206-44-0									
19		fluorene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.13	mg/kg		0.13	mg/kg	0.000013 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	110	mg/kg		110	mg/kg	0.011 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.05	mg/kg	1.16	0.058	mg/kg	0.0000058 %		
			215-696-3	1344-48-5									
23		naphthalene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				15	mg/kg	1.545	23.178	mg/kg	0.00232 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.84	mg/kg		0.84	mg/kg	0.000084 %		
			201-581-5	85-01-8									
26		pyrene				1.3	mg/kg		1.3	mg/kg	0.00013 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				21	mg/kg	1.785	37.489	mg/kg	0.00375 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				43	mg/kg	1.245	53.523	mg/kg	0.00535 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0293 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH002[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH002[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
2.5 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	5.8 mg/kg		5.8 mg/kg	0.00058 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	21 mg/kg		21 mg/kg	0.0021 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.1 mg/kg	2.775	3.053 mg/kg	0.000305 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4 mg/kg		0.4 mg/kg	0.00004 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
13		chromium { chromium(III) oxide }		215-160-9	1308-38-9		210	mg/kg	1.462	306.927	mg/kg	0.0307 %		
14		chrysene	601-048-00-0	205-923-4	218-01-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
15		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		77	mg/kg	1.252	96.387	mg/kg	0.00964 %		
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1	mg/kg	1.884	1.884	mg/kg	0.000188 %		
17		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
18		fluoranthene		205-912-4	206-44-0		0.09	mg/kg		0.09	mg/kg	0.000009 %		
19		fluorene		201-695-5	86-73-7		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
20		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	150	mg/kg		150	mg/kg	0.015 %		
22		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		0.23	mg/kg	1.16	0.267	mg/kg	0.0000267 %		
23		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
24		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		30	mg/kg	1.545	46.356	mg/kg	0.00464 %		
25		phenanthrene		201-581-5	85-01-8		0.08	mg/kg		0.08	mg/kg	0.000008 %		
26		pyrene		204-927-3	129-00-0		0.08	mg/kg		0.08	mg/kg	0.000008 %		
27		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		1.3	mg/kg		1.3	mg/kg	0.00013 %		
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		32	mg/kg	1.785	57.126	mg/kg	0.00571 %		
29		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		100	mg/kg	1.245	124.471	mg/kg	0.0124 %		
											Total:	0.0816 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH003

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH003
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.08 mg/kg		0.08 mg/kg	0.000008 %		
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		0.17 mg/kg		0.17 mg/kg	0.000017 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	1.4 mg/kg		1.4 mg/kg	0.00014 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	10 mg/kg		10 mg/kg	0.001 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.6 mg/kg		0.6 mg/kg	0.00006 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.57 mg/kg		0.57 mg/kg	0.000057 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.1 mg/kg		1.1 mg/kg	0.00011 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.1 mg/kg		1.1 mg/kg	0.00011 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.4 mg/kg		0.4 mg/kg	0.00004 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.3 mg/kg	2.775	0.833 mg/kg	0.0000833 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.2 mg/kg		0.2 mg/kg	0.00002 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				10	mg/kg	1.462	14.616	mg/kg	0.00146 %		
			215-160-9	1308-38-9									
14		chrysene				0.74	mg/kg		0.74	mg/kg	0.000074 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				180	mg/kg	1.252	225.32	mg/kg	0.0225 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.2	mg/kg	1.884	0.377	mg/kg	0.0000377 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				0.11	mg/kg		0.11	mg/kg	0.000011 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				1.9	mg/kg		1.9	mg/kg	0.00019 %		
			205-912-4	206-44-0									
19		fluorene				0.08	mg/kg		0.08	mg/kg	0.000008 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.53	mg/kg		0.53	mg/kg	0.000053 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	88	mg/kg		88	mg/kg	0.0088 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				1.6	mg/kg	1.16	1.856	mg/kg	0.000186 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				9.5	mg/kg	1.545	14.679	mg/kg	0.00147 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.67	mg/kg		0.67	mg/kg	0.000067 %		
			201-581-5	85-01-8									
26		pyrene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
			204-927-3	129-00-0									
27		selenium { selenium }				0.9	mg/kg		0.9	mg/kg	0.00009 %		
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				16	mg/kg	1.785	28.563	mg/kg	0.00286 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				74	mg/kg	1.245	92.109	mg/kg	0.00921 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0488 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH003[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH003[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
3.5 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		2.4 mg/kg		2.4 mg/kg	0.00024 %		
2	acenaphthylene		205-917-1	208-96-8		0.09 mg/kg		0.09 mg/kg	0.000009 %		
3	anthracene		204-371-1	120-12-7		3.2 mg/kg		3.2 mg/kg	0.00032 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	1.1 mg/kg		1.1 mg/kg	0.00011 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	8.2 mg/kg		8.2 mg/kg	0.00082 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.81 mg/kg		0.81 mg/kg	0.000081 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		2.7 mg/kg		2.7 mg/kg	0.00027 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.8 mg/kg		1.8 mg/kg	0.00018 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		2.4 mg/kg		2.4 mg/kg	0.00024 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.77 mg/kg		0.77 mg/kg	0.000077 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.3 mg/kg	2.775	0.833 mg/kg	0.0000833 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				11	mg/kg	1.462	16.077	mg/kg	0.00161 %		
			215-160-9	1308-38-9									
14		chrysene				2.9	mg/kg		2.9	mg/kg	0.00029 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				110	mg/kg	1.252	137.695	mg/kg	0.0138 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.3	mg/kg	1.884	0.565	mg/kg	0.0000565 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				0.17	mg/kg		0.17	mg/kg	0.000017 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				9.5	mg/kg		9.5	mg/kg	0.00095 %		
			205-912-4	206-44-0									
19		fluorene				2.5	mg/kg		2.5	mg/kg	0.00025 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.71	mg/kg		0.71	mg/kg	0.000071 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	59	mg/kg		59	mg/kg	0.0059 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.06	mg/kg	1.16	0.0696	mg/kg	0.00000696 %		
			215-696-3	1344-48-5									
23		naphthalene				3.7	mg/kg		3.7	mg/kg	0.00037 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				8.7	mg/kg	1.545	13.443	mg/kg	0.00134 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				12	mg/kg		12	mg/kg	0.0012 %		
			201-581-5	85-01-8									
26		pyrene				8.8	mg/kg		8.8	mg/kg	0.00088 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				18	mg/kg	1.785	32.133	mg/kg	0.00321 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				31	mg/kg	1.245	38.586	mg/kg	0.00386 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0363 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH004

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH004
Sample Depth:
2.3 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		1.2 mg/kg		1.2 mg/kg	0.00012 %		
2		acenaphthylene 205-917-1 / 208-96-8		0.1 mg/kg		0.1 mg/kg	0.00001 %		
3		anthracene 204-371-1 / 120-12-7		1.4 mg/kg		1.4 mg/kg	0.00014 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	2.4 mg/kg		2.4 mg/kg	0.00024 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	9.4 mg/kg		9.4 mg/kg	0.00094 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		1.2 mg/kg		1.2 mg/kg	0.00012 %		
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		3.5 mg/kg		3.5 mg/kg	0.00035 %		
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		2.4 mg/kg		2.4 mg/kg	0.00024 %		
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		3.6 mg/kg		3.6 mg/kg	0.00036 %		
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		1.4 mg/kg		1.4 mg/kg	0.00014 %		
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		0.5 mg/kg	2.775	1.388 mg/kg	0.000139 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	1.2 mg/kg		1.2 mg/kg	0.00012 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				12	mg/kg	1.462	17.539	mg/kg	0.00175 %		
			215-160-9	1308-38-9									
14		chrysene				3.7	mg/kg		3.7	mg/kg	0.00037 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				120	mg/kg	1.252	150.213	mg/kg	0.015 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.4	mg/kg	1.884	0.754	mg/kg	0.0000754 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				0.25	mg/kg		0.25	mg/kg	0.000025 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				9.8	mg/kg		9.8	mg/kg	0.00098 %		
			205-912-4	206-44-0									
19		fluorene				1	mg/kg		1	mg/kg	0.0001 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				1	mg/kg		1	mg/kg	0.0001 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	400	mg/kg		400	mg/kg	0.04 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.43	mg/kg	1.16	0.499	mg/kg	0.0000499 %		
			215-696-3	1344-48-5									
23		naphthalene				0.61	mg/kg		0.61	mg/kg	0.000061 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				9.8	mg/kg	1.545	15.143	mg/kg	0.00151 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				8.5	mg/kg		8.5	mg/kg	0.00085 %		
			201-581-5	85-01-8									
26		pyrene				9.8	mg/kg		9.8	mg/kg	0.00098 %		
			204-927-3	129-00-0									
27		selenium { selenium }				1.1	mg/kg		1.1	mg/kg	0.00011 %		
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				23	mg/kg	1.785	41.059	mg/kg	0.00411 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				310	mg/kg	1.245	385.861	mg/kg	0.0386 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.108 %		

Key

	User supplied data
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH004[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH004[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
5.3 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	2 mg/kg		2 mg/kg	0.0002 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	13 mg/kg		13 mg/kg	0.0013 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.04 mg/kg		0.04 mg/kg	0.000004 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.09 mg/kg		0.09 mg/kg	0.000009 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.2 mg/kg		0.2 mg/kg	0.00002 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.11 mg/kg		0.11 mg/kg	0.000011 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.5 mg/kg	2.775	1.388 mg/kg	0.000139 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.5 mg/kg		0.5 mg/kg	0.00005 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
			215-160-9	1308-38-9									
14		chrysene				0.13	mg/kg		0.13	mg/kg	0.000013 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				46	mg/kg	1.252	57.582	mg/kg	0.00576 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				9	mg/kg	1.884	16.956	mg/kg	0.0017 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.3	mg/kg		0.3	mg/kg	0.00003 %		
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	98	mg/kg		98	mg/kg	0.0098 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				<0.05	mg/kg	1.16	<0.058	mg/kg	<0.0000058 %		<LOD
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				13	mg/kg	1.545	20.087	mg/kg	0.00201 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.21	mg/kg		0.21	mg/kg	0.000021 %		
			201-581-5	85-01-8									
26		pyrene				0.25	mg/kg		0.25	mg/kg	0.000025 %		
			204-927-3	129-00-0									
27		selenium { selenium }				0.7	mg/kg		0.7	mg/kg	0.00007 %		
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				18	mg/kg	1.785	32.133	mg/kg	0.00321 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				91	mg/kg	1.245	113.269	mg/kg	0.0113 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0387 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH005

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH005
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3		anthracene		204-371-1	120-12-7		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	3	mg/kg		3	mg/kg	0.0003 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	35	mg/kg		35	mg/kg	0.0035 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.05	mg/kg		0.05	mg/kg	0.000005 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.04	mg/kg		0.04	mg/kg	0.000004 %		
10		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
11		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.2	mg/kg		0.2	mg/kg	0.00002 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				25	mg/kg	1.462	36.539	mg/kg	0.00365 %		
			215-160-9	1308-38-9									
14		chrysene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				130	mg/kg	1.252	162.731	mg/kg	0.0163 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.1	mg/kg	1.884	0.188	mg/kg	0.0000188 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		dibenzofuran				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-071-3	132-64-9									
19		fluoranthene				0.12	mg/kg		0.12	mg/kg	0.000012 %		
			205-912-4	206-44-0									
20		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	110	mg/kg		110	mg/kg	0.011 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				0.13	mg/kg	1.16	0.151	mg/kg	0.0000151 %		
			215-696-3	1344-48-5									
24		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				31	mg/kg	1.545	47.901	mg/kg	0.00479 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				0.11	mg/kg		0.11	mg/kg	0.000011 %		
			201-581-5	85-01-8									
27		pyrene				0.12	mg/kg		0.12	mg/kg	0.000012 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				35	mg/kg	1.785	62.481	mg/kg	0.00625 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				96	mg/kg	1.245	119.493	mg/kg	0.0119 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0582 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH006

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH006
Sample Depth:
1.2 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
2		acenaphthylene 205-917-1 / 208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3		anthracene 204-371-1 / 120-12-7		0.08 mg/kg		0.08 mg/kg	0.000008 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	3.2 mg/kg		3.2 mg/kg	0.00032 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	20 mg/kg		20 mg/kg	0.002 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		0.13 mg/kg		0.13 mg/kg	0.000013 %		
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		0.24 mg/kg		0.24 mg/kg	0.000024 %		
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		0.18 mg/kg		0.18 mg/kg	0.000018 %		
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		0.5 mg/kg		0.5 mg/kg	0.00005 %		
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		0.29 mg/kg		0.29 mg/kg	0.000029 %		
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		1.3 mg/kg	2.775	3.608 mg/kg	0.000361 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	0.7 mg/kg		0.7 mg/kg	0.00007 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				21	mg/kg	1.462	30.693	mg/kg	0.00307 %		
			215-160-9	1308-38-9									
14		chrysene				0.3	mg/kg		0.3	mg/kg	0.00003 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				100	mg/kg	1.252	125.178	mg/kg	0.0125 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				1	mg/kg	1.884	1.884	mg/kg	0.000188 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.72	mg/kg		0.72	mg/kg	0.000072 %		
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.12	mg/kg		0.12	mg/kg	0.000012 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	270	mg/kg		270	mg/kg	0.027 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.48	mg/kg	1.16	0.557	mg/kg	0.0000557 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				28	mg/kg	1.545	43.265	mg/kg	0.00433 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.29	mg/kg		0.29	mg/kg	0.000029 %		
			201-581-5	85-01-8									
26		pyrene				0.74	mg/kg		0.74	mg/kg	0.000074 %		
			204-927-3	129-00-0									
27		selenium { selenium }				1.5	mg/kg		1.5	mg/kg	0.00015 %		
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				39	mg/kg	1.785	69.622	mg/kg	0.00696 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				180	mg/kg	1.245	224.049	mg/kg	0.0224 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0798 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH006A

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH006A
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.21 mg/kg		0.21 mg/kg	0.000021 %		
2	acenaphthylene		205-917-1	208-96-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
3	anthracene		204-371-1	120-12-7		0.33 mg/kg		0.33 mg/kg	0.000033 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	9.1 mg/kg		9.1 mg/kg	0.00091 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	25 mg/kg		25 mg/kg	0.0025 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.14 mg/kg		0.14 mg/kg	0.000014 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.38 mg/kg		0.38 mg/kg	0.000038 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.32 mg/kg		0.32 mg/kg	0.000032 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.42 mg/kg		0.42 mg/kg	0.000042 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.16 mg/kg		0.16 mg/kg	0.000016 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.8 mg/kg	2.775	2.22 mg/kg	0.000222 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.8 mg/kg		0.8 mg/kg	0.00008 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
			215-160-9	1308-38-9									
14		chrysene				0.48	mg/kg		0.48	mg/kg	0.000048 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				76	mg/kg	1.252	95.135	mg/kg	0.00951 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				11	mg/kg	1.884	20.724	mg/kg	0.00207 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		dibenzofuran				0.2	mg/kg		0.2	mg/kg	0.00002 %		
			205-071-3	132-64-9									
19		fluoranthene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
			205-912-4	206-44-0									
20		fluorene				0.13	mg/kg		0.13	mg/kg	0.000013 %		
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				0.13	mg/kg		0.13	mg/kg	0.000013 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	180	mg/kg		180	mg/kg	0.018 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				0.39	mg/kg	1.16	0.452	mg/kg	0.0000452 %		
			215-696-3	1344-48-5									
24		naphthalene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				19	mg/kg	1.545	29.359	mg/kg	0.00294 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				1	mg/kg		1	mg/kg	0.0001 %		
			201-581-5	85-01-8									
27		pyrene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				27	mg/kg	1.785	48.2	mg/kg	0.00482 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				130	mg/kg	1.245	161.813	mg/kg	0.0162 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0605 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH006B

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH006B	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.6 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.05	mg/kg		0.05	mg/kg	0.000005 %		
2	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		0.1	mg/kg		0.1	mg/kg	0.00001 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	7.8	mg/kg		7.8	mg/kg	0.00078 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.11	mg/kg		0.11	mg/kg	0.000011 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.27	mg/kg		0.27	mg/kg	0.000027 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.21	mg/kg		0.21	mg/kg	0.000021 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.24	mg/kg		0.24	mg/kg	0.000024 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.1	mg/kg		0.1	mg/kg	0.00001 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.2	mg/kg	2.775	0.555	mg/kg	0.0000555 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.8	mg/kg		0.8	mg/kg	0.00008 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				8.2	mg/kg	1.462	11.985	mg/kg	0.0012 %		
			215-160-9	1308-38-9									
14		chrysene				0.32	mg/kg		0.32	mg/kg	0.000032 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				22	mg/kg	1.252	27.539	mg/kg	0.00275 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.5	mg/kg	1.884	0.942	mg/kg	0.0000942 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		dibenzofuran				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-071-3	132-64-9									
19		fluoranthene				0.81	mg/kg		0.81	mg/kg	0.000081 %		
			205-912-4	206-44-0									
20		fluorene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				0.1	mg/kg		0.1	mg/kg	0.00001 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	30	mg/kg		30	mg/kg	0.003 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				0.05	mg/kg	1.16	0.058	mg/kg	0.0000058 %		
			215-696-3	1344-48-5									
24		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				6.1	mg/kg	1.545	9.426	mg/kg	0.000943 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				0.54	mg/kg		0.54	mg/kg	0.000054 %		
			201-581-5	85-01-8									
27		pyrene				0.82	mg/kg		0.82	mg/kg	0.000082 %		
			204-927-3	129-00-0									
28		selenium { selenium }				0.5	mg/kg		0.5	mg/kg	0.00005 %		
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				11	mg/kg	1.785	19.637	mg/kg	0.00196 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				35	mg/kg	1.245	43.565	mg/kg	0.00436 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0158 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH007

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH007
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.53 mg/kg		0.53 mg/kg	0.000053 %		
2	acenaphthylene		205-917-1	208-96-8		1.1 mg/kg		1.1 mg/kg	0.00011 %		
3	anthracene		204-371-1	120-12-7		1.4 mg/kg		1.4 mg/kg	0.00014 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	7.7 mg/kg		7.7 mg/kg	0.00077 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		7.3 mg/kg		7.3 mg/kg	0.00073 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		11 mg/kg		11 mg/kg	0.0011 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		12 mg/kg		12 mg/kg	0.0012 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		12 mg/kg		12 mg/kg	0.0012 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		6.9 mg/kg		6.9 mg/kg	0.00069 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.3 mg/kg	2.775	0.833 mg/kg	0.0000833 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4 mg/kg		0.4 mg/kg	0.00004 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				11	mg/kg	1.462	16.077	mg/kg	0.00161 %		
			215-160-9	1308-38-9									
14		chrysene				9.3	mg/kg		9.3	mg/kg	0.00093 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				24	mg/kg	1.252	30.043	mg/kg	0.003 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.4	mg/kg	1.884	0.754	mg/kg	0.0000754 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				1	mg/kg		1	mg/kg	0.0001 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				20	mg/kg		20	mg/kg	0.002 %		
			205-912-4	206-44-0									
19		fluorene				0.38	mg/kg		0.38	mg/kg	0.000038 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				5	mg/kg		5	mg/kg	0.0005 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	100	mg/kg		100	mg/kg	0.01 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.07	mg/kg	1.16	0.0812	mg/kg	0.00000812 %		
			215-696-3	1344-48-5									
23		naphthalene				0.53	mg/kg		0.53	mg/kg	0.000053 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				7.9	mg/kg	1.545	12.207	mg/kg	0.00122 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				5.6	mg/kg		5.6	mg/kg	0.00056 %		
			201-581-5	85-01-8									
26		pyrene				21	mg/kg		21	mg/kg	0.0021 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				14	mg/kg	1.785	24.993	mg/kg	0.0025 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				36	mg/kg	1.245	44.81	mg/kg	0.00448 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0354 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH007[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH007[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
3.3 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		0.23	mg/kg		0.23	mg/kg	0.000023 %		
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3		anthracene		204-371-1	120-12-7		0.37	mg/kg		0.37	mg/kg	0.000037 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	2.2	mg/kg		2.2	mg/kg	0.00022 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	18	mg/kg		18	mg/kg	0.0018 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.14	mg/kg		0.14	mg/kg	0.000014 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.56	mg/kg		0.56	mg/kg	0.000056 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.43	mg/kg		0.43	mg/kg	0.000043 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.46	mg/kg		0.46	mg/kg	0.000046 %		
10		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.2	mg/kg		0.2	mg/kg	0.00002 %		
11		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.6	mg/kg	2.775	1.665	mg/kg	0.000167 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4	mg/kg		0.4	mg/kg	0.00004 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
			215-160-9	1308-38-9									
14		chrysene				0.43	mg/kg		0.43	mg/kg	0.000043 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				56	mg/kg	1.252	70.099	mg/kg	0.00701 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.3	mg/kg	1.884	0.565	mg/kg	0.0000565 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
			205-912-4	206-44-0									
19		fluorene				0.14	mg/kg		0.14	mg/kg	0.000014 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.12	mg/kg		0.12	mg/kg	0.000012 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	140	mg/kg		140	mg/kg	0.014 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.2	mg/kg	1.16	0.232	mg/kg	0.0000232 %		
			215-696-3	1344-48-5									
23		naphthalene				0.25	mg/kg		0.25	mg/kg	0.000025 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				16	mg/kg	1.545	24.723	mg/kg	0.00247 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				1.4	mg/kg		1.4	mg/kg	0.00014 %		
			201-581-5	85-01-8									
26		pyrene				1.4	mg/kg		1.4	mg/kg	0.00014 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				17	mg/kg	1.785	30.348	mg/kg	0.00303 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				86	mg/kg	1.245	107.045	mg/kg	0.0107 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0433 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH008

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH008
Sample Depth:
5.2 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		4.6 mg/kg		4.6 mg/kg	0.00046 %		
2	acenaphthylene		205-917-1	208-96-8		0.16 mg/kg		0.16 mg/kg	0.000016 %		
3	anthracene		204-371-1	120-12-7		6.3 mg/kg		6.3 mg/kg	0.00063 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	3.9 mg/kg		3.9 mg/kg	0.00039 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	28 mg/kg		28 mg/kg	0.0028 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		2.7 mg/kg		2.7 mg/kg	0.00027 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		8.6 mg/kg		8.6 mg/kg	0.00086 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		6.3 mg/kg		6.3 mg/kg	0.00063 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		6.7 mg/kg		6.7 mg/kg	0.00067 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		2.8 mg/kg		2.8 mg/kg	0.00028 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.9 mg/kg	2.775	2.498 mg/kg	0.00025 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.5 mg/kg		0.5 mg/kg	0.00005 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				29	mg/kg	1.462	42.385	mg/kg	0.00424 %		
			215-160-9	1308-38-9									
14		chrysene				6.9	mg/kg		6.9	mg/kg	0.00069 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				87	mg/kg	1.252	108.905	mg/kg	0.0109 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.4	mg/kg	1.884	0.754	mg/kg	0.0000754 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				0.36	mg/kg		0.36	mg/kg	0.000036 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				21	mg/kg		21	mg/kg	0.0021 %		
			205-912-4	206-44-0									
19		fluorene				3.6	mg/kg		3.6	mg/kg	0.00036 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				2	mg/kg		2	mg/kg	0.0002 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	250	mg/kg		250	mg/kg	0.025 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.41	mg/kg	1.16	0.476	mg/kg	0.0000476 %		
			215-696-3	1344-48-5									
23		naphthalene				4.2	mg/kg		4.2	mg/kg	0.00042 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				20	mg/kg	1.545	30.904	mg/kg	0.00309 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				24	mg/kg		24	mg/kg	0.0024 %		
			201-581-5	85-01-8									
26		pyrene				20	mg/kg		20	mg/kg	0.002 %		
			204-927-3	129-00-0									
27		selenium { selenium }				0.5	mg/kg		0.5	mg/kg	0.00005 %		
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				25	mg/kg	1.785	44.63	mg/kg	0.00446 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				130	mg/kg	1.245	161.813	mg/kg	0.0162 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0795 %		

Key

	User supplied data
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH008[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH008[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
2.2 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		4.2 mg/kg		4.2 mg/kg	0.00042 %		
2		acenaphthylene 205-917-1 / 208-96-8		0.37 mg/kg		0.37 mg/kg	0.000037 %		
3		anthracene 204-371-1 / 120-12-7		5.7 mg/kg		5.7 mg/kg	0.00057 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	2.9 mg/kg		2.9 mg/kg	0.00029 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	22 mg/kg		22 mg/kg	0.0022 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		2.3 mg/kg		2.3 mg/kg	0.00023 %		
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		9.6 mg/kg		9.6 mg/kg	0.00096 %		
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		6.7 mg/kg		6.7 mg/kg	0.00067 %		
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		6.4 mg/kg		6.4 mg/kg	0.00064 %		
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		3 mg/kg		3 mg/kg	0.0003 %		
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		0.9 mg/kg	2.775	2.498 mg/kg	0.00025 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	0.4 mg/kg		0.4 mg/kg	0.00004 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				33	mg/kg	1.462	48.231	mg/kg	0.00482 %		
			215-160-9	1308-38-9									
14		chrysene				7.3	mg/kg		7.3	mg/kg	0.00073 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				65	mg/kg	1.252	81.365	mg/kg	0.00814 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.3	mg/kg	1.884	0.565	mg/kg	0.0000565 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				0.45	mg/kg		0.45	mg/kg	0.000045 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				21	mg/kg		21	mg/kg	0.0021 %		
			205-912-4	206-44-0									
19		fluorene				3.7	mg/kg		3.7	mg/kg	0.00037 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				1.7	mg/kg		1.7	mg/kg	0.00017 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	160	mg/kg		160	mg/kg	0.016 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.3	mg/kg	1.16	0.348	mg/kg	0.0000348 %		
			215-696-3	1344-48-5									
23		naphthalene				5.7	mg/kg		5.7	mg/kg	0.00057 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				22	mg/kg	1.545	33.994	mg/kg	0.0034 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				24	mg/kg		24	mg/kg	0.0024 %		
			201-581-5	85-01-8									
26		pyrene				21	mg/kg		21	mg/kg	0.0021 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				29	mg/kg	1.785	51.77	mg/kg	0.00518 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				100	mg/kg	1.245	124.471	mg/kg	0.0124 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0652 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH009

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH009	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
2.6 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3		anthracene		204-371-1	120-12-7		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	1.7	mg/kg		1.7	mg/kg	0.00017 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	18	mg/kg		18	mg/kg	0.0018 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.07	mg/kg		0.07	mg/kg	0.000007 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.04	mg/kg		0.04	mg/kg	0.000004 %		
10		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
11		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1	mg/kg	2.775	2.775	mg/kg	0.000278 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.7	mg/kg		0.7	mg/kg	0.00007 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				15	mg/kg	1.462	21.923	mg/kg	0.00219 %		
			215-160-9	1308-38-9									
14		chrysene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				30	mg/kg	1.252	37.553	mg/kg	0.00376 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.5	mg/kg	1.884	0.942	mg/kg	0.0000942 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.11	mg/kg		0.11	mg/kg	0.000011 %		
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	120	mg/kg		120	mg/kg	0.012 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.1	mg/kg	1.16	0.116	mg/kg	0.0000116 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				11	mg/kg	1.545	16.997	mg/kg	0.0017 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
			201-581-5	85-01-8									
26		pyrene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				16	mg/kg	1.785	28.563	mg/kg	0.00286 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				170	mg/kg	1.245	211.601	mg/kg	0.0212 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0462 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH011

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH011
Sample Depth:
3.6 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3	anthracene		204-371-1	120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	16 mg/kg		16 mg/kg	0.0016 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.04 mg/kg		0.04 mg/kg	0.000004 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.03 mg/kg		0.03 mg/kg	0.000003 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.2 mg/kg	2.775	3.33 mg/kg	0.000333 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4 mg/kg		0.4 mg/kg	0.00004 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				11	mg/kg	1.462	16.077	mg/kg	0.00161 %		
			215-160-9	1308-38-9									
14		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				440	mg/kg	1.252	550.782	mg/kg	0.0551 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	290	mg/kg		290	mg/kg	0.029 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				<0.05	mg/kg	1.16	<0.058	mg/kg	<0.0000058 %		<LOD
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				17	mg/kg	1.545	26.268	mg/kg	0.00263 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
			201-581-5	85-01-8									
26		pyrene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			204-927-3	129-00-0									
27		selenium { selenium }				1.1	mg/kg		1.1	mg/kg	0.00011 %		
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				23	mg/kg	1.785	41.059	mg/kg	0.00411 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				150	mg/kg	1.245	186.707	mg/kg	0.0187 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.113 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH011[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH011[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
1 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		0.1 mg/kg		0.1 mg/kg	0.00001 %		
2		acenaphthylene 205-917-1 / 208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3		anthracene 204-371-1 / 120-12-7		0.34 mg/kg		0.34 mg/kg	0.000034 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	1.5 mg/kg		1.5 mg/kg	0.00015 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	12 mg/kg		12 mg/kg	0.0012 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		0.22 mg/kg		0.22 mg/kg	0.000022 %		
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		0.78 mg/kg		0.78 mg/kg	0.000078 %		
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		0.59 mg/kg		0.59 mg/kg	0.000059 %		
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		0.69 mg/kg		0.69 mg/kg	0.000069 %		
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		0.29 mg/kg		0.29 mg/kg	0.000029 %		
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		0.4 mg/kg	2.775	1.11 mg/kg	0.000111 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	0.9 mg/kg		0.9 mg/kg	0.00009 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
			215-160-9	1308-38-9									
14		chrysene				0.73	mg/kg		0.73	mg/kg	0.000073 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				32	mg/kg	1.252	40.057	mg/kg	0.00401 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
		006-007-00-5											
17		dibenz[a,h]anthracene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				1.9	mg/kg		1.9	mg/kg	0.00019 %		
			205-912-4	206-44-0									
19		fluorene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.21	mg/kg		0.21	mg/kg	0.000021 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	150	mg/kg		150	mg/kg	0.015 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.22	mg/kg	1.16	0.255	mg/kg	0.0000255 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				9.2	mg/kg	1.545	14.216	mg/kg	0.00142 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
			201-581-5	85-01-8									
26		pyrene				1.8	mg/kg		1.8	mg/kg	0.00018 %		
			204-927-3	129-00-0									
27		selenium { selenium }				0.9	mg/kg		0.9	mg/kg	0.00009 %		
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				15	mg/kg	1.785	26.778	mg/kg	0.00268 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				60	mg/kg	1.245	74.683	mg/kg	0.00747 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0358 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH012A

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH012A	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
7.5 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
2		acenaphthylene 205-917-1 / 208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3		anthracene 204-371-1 / 120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	1.2 mg/kg		1.2 mg/kg	0.00012 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	7.2 mg/kg		7.2 mg/kg	0.00072 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		0.7 mg/kg	2.775	1.943 mg/kg	0.000194 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	0.2 mg/kg		0.2 mg/kg	0.00002 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
			215-160-9	1308-38-9									
14		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				25	mg/kg	1.252	31.294	mg/kg	0.00313 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.1	mg/kg	1.884	0.188	mg/kg	0.0000188 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	42	mg/kg		42	mg/kg	0.0042 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.09	mg/kg	1.16	0.104	mg/kg	0.0000104 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				18	mg/kg	1.545	27.813	mg/kg	0.00278 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-581-5	85-01-8									
26		pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				25	mg/kg	1.785	44.63	mg/kg	0.00446 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				48	mg/kg	1.245	59.746	mg/kg	0.00597 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0244 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH012A[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH012A[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
2.6 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3		anthracene		204-371-1	120-12-7		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	6.4	mg/kg		6.4	mg/kg	0.00064 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
10		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
11		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.5	mg/kg	2.775	1.388	mg/kg	0.000139 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.1	mg/kg		0.1	mg/kg	0.00001 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				12	mg/kg	1.462	17.539	mg/kg	0.00175 %		
			215-160-9	1308-38-9									
14		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				23	mg/kg	1.252	28.791	mg/kg	0.00288 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	34	mg/kg		34	mg/kg	0.0034 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.06	mg/kg	1.16	0.0696	mg/kg	0.00000696 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				13	mg/kg	1.545	20.087	mg/kg	0.00201 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-581-5	85-01-8									
26		pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				17	mg/kg	1.785	30.348	mg/kg	0.00303 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				37	mg/kg	1.245	46.054	mg/kg	0.00461 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0187 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH013

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-BH013
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.48 mg/kg		0.48 mg/kg	0.000048 %		
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		0.91 mg/kg		0.91 mg/kg	0.000091 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	1.7 mg/kg		1.7 mg/kg	0.00017 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	19 mg/kg		19 mg/kg	0.0019 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.24 mg/kg		0.24 mg/kg	0.000024 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.86 mg/kg		0.86 mg/kg	0.000086 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.54 mg/kg		0.54 mg/kg	0.000054 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.74 mg/kg		0.74 mg/kg	0.000074 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.27 mg/kg		0.27 mg/kg	0.000027 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.9 mg/kg	2.775	2.498 mg/kg	0.00025 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.3 mg/kg		0.3 mg/kg	0.00003 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
			215-160-9	1308-38-9									
14		chrysene				0.78	mg/kg		0.78	mg/kg	0.000078 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				36	mg/kg	1.252	45.064	mg/kg	0.00451 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
		006-007-00-5											
17		dibenz[a,h]anthracene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				3.4	mg/kg		3.4	mg/kg	0.00034 %		
			205-912-4	206-44-0									
19		fluorene				0.46	mg/kg		0.46	mg/kg	0.000046 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.2	mg/kg		0.2	mg/kg	0.00002 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	51	mg/kg		51	mg/kg	0.0051 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.11	mg/kg	1.16	0.128	mg/kg	0.0000128 %		
			215-696-3	1344-48-5									
23		naphthalene				0.2	mg/kg		0.2	mg/kg	0.00002 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				22	mg/kg	1.545	33.994	mg/kg	0.0034 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				2.9	mg/kg		2.9	mg/kg	0.00029 %		
			201-581-5	85-01-8									
26		pyrene				2.8	mg/kg		2.8	mg/kg	0.00028 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				29	mg/kg	1.785	51.77	mg/kg	0.00518 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				75	mg/kg	1.245	93.354	mg/kg	0.00934 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0341 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH013[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH013[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
3.5 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		0.26 mg/kg		0.26 mg/kg	0.000026 %		
2		acenaphthylene 205-917-1 / 208-96-8		0.06 mg/kg		0.06 mg/kg	0.000006 %		
3		anthracene 204-371-1 / 120-12-7		0.46 mg/kg		0.46 mg/kg	0.000046 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	1.5 mg/kg		1.5 mg/kg	0.00015 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	7.4 mg/kg		7.4 mg/kg	0.00074 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		0.22 mg/kg		0.22 mg/kg	0.000022 %		
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		0.84 mg/kg		0.84 mg/kg	0.000084 %		
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		0.54 mg/kg		0.54 mg/kg	0.000054 %		
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		0.71 mg/kg		0.71 mg/kg	0.000071 %		
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		0.25 mg/kg		0.25 mg/kg	0.000025 %		
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		0.6 mg/kg	2.775	1.665 mg/kg	0.000167 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	0.5 mg/kg		0.5 mg/kg	0.00005 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
13		chromium { chromium(III) oxide }		215-160-9	1308-38-9		11	mg/kg	1.462	16.077	mg/kg	0.00161 %		
14		chrysene	601-048-00-0	205-923-4	218-01-9		0.81	mg/kg		0.81	mg/kg	0.000081 %		
15		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		46	mg/kg	1.252	57.582	mg/kg	0.00576 %		
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
17		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
18		fluoranthene		205-912-4	206-44-0		2.9	mg/kg		2.9	mg/kg	0.00029 %		
19		fluorene		201-695-5	86-73-7		0.2	mg/kg		0.2	mg/kg	0.00002 %		
20		indeno[123-cd]pyrene		205-893-2	193-39-5		0.18	mg/kg		0.18	mg/kg	0.000018 %		
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	73	mg/kg		73	mg/kg	0.0073 %		
22		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		0.24	mg/kg	1.16	0.278	mg/kg	0.0000278 %		
23		naphthalene	601-052-00-2	202-049-5	91-20-3		0.12	mg/kg		0.12	mg/kg	0.000012 %		
24		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		13	mg/kg	1.545	20.087	mg/kg	0.00201 %		
25		phenanthrene		201-581-5	85-01-8		1.6	mg/kg		1.6	mg/kg	0.00016 %		
26		pyrene		204-927-3	129-00-0		2.6	mg/kg		2.6	mg/kg	0.00026 %		
27		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		21	mg/kg	1.785	37.489	mg/kg	0.00375 %		
29		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		84	mg/kg	1.245	104.556	mg/kg	0.0105 %		
											Total:	0.0333 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH014

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH014	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.7 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		2.3	mg/kg		2.3	mg/kg	0.00023 %		
2		acenaphthylene		205-917-1	208-96-8		0.08	mg/kg		0.08	mg/kg	0.000008 %		
3		anthracene		204-371-1	120-12-7		2.5	mg/kg		2.5	mg/kg	0.00025 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	7.4	mg/kg		7.4	mg/kg	0.00074 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	32	mg/kg		32	mg/kg	0.0032 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.86	mg/kg		0.86	mg/kg	0.000086 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		3.2	mg/kg		3.2	mg/kg	0.00032 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		2.1	mg/kg		2.1	mg/kg	0.00021 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		2.8	mg/kg		2.8	mg/kg	0.00028 %		
10		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.95	mg/kg		0.95	mg/kg	0.000095 %		
11		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.6	mg/kg	2.775	1.665	mg/kg	0.000167 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.9	mg/kg		0.9	mg/kg	0.00009 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				24	mg/kg	1.462	35.077	mg/kg	0.00351 %		
			215-160-9	1308-38-9									
14		chrysene				3	mg/kg		3	mg/kg	0.0003 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				430	mg/kg	1.252	538.264	mg/kg	0.0538 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				3.5	mg/kg	1.884	6.594	mg/kg	0.000659 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				0.2	mg/kg		0.2	mg/kg	0.00002 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				11	mg/kg		11	mg/kg	0.0011 %		
			205-912-4	206-44-0									
19		fluorene				1.4	mg/kg		1.4	mg/kg	0.00014 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.7	mg/kg		0.7	mg/kg	0.00007 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	230	mg/kg		230	mg/kg	0.023 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.17	mg/kg	1.16	0.197	mg/kg	0.0000197 %		
			215-696-3	1344-48-5									
23		naphthalene				0.42	mg/kg		0.42	mg/kg	0.000042 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				34	mg/kg	1.545	52.536	mg/kg	0.00525 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				13	mg/kg		13	mg/kg	0.0013 %		
			201-581-5	85-01-8									
26		pyrene				9.9	mg/kg		9.9	mg/kg	0.00099 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				24	mg/kg	1.785	42.844	mg/kg	0.00428 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				560	mg/kg	1.245	697.04	mg/kg	0.0697 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.17 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-BH014[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-BH014[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
4 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
2	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	2.3	mg/kg		2.3	mg/kg	0.00023 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	13	mg/kg		13	mg/kg	0.0013 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.06	mg/kg		0.06	mg/kg	0.000006 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.04	mg/kg		0.04	mg/kg	0.000004 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.05	mg/kg		0.05	mg/kg	0.000005 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.5	mg/kg	2.775	1.388	mg/kg	0.000139 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.3	mg/kg		0.3	mg/kg	0.00003 %		

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#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
13		chromium { chromium(III) oxide }		25 mg/kg	1.462	36.539 mg/kg	0.00365 %		
		215-160-9 / 1308-38-9							
14		chrysene		0.06 mg/kg		0.06 mg/kg	0.000006 %		
		601-048-00-0 / 205-923-4 / 218-01-9							
15		copper { copper(II) oxide }		79 mg/kg	1.252	98.89 mg/kg	0.00989 %		
		029-016-00-6 / 215-269-1 / 1317-38-0							
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }		0.3 mg/kg	1.884	0.565 mg/kg	0.0000565 %		
		006-007-00-5							
17		dibenz[a,h]anthracene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		601-041-00-2 / 200-181-8 / 53-70-3							
18		fluoranthene		0.14 mg/kg		0.14 mg/kg	0.000014 %		
		205-912-4 / 206-44-0							
19		fluorene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		201-695-5 / 86-73-7							
20		indeno[123-cd]pyrene		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
		205-893-2 / 193-39-5							
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }	1	82 mg/kg		82 mg/kg	0.0082 %		
		082-001-00-6							
22		mercury { mercury(II) sulphide }		0.12 mg/kg	1.16	0.139 mg/kg	0.0000139 %		
		215-696-3 / 1344-48-5							
23		naphthalene		0.04 mg/kg		0.04 mg/kg	0.000004 %		
		601-052-00-2 / 202-049-5 / 91-20-3							
24		nickel { nickel(IV) oxide (nickel dioxide) }		20 mg/kg	1.545	30.904 mg/kg	0.00309 %		
		028-004-00-8 / 234-823-3 / 12035-36-8							
25		phenanthrene		0.14 mg/kg		0.14 mg/kg	0.000014 %		
		201-581-5 / 85-01-8							
26		pyrene		0.14 mg/kg		0.14 mg/kg	0.000014 %		
		204-927-3 / 129-00-0							
27		selenium { selenium }		<0.5 mg/kg		<0.5 mg/kg	<0.00005 %		<LOD
		034-001-00-2 / 231-957-4 / 7782-49-2							
28		vanadium { divanadium pentaoxide; vanadium pentoxide }		27 mg/kg	1.785	48.2 mg/kg	0.00482 %		
		023-001-00-8 / 215-239-8 / 1314-62-1							
29		zinc { zinc oxide }		110 mg/kg	1.245	136.919 mg/kg	0.0137 %		
		030-013-00-7 / 215-222-5 / 1314-13-2							
						Total:	0.0453 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-DS001

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-DS001	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.6 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		0.03	mg/kg		0.03	mg/kg	0.000003 %		
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3		anthracene		204-371-1	120-12-7		0.04	mg/kg		0.04	mg/kg	0.000004 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	3.5	mg/kg		3.5	mg/kg	0.00035 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	32	mg/kg		32	mg/kg	0.0032 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.06	mg/kg		0.06	mg/kg	0.000006 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.13	mg/kg		0.13	mg/kg	0.000013 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.11	mg/kg		0.11	mg/kg	0.000011 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.14	mg/kg		0.14	mg/kg	0.000014 %		
10		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.06	mg/kg		0.06	mg/kg	0.000006 %		
11		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.8	mg/kg	2.775	2.22	mg/kg	0.000222 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	1.2	mg/kg		1.2	mg/kg	0.00012 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				27	mg/kg	1.462	39.462	mg/kg	0.00395 %		
			215-160-9	1308-38-9									
14		chrysene				0.18	mg/kg		0.18	mg/kg	0.000018 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				80	mg/kg	1.252	100.142	mg/kg	0.01 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.6	mg/kg	1.884	1.13	mg/kg	0.000113 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.39	mg/kg		0.39	mg/kg	0.000039 %		
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	330	mg/kg		330	mg/kg	0.033 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.37	mg/kg	1.16	0.429	mg/kg	0.0000429 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				17	mg/kg	1.545	26.268	mg/kg	0.00263 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.22	mg/kg		0.22	mg/kg	0.000022 %		
			201-581-5	85-01-8									
26		pyrene				0.37	mg/kg		0.37	mg/kg	0.000037 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				28	mg/kg	1.785	49.985	mg/kg	0.005 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				210	mg/kg	1.245	261.39	mg/kg	0.0261 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.085 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-DS002

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-DS002
Sample Depth:
0.8 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		0.25 mg/kg		0.25 mg/kg	0.000025 %		
2		acenaphthylene 205-917-1 / 208-96-8		0.1 mg/kg		0.1 mg/kg	0.00001 %		
3		anthracene 204-371-1 / 120-12-7		0.56 mg/kg		0.56 mg/kg	0.000056 %		
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	260 mg/kg		260 mg/kg	0.026 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	56 mg/kg		56 mg/kg	0.0056 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		0.41 mg/kg		0.41 mg/kg	0.000041 %		
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		1 mg/kg		1 mg/kg	0.0001 %		
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		0.88 mg/kg		0.88 mg/kg	0.000088 %		
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		1.1 mg/kg		1.1 mg/kg	0.00011 %		
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		0.44 mg/kg		0.44 mg/kg	0.000044 %		
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		1.3 mg/kg	2.775	3.608 mg/kg	0.000361 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	1.2 mg/kg		1.2 mg/kg	0.00012 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				33	mg/kg	1.462	48.231	mg/kg	0.00482 %		
			215-160-9	1308-38-9									
14		chrysene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				160	mg/kg	1.252	200.284	mg/kg	0.02 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				1.6	mg/kg	1.884	3.014	mg/kg	0.000301 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				0.1	mg/kg		0.1	mg/kg	0.00001 %		
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				3.4	mg/kg		3.4	mg/kg	0.00034 %		
			205-912-4	206-44-0									
19		fluorene				0.3	mg/kg		0.3	mg/kg	0.00003 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.32	mg/kg		0.32	mg/kg	0.000032 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	2400	mg/kg		2400	mg/kg	0.24 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				1.1	mg/kg	1.16	1.276	mg/kg	0.000128 %		
			215-696-3	1344-48-5									
23		naphthalene				0.16	mg/kg		0.16	mg/kg	0.000016 %		
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				26	mg/kg	1.545	40.175	mg/kg	0.00402 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				2.7	mg/kg		2.7	mg/kg	0.00027 %		
			201-581-5	85-01-8									
26		pyrene				3.2	mg/kg		3.2	mg/kg	0.00032 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				36	mg/kg	1.785	64.267	mg/kg	0.00643 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				470	mg/kg	1.245	585.016	mg/kg	0.0585 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.368 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-TP001

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-TP001	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.8 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	4.8 mg/kg		4.8 mg/kg	0.00048 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	87 mg/kg		87 mg/kg	0.0087 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.7 mg/kg	2.775	1.943 mg/kg	0.000194 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.3 mg/kg		0.3 mg/kg	0.00003 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
			215-160-9	1308-38-9									
14		chrysene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				110	mg/kg	1.252	137.695	mg/kg	0.0138 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				2.9	mg/kg	1.884	5.464	mg/kg	0.000546 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
			205-912-4	206-44-0									
19		fluorene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	300	mg/kg		300	mg/kg	0.03 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.45	mg/kg	1.16	0.522	mg/kg	0.0000522 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				17	mg/kg	1.545	26.268	mg/kg	0.00263 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-581-5	85-01-8									
26		pyrene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				31	mg/kg	1.785	55.341	mg/kg	0.00553 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				140	mg/kg	1.245	174.26	mg/kg	0.0174 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0824 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-TP002

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
ARP-TP002
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
2		acenaphthylene 205-917-1 / 208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3		anthracene 204-371-1 / 120-12-7		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
4		antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex } 051-003-00-9	1	6.1 mg/kg		6.1 mg/kg	0.00061 %		
5		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	44 mg/kg		44 mg/kg	0.0044 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		0.04 mg/kg		0.04 mg/kg	0.000004 %		
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		0.09 mg/kg		0.09 mg/kg	0.000009 %		
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		0.08 mg/kg		0.08 mg/kg	0.000008 %		
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		0.13 mg/kg		0.13 mg/kg	0.000013 %		
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		0.03 mg/kg		0.03 mg/kg	0.000003 %		
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		1.3 mg/kg	2.775	3.608 mg/kg	0.000361 %		
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	0.3 mg/kg		0.3 mg/kg	0.00003 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
13		chromium { chromium(III) oxide }		215-160-9	1308-38-9		22	mg/kg	1.462	32.154	mg/kg	0.00322 %		
14		chrysene	601-048-00-0	205-923-4	218-01-9		0.1	mg/kg		0.1	mg/kg	0.00001 %		
15		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		230	mg/kg	1.252	287.909	mg/kg	0.0288 %		
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				1.8	mg/kg	1.884	3.391	mg/kg	0.000339 %		
17		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
18		fluoranthene		205-912-4	206-44-0		0.19	mg/kg		0.19	mg/kg	0.000019 %		
19		fluorene		201-695-5	86-73-7		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
20		indeno[123-cd]pyrene		205-893-2	193-39-5		0.04	mg/kg		0.04	mg/kg	0.000004 %		
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	530	mg/kg		530	mg/kg	0.053 %		
22		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		1.6	mg/kg	1.16	1.856	mg/kg	0.000186 %		
23		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
24		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		32	mg/kg	1.545	49.446	mg/kg	0.00494 %		
25		phenanthrene		201-581-5	85-01-8		0.11	mg/kg		0.11	mg/kg	0.000011 %		
26		pyrene		204-927-3	129-00-0		0.2	mg/kg		0.2	mg/kg	0.00002 %		
27		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		1.3	mg/kg		1.3	mg/kg	0.00013 %		
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		37	mg/kg	1.785	66.052	mg/kg	0.00661 %		
29		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		620	mg/kg	1.245	771.723	mg/kg	0.0772 %		
											Total:	0.18 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: ARP-TP002[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
ARP-TP002[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
2.5 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		0.07 mg/kg		0.07 mg/kg	0.000007 %		
4	antimony { antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex }	051-003-00-9			1	3.3 mg/kg		3.3 mg/kg	0.00033 %		
5	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	20 mg/kg		20 mg/kg	0.002 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.09 mg/kg		0.09 mg/kg	0.000009 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.2 mg/kg		0.2 mg/kg	0.00002 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.16 mg/kg		0.16 mg/kg	0.000016 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.2 mg/kg		0.2 mg/kg	0.00002 %		
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.07 mg/kg		0.07 mg/kg	0.000007 %		
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.6 mg/kg	2.775	1.665 mg/kg	0.000167 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.8 mg/kg		0.8 mg/kg	0.00008 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		chromium { chromium(III) oxide }				15	mg/kg	1.462	21.923	mg/kg	0.00219 %		
			215-160-9	1308-38-9									
14		chrysene				0.21	mg/kg		0.21	mg/kg	0.000021 %		
		601-048-00-0	205-923-4	218-01-9									
15		copper { copper(II) oxide }				100	mg/kg	1.252	125.178	mg/kg	0.0125 %		
		029-016-00-6	215-269-1	1317-38-0									
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.3	mg/kg	1.884	0.565	mg/kg	0.0000565 %		
		006-007-00-5											
17		dibenz[a,h]anthracene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
18		fluoranthene				0.55	mg/kg		0.55	mg/kg	0.000055 %		
			205-912-4	206-44-0									
19		fluorene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
			201-695-5	86-73-7									
20		indeno[123-cd]pyrene				0.08	mg/kg		0.08	mg/kg	0.000008 %		
			205-893-2	193-39-5									
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	250	mg/kg		250	mg/kg	0.025 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }				0.67	mg/kg	1.16	0.777	mg/kg	0.0000777 %		
			215-696-3	1344-48-5									
23		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
24		nickel { nickel(IV) oxide (nickel dioxide) }				16	mg/kg	1.545	24.723	mg/kg	0.00247 %		
		028-004-00-8	234-823-3	12035-36-8									
25		phenanthrene				0.36	mg/kg		0.36	mg/kg	0.000036 %		
			201-581-5	85-01-8									
26		pyrene				0.55	mg/kg		0.55	mg/kg	0.000055 %		
			204-927-3	129-00-0									
27		selenium { selenium }				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
28		vanadium { divanadium pentaoxide; vanadium pentoxide }				18	mg/kg	1.785	32.133	mg/kg	0.00321 %		
		023-001-00-8	215-239-8	1314-62-1									
29		zinc { zinc oxide }				220	mg/kg	1.245	273.837	mg/kg	0.0274 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0758 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: CE-2015-CC/WS2

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
CE-2015-CC/WS2
Sample Depth:
0.68 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		acenaphthene 201-469-6 / 83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
2		acenaphthylene 205-917-1 / 208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
3		anthracene 204-371-1 / 120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex } 033-002-00-5	1	<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
5		barium { barium sulfate } 231-784-4 / 7727-43-7		25 mg/kg	1.7	42.488 mg/kg	0.00425 %		
6		benzo[ghi]perylene 205-883-8 / 191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
7		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
8		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
9		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
10		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
11		beryllium { beryllium oxide } 004-003-00-8 / 215-133-1 / 1304-56-9		<0.5 mg/kg	2.775	<1.388 mg/kg	<0.000139 %		<LOD
12		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex } 048-001-00-5	1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
13		chromium { chromium(III) oxide } 215-160-9 / 1308-38-9		6 mg/kg	1.462	8.769 mg/kg	0.000877 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
15		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		<4	mg/kg	1.252	<5.007	mg/kg	<0.000501 %		<LOD
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18		fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	<3	mg/kg		<3	mg/kg	<0.0003 %		<LOD
22		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		<1	mg/kg	1.16	<1.16	mg/kg	<0.000116 %		<LOD
23		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		4	mg/kg	1.545	6.181	mg/kg	0.000618 %		
25		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
26		pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		<3	mg/kg		<3	mg/kg	<0.0003 %		<LOD
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		11	mg/kg	1.785	19.637	mg/kg	0.00196 %		
29		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		16	mg/kg	1.245	19.915	mg/kg	0.00199 %		
											Total:	0.0118 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: CE-2015-CC/WS3

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
CE-2015-CC/WS3
Sample Depth:
0.56 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
2	acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
3	anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	2	mg/kg		2	mg/kg	0.0002 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		274	mg/kg	1.7	465.668	mg/kg	0.0466 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
11	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.6	mg/kg	2.775	1.665	mg/kg	0.000167 %		
12	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.3	mg/kg		0.3	mg/kg	0.00003 %		
13	chromium { chromium(III) oxide }		215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
15		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		18	mg/kg	1.252	22.532	mg/kg	0.00225 %		
16		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<2	mg/kg	1.884	<3.768	mg/kg	<0.000377 %		<LOD
17		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18		fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	10	mg/kg		10	mg/kg	0.001 %		
22		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		<LOD
23		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		<1	mg/kg	1.16	<1.16	mg/kg	<0.000116 %		<LOD
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
25		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		25	mg/kg	1.545	38.63	mg/kg	0.00386 %		
26		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27		pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		<3	mg/kg		<3	mg/kg	<0.0003 %		<LOD
29		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		26	mg/kg	1.785	46.415	mg/kg	0.00464 %		
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		47	mg/kg	1.245	58.502	mg/kg	0.00585 %		
											Total:	0.0689 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-CRH01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-CRH01
Sample Depth:
0.2 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.12	mg/kg		0.12	mg/kg	0.000012 %		
2	acenaphthylene		205-917-1	208-96-8		0.06	mg/kg		0.06	mg/kg	0.000006 %		
3	anthracene		204-371-1	120-12-7		0.26	mg/kg		0.26	mg/kg	0.000026 %		
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	14.9	mg/kg		14.9	mg/kg	0.00149 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		212	mg/kg	1.7	360.298	mg/kg	0.036 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.58	mg/kg		0.58	mg/kg	0.000058 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.91	mg/kg		0.91	mg/kg	0.000091 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.96	mg/kg		0.96	mg/kg	0.000096 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.16	mg/kg		1.16	mg/kg	0.000116 %		
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		1.61	mg/kg		1.61	mg/kg	0.000161 %		
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.45	mg/kg		0.45	mg/kg	0.000045 %		
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1	mg/kg	2.775	2.775	mg/kg	0.000278 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.9	mg/kg		0.9	mg/kg	0.00009 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				17.2	mg/kg	1.462	25.139	mg/kg	0.00251 %		
			215-160-9	1308-38-9									
15		chrysene				0.98	mg/kg		0.98	mg/kg	0.000098 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				73	mg/kg	1.252	91.38	mg/kg	0.00914 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				2.16	mg/kg		2.16	mg/kg	0.000216 %		
			205-912-4	206-44-0									
20		fluorene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				0.48	mg/kg		0.48	mg/kg	0.000048 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	170	mg/kg		170	mg/kg	0.017 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				0.4	mg/kg	1.16	0.464	mg/kg	0.0000464 %		
			215-696-3	1344-48-5									
24		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				18.2	mg/kg	1.545	28.122	mg/kg	0.00281 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				1.09	mg/kg		1.09	mg/kg	0.000109 %		
			201-581-5	85-01-8									
27		pyrene				1.89	mg/kg		1.89	mg/kg	0.000189 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				26	mg/kg	1.785	46.415	mg/kg	0.00464 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				177	mg/kg	1.245	220.314	mg/kg	0.022 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0976 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Report created by Mark Griffiths on 15 Jan 2020

Classification of sample: GEO-2015-CRH01[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-CRH01[2]
Sample Depth:
0.5 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
2	acenaphthylene		205-917-1	208-96-8		0.05	mg/kg		0.05	mg/kg	0.000005 %		
3	anthracene		204-371-1	120-12-7		0.1	mg/kg		0.1	mg/kg	0.00001 %		
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	10.1	mg/kg		10.1	mg/kg	0.00101 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		578	mg/kg	1.7	982.321	mg/kg	0.0982 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		0.19	mg/kg		0.19	mg/kg	0.000019 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.35	mg/kg		0.35	mg/kg	0.000035 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.3	mg/kg		0.3	mg/kg	0.00003 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.36	mg/kg		0.36	mg/kg	0.000036 %		
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		0.5	mg/kg		0.5	mg/kg	0.00005 %		
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.14	mg/kg		0.14	mg/kg	0.000014 %		
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.3	mg/kg	2.775	3.608	mg/kg	0.000361 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.9	mg/kg		0.9	mg/kg	0.00009 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chromium { chromium(III) oxide }		215-160-9	1308-38-9		33.3	mg/kg	1.462	48.67	mg/kg	0.00487 %		
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.34	mg/kg		0.34	mg/kg	0.000034 %		
16		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		47	mg/kg	1.252	58.834	mg/kg	0.00588 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
19		fluoranthene		205-912-4	206-44-0		0.63	mg/kg		0.63	mg/kg	0.000063 %		
20		fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21		indeno[123-cd]pyrene		205-893-2	193-39-5		0.16	mg/kg		0.16	mg/kg	0.000016 %		
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	191	mg/kg		191	mg/kg	0.0191 %		
23		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		0.3	mg/kg	1.16	0.348	mg/kg	0.0000348 %		
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
25		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		20.7	mg/kg	1.545	31.985	mg/kg	0.0032 %		
26		phenanthrene		201-581-5	85-01-8		0.39	mg/kg		0.39	mg/kg	0.000039 %		
27		pyrene		204-927-3	129-00-0		0.63	mg/kg		0.63	mg/kg	0.000063 %		
28		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		1	mg/kg		1	mg/kg	0.0001 %		
29		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		31	mg/kg	1.785	55.341	mg/kg	0.00553 %		
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		93	mg/kg	1.245	115.758	mg/kg	0.0116 %		
											Total:	0.151 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-CRH01[3]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-CRH01[3]
Sample Depth:
2 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
4	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
8	●	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.07 mg/kg		<0.07 mg/kg	<0.000007 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
10		chrysene	601-048-00-0	205-923-4	218-01-9		0.04 mg/kg		0.04 mg/kg	0.000004 %		
11		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
12	●	fluoranthene		205-912-4	206-44-0		0.04 mg/kg		0.04 mg/kg	0.000004 %		
13	●	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
14	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
15		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17	●	phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-581-5	85-01-8									
18	●	pyrene				0.04	mg/kg		0.04	mg/kg	0.000004 %		
			204-927-3	129-00-0									
										Total:	0.00007 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
<LOD	Below limit of detection
ND	Not detected

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Classification of sample: GEO-2015-CRH01[4]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-CRH01[4]
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
2	●	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	●	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<**LOD**
4	●	benzo[ghi]perylene		205-883-8	191-24-2		0.09 mg/kg		0.09 mg/kg	0.000009 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.22 mg/kg		0.22 mg/kg	0.000022 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.15 mg/kg		0.15 mg/kg	0.000015 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.19 mg/kg		0.19 mg/kg	0.000019 %		
8	●	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		0.26 mg/kg		0.26 mg/kg	0.000026 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.07 mg/kg		0.07 mg/kg	0.000007 %		
10		chrysene	601-048-00-0	205-923-4	218-01-9		0.22 mg/kg		0.22 mg/kg	0.000022 %		
11		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<**LOD**
12	●	fluoranthene		205-912-4	206-44-0		0.34 mg/kg		0.34 mg/kg	0.000034 %		
13	●	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<**LOD**
14	●	indeno[123-cd]pyrene		205-893-2	193-39-5		0.08 mg/kg		0.08 mg/kg	0.000008 %		
15		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
17	•	phenanthrene				0.16	mg/kg		0.16	mg/kg	0.000016 %		
			201-581-5	85-01-8									
18	•	pyrene				0.32	mg/kg		0.32	mg/kg	0.000032 %		
			204-927-3	129-00-0									
										Total:	0.00023 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
<LOD	Below limit of detection
ND	Not detected

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Classification of sample: GEO-2015-CRH01B

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-CRH01B
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	13.3 mg/kg		13.3 mg/kg	0.00133 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		100 mg/kg	1.7	169.952 mg/kg	0.017 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.07 mg/kg		<0.07 mg/kg	<0.000007 %		<LOD
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1 mg/kg	2.775	2.775 mg/kg	0.000278 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chromium { chromium(III) oxide }		215-160-9	1308-38-9		43.6	mg/kg	1.462	63.724	mg/kg	0.00637 %		
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
16		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		37	mg/kg	1.252	46.316	mg/kg	0.00463 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
19		fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
20		fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	78	mg/kg		78	mg/kg	0.0078 %		
23		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
24		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		0.6	mg/kg	1.16	0.696	mg/kg	0.0000696 %		
25		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		21.3	mg/kg	1.545	32.912	mg/kg	0.00329 %		
27		phenanthrene		201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28		pyrene		204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
29		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		25	mg/kg	1.785	44.63	mg/kg	0.00446 %		
31		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		57	mg/kg	1.245	70.949	mg/kg	0.00709 %		
											Total:	0.0526 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-CRH01B[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-CRH01B[2]
Sample Depth:
2 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
4	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8	●	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
10		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
11		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
12	●	fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
13	●	fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
14	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
15		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		0.009	mg/kg		0.009	mg/kg	0.0000009 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17	●	phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-581-5	85-01-8									
18	●	pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			204-927-3	129-00-0									
										Total:	0.00006 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
<LOD	Below limit of detection
ND	Not detected

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Unlikely to be flammable due to dilution and low concentration.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]: (conc.: 9.0e-07%)

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Classification of sample: GEO-2015-CRH03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-CRH03
Sample Depth:
3 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		0.22	mg/kg		0.22	mg/kg	0.000022 %		
2		acenaphthylene		205-917-1	208-96-8		0.24	mg/kg		0.24	mg/kg	0.000024 %		
3		anthracene		204-371-1	120-12-7		0.62	mg/kg		0.62	mg/kg	0.000062 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	5.9	mg/kg		5.9	mg/kg	0.00059 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		351	mg/kg	1.7	596.531	mg/kg	0.0597 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.68	mg/kg		0.68	mg/kg	0.000068 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.64	mg/kg		1.64	mg/kg	0.000164 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.29	mg/kg		1.29	mg/kg	0.000129 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.45	mg/kg		1.45	mg/kg	0.000145 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		2.02	mg/kg		2.02	mg/kg	0.000202 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.57	mg/kg		0.57	mg/kg	0.000057 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1	mg/kg	2.775	2.775	mg/kg	0.000278 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chromium { chromium(III) oxide }		215-160-9	1308-38-9		49.2	mg/kg	1.462	71.909	mg/kg	0.00719 %		
15		chrysene	601-048-00-0	205-923-4	218-01-9		1.46	mg/kg		1.46	mg/kg	0.000146 %		
16		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		24	mg/kg	1.252	30.043	mg/kg	0.003 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.1	mg/kg		0.1	mg/kg	0.00001 %		
19		fluoranthene		205-912-4	206-44-0		2.89	mg/kg		2.89	mg/kg	0.000289 %		
20		fluorene		201-695-5	86-73-7		0.3	mg/kg		0.3	mg/kg	0.00003 %		
21		indeno[123-cd]pyrene		205-893-2	193-39-5		0.7	mg/kg		0.7	mg/kg	0.00007 %		
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	17	mg/kg		17	mg/kg	0.0017 %		
23		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		<0.1	mg/kg	1.16	<0.116	mg/kg	<0.0000116 %		<LOD
24		naphthalene	601-052-00-2	202-049-5	91-20-3		0.41	mg/kg		0.41	mg/kg	0.000041 %		
25		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		16	mg/kg	1.545	24.723	mg/kg	0.00247 %		
26		phenanthrene		201-581-5	85-01-8		2.36	mg/kg		2.36	mg/kg	0.000236 %		
27		pyrene		204-927-3	129-00-0		2.79	mg/kg		2.79	mg/kg	0.000279 %		
28		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
29		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		29	mg/kg	1.785	51.77	mg/kg	0.00518 %		
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		28	mg/kg	1.245	34.852	mg/kg	0.00349 %		
											Total:	0.0857 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-TP01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
GEO-2015-TP01	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.3 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
2		acenaphthylene		205-917-1	208-96-8		0.04	mg/kg		0.04	mg/kg	0.000004 %		
3		anthracene		204-371-1	120-12-7		0.13	mg/kg		0.13	mg/kg	0.000013 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	16.5	mg/kg		16.5	mg/kg	0.00165 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		105	mg/kg	1.7	178.449	mg/kg	0.0178 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.43	mg/kg		0.43	mg/kg	0.000043 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.76	mg/kg		0.76	mg/kg	0.000076 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.66	mg/kg		0.66	mg/kg	0.000066 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.78	mg/kg		0.78	mg/kg	0.000078 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		1.09	mg/kg		1.09	mg/kg	0.000109 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.31	mg/kg		0.31	mg/kg	0.000031 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.8	mg/kg	2.775	2.22	mg/kg	0.000222 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4	mg/kg		0.4	mg/kg	0.00004 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chromium { chromium(III) oxide }		215-160-9	1308-38-9		34.2	mg/kg	1.462	49.985	mg/kg	0.005 %		
15		chrysene	601-048-00-0	205-923-4	218-01-9		0.65	mg/kg		0.65	mg/kg	0.000065 %		
16		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		49	mg/kg	1.252	61.337	mg/kg	0.00613 %		
17		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.07	mg/kg		0.07	mg/kg	0.000007 %		
18		fluoranthene		205-912-4	206-44-0		1.07	mg/kg		1.07	mg/kg	0.000107 %		
19		fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
20		indeno[123-cd]pyrene		205-893-2	193-39-5		0.41	mg/kg		0.41	mg/kg	0.000041 %		
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	139	mg/kg		139	mg/kg	0.0139 %		
22		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		0.5	mg/kg	1.16	0.58	mg/kg	0.000058 %		
23		naphthalene	601-052-00-2	202-049-5	91-20-3		0.05	mg/kg		0.05	mg/kg	0.000005 %		
24		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		24.1	mg/kg	1.545	37.239	mg/kg	0.00372 %		
25		phenanthrene		201-581-5	85-01-8		0.56	mg/kg		0.56	mg/kg	0.000056 %		
26		pyrene		204-927-3	129-00-0		1.06	mg/kg		1.06	mg/kg	0.000106 %		
27		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		23	mg/kg	1.785	41.059	mg/kg	0.00411 %		
29		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		98	mg/kg	1.245	121.982	mg/kg	0.0122 %		
											Total:	0.0658 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-TP02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
GEO-2015-TP02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
0.5 m	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.41 mg/kg		0.41 mg/kg	0.000041 %		
2	acenaphthylene		205-917-1	208-96-8		0.17 mg/kg		0.17 mg/kg	0.000017 %		
3	anthracene		204-371-1	120-12-7		0.9 mg/kg		0.9 mg/kg	0.00009 %		
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	10.4 mg/kg		10.4 mg/kg	0.00104 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		120 mg/kg	1.7	203.942 mg/kg	0.0204 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		2.21 mg/kg		2.21 mg/kg	0.000221 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		4.32 mg/kg		4.32 mg/kg	0.000432 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		3.58 mg/kg		3.58 mg/kg	0.000358 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		4.47 mg/kg		4.47 mg/kg	0.000447 %		
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		6.21 mg/kg		6.21 mg/kg	0.000621 %		
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.74 mg/kg		1.74 mg/kg	0.000174 %		
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.9 mg/kg	2.775	2.498 mg/kg	0.00025 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.8 mg/kg		0.8 mg/kg	0.00008 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				15.5	mg/kg	1.462	22.654	mg/kg	0.00227 %		
			215-160-9	1308-38-9									
15		chrysene				4.17	mg/kg		4.17	mg/kg	0.000417 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				44	mg/kg	1.252	55.078	mg/kg	0.00551 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<**LOD**
		006-007-00-5											
18		dibenz[a,h]anthracene				0.31	mg/kg		0.31	mg/kg	0.000031 %		
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				7.11	mg/kg		7.11	mg/kg	0.000711 %		
			205-912-4	206-44-0									
20		fluorene				0.28	mg/kg		0.28	mg/kg	0.000028 %		
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				2.07	mg/kg		2.07	mg/kg	0.000207 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	83	mg/kg		83	mg/kg	0.0083 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				0.2	mg/kg	1.16	0.232	mg/kg	0.0000232 %		
			215-696-3	1344-48-5									
24		naphthalene				0.22	mg/kg		0.22	mg/kg	0.000022 %		
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				17.3	mg/kg	1.545	26.732	mg/kg	0.00267 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				3.57	mg/kg		3.57	mg/kg	0.000357 %		
			201-581-5	85-01-8									
27		pyrene				6.76	mg/kg		6.76	mg/kg	0.000676 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				22	mg/kg	1.785	39.274	mg/kg	0.00393 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				79	mg/kg	1.245	98.332	mg/kg	0.00983 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0593 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Report created by Mark Griffiths on 15 Jan 2020

Classification of sample: GEO-2015-TP03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-TP03
Sample Depth:
0.7 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3		anthracene		204-371-1	120-12-7		0.07	mg/kg		0.07	mg/kg	0.000007 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	2.9	mg/kg		2.9	mg/kg	0.00029 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		38	mg/kg	1.7	64.582	mg/kg	0.00646 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.09	mg/kg		0.09	mg/kg	0.000009 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.17	mg/kg		0.17	mg/kg	0.000017 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.16	mg/kg		0.16	mg/kg	0.000016 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.17	mg/kg		0.17	mg/kg	0.000017 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		0.24	mg/kg		0.24	mg/kg	0.000024 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.07	mg/kg		0.07	mg/kg	0.000007 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.7	mg/kg	2.775	1.943	mg/kg	0.000194 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				10.4	mg/kg	1.462	15.2	mg/kg	0.00152 %		
			215-160-9	1308-38-9									
15		chrysene				0.17	mg/kg		0.17	mg/kg	0.000017 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				11	mg/kg	1.252	13.77	mg/kg	0.00138 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				0.38	mg/kg		0.38	mg/kg	0.000038 %		
			205-912-4	206-44-0									
20		fluorene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	16	mg/kg		16	mg/kg	0.0016 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				<0.1	mg/kg	1.16	<0.116	mg/kg	<0.0000116 %		<LOD
			215-696-3	1344-48-5									
24		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				7.5	mg/kg	1.545	11.589	mg/kg	0.00116 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				0.31	mg/kg		0.31	mg/kg	0.000031 %		
			201-581-5	85-01-8									
27		pyrene				0.36	mg/kg		0.36	mg/kg	0.000036 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				16	mg/kg	1.785	28.563	mg/kg	0.00286 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				25	mg/kg	1.245	31.118	mg/kg	0.00311 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.019 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Report created by Mark Griffiths on 15 Jan 2020

Classification of sample: GEO-2015-TP04

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
GEO-2015-TP04	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.2 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		0.15	mg/kg		0.15	mg/kg	0.000015 %		
2		acenaphthylene		205-917-1	208-96-8		0.11	mg/kg		0.11	mg/kg	0.000011 %		
3		anthracene		204-371-1	120-12-7		0.56	mg/kg		0.56	mg/kg	0.000056 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	40.4	mg/kg		40.4	mg/kg	0.00404 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		148	mg/kg	1.7	251.529	mg/kg	0.0252 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		1.08	mg/kg		1.08	mg/kg	0.000108 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.66	mg/kg		1.66	mg/kg	0.000166 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.87	mg/kg		1.87	mg/kg	0.000187 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		2.11	mg/kg		2.11	mg/kg	0.000211 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		2.93	mg/kg		2.93	mg/kg	0.000293 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.82	mg/kg		0.82	mg/kg	0.000082 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4	mg/kg		0.4	mg/kg	0.00004 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				18	mg/kg	1.462	26.308	mg/kg	0.00263 %		
			215-160-9	1308-38-9									
15		chrysene				1.78	mg/kg		1.78	mg/kg	0.000178 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				52	mg/kg	1.252	65.092	mg/kg	0.00651 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				0.15	mg/kg		0.15	mg/kg	0.000015 %		
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				3.91	mg/kg		3.91	mg/kg	0.000391 %		
			205-912-4	206-44-0									
20		fluorene				0.11	mg/kg		0.11	mg/kg	0.000011 %		
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				1.09	mg/kg		1.09	mg/kg	0.000109 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	110	mg/kg		110	mg/kg	0.011 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				0.2	mg/kg	1.16	0.232	mg/kg	0.0000232 %		
			215-696-3	1344-48-5									
24		naphthalene				0.1	mg/kg		0.1	mg/kg	0.00001 %		
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				22.3	mg/kg	1.545	34.458	mg/kg	0.00345 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				1.98	mg/kg		1.98	mg/kg	0.000198 %		
			201-581-5	85-01-8									
27		pyrene				3.54	mg/kg		3.54	mg/kg	0.000354 %		
			204-927-3	129-00-0									
28		selenium { selenium }				2	mg/kg		2	mg/kg	0.0002 %		
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				27	mg/kg	1.785	48.2	mg/kg	0.00482 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				100	mg/kg	1.245	124.471	mg/kg	0.0124 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0731 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-TP05

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-TP05
Sample Depth:
2 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
2		acenaphthylene		205-917-1	208-96-8		0.05	mg/kg		0.05	mg/kg	0.000005 %		
3		anthracene		204-371-1	120-12-7		0.18	mg/kg		0.18	mg/kg	0.000018 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	2.5	mg/kg		2.5	mg/kg	0.00025 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		59	mg/kg	1.7	100.272	mg/kg	0.01 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.22	mg/kg		0.22	mg/kg	0.000022 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.53	mg/kg		0.53	mg/kg	0.000053 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.39	mg/kg		0.39	mg/kg	0.000039 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.44	mg/kg		0.44	mg/kg	0.000044 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		0.61	mg/kg		0.61	mg/kg	0.000061 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.17	mg/kg		0.17	mg/kg	0.000017 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.7	mg/kg	2.775	1.943	mg/kg	0.000194 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				47.5	mg/kg	1.462	69.424	mg/kg	0.00694 %		
			215-160-9	1308-38-9									
15		chrysene				0.46	mg/kg		0.46	mg/kg	0.000046 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				14	mg/kg	1.252	17.525	mg/kg	0.00175 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				0.89	mg/kg		0.89	mg/kg	0.000089 %		
			205-912-4	206-44-0									
20		fluorene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				0.21	mg/kg		0.21	mg/kg	0.000021 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	24	mg/kg		24	mg/kg	0.0024 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				<0.1	mg/kg	1.16	<0.116	mg/kg	<0.0000116 %		<LOD
			215-696-3	1344-48-5									
24		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				8.3	mg/kg	1.545	12.825	mg/kg	0.00128 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				0.57	mg/kg		0.57	mg/kg	0.000057 %		
			201-581-5	85-01-8									
27		pyrene				0.89	mg/kg		0.89	mg/kg	0.000089 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				21	mg/kg	1.785	37.489	mg/kg	0.00375 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				30	mg/kg	1.245	37.341	mg/kg	0.00373 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0311 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-TP05[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-TP05[2]
Sample Depth:
1.4 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		2.48	mg/kg		2.48	mg/kg	0.000248 %		
2		acenaphthylene		205-917-1	208-96-8		0.84	mg/kg		0.84	mg/kg	0.000084 %		
3		anthracene		204-371-1	120-12-7		2.63	mg/kg		2.63	mg/kg	0.000263 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	53.3	mg/kg		53.3	mg/kg	0.00533 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		271	mg/kg	1.7	460.569	mg/kg	0.0461 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		1.13	mg/kg		1.13	mg/kg	0.000113 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		4.09	mg/kg		4.09	mg/kg	0.000409 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		2.3	mg/kg		2.3	mg/kg	0.00023 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		2.44	mg/kg		2.44	mg/kg	0.000244 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		3.39	mg/kg		3.39	mg/kg	0.000339 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.95	mg/kg		0.95	mg/kg	0.000095 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		2.1	mg/kg	2.775	5.828	mg/kg	0.000583 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4	mg/kg		0.4	mg/kg	0.00004 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chromium { chromium(III) oxide }		215-160-9	1308-38-9		45.8	mg/kg	1.462	66.939	mg/kg	0.00669 %		
15		chrysene	601-048-00-0	205-923-4	218-01-9		2.99	mg/kg		2.99	mg/kg	0.000299 %		
16		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		57	mg/kg	1.252	71.351	mg/kg	0.00714 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.19	mg/kg		0.19	mg/kg	0.000019 %		
19		dibenzofuran		205-071-3	132-64-9		0.044	mg/kg		0.044	mg/kg	0.0000044 %		
20		fluoranthene		205-912-4	206-44-0		9.7	mg/kg		9.7	mg/kg	0.00097 %		
21		fluorene		201-695-5	86-73-7		2.21	mg/kg		2.21	mg/kg	0.000221 %		
22		indeno[123-cd]pyrene		205-893-2	193-39-5		1.13	mg/kg		1.13	mg/kg	0.000113 %		
23		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	32	mg/kg		32	mg/kg	0.0032 %		
24		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		**<LOD**
25		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		<0.1	mg/kg	1.16	<0.116	mg/kg	<0.0000116 %		**<LOD**
26		naphthalene	601-052-00-2	202-049-5	91-20-3		1.53	mg/kg		1.53	mg/kg	0.000153 %		
27		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		32.3	mg/kg	1.545	49.909	mg/kg	0.00499 %		
28		phenanthrene		201-581-5	85-01-8		16.04	mg/kg		16.04	mg/kg	0.0016 %		
29		pyrene		204-927-3	129-00-0		8.79	mg/kg		8.79	mg/kg	0.000879 %		
30		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		1	mg/kg		1	mg/kg	0.0001 %		
31		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		48	mg/kg	1.785	85.689	mg/kg	0.00857 %		
32		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		55	mg/kg	1.245	68.459	mg/kg	0.00685 %		
											Total:	0.0959 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-TP06

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
GEO-2015-TP06	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.3 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.23	mg/kg		0.23	mg/kg	0.000023 %		
2	acenaphthylene		205-917-1	208-96-8		0.14	mg/kg		0.14	mg/kg	0.000014 %		
3	anthracene		204-371-1	120-12-7		0.39	mg/kg		0.39	mg/kg	0.000039 %		
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	19.5	mg/kg		19.5	mg/kg	0.00195 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		184	mg/kg	1.7	312.711	mg/kg	0.0313 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		1.02	mg/kg		1.02	mg/kg	0.000102 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.5	mg/kg		1.5	mg/kg	0.00015 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.67	mg/kg		1.67	mg/kg	0.000167 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.94	mg/kg		1.94	mg/kg	0.000194 %		
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		2.7	mg/kg		2.7	mg/kg	0.00027 %		
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.76	mg/kg		0.76	mg/kg	0.000076 %		
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.3	mg/kg	2.775	3.608	mg/kg	0.000361 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.7	mg/kg		0.7	mg/kg	0.00007 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				31.2	mg/kg	1.462	45.601	mg/kg	0.00456 %		
			215-160-9	1308-38-9									
15		chrysene				1.67	mg/kg		1.67	mg/kg	0.000167 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				80	mg/kg	1.252	100.142	mg/kg	0.01 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				1.9	mg/kg	1.884	3.58	mg/kg	0.000358 %		
		006-007-00-5											
18		dibenz[a,h]anthracene				0.2	mg/kg		0.2	mg/kg	0.00002 %		
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				3.15	mg/kg		3.15	mg/kg	0.000315 %		
			205-912-4	206-44-0									
20		fluorene				0.14	mg/kg		0.14	mg/kg	0.000014 %		
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				1.02	mg/kg		1.02	mg/kg	0.000102 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	289	mg/kg		289	mg/kg	0.0289 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				0.8	mg/kg	1.16	0.928	mg/kg	0.0000928 %		
			215-696-3	1344-48-5									
24		naphthalene				0.2	mg/kg		0.2	mg/kg	0.00002 %		
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				22.9	mg/kg	1.545	35.385	mg/kg	0.00354 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				1.9	mg/kg		1.9	mg/kg	0.00019 %		
			201-581-5	85-01-8									
27		pyrene				2.93	mg/kg		2.93	mg/kg	0.000293 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				28	mg/kg	1.785	49.985	mg/kg	0.005 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				186	mg/kg	1.245	231.517	mg/kg	0.0232 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.112 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-TP07

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-TP07
Sample Depth:
1.8 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		0.34	mg/kg		0.34	mg/kg	0.000034 %		
2		acenaphthylene		205-917-1	208-96-8		0.42	mg/kg		0.42	mg/kg	0.000042 %		
3		anthracene		204-371-1	120-12-7		1.04	mg/kg		1.04	mg/kg	0.000104 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	2.9	mg/kg		2.9	mg/kg	0.00029 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		43	mg/kg	1.7	73.079	mg/kg	0.00731 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		0.88	mg/kg		0.88	mg/kg	0.000088 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		2.25	mg/kg		2.25	mg/kg	0.000225 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.65	mg/kg		1.65	mg/kg	0.000165 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.79	mg/kg		1.79	mg/kg	0.000179 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		2.48	mg/kg		2.48	mg/kg	0.000248 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.69	mg/kg		0.69	mg/kg	0.000069 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.7	mg/kg	2.775	1.943	mg/kg	0.000194 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				11.8	mg/kg	1.462	17.246	mg/kg	0.00172 %		
			215-160-9	1308-38-9									
15		chrysene				1.85	mg/kg		1.85	mg/kg	0.000185 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				11	mg/kg	1.252	13.77	mg/kg	0.00138 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				0.15	mg/kg		0.15	mg/kg	0.000015 %		
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				4.11	mg/kg		4.11	mg/kg	0.000411 %		
			205-912-4	206-44-0									
20		fluorene				0.63	mg/kg		0.63	mg/kg	0.000063 %		
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				0.84	mg/kg		0.84	mg/kg	0.000084 %		
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	15	mg/kg		15	mg/kg	0.0015 %		
		082-001-00-6											
23		mercury { mercury(II) sulphide }				<0.1	mg/kg	1.16	<0.116	mg/kg	<0.0000116 %		<LOD
			215-696-3	1344-48-5									
24		naphthalene				0.43	mg/kg		0.43	mg/kg	0.000043 %		
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel(IV) oxide (nickel dioxide) }				9.6	mg/kg	1.545	14.834	mg/kg	0.00148 %		
		028-004-00-8	234-823-3	12035-36-8									
26		phenanthrene				4.62	mg/kg		4.62	mg/kg	0.000462 %		
			201-581-5	85-01-8									
27		pyrene				4.24	mg/kg		4.24	mg/kg	0.000424 %		
			204-927-3	129-00-0									
28		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
29		vanadium { divanadium pentaoxide; vanadium pentoxide }				17	mg/kg	1.785	30.348	mg/kg	0.00303 %		
		023-001-00-8	215-239-8	1314-62-1									
30		zinc { zinc oxide }				28	mg/kg	1.245	34.852	mg/kg	0.00349 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0235 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Report created by Mark Griffiths on 15 Jan 2020

Classification of sample: GEO-2015-TP08

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
GEO-2015-TP08	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.8 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
3	anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	5.4	mg/kg		5.4	mg/kg	0.00054 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		189	mg/kg	1.7	321.209	mg/kg	0.0321 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.2	mg/kg	2.775	3.33	mg/kg	0.000333 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }	215-160-9	1308-38-9		47.8	mg/kg	1.462	69.862	mg/kg	0.00699 %		
15		chrysene	205-923-4	218-01-9		0.02	mg/kg		0.02	mg/kg	0.000002 %		
		601-048-00-0											
16		copper { copper(II) oxide }	215-269-1	1317-38-0		28	mg/kg	1.252	35.05	mg/kg	0.0035 %		
		029-016-00-6											
17		dibenz[a,h]anthracene	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-041-00-2											
18		fluoranthene	205-912-4	206-44-0		0.03	mg/kg		0.03	mg/kg	0.000003 %		
19		fluorene	201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
20		indeno[123-cd]pyrene	205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	12	mg/kg		12	mg/kg	0.0012 %		
		082-001-00-6											
22		mercury { mercury(II) sulphide }	215-696-3	1344-48-5		<0.1	mg/kg	1.16	<0.116	mg/kg	<0.0000116 %		<LOD
23		naphthalene	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2											
24		nickel { nickel(IV) oxide (nickel dioxide) }	234-823-3	12035-36-8		33.4	mg/kg	1.545	51.609	mg/kg	0.00516 %		
		028-004-00-8											
25		phenanthrene	201-581-5	85-01-8		0.03	mg/kg		0.03	mg/kg	0.000003 %		
26		pyrene	204-927-3	129-00-0		0.03	mg/kg		0.03	mg/kg	0.000003 %		
27		selenium { selenium }	231-957-4	7782-49-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2											
28		vanadium { divanadium pentaoxide; vanadium pentoxide }	215-239-8	1314-62-1		31	mg/kg	1.785	55.341	mg/kg	0.00553 %		
		023-001-00-8											
29		zinc { zinc oxide }	215-222-5	1314-13-2		76	mg/kg	1.245	94.598	mg/kg	0.00946 %		
		030-013-00-7											
										Total:	0.065 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Report created by Mark Griffiths on 15 Jan 2020

Classification of sample: GEO-2015-WLS01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-WLS01
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	4.7	mg/kg		4.7	mg/kg	0.00047 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		50	mg/kg	1.7	84.976	mg/kg	0.0085 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.6	mg/kg	2.775	1.665	mg/kg	0.000167 %		
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				52.8	mg/kg	1.462	77.17	mg/kg	0.00772 %		
			215-160-9	1308-38-9									
15		chrysene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				14	mg/kg	1.252	17.525	mg/kg	0.00175 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19		dibenzofuran				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-071-3	132-64-9									
20		fluoranthene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			205-912-4	206-44-0									
21		fluorene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			201-695-5	86-73-7									
22		indeno[123-cd]pyrene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			205-893-2	193-39-5									
23		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	11	mg/kg		11	mg/kg	0.0011 %		
		082-001-00-6											
24		mercury { mercury(II) sulphide }				<0.1	mg/kg	1.16	<0.116	mg/kg	<0.0000116 %		<LOD
			215-696-3	1344-48-5									
25		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
26		nickel { nickel(IV) oxide (nickel dioxide) }				19.6	mg/kg	1.545	30.286	mg/kg	0.00303 %		
		028-004-00-8	234-823-3	12035-36-8									
27		phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			201-581-5	85-01-8									
28		pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
			204-927-3	129-00-0									
29		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
30		vanadium { divanadium pentaoxide; vanadium pentoxide }				19	mg/kg	1.785	33.919	mg/kg	0.00339 %		
		023-001-00-8	215-239-8	1314-62-1									
31		zinc { zinc oxide }				37	mg/kg	1.245	46.054	mg/kg	0.00461 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.031 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-WLS02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
GEO-2015-WLS02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
2 m	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		0.28 mg/kg		0.28 mg/kg	0.000028 %		
2	acenaphthylene		205-917-1	208-96-8		0.22 mg/kg		0.22 mg/kg	0.000022 %		
3	anthracene		204-371-1	120-12-7		1.11 mg/kg		1.11 mg/kg	0.000111 %		
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	10.5 mg/kg		10.5 mg/kg	0.00105 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		136 mg/kg	1.7	231.134 mg/kg	0.0231 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		1.79 mg/kg		1.79 mg/kg	0.000179 %		
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		4.15 mg/kg		4.15 mg/kg	0.000415 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		3.09 mg/kg		3.09 mg/kg	0.000309 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		3.85 mg/kg		3.85 mg/kg	0.000385 %		
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		5.35 mg/kg		5.35 mg/kg	0.000535 %		
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.5 mg/kg		1.5 mg/kg	0.00015 %		
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.3 mg/kg	2.775	3.608 mg/kg	0.000361 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.2 mg/kg		0.2 mg/kg	0.00002 %		

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#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		chromium { chromium(III) oxide }		215-160-9	1308-38-9		11.1	mg/kg	1.462	16.223	mg/kg	0.00162 %		
15		chrysene	601-048-00-0	205-923-4	218-01-9		3.59	mg/kg		3.59	mg/kg	0.000359 %		
16		copper { copper(II) oxide }	029-016-00-6	215-269-1	1317-38-0		82	mg/kg	1.252	102.646	mg/kg	0.0103 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.32	mg/kg		0.32	mg/kg	0.000032 %		
19		dibenzofuran		205-071-3	132-64-9		0.071	mg/kg		0.071	mg/kg	0.0000071 %		
20		fluoranthene		205-912-4	206-44-0		7.18	mg/kg		7.18	mg/kg	0.000718 %		
21		fluorene		201-695-5	86-73-7		0.27	mg/kg		0.27	mg/kg	0.000027 %		
22		indeno[123-cd]pyrene		205-893-2	193-39-5		1.92	mg/kg		1.92	mg/kg	0.000192 %		
23		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	190	mg/kg		190	mg/kg	0.019 %		
24		mercury { mercury(II) sulphide }		215-696-3	1344-48-5		0.2	mg/kg	1.16	0.232	mg/kg	0.0000232 %		
25		naphthalene	601-052-00-2	202-049-5	91-20-3		0.15	mg/kg		0.15	mg/kg	0.000015 %		
26		nickel { nickel(IV) oxide (nickel dioxide) }	028-004-00-8	234-823-3	12035-36-8		15.5	mg/kg	1.545	23.95	mg/kg	0.0024 %		
27		phenanthrene		201-581-5	85-01-8		4.11	mg/kg		4.11	mg/kg	0.000411 %		
28		pyrene		204-927-3	129-00-0		6.72	mg/kg		6.72	mg/kg	0.000672 %		
29		selenium { selenium }	034-001-00-2	231-957-4	7782-49-2		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
30		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		18	mg/kg	1.785	32.133	mg/kg	0.00321 %		
31		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		56	mg/kg	1.245	69.704	mg/kg	0.00697 %		
											Total:	0.0728 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-WLS02[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-WLS02[2]
Sample Depth:
1 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	●	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
2	●	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
3	●	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
4	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
8	●	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.07 mg/kg		<0.07 mg/kg	<0.000007 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
10		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
11		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
12	●	fluoranthene		205-912-4	206-44-0		0.03 mg/kg		0.03 mg/kg	0.000003 %		
13	●	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
14	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
15		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
17	●	phenanthrene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
			201-581-5	85-01-8									
18	●	pyrene				0.03	mg/kg		0.03	mg/kg	0.000003 %		
			204-927-3	129-00-0									
										Total:	0.00006 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
<LOD	Below limit of detection
ND	Not detected

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Classification of sample: GEO-2015-WLS03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-WLS03
Sample Depth:
3.5 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
2	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<**LOD**
3	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<**LOD**
4	arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	8.1 mg/kg		8.1 mg/kg	0.00081 %		
5	barium { barium sulfate }		231-784-4	7727-43-7		84 mg/kg	1.7	142.759 mg/kg	0.0143 %		
6	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<**LOD**
7	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.07 mg/kg		0.07 mg/kg	0.000007 %		
8	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
9	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.06 mg/kg		0.06 mg/kg	0.000006 %		
10	benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		0.08 mg/kg		0.08 mg/kg	0.000008 %		
11	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.02 mg/kg		0.02 mg/kg	0.000002 %		
12	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.9 mg/kg	2.775	2.498 mg/kg	0.00025 %		
13	cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.1 mg/kg		0.1 mg/kg	0.00001 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				19	mg/kg	1.462	27.77	mg/kg	0.00278 %		
			215-160-9	1308-38-9									
15		chrysene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				37	mg/kg	1.252	46.316	mg/kg	0.00463 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
18		dibenz[a,h]anthracene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				0.07	mg/kg		0.07	mg/kg	0.000007 %		
			205-912-4	206-44-0									
20		fluorene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	56	mg/kg		56	mg/kg	0.0056 %		
		082-001-00-6											
23		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
24		mercury { mercury(II) sulphide }				0.2	mg/kg	1.16	0.232	mg/kg	0.0000232 %		
			215-696-3	1344-48-5									
25		naphthalene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
26		nickel { nickel(IV) oxide (nickel dioxide) }				22.9	mg/kg	1.545	35.385	mg/kg	0.00354 %		
		028-004-00-8	234-823-3	12035-36-8									
27		phenanthrene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
			201-581-5	85-01-8									
28		pyrene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
			204-927-3	129-00-0									
29		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
30		vanadium { divanadium pentaoxide; vanadium pentoxide }				21	mg/kg	1.785	37.489	mg/kg	0.00375 %		
		023-001-00-8	215-239-8	1314-62-1									
31		zinc { zinc oxide }				62	mg/kg	1.245	77.172	mg/kg	0.00772 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0437 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: GEO-2015-WLS03[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
GEO-2015-WLS03[2]
Sample Depth:
2.5 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		1.61	mg/kg		1.61	mg/kg	0.000161 %		
2		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
3		anthracene		204-371-1	120-12-7		1.94	mg/kg		1.94	mg/kg	0.000194 %		
4		arsenic { arsenic compounds, with the exception of those specified elsewhere in this Annex }	033-002-00-5			1	2.2	mg/kg		2.2	mg/kg	0.00022 %		
5		barium { barium sulfate }		231-784-4	7727-43-7		70	mg/kg	1.7	118.966	mg/kg	0.0119 %		
6		benzo[ghi]perylene		205-883-8	191-24-2		1.71	mg/kg		1.71	mg/kg	0.000171 %		
7		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		4.09	mg/kg		4.09	mg/kg	0.000409 %		
8		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		3.04	mg/kg		3.04	mg/kg	0.000304 %		
9		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		4.08	mg/kg		4.08	mg/kg	0.000408 %		
10		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		5.67	mg/kg		5.67	mg/kg	0.000567 %		
11		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.59	mg/kg		1.59	mg/kg	0.000159 %		
12		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		<0.5	mg/kg	2.775	<1.388	mg/kg	<0.000139 %		<**LOD**
13		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.2	mg/kg		0.2	mg/kg	0.00002 %		

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		chromium { chromium(III) oxide }				57.3	mg/kg	1.462	83.747	mg/kg	0.00837 %		
			215-160-9	1308-38-9									
15		chrysene				3.69	mg/kg		3.69	mg/kg	0.000369 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { copper(II) oxide }				21	mg/kg	1.252	26.287	mg/kg	0.00263 %		
		029-016-00-6	215-269-1	1317-38-0									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.6	mg/kg	1.884	1.13	mg/kg	0.000113 %		
		006-007-00-5											
18		dibenz[a,h]anthracene				0.35	mg/kg		0.35	mg/kg	0.000035 %		
		601-041-00-2	200-181-8	53-70-3									
19		dibenzofuran				0.042	mg/kg		0.042	mg/kg	0.0000042 %		
			205-071-3	132-64-9									
20		fluoranthene				9.89	mg/kg		9.89	mg/kg	0.000989 %		
			205-912-4	206-44-0									
21		fluorene				0.83	mg/kg		0.83	mg/kg	0.000083 %		
			201-695-5	86-73-7									
22		indeno[123-cd]pyrene				1.97	mg/kg		1.97	mg/kg	0.000197 %		
			205-893-2	193-39-5									
23		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	55	mg/kg		55	mg/kg	0.0055 %		
		082-001-00-6											
24		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
25		mercury { mercury(II) sulphide }				1	mg/kg	1.16	1.16	mg/kg	0.000116 %		
			215-696-3	1344-48-5									
26		naphthalene				0.1	mg/kg		0.1	mg/kg	0.00001 %		
		601-052-00-2	202-049-5	91-20-3									
27		nickel { nickel(IV) oxide (nickel dioxide) }				6.6	mg/kg	1.545	10.198	mg/kg	0.00102 %		
		028-004-00-8	234-823-3	12035-36-8									
28		phenanthrene				7.76	mg/kg		7.76	mg/kg	0.000776 %		
			201-581-5	85-01-8									
29		pyrene				7.23	mg/kg		7.23	mg/kg	0.000723 %		
			204-927-3	129-00-0									
30		selenium { selenium }				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		034-001-00-2	231-957-4	7782-49-2									
31		vanadium { divanadium pentaoxide; vanadium pentoxide }				11	mg/kg	1.785	19.637	mg/kg	0.00196 %		
		023-001-00-8	215-239-8	1314-62-1									
32		zinc { zinc oxide }				42	mg/kg	1.245	52.278	mg/kg	0.00523 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.0429 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Appendix A: Classifier defined and non CLP determinands

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Aquatic Chronic 2 H411 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 1 H310 , Acute Tox. 1 H330 , Acute Tox. 4 H302

anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

arsenic compounds, with the exception of those specified elsewhere in this Annex

CLP index number: 033-002-00-5
Description/Comments: Worst Case: IARC considers arsenic compounds Group 1; Carcinogenic to humans
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s)/Risk Phrase(s):
03 Jun 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex

CLP index number: 048-001-00-5
Description/Comments: Worst Case: IARC considers cadmium compounds Group 1; Carcinogenic to humans
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s)/Risk Phrase(s):
29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

chromium(III) oxide (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s)/Risk Phrase(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

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- **dibenzofuran** (EC Number: 205-071-3, CAS Number: 132-64-9)

Description/Comments: VOC; Data from C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Aquatic Chronic 2 H411 , Acute Tox. 4 H332 , Acute Tox. 4 H312 , Acute Tox. 4 H302

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

- **lead compounds with the exception of those specified elsewhere in this Annex**

CLP index number: 082-001-00-6
Description/Comments: Least-worst case: Lead REACH Consortium considers some lead compounds Carcinogenic category 2B
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s)/Risk Phrase(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

- **mercury(II) sulphide** (EC Number: 215-696-3, CAS Number: 1344-48-5)

Conversion factor: 1.16
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT RE 2 H373 , Acute Tox. 2 H300 , Acute Tox. 1 H310 , Acute Tox. 3 H331

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315

- **barium sulfate** (EC Number: 231-784-4, CAS Number: 7727-43-7)

Conversion factor: 1.7
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , STOT RE 2 H373 , Acute Tox. 4 H302 , Acute Tox. 4 H332

- **benzo[bk]fluoranthene** (EC Number: [1] 205-911-9 [2] 205-916-6, CAS Number: [1] 205-99-2 [2] 207-08-9)

Description/Comments: Combined data from harmonised entries in CLP for benzo[b] and benzo[k]fluoranthene; C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Carc. 1B H350

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Appendix B: Rationale for selection of metal species

antimony {antimony compounds, with the exception of the tetroxide (Sb2O4), pentoxide (Sb2O5), trisulphide (Sb2S3), pentasulphide (Sb2S5) and those specified elsewhere in this Annex}

Most likely compound based on site history.

arsenic {arsenic compounds, with the exception of those specified elsewhere in this Annex}

Most likely compound based on site history.

beryllium {beryllium oxide}

Most likely compound based on site history.

cadmium {cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex}

Most likely compound based on site history.

chromium {chromium(III) oxide}

Most likely compound based on site history.

copper {copper(II) oxide}

Most likely compound based on site history.

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Most likely compound based on site history.

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Most likely compound based on site history.

mercury {mercury(II) sulphide}

Most likely compound based on site history.

nickel {nickel(IV) oxide (nickel dioxide)}

Most likely compound based on site history.

selenium {selenium}

Most likely compound based on site history.

vanadium {divanadium pentaoxide; vanadium pentoxide}

Most likely compound based on site history.

zinc {zinc oxide}

Most likely compound based on site history.

barium {barium sulfate}

Most likely compound based on site history.

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2020.13.4139.8254 (13 Jan 2020)
HazWasteOnline Database: 2020.13.4139.8254 (13 Jan 2020)

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This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

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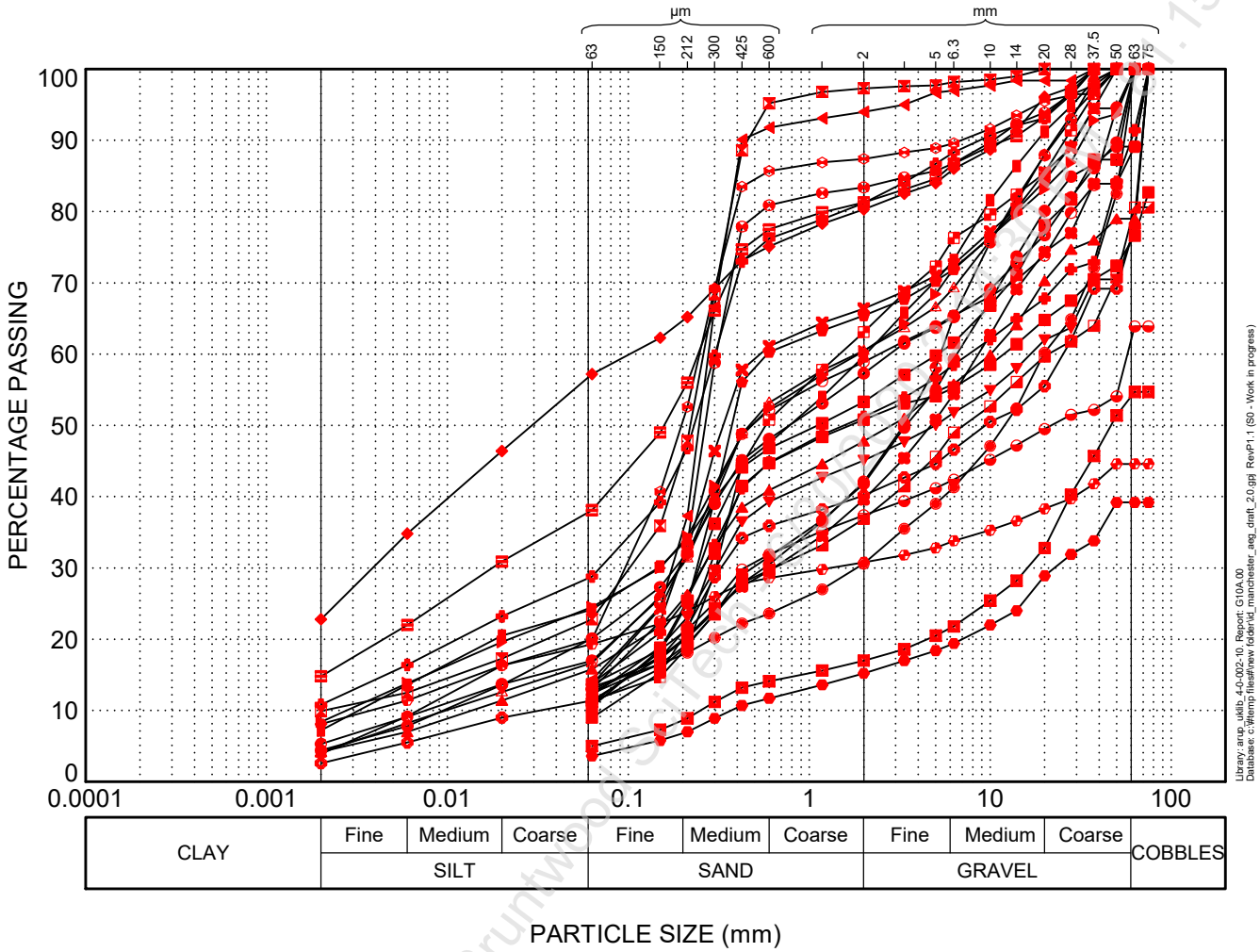
Appendix H

Geotechnical Laboratory Data and Plots

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- ARP-BH002, 32.1mOD
- ARP-BH003, 31.4mOD
- ARP-BH006A, 33.2mOD
- ARP-BH006B, 33.1mOD
- ARP-BH008, 33.5mOD
- ARP-BH008, 31.6mOD
- ARP-BH008, 29.6mOD
- ARP-BH009, 33.2mOD
- ARP-BH009, 30.5mOD
- ARP-BH012A, 31.8mOD
- ARP-BH012A, 29.3mOD
- ARP-BH014, 34.5mOD
- ARP-BH014, 32.7mOD
- ARP-BH001, 37.3mOD
- ARP-BH001, 34.8mOD
- ARP-BH004, 32.8mOD
- ARP-BH004, 29.2mOD
- ARP-BH007, 34.1mOD
- ARP-BH007, 32.2mOD
- ARP-BH011, 31.4mOD
- ARP-BH013, 31.4mOD
- ARP-TP001, 32.4mOD
- ARP-TP001, 31.7mOD
- ARP-TP002, 31.9mOD
- ARP-TP002, 30.4mOD
- ARP-TP003, 33.2mOD
- ARP-TP003, 31.2mOD
- ARP-BH005, 32.6mOD
- ARP-DS001, 33.5mOD
- ARP-DS002, 33.3mOD

Library: arup_ukllb_4-0-002-10, Report: G10A.00
Database: c:\#temp files#new folder\id_manchester_aeg_draft_2.0.gpj RevP1.1 (S0 - Work in progress)

ARUP, gINT v8.30.004
Made by Jordan Weddell on 24-Jan-20

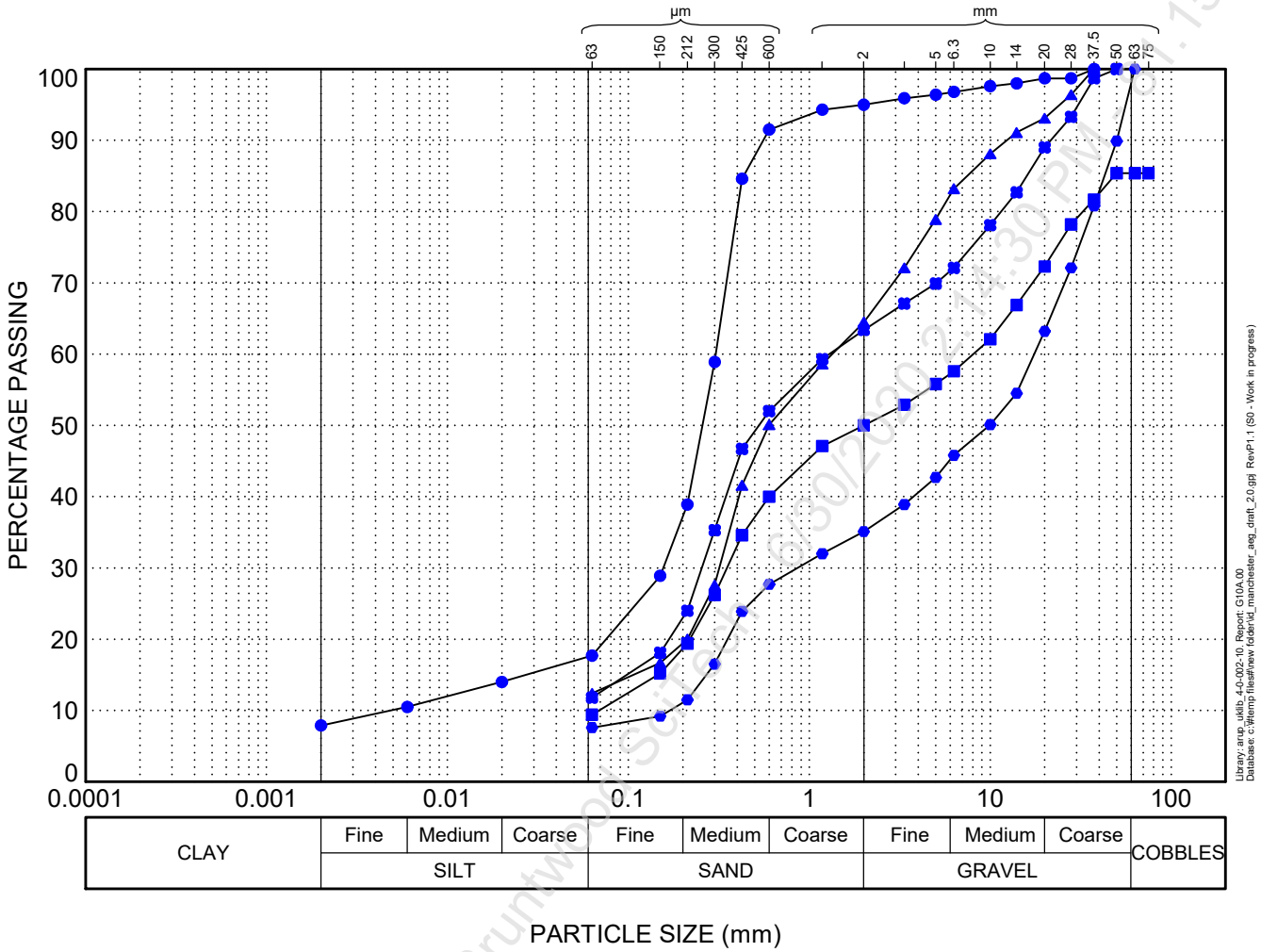
ID MANCHESTER
PARTICLE SIZE DISTRIBUTION
MADE GROUND

265190-00

FIGURE 001

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ID MANCHESTER
PARTICLE SIZE DISTRIBUTION
ALLUVIUM

265190-00

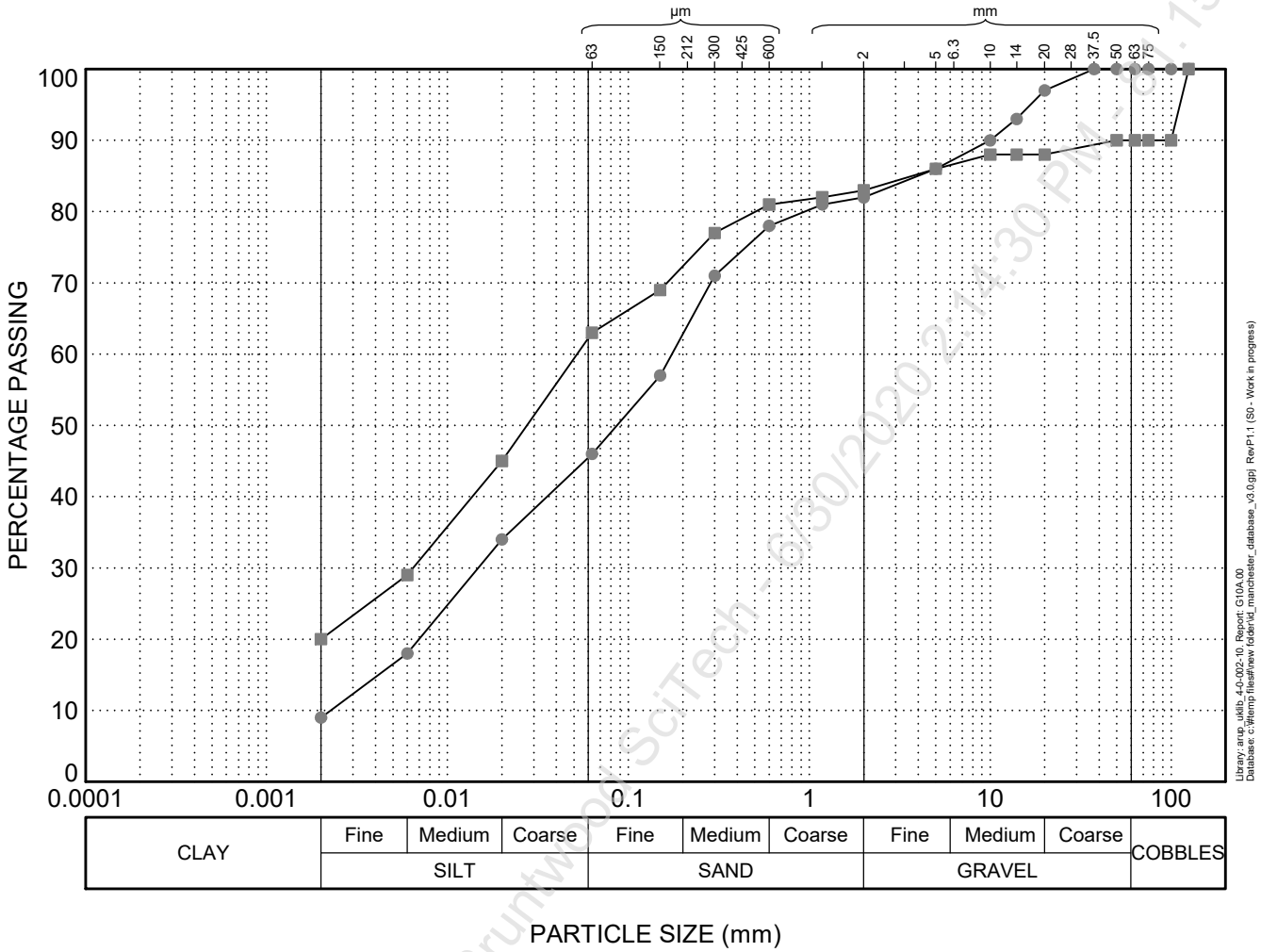
FIGURE 002

ARUP, gINT v8.30.004
Made by Jordan Weddell on 24-Jan-20

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ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 131.154.246.72

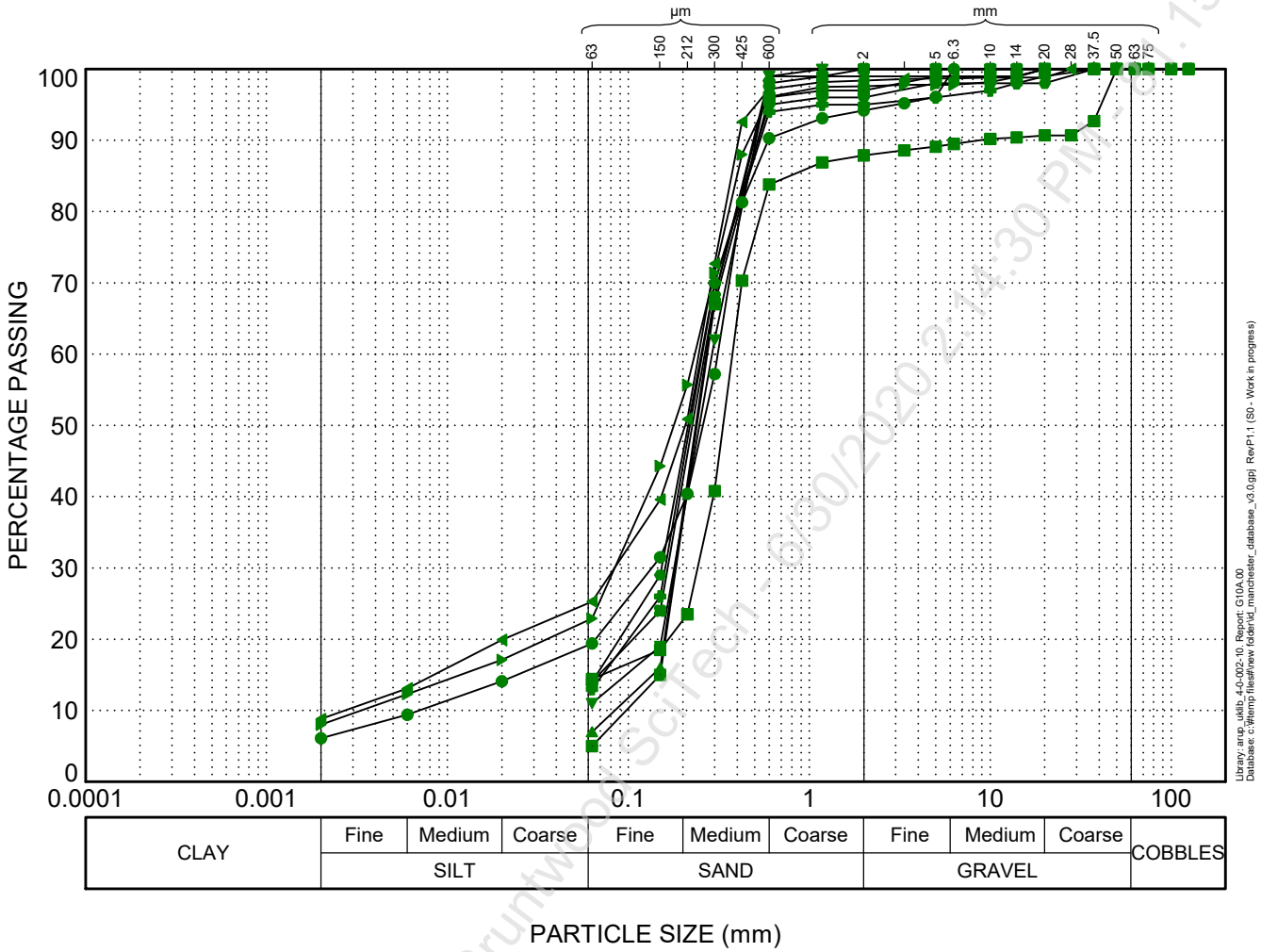
ID MANCHESTER
PARTICLE SIZE DISTRIBUTION
GLACIAL TILL DEPOSITS

FIGURE 003

ARUP, gINT v8.30.004
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- ARP-BH002, 29.6mOD
- ARP-BH003, 28.4mOD
- GEO-2015-CRH02A, 27.5mOD
- GEO-2015-CRH02A, 23.5mOD
- GEO-2015-CRH02A, 17.5mOD
- GEO-2015-CRH03, 30.2mOD
- GEO-2015-CRH03, 25.7mOD
- GEO-2015-CRH03, 21.2mOD
- ARP-BH001, 32.8mOD
- ARP-BH011, 29.4mOD

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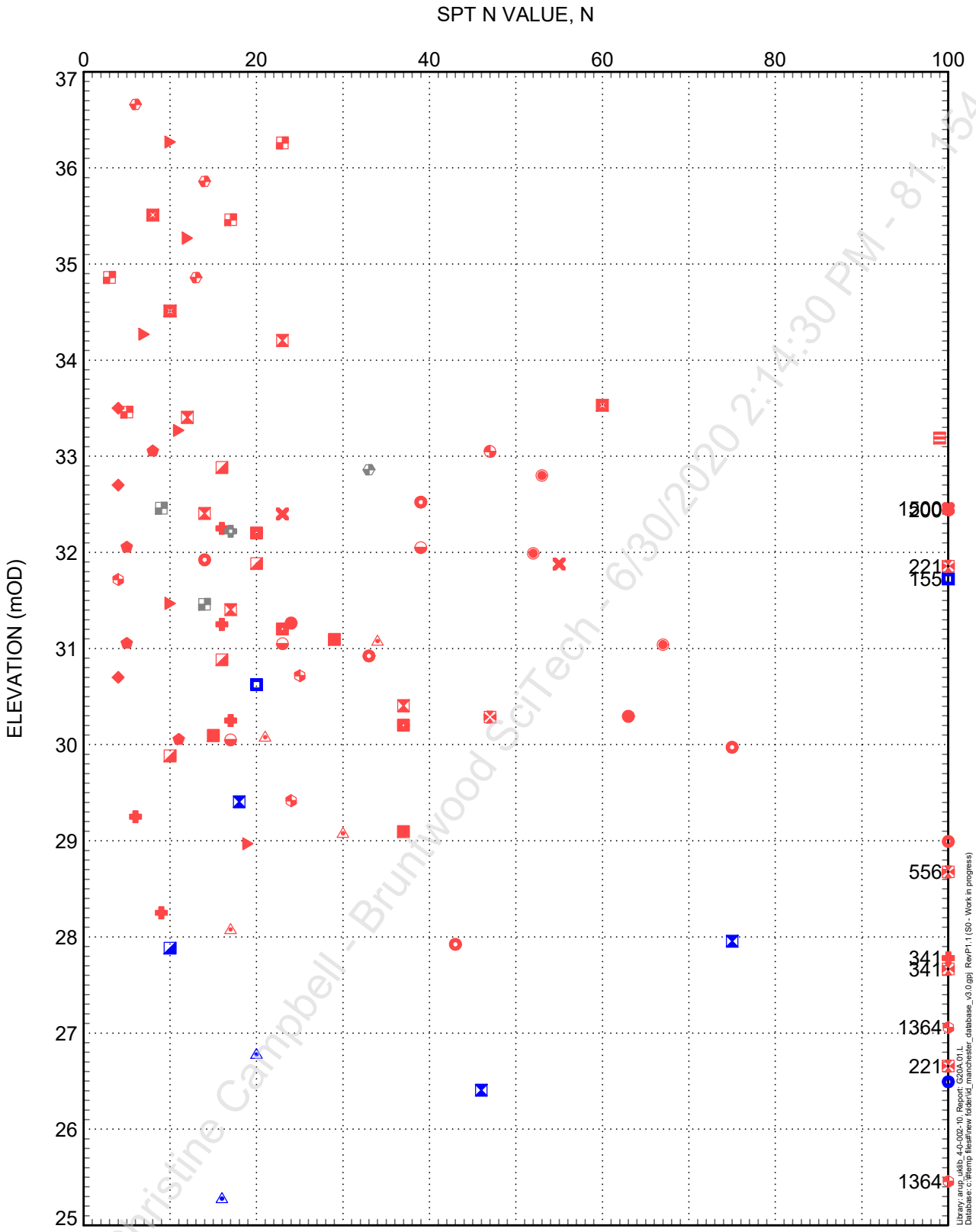
ARUP_gINT v8.30.004
Made by Jordan Weddell on 24-Jan-20

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PARTICLE SIZE DISTRIBUTION
SHERWOOD SANDSTONE

FIGURE 004

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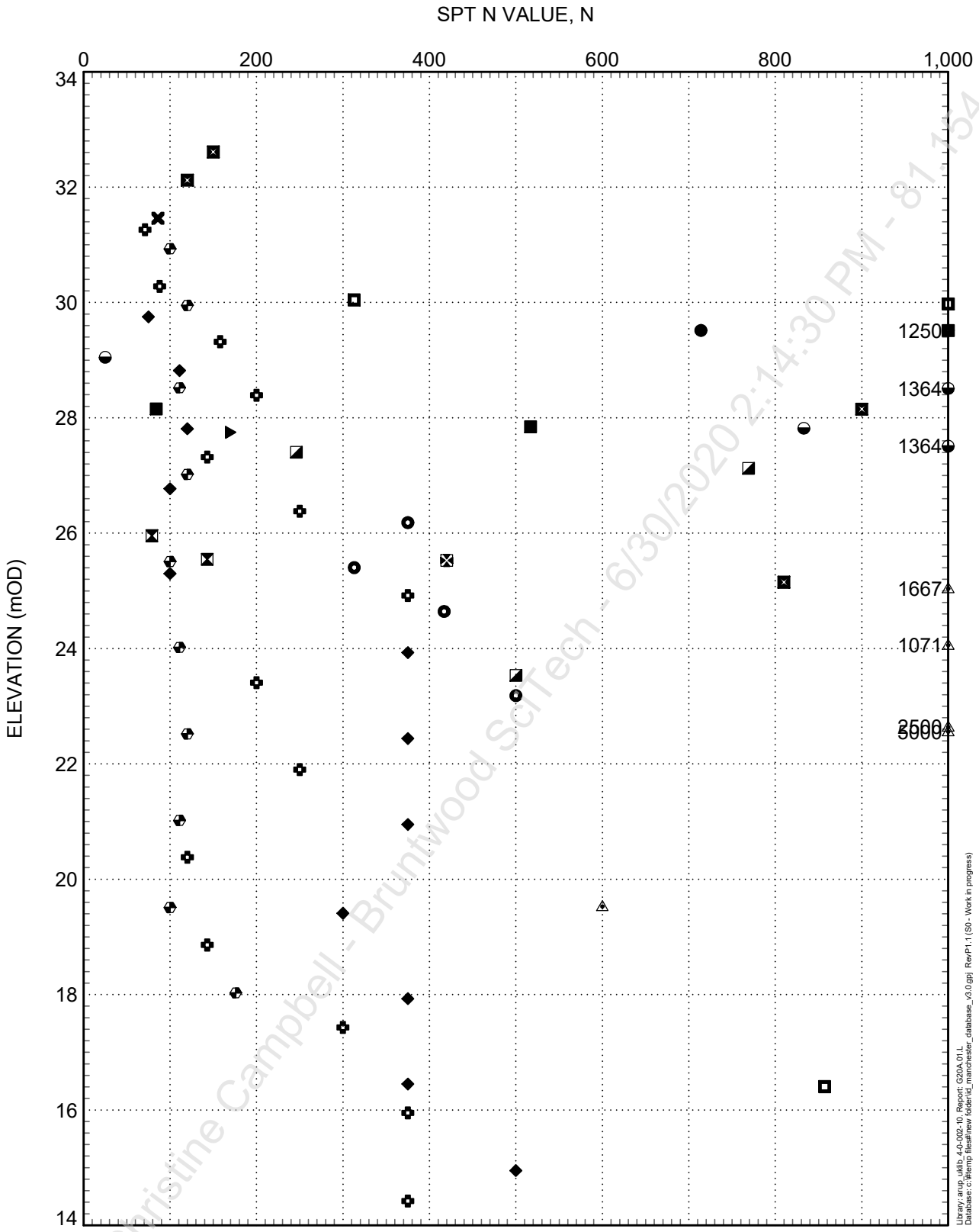
ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

ID MANCHESTER
STANDARD PENETRATION TESTS
SUPERFICIALS

FIGURE 005

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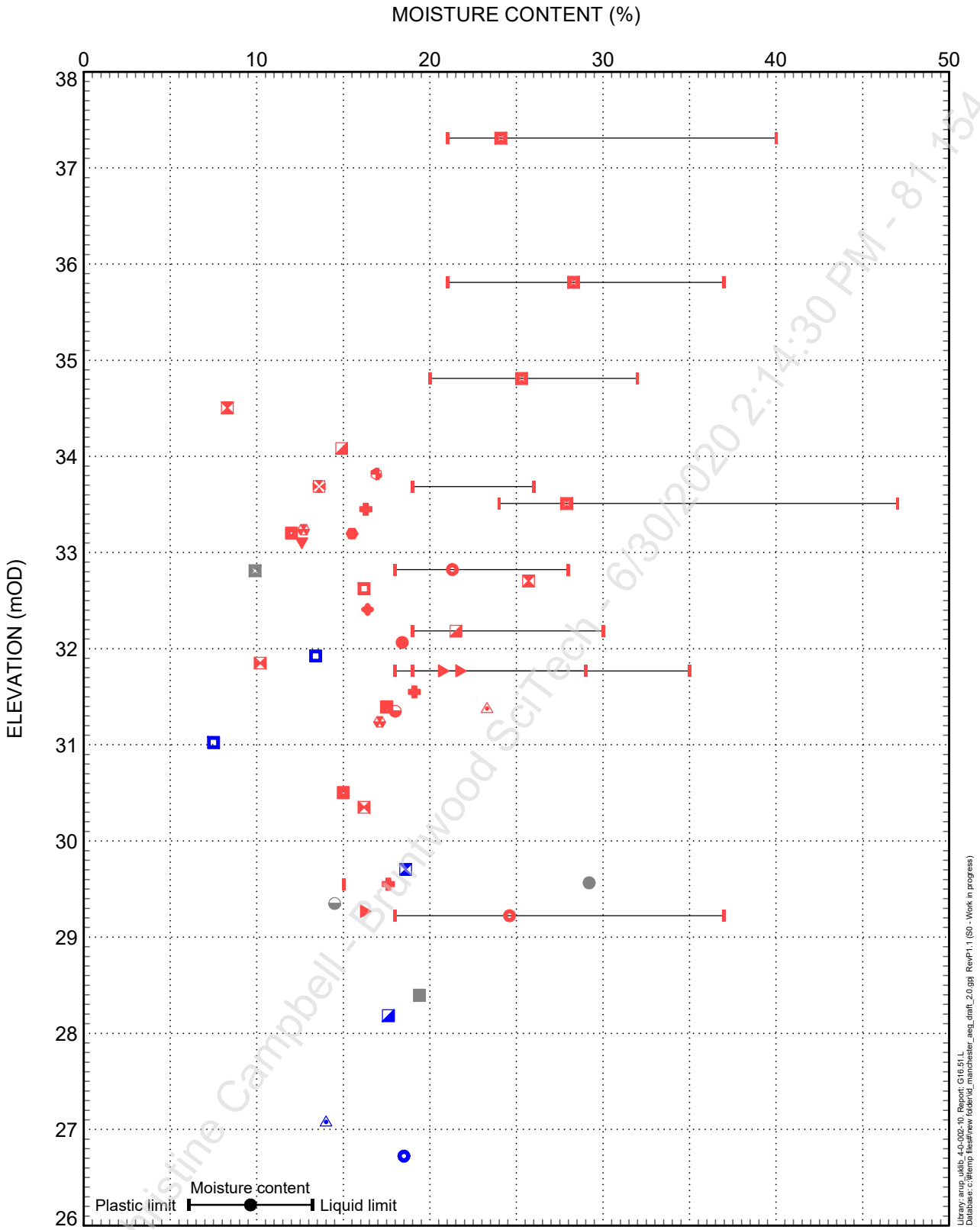


ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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STANDARD PENETRATION TESTS
SHERWOOD SANDSTONE

FIGURE 006

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- Made Ground (MG)
- Alluvium (ALV)
- Sherwood Sandstone (SS)
- ARP-BH002
- ARP-BH003
- ARP-BH006A
- ARP-BH006B
- ARP-BH008
- ARP-BH009
- ARP-BH012A
- ARP-BH014
- ARP-BH001
- ARP-BH004
- ARP-BH007
- ARP-BH011
- ARP-BH013
- ARP-TP001
- ARP-TP002
- ARP-TP003
- ARP-BH005
- ARP-DS001
- ARP-DS002

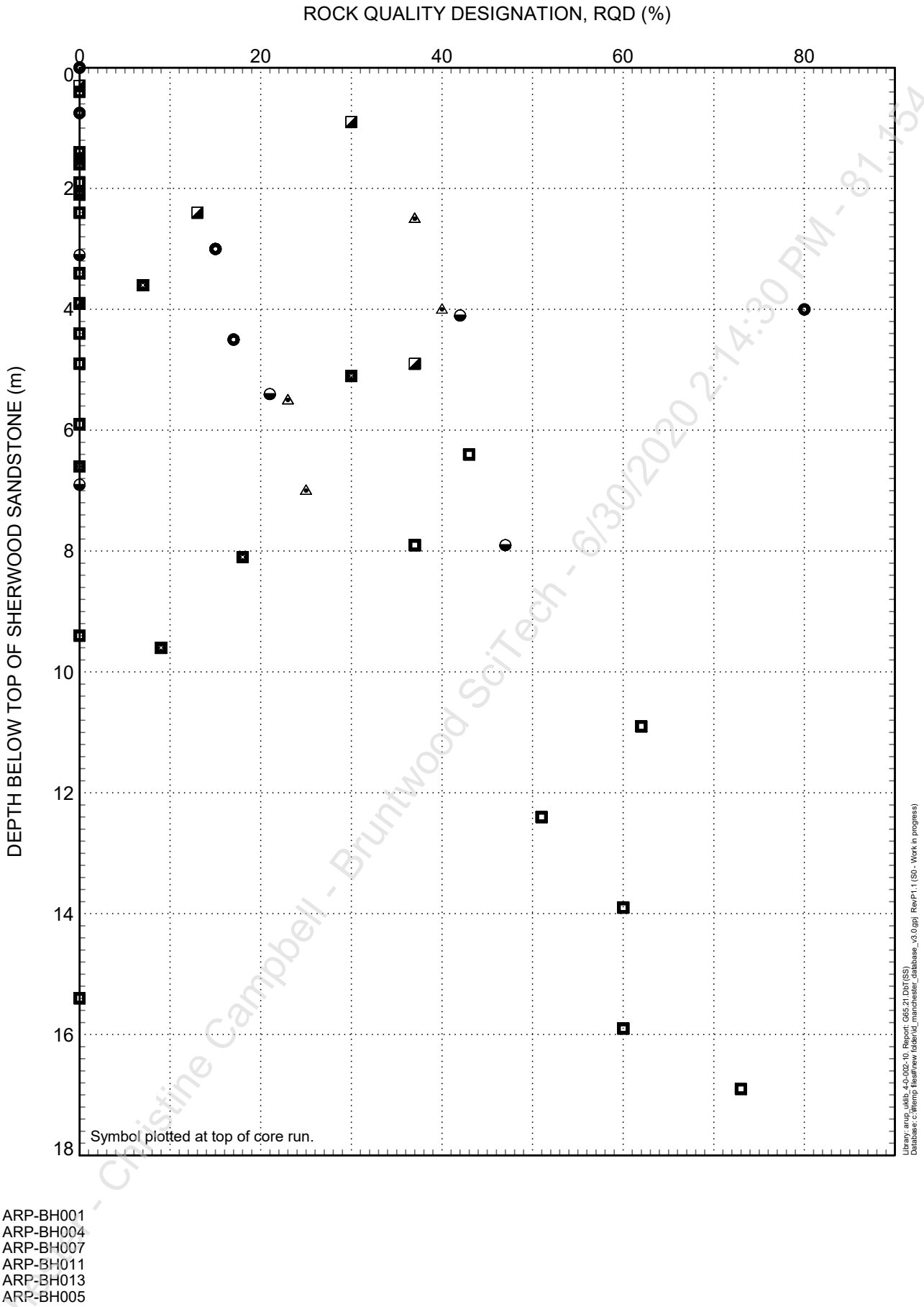
ID MANCHESTER
ATTERBERG LIMITS

265190-00

FIGURE 007

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Library: arup_uklib_4-0_002-10_Report: G65 21 DbT(GS)
Database: c:\temp files\new folder\id_manchester_database_v3.0.ggpj Rev:P1.1 (S0 - Work in progress)

ARUP, gINT v6.30.004
Made by Jordan Weddell on 24-Jan-20

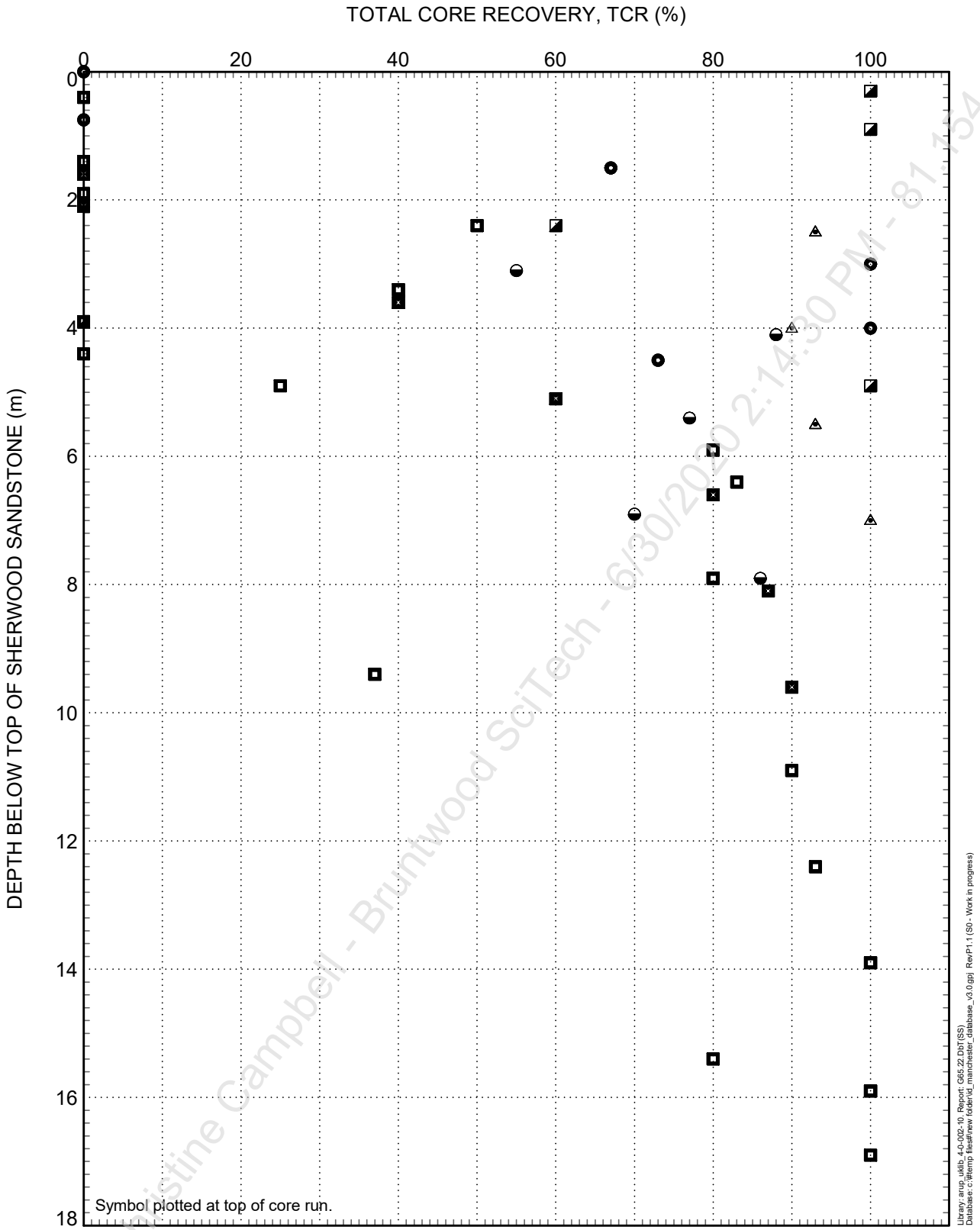
ID MANCHESTER
ROCK QUALITY DESIGNATION

FIGURE 008

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ARP-BH001
ARP-BH004
ARP-BH007
ARP-BH011
ARP-BH013
ARP-BH005

ARUP, gINT v8.30.004
Made by Jordan Weddell on 24-Jan-20

ID MANCHESTER
TOTAL CORE RECOVERY

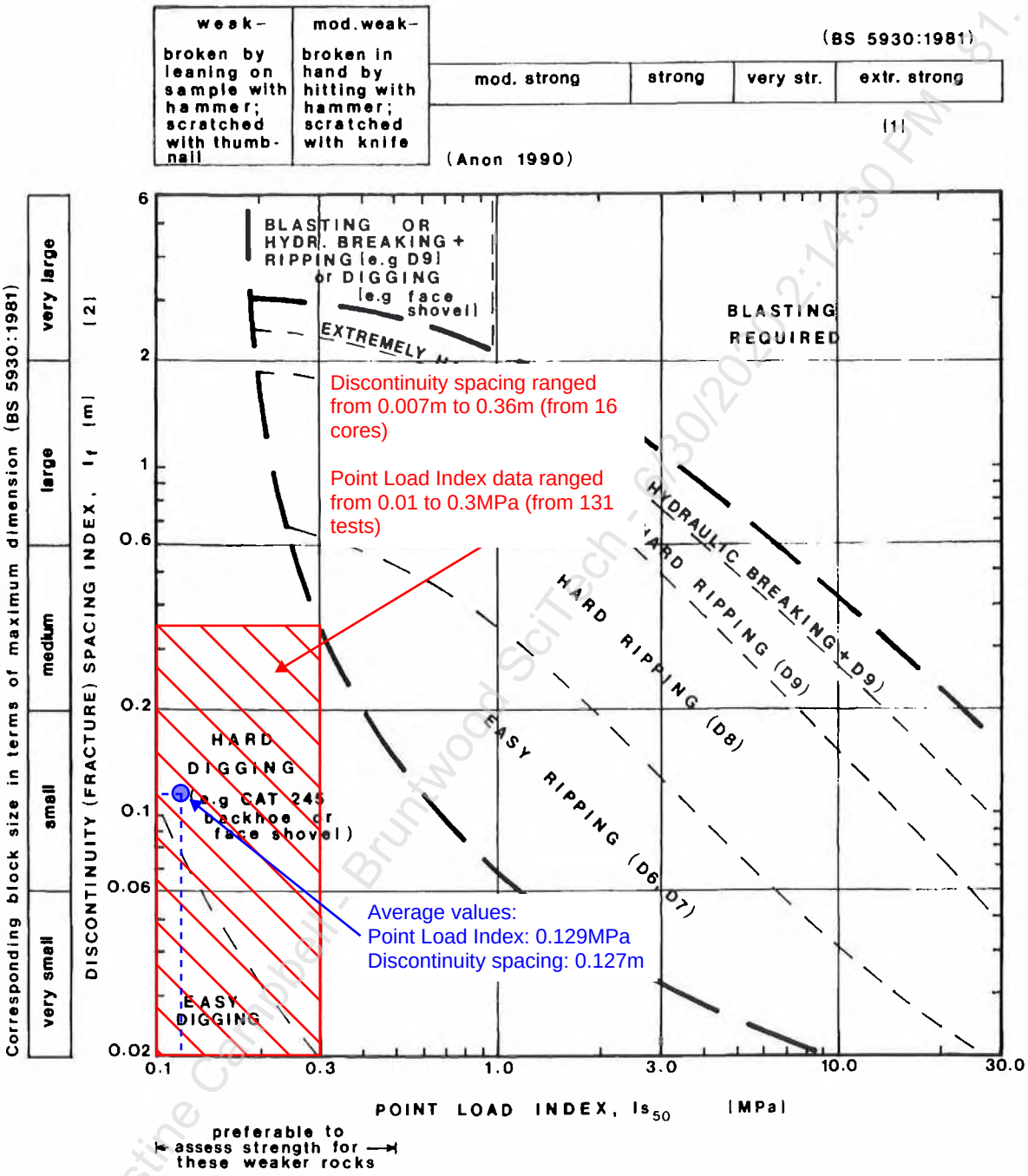
FIGURE 009

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Notes [1] Approx. correlation with point load index (UCS = 20 Is_{50} – This Study).

[2] Where the rock mass structure is unfavourable for ripping, I_f values should be increased (see Table 5).

$Jv = 3/I_f$, for a rock mass with three intersecting joint sets, where I_f is determined on a unit volume basis (see Table 4). RQD = 115 – 3.3 Jv approx. (ISRM 1981).

FIG. 10. Revised excavatability graph.

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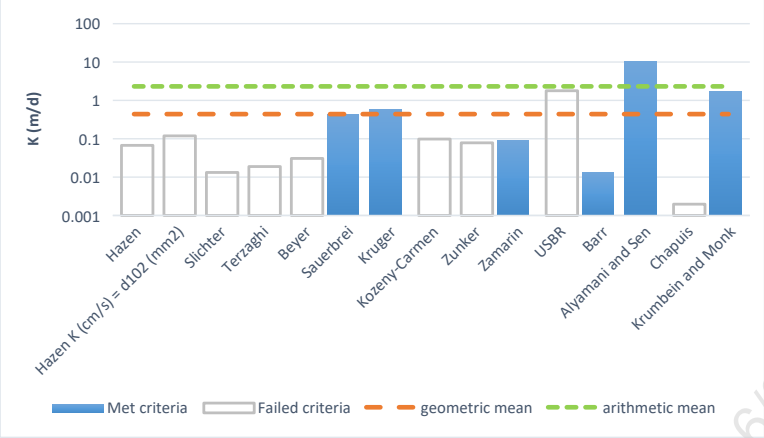
[redacted]

K from Grain Size Analysis Report Date: 23/01/2020

Sample Name: TP001 (0.8mbgl)

Mass Sample (g): _____ T (oC) _____

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d
Hazen	.779E-04	.779E-06	0.07
Hazen K (cm/s) = d_{10} (mm)	.138E-03	.138E-05	0.12
Slichter	.153E-04	.153E-06	0.01
Terzaghi	.218E-04	.218E-06	0.02
Beyer	.355E-04	.355E-06	0.03
Sauerbrei	.507E-03	.507E-05	0.44
Kruger	.723E-03	.723E-05	0.62
Kozeny-Carmen	.114E-03	.114E-05	0.10
Zunker	.906E-04	.906E-06	0.08
Zamarin	.112E-03	.112E-05	0.10
USBR	.207E-02	.207E-04	1.79
Barr	.164E-04	.164E-06	0.01
Alyamani and Sen	.127E-01	.127E-03	11.00
Chapuis	.228E-05	.228E-07	0.00
Krumbein and Monk	.201E-02	.201E-04	1.74
geometric mean	.508E-03	.508E-05	0.44
arithmetic mean	.268E-02	.268E-04	2.32

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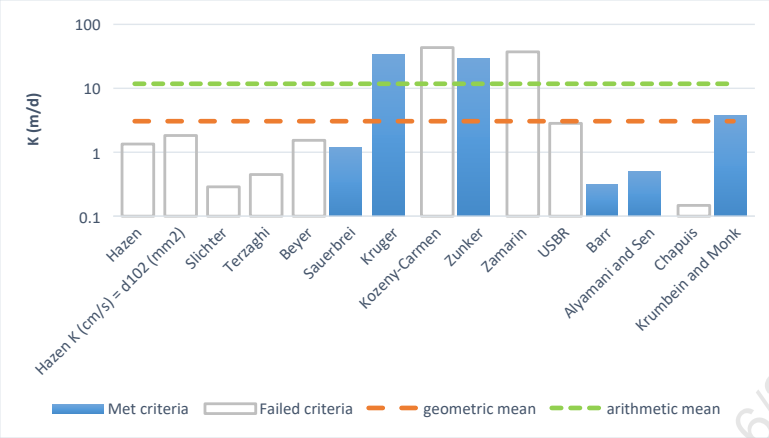
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K from Grain Size Analysis Report Date: 23/01/2020

Sample Name: TP001 (1.5mbgl)

Mass Sample (g): T (oC)

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d
Hazen	.156E-02	.156E-04	1.34
Hazen K (cm/s) = d_{10} (mm)	.211E-02	.211E-04	1.83
Slichter	.333E-03	.333E-05	0.29
Terzaghi	.518E-03	.518E-05	0.45
Beyer	.178E-02	.178E-04	1.54
Sauerbrei	.141E-02	.141E-04	1.22
Kruger	.397E-01	.397E-03	34.30
Kozeny-Carmen	.502E-01	.502E-03	43.35
Zunker	.353E-01	.353E-03	30.48
Zamarin	.430E-01	.430E-03	37.17
USBR	.328E-02	.328E-04	2.83
Barr	.374E-03	.374E-05	0.32
Alyamani and Sen	.605E-03	.605E-05	0.52
Chapuis	.171E-03	.171E-05	0.15
Krumbein and Monk	.439E-02	.439E-04	3.80
geometric mean	.354E-02	.354E-04	3.06
arithmetic mean	.136E-01	.136E-03	11.77

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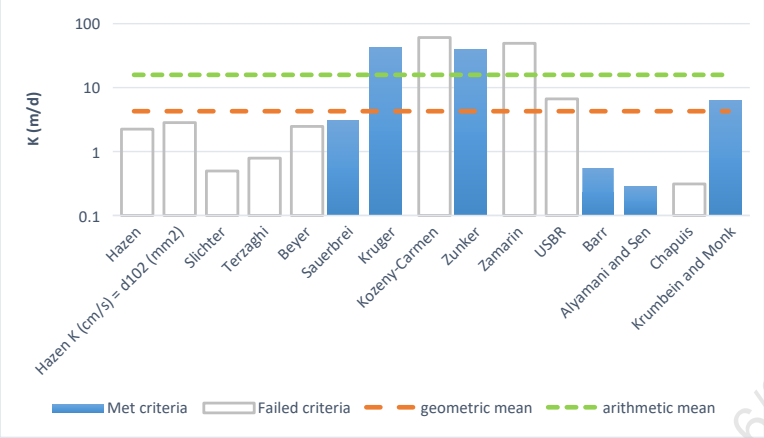
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K from Grain Size Analysis Report Date: 23/01/2020

Sample Name: TP002 (1mbgl)

Mass Sample (g): _____ T (oC) _____

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d
Hazen	.259E-02	.259E-04	2.24
Hazen K (cm/s) = d_{10} (mm)	.328E-02	.328E-04	2.83
Slichter	.574E-03	.574E-05	0.50
Terzaghi	.913E-03	.913E-05	0.79
Beyer	.286E-02	.286E-04	2.47
Sauerbrei	.361E-02	.361E-04	3.12
Kruger	.505E-01	.505E-03	43.60
Kozeny-Carmen	.703E-01	.703E-03	60.71
Zunker	.473E-01	.473E-03	40.89
Zamarin	.570E-01	.570E-03	49.28
USBR	.771E-02	.771E-04	6.66
Barr	.657E-03	.657E-05	0.57
Alyamani and Sen	.344E-03	.344E-05	0.30
Chapuis	.360E-03	.360E-05	0.31
Krumbein and Monk	.752E-02	.752E-04	6.49
geometric mean	.495E-02	.495E-04	4.27
arithmetic mean	.183E-01	.183E-03	15.83

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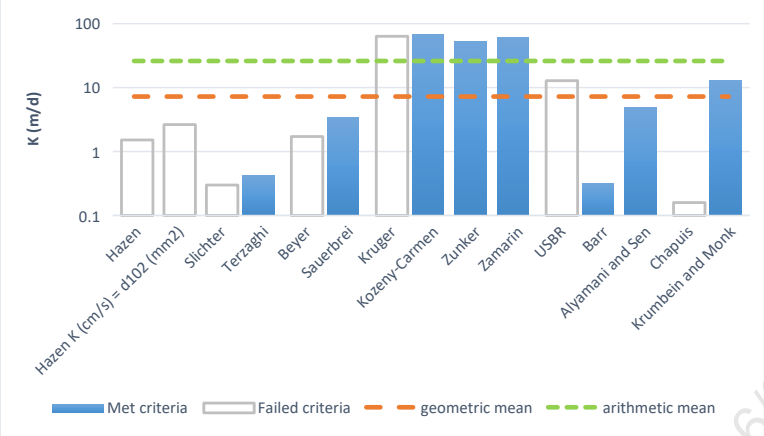
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K from Grain Size Analysis Report Date: 23/01/2020

Sample Name: TP002 (2.5mbgl)

Mass Sample (g): _____ T (oC) _____

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d
Hazen	.176E-02	.176E-04	1.52
Hazen K (cm/s) = d_{10} (mm)	.305E-02	.305E-04	2.64
Slichter	.346E-03	.346E-05	0.30
Terzaghi	.497E-03	.497E-05	0.43
Beyer	.199E-02	.199E-04	1.72
Sauerbrei	.405E-02	.405E-04	3.50
Kruger	.735E-01	.735E-03	63.49
Kozeny-Carmen	.809E-01	.809E-03	69.91
Zunker	.616E-01	.616E-03	53.19
Zamarin	.730E-01	.730E-03	63.09
USBR	.149E-01	.149E-03	12.83
Barr	.372E-03	.372E-05	0.32
Alyamani and Sen	.584E-02	.584E-04	5.05
Chapuis	.184E-03	.184E-05	0.16
Krumbein and Monk	.154E-01	.154E-03	13.29
geometric mean	.839E-02	.839E-04	7.25
arithmetic mean	.302E-01	.302E-03	26.10

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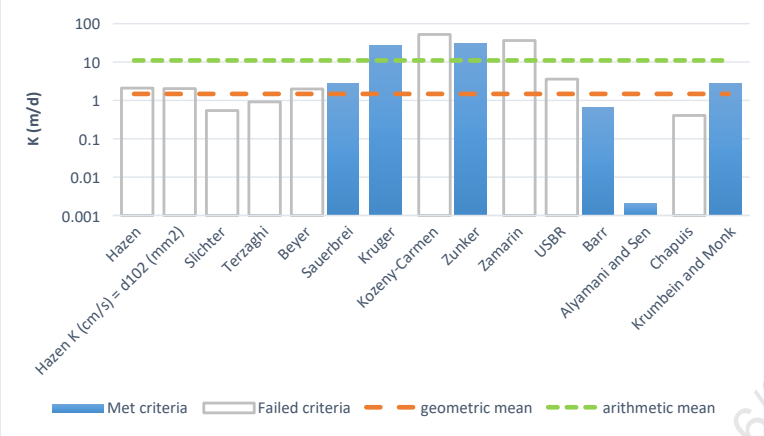
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K from Grain Size Analysis Report Date: 23/01/2020

Sample Name: TP003 (1mbgl)

Mass Sample (g): _____ T (oC) _____

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d
Hazen	.242E-02	.242E-04	2.09
Hazen K (cm/s) = d_{10} (mm)	.235E-02	.235E-04	2.03
Slichter	.629E-03	.629E-05	0.54
Terzaghi	.106E-02	.106E-04	0.91
Beyer	.230E-02	.230E-04	1.99
Sauerbrei	.323E-02	.323E-04	2.79
Kruger	.334E-01	.334E-03	28.83
Kozeny-Carmen	.606E-01	.606E-03	52.34
Zunker	.358E-01	.358E-03	30.91
Zamarin	.421E-01	.421E-03	36.39
USBR	.415E-02	.415E-04	3.58
Barr	.779E-03	.779E-05	0.67
Alyamani and Sen	.245E-05	.245E-07	0.00
Chapuis	.468E-03	.468E-05	0.40
Krumbein and Monk	.338E-02	.338E-04	2.92
geometric mean	.171E-02	.171E-04	1.48
arithmetic mean	.128E-01	.128E-03	11.02

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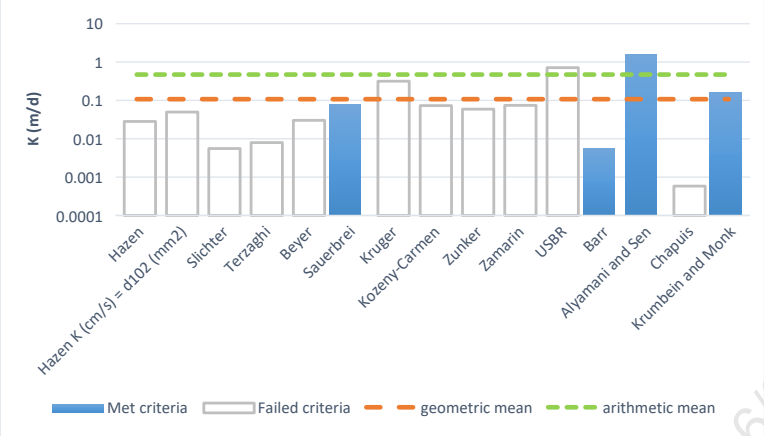
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K from Grain Size Analysis Report Date: 23/01/2020

Sample Name: TP003 (3mbgl)

Mass Sample (g): _____ T (oC) _____

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d
Hazen	.327E-04	.327E-06	0.03
Hazen K (cm/s) = d_{10} (mm)	.574E-04	.574E-06	0.05
Slichter	.643E-05	.643E-07	0.01
Terzaghi	.919E-05	.919E-07	0.01
Beyer	.349E-04	.349E-06	0.03
Sauerbrei	.935E-04	.935E-06	0.08
Kruger	.366E-03	.366E-05	0.32
Kozeny-Carmen	.847E-04	.847E-06	0.07
Zunker	.685E-04	.685E-06	0.06
Zamarin	.860E-04	.860E-06	0.07
USBR	.826E-03	.826E-05	0.71
Barr	.690E-05	.690E-07	0.01
Alyamani and Sen	.188E-02	.188E-04	1.63
Chapuis	.674E-06	.674E-08	0.00
Krumbein and Monk	.198E-03	.198E-05	0.17
geometric mean	.125E-03	.125E-05	0.11
arithmetic mean	.545E-03	.545E-05	0.47

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Appendix I

Preliminary Ground Investigation Rationale

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ARUP

ID Manchester: Surveys

Preliminary Ground Investigation Rationale

UNMC-ARUP-ZZ-XX-RP-CG-0002

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1. Introduction

Arup has been appointed to design a ground investigation based on the findings of earlier desk study and constraints mapping work for the ID Manchester plot.

Appointment

- Ove Arup & Partners Ltd (Arup) has previously provided support to the University of Manchester (UoM) relating to geotechnical and geoenvironmental constraints identification. This work was undertaken to support masterplan optioneering and developing a cost plan for the proposed ID Manchester development. This work is summarised in the following reports, drawings and registers:
  - UNMC-ARUP -XX-RPT-CG-0001 Ground Conditions Desk Study
  - UMNC-ARUP -XX-DRG-CG-0001 Contamination Constraints
  - UMNC-ARUP -XX-DRG-CG-0002 Geotechnical Constraints
  - UMNC-ARUP -XX-DRG-CG-0003 Contamination Potential
  - UMNC-ARUP -XX-DRG-CG-0004 Indicative Rockhead and Foundations Plan
  - UMNC-ARUP -XX-SHT-CG-0018 Ground Conditions Constraints Tracker
- Arup has been appointed by UoM to design a ground investigation to provide data to increase confidence on the level of risk associated with abnormal ground conditions and site features identified during the desk study and constraint mapping work.

Scope

- Arup has recommended a preliminary ground investigation with a focus on collecting data for those constraints that are likely to have the biggest impact on ground related costs. This includes collecting data on:
  - the depth to rock in particular near to the BT tunnel;
  - the infill within the former River Medlock;
  - contamination within the plots of the former oil works and chemical works;
  - the material behind the Altrincham Road retaining wall; and
  - soakaway tests to help with drainage assessment.
- The ground investigation design presented within this document is based upon this scope.
- In addition to this rationale report Arup has been appointed to prepare a drawing showing the proposed ground investigation positions, a schedule outlining in more detail the purpose of individual exploratory holes and provide a budget for the ground investigation based on this.
- The ground investigation design has focussed on the area shown shaded in blue in Figure 1.
- Further ground investigation will be required in the future for detailed design and to discharge planning conditions.

Limitations

- This report was prepared by Arup on behalf of the University of Manchester in connection with the ID Manchester site. It takes into account our Client's particular instructions and requirements and addresses their priorities at the time.
- All reasonable skill, care and diligence have been exercised within the timescale available and in accordance with the technical requirements of the brief.



Figure 1: Wider ID Manchester Site and area of preliminary ground investigation (blue)

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2. Summary of geotechnical and geoenvironmental constraints (wider ID site)

The site was once within a valley of the Medlock and with a varied development history dating back to the 18th Century. There is potential for soft ground, physical constraints as well as restrictions on construction around the BT tunnel.

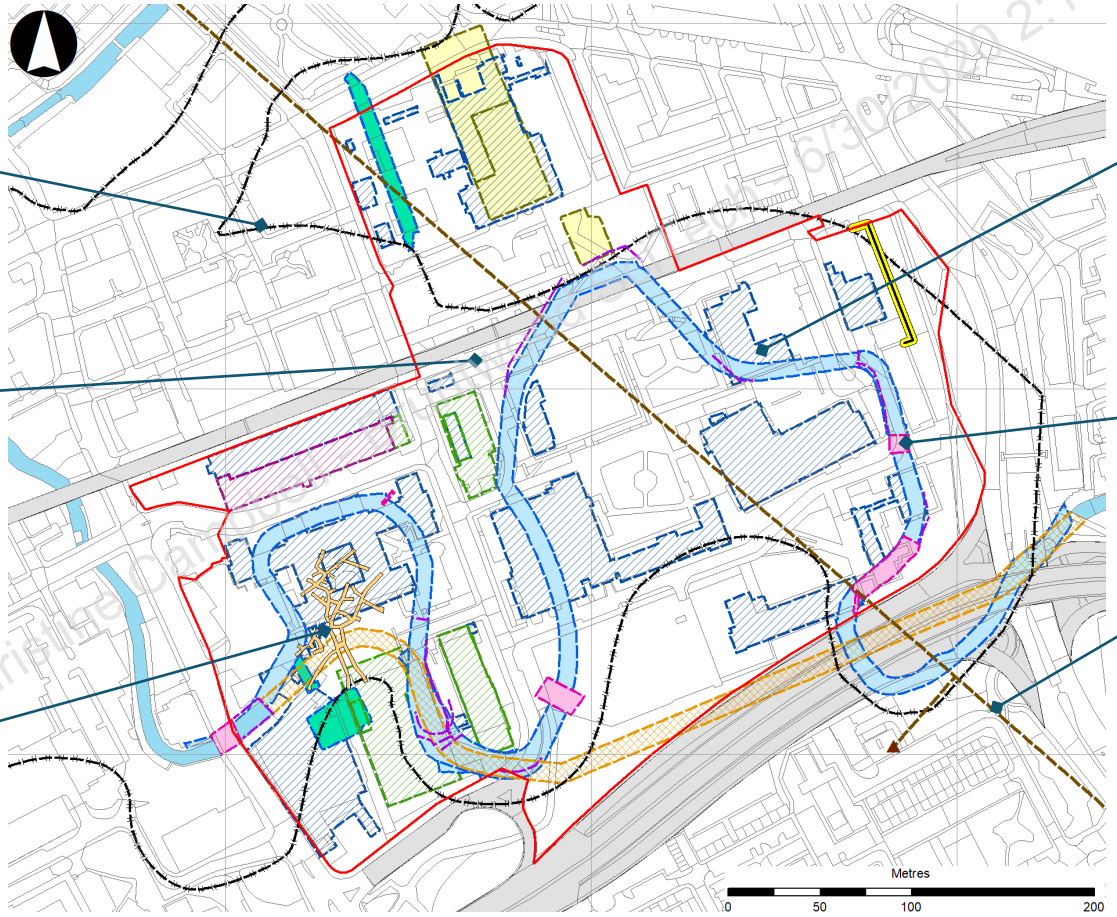


Figure 2: Summary of geotechnical constraints (refer to Drawing UMNC-ARUP-ZZ-XX-DR-CG-0002)

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2. Summary of geotechnical and geoenvironmental constraints (wider ID site)

There is a moderate contamination potential in former industrial land and areas of backfill across much of the site with certain areas of greater contamination risk such as the former chemical and oil works

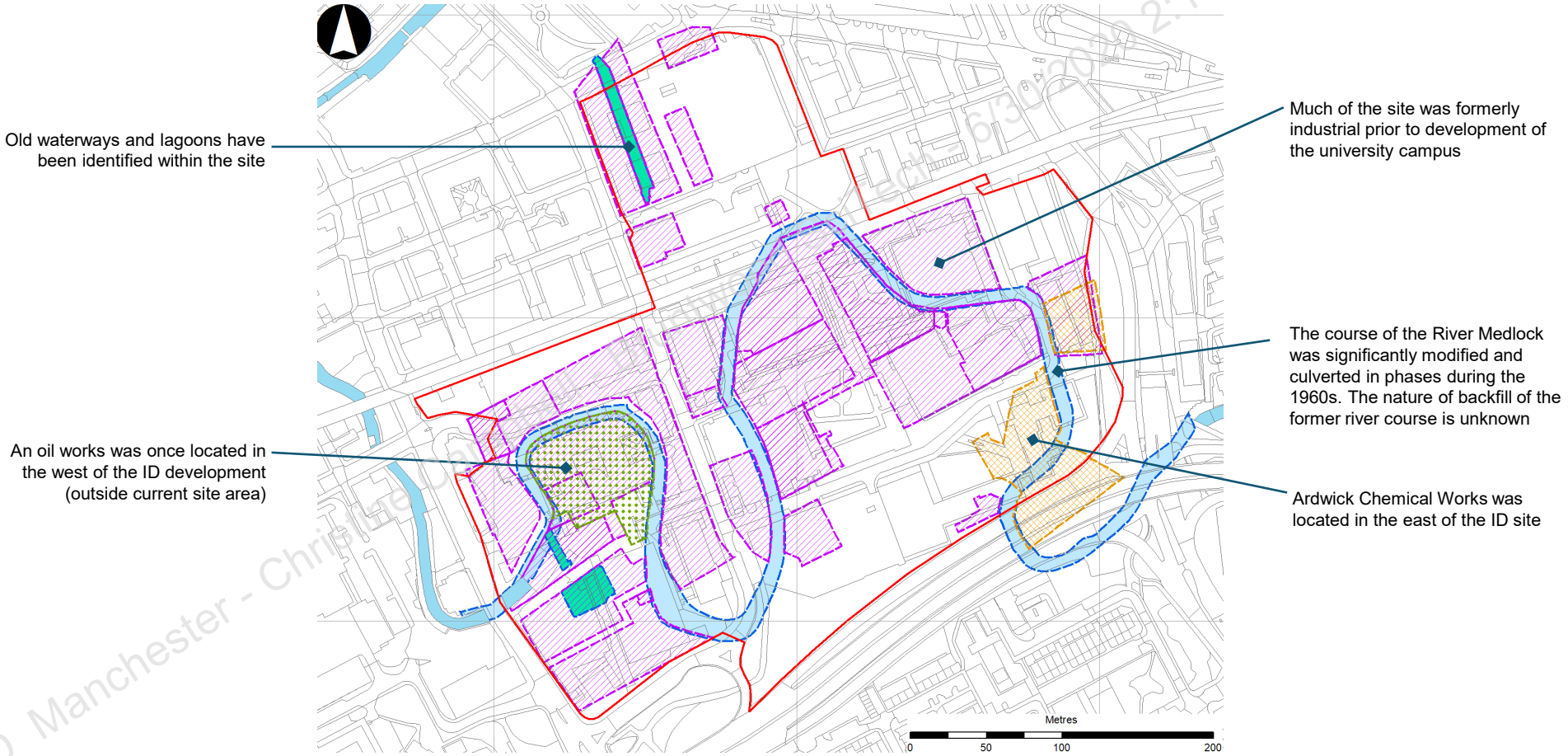


Figure 3: Summary of geoenvironmental constraints (refer to Drawing UMNC-ARUP-ZZ-XX-DR-CG-0001)

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3. Preliminary ground model

The ground conditions are expected to be highly variable due to the nature of the glacial and fluvial processes which formed the landscape and more recent modification by industrial development and university campus.

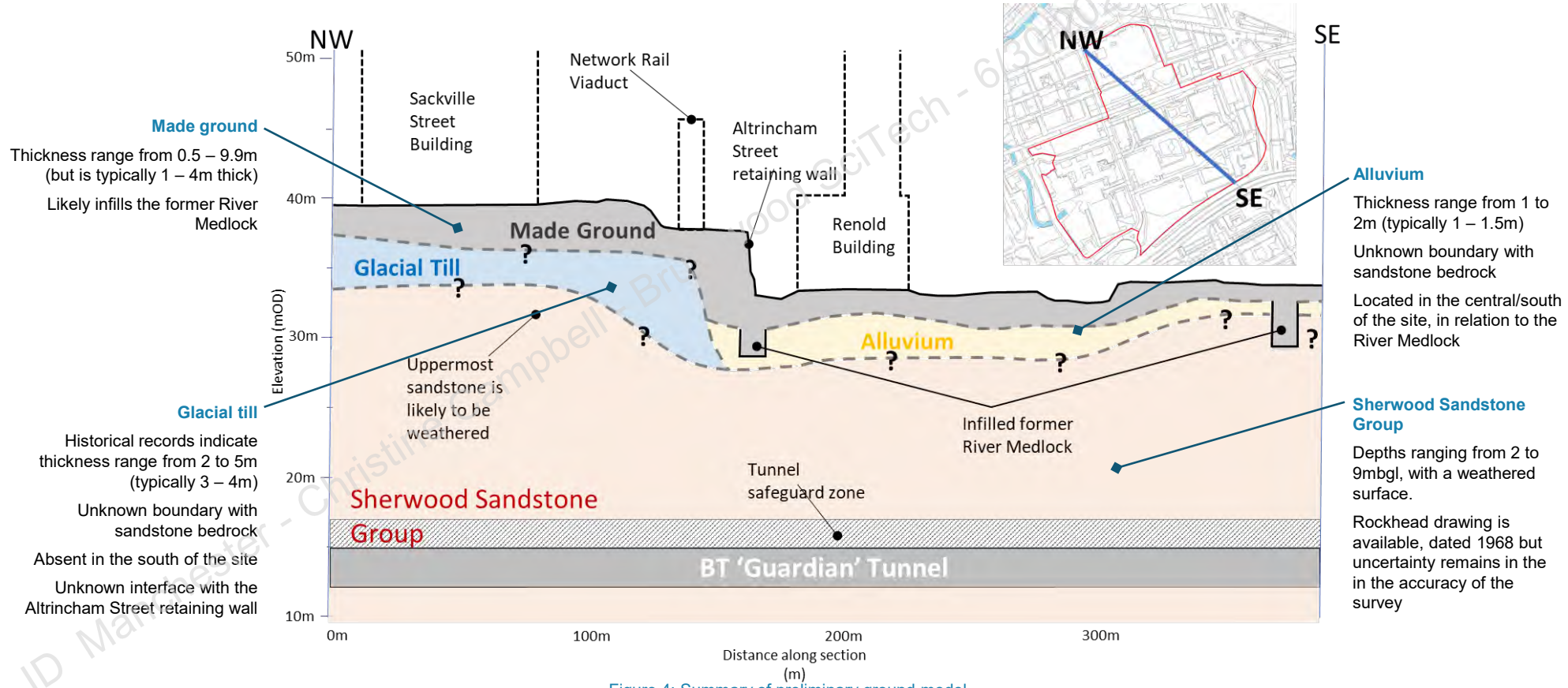


Figure 4: Summary of preliminary ground model

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4. Ground investigation design

Arup has designed a ground investigation focussing on higher risk constraints and abnormal ground conditions to provide early information to support ground related cost estimates and decision making.

Summary

- Arup has designed a ground investigation to investigate higher risk geotechnical constraints and abnormal ground conditions identified through desk based analysis (see earlier slides). Further detail on the main focus of the ground investigation is presented in the following slides and a summary of the scope presented in Figure 5 and described in the next section.



Figure 5: Ground investigation targeting rockhead (shown in blue)

- Investigation to the north of Altrincham Road is not recommended at this stage. This is because the current development proposals involve refurbishing existing structures and some external works in that area. Ground investigation will be required in this area in the future to inform external works design but is considered inappropriate at this stage.

Ground investigation scope

- 6 no. cable percussive boreholes to 10m depth
- 5 no. cable percussive borehole followed by rotary coring for 6m into sandstone bedrock
- 2 no. dynamic sample holes to 10m depth in areas with restricted access, with rotary coring in bedrock
- 3 no. trial pits to a maximum depth of 3m
- 4 no. horizontal cores in retaining walls
- Groundwater monitoring wells installed in 7 no. boreholes
- Ground gas monitoring installations in 5 no. boreholes
- Soakaway testing in the three trial pits and in situ soil/ rock density testing in boreholes
- Collection of samples for geotechnical laboratory testing (see below)
- Collection of geoenvironmental samples for laboratory for contaminants expected based on the land use (see below)
- Collection of groundwater samples and testing for contaminants expected based on the former land use (see below)
- 4 rounds of monitoring to measure groundwater levels and ground gases

Geotechnical laboratory testing (for basic classification testing)

- **Soils:** Moisture content, Atterberg limits, particle size distribution (PSD), chemical aggressivity testing (for concrete)
- **Rock:** Point load, uniaxial compressive stress (UCS), chemical aggressivity testing

Geoenvironmental laboratory testing (for initial risk assessment)

- **Soils:** Asbestos, heavy metals, polycyclic aromatic hydrocarbons (PAH), benzene, toluene, ethylbenzene, xylenes (BTEX), banded total petroleum hydrocarbons (TPH CWG) and volatile as well as semi volatile organic compounds (VOC and SVOC) in selected locations.
- **Groundwater:** Asbestos, heavy metals, inorganics, PAH, BTEX, TPH CWG as well as VOC and SVOC in selected locations.

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4. Ground investigation design

The investigation will provide data on the depth to sandstone which will be important for foundation design, especially nearby to the BT tunnel. The former course of the Medlock will be targeted to better understand this constraint.

Rockhead

- Arup has recommended thirteen boreholes to provide data on the depth to rockhead and collect data on the rock properties to inform later design. This includes five boreholes within close(>3m) proximity (but >3m) to the BT/ Guardian tunnel where the depth to rockhead has a greater importance in understanding foundation and building load configurations. It is proposed to utilise cable percussive techniques where access allows followed by rotary coring. In areas of limited access dynamic sampling is proposed to advance to rockhead before switching to rotary drilling.



Figure 6: Ground investigation targeting rockhead (shown in blue)

Former River Medlock

- The River Medlock was infilled in stages in the 1960s. The nature of the backfill is unknown. Ground investigation is recommended to provide data on the geotechnical composition of the infill which may contain poorly compacted materials, voids. These boreholes will also provide data on the geo-environmental properties of the river infill to inform risk assessment and waste disposal options should this material need to be removed from site.



Figure 7: Ground investigation targeting the former River Medlock (shown in blue)

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4. Ground investigation design

Part of the site was a chemical works and may require specialist remediation, the investigation will provide data to assess this. The investigation will provide data on the construction and condition of retaining walls on site.

Abnormal contamination

- Much of the site was formerly industrial and although the activities may have resulted in contamination of the soil and groundwater this is expected to be typical of an urban area. However, an area in the southeast of the site was once occupied by Ardwick Chemical works and there is possibly a higher risk of contamination in that area that may require specialist remediation. Ground investigation is recommended to provide data on the levels of contamination in the soil and groundwater to inform risk assessment and remediation options in that area.



Figure 8: Ground investigation targeting abnormal contamination (blue)

Altrincham Road and other retaining walls

- Ground levels to the south of Altrincham Road undulate. At low points Altrincham Road is situated on a retaining wall that was constructed prior to 1849. The material being retained and the construction/ design of the wall is unknown. Arup recommends undertaking three horizontal cores through the retaining wall to provide data on the wall thickness and wall material. In addition to a borehole north of the retaining wall to collect data on the soil being retained.
- Arup also recommends investigating the construction build-up of, and soil behind, a retaining wall for the ramp to the basement of the Pariser building.



Figure 9: Ground investigation targeting retaining walls (blue)

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4. Ground investigation design

The investigation will include monitoring of groundwater levels and ground gas to inform structural and earthworks design and soakaways to assess the potential for infiltration drainage.

Infiltration drainage

- Infiltration drainage may be possible in certain areas of the site, where low permeability glacial deposits have been eroded and replaced by more permeable alluvium. Arup recommends soakaway testing is undertaken in selected locations to provide data on infiltration rates to support drainage options assessment and costs. Current costs are based on an assumption that infiltration drainage will not be possible and drainage will require a new outfall to the River Medlock culvert.



Figure 10: Locations proposed for soakaway testing (blue)

Monitoring

- Groundwater levels and ground gas monitoring is recommended to provide initial data to understand ground gas protection and provide data for, earthworks, pile design and groundwater flow direction and groundwater contaminant transport directions.



Figure 11: Indicative monitoring locations (blue)

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5. Ground investigation constraints

Constraints have been identified at the site which may have an impact on the scope, programme and cost of the ground investigation

Access

- Arup has undertaken a site walkover as part of the ground investigation scoping to identify locations where ground investigation plant can access the site without the need to create accessways or obtain permissions from third parties. Much of the site is formed of buildings and Arup considers the costs associated with in-building investigation will outweigh the benefits of the data obtained. Other constrains include narrow passages and gates which may limit access for certain plant and where this is the case investigation methods have been modified.
- Network Rail own the viaduct north of Altrincham Road and Arup has positioned investigation so not to interfere with this structure. However, approvals and a licence from Network Rail may still be required. Arup has made initial queries with Network Rail and are awaiting a response. Contingency options have been identified in the event it is not possible to undertake investigation around the rail viaduct.

UXO

- Manchester was a bomb target during the Second World War and there is evidence of bomb strikes across Manchester. A Preliminary UXO risk assessment obtained during the desk study has identified a medium UXO risk. Arup has undertaken additional risk assessment, following the approach outlined in Ciria C681, to review the outcome of the more generic preliminary assessment. Arup has concluded there is a low risk of encountering UXO on this site. This is largely due to the significant post war development.
- UXO mitigation has therefore been excluded from the ground investigation scope at this time. However, Arup recommends that UoM undertake a Detailed UXO risk assessment for the site to confirm the level of risk.

Ecology

- Arup is unaware of any ecological studies for the ID site and has assumed that there are no specific ecology requirements for the preliminary ground investigation. However, we have made an allowance under the contract for an ecology survey to confirm this.

Archaeology

- Industrial archaeology is becoming of increasing interest and given the history of this site, dating back to the mid to late 18th Century it is possible that the ground investigation may require the oversite of an archaeologist. The scope excludes this.

Utilities

- Arup has used available service and utility records provided by UoM to position investigation locations to avoid clashes with known utilities. Additional mitigation will be implemented during the fieldwork and will include hand dug inspection pits (to 1.2m below ground level) and CAT scanning prior to commencing any intrusive works.

Traffic and pedestrian management

- Traffic and pedestrian management is likely to be required to minimise health and safety risks to students, staff and other users of the site during the fieldwork.

Reinstatement

- Arup has chosen investigation locations to reduce the surface disruption and therefore reduce reinstatement costs. Boreholes have been positioned in areas of hard surfacing and trial pits in areas of soft landscaping. Arup has assumed that excavations in landscaping areas can be carefully backfilled and do not require replacement turf.

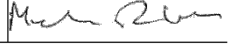
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7. Document verification

Job title		ID Manchester			**Job number** 265190-00
Document title		Preliminary Ground Investigation Rationale			**File reference** 4-05-11.3
Document ref		UNMC-ARUP-ZZ-XX-RP-CG-0002			
Revision	**Date**	**Filename**	UoM_North_Campus_GI_Rationale ISSUE.pptx		
ISSUE	20/08/19	**Description**	Issue for comment		
			Prepared by	Checked by	Approved by
		Name	Mark Griffiths	Carl Lowe	Michael Wilton
		Signature		pp 	
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
Issue Document verification with document					☑

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ID MANCHESTER PRELIMINARY GROUND INVESTIGATION



Final Factual Report (Rev.00)

Contract Number: NW1588
Client: University of Manchester
Consulting Engineer: Arup

Date: April 2020

Allied Exploration & Geotechnics Ltd.

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

REPORT CONTROL SHEET

Contract Details

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National Grid Reference	SJ 843 975

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Client/Consultant Engineer Details

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Abbreviation	Definition
CC	Concrete Coring
CP	Cable Percussion
DS	Dynamic Sampling
RC	Rotary Coring
RO	Rotary Openhole

Text Abbreviations

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1. INTRODUCTION

It is proposed to redevelop an area of land approximately 0.5km to the west of Manchester Picadilly Train Station. The works were commissioned in order to determine to ground and groundwater conditions on site to aid the design of the proposed works,

Allied Exploration & Geotechnics Limited (AEG) were contracted by the University of Manchester with Arup acting in the capacity of Consulting Engineer to perform a ground investigation at this site in order to provide information on the subsurface ground and groundwater conditions as well as to obtain samples for geotechnical and specialist chemical testing.

1.1 Scope of Works

The investigation works consisted of the following main elements:

- Seventeen cable percussion boreholes, six of which were further advanced using rotary coring techniques.
- Two dynamic sampling holes, both of which were continued using rotary openhole/coring techniques.
- Four concrete core holes.
- Three mechanically excavated trial pits.
- Associated sampling.
- *In-situ* Standard Penetration and Water Quality Parameter Testing.
- Installation of gas/groundwater monitoring instrumentation.
- Post site works gas and groundwater monitoring.

Site work was carried out between the 26th October and 1st December 2019 with subsequent post site work monitoring, laboratory testing and reporting thereafter. A factual report only was requested.

The comments and opinions expressed in this report are based on the ground conditions encountered during the site work and on the results of tests carried out in the field and in the laboratory. There may, however, be special conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report.

2. THE SITE

2.1 Location

The National Grid Reference of the approximate centre of the site is SJ 843 975. This can be found on Ordnance Survey 1:50,000 Sheet Number 109 (Manchester, Bolton & Warrington). Part of this sheet is reproduced as Figure 1, the Site Location Plan.

The site is located in Manchester City Centre approximately 0.5km east of Manchester Piccadilly Train Station.

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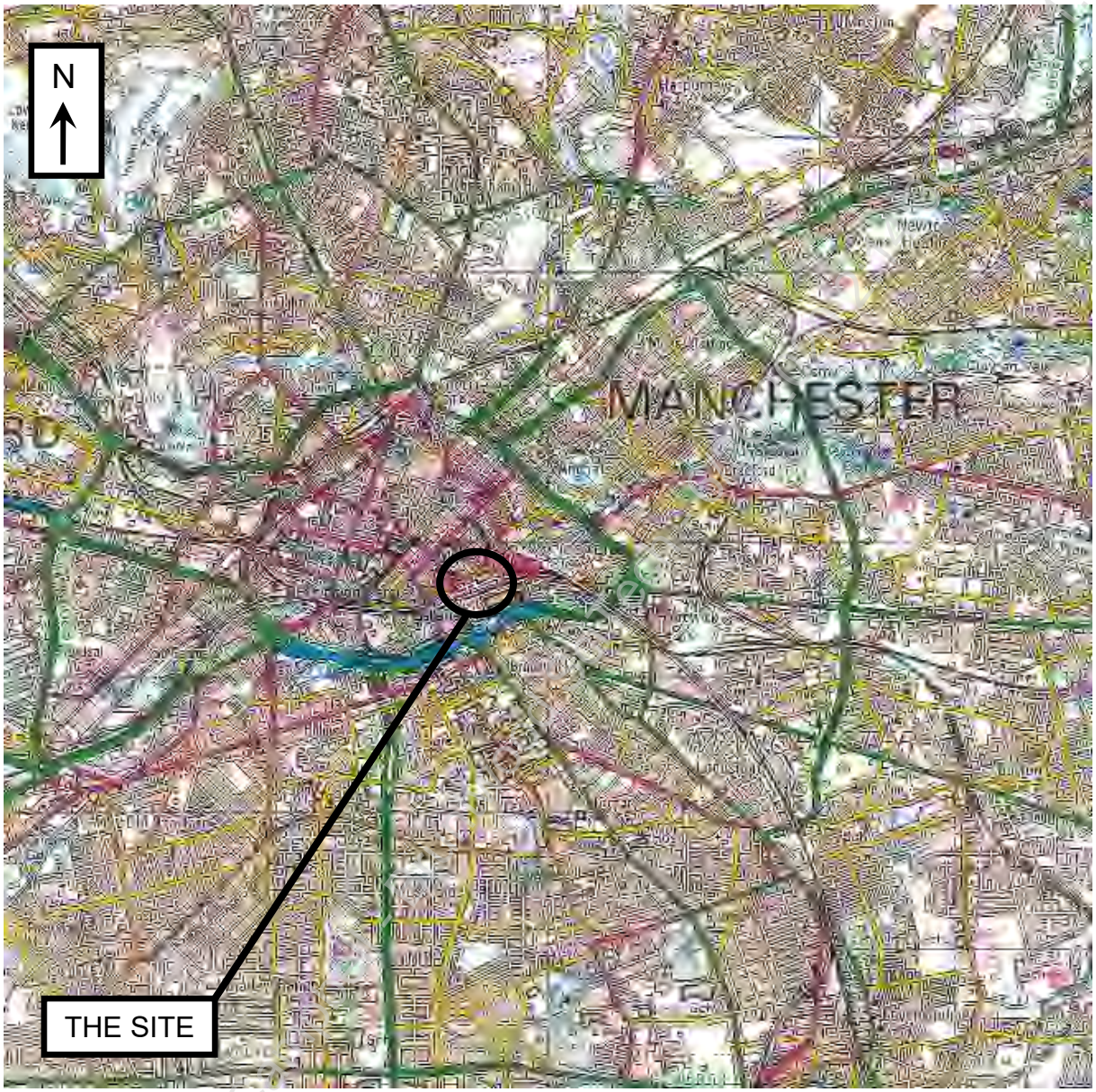


Figure 1: Site Location Plan

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2.2 Site Description and Topography

The site is located approximately 0.5km to the west of Piccadilly Train Station in Manchester and comprises a number of buildings owned by the University of Manchester along with associated landscaping, verges and roads. The site has a varied history of previous land uses including (but not limited to) mills, metal works, engineering works, timber works dye works and chemical works. The site is bound by the railway line to the north, the A57(M) to the south, London Road to the east and Sackville Street to the west.

3. SITE OPERATIONS

3.1 General

All exploratory hole work, associated sampling, *in-situ* testing and logging was carried out in accordance with techniques outlined in Table 1, as appropriate; at positions as near as practicable to those supplied by the Consulting Engineer. These are shown on the Exploratory Hole Location Plan, Field Data Enclosure 1.

Reference Code Number	Title
BS 1377:1990	Methods of Test for Soils for Civil Engineering Purposes (where not in contravention or superseded by Eurocode references)
BS 5930:2015	Code of Practice for Ground Investigation (where not in contravention or superseded by Eurocode references)
BS EN ISO 14689-1:2003	Identification and Classification of Rock
BS EN ISO 14688-1:2002 & 14688-2:2004	Identification and Classification of Soil
BS 10175:2011+A2:2017	Investigation of Potentially Contaminated Sites
BS EN ISO 22476-3: 2005	Geotechnical investigation and testing - Field testing - Part 3 Standard Penetration Testing

Table 1: British Standard Reference Code Number

The depths of all exploratory holes, descriptions of the material encountered, details of any groundwater encountered, samples taken and *in-situ* testing carried out together with any other relevant information can be found on the Borehole, Dynamic Sample Hole, Concrete Core Hole and Trial Pit Records, Field Data Enclosures 2, 3, 4 and 5 respectively. A key to all symbols and abbreviations used throughout the report is included in the Key Sheets.

In accordance with the Site Investigation Steering Group publication “Guidelines for the Safe Investigation by Drilling of Landfills and Contaminated Land” the site was classified YELLOW.

The primary purpose of ground investigation exploratory holes is to probe the stratified sequences of soil and/or rock. From the results of these probings no conclusion should be drawn concerning the presence of, size, lithological nature, and numbers per unit volume of ground cobbles and boulders in soil types such as glacial till (boulder clay). With respect to rotary coring, driller’s records and observations of the recovered core are used to determine any zones of no recovery (core loss). These zones are based on the interpretation of the logging engineer and are therefore subjective.

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3.2 Health & Safety Considerations: Services

Before the commencement of any exploratory hole a search for underground services was conducted as prescribed in HSE publication '*Avoiding Underground Services (HSG47)*' and in accordance with in-house internal safety procedure AEG-14.

Service plans were provided by the Client and were consulted prior to using a service locating device (such as a Cable Avoidance Tool or C.A.T.) to scan a working area around the proposed exploratory hole location. Where no services were indicated a '*Permit-to-Work*' form was issued by the investigation supervisor and, with the exception of trial pits, the position was commenced with a hand excavated inspection pit. The inspection pit was also scanned during the excavation procedure. It should be noted that the digging of an inspection pit only confirms or guards against the possible presence of underground public utility services within the excavated pit. Where no services were indicated by the scanning procedure or inspection pit the exploratory hole was commenced in accordance with the Contract Specification.

Where services were located or there was reasonable belief that they were present, the position was relocated in agreement with the Client. Details of any services uncovered/located during this investigation are given in Table 2.

Exploratory Hole Number	Type of Service	Orientation & Depth (size where indicated)	Status (Damaged/Undamaged)	Additional Remarks
BH012A	Ceramic drain (redundant)	047˚ at 1.10m BGL (125mm diameter)	Damaged	None

Table 2: Services Encountered

3.3 Exploratory Holes: Boreholes

Seventeen boreholes were sunk using a Dando 2000 drilling rig, utilising cable percussive (shell and clay cutter) techniques, to depths of between 0.35m (BH012) and 10.80m BGL (BH012A). Six of the boreholes were further advanced using a Comacchio GEO 205 drilling rig, utilising rotary openhole/coring methods, to depths of between 13.00m (BH011) and 21.50m BGL (BH005).

Rotary openhole drilling was performed using various diameter tri-cone rock bits in combination with water flush. Rotary coring employed a GeoBor 'S' wireline system (146mm OD) barrel in combination with an Easycut drill bit together with water/polymer flushing medium. This coring assembly was used to recover 102mm lined cylindrical specimens of rock core.

The Borehole Records are presented along with a Summary Table as Field Data Enclosure 2.

3.4 Exploratory Holes: Dynamic Sample Holes

Two dynamic sample holes were sunk using a Premier Compact 110 Series tracked rig utilising a removable liner system, to depths of 9.30m (DS001) and 9.90m BGL (DS002). The Dynamic Sample Hole Records are presented as Field Data Enclosure 3 and a summary of any relevant remarks are detailed in Table 3.

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Exploratory Hole Number	Drilling Method	Completion Depth (m BGL)	Installation	Remarks
DS001	DS/RO	9.30	Yes – refer to Section 3.9	Advanced to required depth.
DS002	DS/RO/RC	9.90	Yes – refer to Section 3.9	Advanced to required depth.
Any relevant photographs are presented after the applicable Dynamic Sample Hole Record				

Table 3: Dynamic Sample Hole Summary

3.5 Exploratory Holes: Concrete Core Holes

Four concrete core holes were advanced using an Xcalibre Vulcan coring rig to depths of either 0.46m (HC004) or 2.00m BGL (HC001 to HC003 inclusive). The Concrete Core Records are presented as Field Data Enclosure 4 and a summary of any relevant remarks are detailed in Table 4.

Exploratory Hole Number	Drilling Method	Completion Depth (m BGL)	Installation	Remarks
HC001	CC	2.00	No – reinstated	Advanced to required depth.
HC002	CC	2.00	No – reinstated	Advanced to required depth.
HC003	CC	2.00	No – reinstated	Advanced to required depth.
HC004	CC	0.46	No – reinstated	Terminated due to unsuitable material.
Any relevant photographs are presented after the applicable Concrete Core Hole Record				

Table 4: Concrete Core Hole Summary

3.6 Exploratory Holes: Mechanically Excavated Trial Pits

Three trial pits were mechanically excavated using a TB240 excavator to depths of between 2.60m (TP001) and 3.00m BGL (TP003). The Trial Pit Records are presented as Field Data Enclosure 5 and a summary of any relevant remarks are detailed in Table 5.

Exploratory Hole Number	Excavation Method	Completion Depth (m BGL)	Remarks
TP001	Machine Excavated	2.60	Terminated due to side stability. Soakaway test attempted between 1.40-2.60m BGL – unsuitable.
TP002	Machine Excavated	2.80	Advanced to required depth.
TP003	Machine Excavated	3.00	Advanced to required depth.
Any relevant photographs are presented after the applicable Trial Pit Record			

Table 5: Trial Pit Summary

3.7 Samples

Representative samples of soil, concrete core and rock were obtained from the exploratory holes and were taken to the laboratory for selected geotechnical and specialist chemical testing.

Environmental samples were taken in accordance with the contract specification during the investigation using an approved selection of container types in order to suit the encountered material properties and designated laboratory analytical parameters. Full chain of custody procedures were in place post sampling and during the transportation stage to the nominated specialist chemical laboratory. Environmental samples were administered appropriately following the best practice guidance provided in the contract specification.

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3.8 Groundwater

The comments on groundwater conditions are based on the observations made at the time of investigation. It should be noted that groundwater levels may vary due to seasonal and other effects. Furthermore, water was added during advancement of the majority of boreholes in order to facilitate drilling operations. As a consequence there is a possibility that this could have masked the discrete ingress of natural groundwater into the boreholes, which subsequently may have been sealed as a result of progressing the casing.

Distinct groundwater strikes were not encountered in any of the exploratory holes during the site works operation. Standing water levels were recorded in some boreholes and dynamic sample holes at the beginning and/or end of each drilling shift. The water level is indicated on the applicable Borehole and Dynamic Sample Hole Record as part of the boring progress information.

3.9 Instrumentation & Monitoring

Eleven boreholes and both dynamic sample holes were installed with monitoring instrumentation in accordance with the requirements of the Consulting Engineer. Details of the installations are shown in Table 6 and on the relevant Borehole and Dynamic Sample Hole Records.

Exploratory Hole Number	Instrumentation	Installation Depth (m BGL)	Response Zone (m BGL)
BH001	1 No. 50mm diameter slotted standpipe	15.50	10.00-15.50
BH002	2 No. 50mm diameter slotted standpipe	2.50 and 4.00	0.50-3.00 and 3.20-4.00
BH004	1 No. 50mm diameter slotted standpipe	14.00	11.00-14.00
BH004A	1 No. 50mm diameter slotted standpipe	4.00	1.00-4.00
BH005	1 No. 50mm diameter slotted standpipe	21.50	18.50-21.50
BH007	1 No. 50mm diameter slotted standpipe	13.60	10.60-13.60
BH008	1 No. 50mm diameter slotted standpipe	6.50	0.30-6.50
BH009	1 No. 50mm diameter slotted standpipe	1.70	0.50-1.70
BH011	1 No. 50mm diameter slotted standpipe	13.00	6.00-13.00
BH012A	1 No. 50mm diameter slotted standpipe	6.00	2.00-6.00
BH013	1 No. 50mm diameter slotted standpipe	16.50	11.00-16.50
DS001	1 No. 50mm diameter slotted standpipe	4.00	2.00-4.00
DS002	1 No. 50mm diameter slotted standpipe	9.90	8.15-9.90

Table 6: Instrumentation Summary

Instruments were monitored during site works on up to two occasions for groundwater. Post site work gas and groundwater monitoring was undertaken on four occasions at fortnightly intervals after the completion of the site works in accordance with the Contract Specification. A record of the readings is presented as Field Data Enclosure 6 (Groundwater Monitoring Results) and Field Data Enclosure 7 (Gas Monitoring Results).

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In addition during one round of post site works monitoring groundwater samples were obtained from all available instruments using low flow methods. Water Quality Parameters will be recorded for the purged water prior to sampling (see Section 4.3).

3.10 Operative Observations: Potential Contamination

For the purposes of determining the condition of the site, with regard to human health and environmental issues, reference should specifically be made to any specialist chemical testing undertaken as part of the investigation scheme, as well as any supporting desk study and risk assessment documentation. The information given herein collates the observations made by the operatives involved in the investigation only and comments that have been indicated on the engineering records.

Where there was potential evidence of contamination, principally as a consequence of olfactory and visual identification, information is provided in Table 7.

Exploratory Hole Number	Occurrence (*in-situ*/surface/ laboratory sample)	Visual / Olfactory / Laboratory Testing	Depth (m BGL)	Occurrence Type	Additional Remarks
No occurrences recorded during the investigation.					

Table 7: Potential Contamination Encountered

It should be stressed that the information provided herein is subjective, as it is based on the perceptions of individuals and not specialists routinely involved in the chemical determination of contaminated residues, liquors, vapours or solid contaminants.

3.11 Surveying

The investigation positions were surveyed after completion of site works by specialist subcontractor Site Surveying Services. These positions have been subsequently plotted in AutoCAD® software and are shown on the Exploratory Hole Location Plan, Field Data Enclosure 1.

4. *IN-SITU* TESTING

4.1 General

In-situ testing as specified by the Consulting Engineer was carried out in selected boreholes and dynamic sample holes in accordance with techniques outlined in the relevant British Standard and/or AEG Quality Procedure. The results are presented in the *In-situ* Testing Enclosures with a number of the test results summarised at the relevant depth on the Borehole and Dynamic Sample Hole Records.

4.2 Standard Penetration Test Results

Standard Penetration Testing (SPT) was carried out in the boreholes and dynamic sample holes in accordance with techniques outlined in BS EN ISO 22476-3: 2005 in order to determine the relative density and consistency of the strata encountered. The 'N' value (number of blows per 300mm penetration) or the

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penetration per blow was recorded for each test. Uncorrected 'N' values or penetration per blow data are provided on the applicable Borehole and Dynamic Sample Hole Records. (Refer to page 6 of the key sheets for further details).

More detailed information concerning the standard penetration testing is given in *In-situ* Testing Enclosure 1 which includes the following;

- Initial exploratory hole conditions prior to the test procedure.
- Calibration and energy ratio (E_m) information for the SPT hammer device used to carry out the test.
- A breakdown of blows for each 75mm penetration interval.
- Rod length (C_R) and energy (C_E) correction ratios.
- Uncorrected 'N' value.
- Corrected 'N_{60}' value that applies the rod (C_R) and energy (C_E) corrections indicated.
- Pertinent remarks corresponding to the test procedure.

In addition to the above, a graph has been prepared for each exploratory hole which plots the uncorrected and corrected 'N' value results against depth. Calibration certificates for the SPT apparatus used during the testing procedure are also presented for reference within this *In-situ* Testing Enclosure.

4.3 *In-situ* Water Quality Parameter Testing

Groundwater samples were obtained from all available installations during one round of post site works monitoring in accordance with techniques outlined in the relevant British Standard and/or AEG Quality Procedure. Water Quality Parameters were recorded for the purged water prior to sampling. The parameters tested were pH, temperature, electrical conductivity, redox potential and dissolved oxygen. The results are presented in tabular format as *In-situ* Testing Enclosure 2.

5. LABORATORY TESTING

5.1 General

Laboratory testing as scheduled by the Consulting Engineer was carried out on selected samples in accordance with techniques outlined in BS 1377:1990, AEG Laboratory Quality Procedures or other appropriate standard as quoted.

5.2 Geotechnical Testing

The results are presented in the Laboratory Enclosures with an outline list of the procedures undertaken given in Table 8.

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Test	Procedure
Moisture Content	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)
Plasticity Index and Moisture Content	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)
Particle Size Distribution Sieving	BS 1377 Part 2 1990
Particle Size Distribution Sedimentation	BS 1377 Part 2 1990
Determination of Total Sulphur, Sulphate and pH (Tested externally)	See External Laboratory Certificates
Determination of Dry Density/Moisture Content Relationship	BS 1377 Part 4 1990
Determination of One Dimensional Consolidation Properties	BS 1377 Part 5 1990
Consolidated Undrained Shear Strength in Triaxial Cell with Measurement of Pore Pressure	BS 1377 Part 8 1990
Moisture Content of Rock	ISRM 1981
Determination of Point Load Index (Some Tested Externally)	ISRM 1985
Determination of Unconfined Compressive Strength (Tested Externally)	ISRM 1985

Table 8: Geotechnical Testing

5.3 Specialist Chemical Testing

Selected samples have been submitted for chemical analysis as specified by the Consulting Engineer, conducted under a subcontract arrangement with Derwentside Environmental Testing Services (DETS). The results of this testing are presented as Appendix I.

5.4 Laboratory Identified Asbestos

Selected samples were analysed for asbestos content as specified by the Consulting Engineer. Any identified asbestos is presented in Table 9 which has been summarised from specialist chemical testing results (see Appendix I for further details).

Exploratory Hole Number	Occurrence	Depth (m BGL)	Occurrence Type	Additional Remarks
BH003	Laboratory Sample	1.00	Brown asbestos	Small bundle of Amosite
BH006	Laboratory Sample	1.20	Brown asbestos	Small bundle of Amosite
BH007	Laboratory Sample	3.30	White asbestos	Chrysotile present as microscopic loose fibrous asbestos debris
DS001	Laboratory Sample	0.60	Brown asbestos	Bundle of Amosite

Table 9: Laboratory Identified Asbestos

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Key Sheets

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Allied Exploration and Geotechnics Limited
Key Sheets

INTRODUCTION

The following explanatory notes define the terminologies, abbreviations and symbols pertaining to each individual column or section of the Exploratory Hole records. 'Exploratory Hole' is used as a general term in this report to comprise borehole, drillhole, and trial pit. All exploratory hole records have been produced using ' gINT®', which is an integrated software environment for the storage and manipulation of subsurface data.

The primary purpose of ground investigation exploratory holes is to probe the stratified sequences of soil and/or rock. From the results of these probings no conclusion should be drawn concerning the presence of, size, lithological nature, and numbers per unit volume of ground cobbles and boulders in soil types such as glacial till (boulder clay). With respect to rotary coring, driller's records and observations of the recovered core are used to determine any zones of no recovery (core loss). These zones are based on the interpretation of the logging engineer and are therefore potentially subjective. In addition, where relevant, every effort is made to highlight material/zones that may relate to suspected old workings. However, it should be noted that this is not straightforward (especially without detailed information regarding anticipated subsurface conditions) and therefore no guarantee can be made with regards to the accuracy of the interpretation of the recovered core.

INFORMATION COMMON TO ALL EXPLORATORY HOLE RECORDS

Status Box
The status box in the top right hand corner of each exploratory hole record gives the status of each individual record i.e. PRELIM1, PRELIM2, PRELIM3 FINAL etc. The date shown relates to the last instance the data was revised. This information is for AEG Quality Assurance only.

Exploratory Hole No
The identity number used throughout the report.

Project
The ground investigation project name. Occasionally the project name may be shortened or abbreviated due to string length restraints imposed by the gINT® computer programme.

Client
Client's name responsible for funding the ground investigation project. The Client's name may be shortened or abbreviated due to string length restraints imposed by the gINT® computer programme.

Location
The exploratory hole position given as either national grid co-ordinates, local grid if specified, or a reference name normally pertaining to the area of investigation.

Method (Equipment)
Represents the drilling, excavation or boring method(s) or equipment used.

Ground Level (m(AOD))
The precise ground level in metres above Ordnance Datum at the exploratory hole location from which the reduced level for each stratigraphic boundary is calculated.

Date
The date relating to the start of the exploratory hole excavation.

Sheet
The sheet number and total number of sheets for the particular record.

Checked By
Printed signature of the person who has carried out the technical quality check on the log.

Logged By
The name of the engineer who has carried out the logging of the exploratory hole.

Contract No.
The Allied Exploration & Geotechnics Limited reference number for the project.

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Key Sheets

INFORMATION RELEVANT TO BOREHOLE AND WINDOW/WINDOWLESS SAMPLE HOLE RECORDS

Sample & Tests Columns

Depth	The depth over which a sample or test is taken is shown in depth column of the exploratory hole record in a "from...to" format.
Type No	Indicates the type of sample/test and number given by the driller.
Test Result	Result of the test given in the applicable units.

Water Column

Water Strike	Level of groundwater strike within an exploratory hole. The symbol 1▼ denotes a water strike and is suffixed with a number, which indicates the strike order. The corresponding unfilled symbol ▽ is the depth the strike rose to.
Seepage	Groundwater seepage within an exploratory hole is denoted by the ≈ symbol.

Strata Columns

Reduced Level	The corresponding reduced level of each soil or rock boundary in metres Ordnance Datum.
Legend	A graphical representation of the materials encountered using BS 5930:1999 Amendment No.2 (Aug 2010) recommended symbols for soil and rock.
Depth (Thickness)	The depth below ground level of each soil or rock boundary in metres and the thickness of each individual stratigraphic unit (given in brackets).
Description	Engineering description of each individual soil or rock type follows recommendations outlined in Section 6 of BS 5930:1999 Amendment No.2 (Aug 2010) with the following implementation:

1 The amendment of section 6 incorporates the guidance indicated in BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003 European Standard with particular emphasis on current UK practice.

2 Supplementary laboratory or in-situ assessed measurements of undrained strength are provided where applicable information is available in parenthesis in accordance with clause 41.3.2 BS 5930:1999 Amendment No.2 (Aug 2010) after the field strength determined consistency. The description based measurement table indicating the quantitative undrained strength classification divisions is provided in Key Sheets Table 1.

Term based on measurement	**Undrained strength classification definition cu, in kPa** (from BS EN ISO 14688-2:2004, 5.3, Table 5)
Extremely low	<10
Very low	10-20
Low	20-40
Medium	40-75
High	75-150
Very High	150-300
Extremely High	300-600

KEY SHEETS TABLE 1

3 Cobble and boulder content is expressed in accordance with the terms provided in EN ISO 14688-2: 2004 where visually identified in trial pit excavations, or inferred/recovered during the drilling operations. The assessment of frequency and spatial occurrence of coarse and very coarse rock material should not be considered as precise, but only an indicator or estimate of the potential conditions. It should be noted that the recovery of coarse or very coarse particles in boreholes is dependent on the limitations imposed by the casing diameter. The terminology used is outlined in Key Sheets Table 2.

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Key Sheets

Fraction	Percent by Mass	Term
Boulders	<5	Low boulder content
	5 to 20	Medium boulder content
	>20	High boulder content
Cobbles	<10	Low cobble content
	10 to 20	Medium cobble content
	>20	High cobble content

KEY SHEETS TABLE 2

4 Rock Strength based on assessed field or measured unconfined compressive strength follows the classification scheme given in clause 44.2.1 BS5930:1999 Amendment No.2 (Aug 2010) as outlined in Key Sheets Table 3.

Term for use in field or based on measurement	Definition for field use	Definition on basis of Unconfined Compressive Strength measurement (MPa)	*Old Classification of rock strength: Terminology (Strength Range MPa)*	*Old Classification of rock strength: Determination Method*
Extremely weak	Can be indented by thumbnail. Gravel sized lumps crush between finger and thumb.	0.6-1.0	*Very Weak (<1.25)*	*Lumps can be crushed between fingers*
Very weak	Crumbles under firm blows with point of geological hammer. Can be peeled by a pocket knife.	1-5	*Weak (1.25 – 5)*	*Lumps can be broken with heavy hand pressure*
Weak	Can be peeled by a pocket knife with difficulty. Shallow indentations made by firm blow with the point of geological hammer.	5-25	*Moderately Weak (5-12.50)*	*This slab can be broken with heavy pressure*
Medium Strong	Cannot be scraped with pocket knife. Can be fractured with a single firm blow of geological hammer.	25-50	*Moderately Strong (12.50-50)*	*Rock can be broken in the hand with a hammer*
Strong	Requires more than one blow of geological hammer to fracture.	50-100	*Strong (50-100)*	*Rock can be broken on a flat surface using a hammer*
Very Strong	Requires many blows of geological hammer to fracture.	100-250	*Very Strong (100-200)*	*Rock chipped by blows with a hammer*
Extremely strong	Can only be chipped with geological hammer.	>250	*Extremely Strong (>200)*	*Rock rings when hit with a hammer*
Based on BS EN ISO 14689-1:2003 4.2.7, Table 5			*BS5930: 1999 – Section 6 (Superseded Version)*	

KEY SHEETS TABLE 3

5 Where 'rock weathering classification' can be applied it is 'Approach 4' which will be used. If any other approach is used the factual text of the report will provide details of the applicable specific approach. (Ref.: Figure 19, p143, BS 5930:1999 Amendment No.2 (Aug 2010)). An outline of the 'Approach 4' rock weathering classification scheme is provided as Key Sheets Table 4.

APPROACH 4 CLASSIFICATION INCORPORATING MATERIAL AND MASS FEATURES		
Class	**Classifier**	**Typical characteristics**
A	Unweathered	Original strength, colour, fracture spacing
B	Partially weathered	Slightly reduced strength, slightly closer fracture spacing, weathering penetrating in from fractures, brown oxidation
C	Distinctly weathered	Further weathered, much closer fracture spacing grey reduction
D	Destructured	Greatly weakened, mottled, ordered lithorelics in matrix becoming weakened and disordered, bedding disturbed.
E	Residual or reworked	Matrix with occasional altered random or 'apparent' lithorelics, bedding destroyed. Classed as reworked when foreign inclusions are present as a result of transportation.

KEY SHEETS TABLE 4

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Instrument/Backfill Column

A graphical representation of backfill material or instrumentation detail using graphic legends. Its placement in the column is relative to depth in metres and corresponds to the exploratory hole in scale.

Boring Progress and Water Observations Columns

This section provides information on each day's production as a daily log.

Date	Date of shift.
Depth	Depth of hole at the start of the shift.
Casing	Casing's depth at the start of the shift.
Casing Dia	Casing's diameter at the start of the shift.
Water Depth	Water level within the borehole at the start and end of shift.

Chiselling Columns

Indicates where hard strata occurred in the borehole and breaking out was carried out to advance the borehole.

From	The depth commenced.
To	The depth finished.
Hours	The time spent for breaking out.

Water Added Columns

Indicates the depth range where water was added to the borehole to facilitate boring or to prevent stress relief disturbance "blowing/boiling" in granular soils.

From	Depth in metres from where water was added.
To	Depth in metres to where water was added.

General Remarks

Any remarks believed to be relevant to the exploratory hole.

INFORMATION RELEVANT TO PIT/TRENCH RECORDS

The pit/trench records follow the same format as the borehole and window/windowless sample hole records for the Samples & Tests, Water and Strata columns. However, in addition to these there are the following:

Plan

A schematic plan view of the pit showing its excavated dimensions together with its orientation, given as a compass bearing to magnetic north.

Groundwater

Notes on water bearing horizons.

Stability

The engineer's comments outlining the stability of the sides during pit excavation.

General Remarks

The engineer's comments of any other information relevant to construction of the pit.

Additional Information

An indication if a sketch and/or photographs accompany the record.

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Underground Services

Depth	Depth service was encountered.
Orientation	Orientation given as a compass bearing to magnetic north.
Type	Type of service encountered.
Diameter	Diameter of service encountered.
Condition	Condition the service encountered was noticed in.

INFORMATION RELEVANT TO DRILLHOLE RECORDS AND ROTARY CONTINUATION

Run Details Columns

Depth	Each drill run is highlighted by a horizontal line with the top and bottom depths shown in metres. Core diameter (C Dia) is presented also within each run.
TCR (SCR) RQD	Information provided on the total core recovery, solid core recovery and rock quality designation. Refer to Abbreviations for further details.
Fracture Index	Information given relating to the fracture index of the rock.

Strata Columns

As the strata columns for borehole and window/windowless sample hole records except for description which is as follows:

Discontinuities Detail	Information on core discontinuities, localised variations in weathering, lithology, strength and structure follows recommendations outlined in Section 6 BS 5930:1999 Amendment No.2 (Aug 2010):Clause 44.
Main	Engineering description of each individual soil or rock type follows recommendations outlined in Section 6 of BS 5930:1999 Amendment No.2 (Aug 2010).

Instrument/Backfill Column

A graphical representation of backfill material or instrumentation detail using graphic legends. Its placement in the column is relative to depth in metres and corresponds to the exploratory hole in scale.

Drilling Progress and Water Observations Columns

Date	Date of shift.
Depth	Depth of hole at the start of the shift.
Casing	Casing's depth at the start of the shift.
Water Strike	Depth at which water was encountered.
Water Standing	Depth at which water in the hole levelled off.
Water Remarks	Any remarks believed to be relevant to the water e.g. Artesian.

Standard Penetration Test

Depth	The depth commenced.
Type	Type of standard penetration test (SPT).
Result	Result of SPT.

Flush

From	The depth commenced.
To	The depth finished.
Type	Details of the type of flush used. A = Air, F = Foam, W = Water and Pol = Polymer.
Returns	An indication of the percentage of the returned flush material.

General Remarks

Any remarks believed to be relevant to the exploratory hole.

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Key Sheets

SAMPLES

B	Bulk disturbed sample.
ES	Environmental soil sample.
EW	Environmental water sample.
G	Gas sample.
J	Small disturbed sample.
LB	Large bulk disturbed sample.
P	Piston sample.
P*	An attempted but failed undisturbed piston sample.
U	Undisturbed sample.
U*	An attempted but failed general purpose undisturbed sample.
$U_{(ss)}$	Sample has been subsampled.
$ES_{(U)}$	Brackets following a sample denotes a subsample. The sample information within the brackets is the origin of the subsample.
W	Water sample.

IN-SITU TESTS

CBR	California Bearing Ratio mould sample or test.
HSV	In-situ hand shear vane.
HSV*	An attempted but failed in-situ hand shear vane.
HSV result of e.g 80(20)kPa	Denotes average HSV peak result followed by average HSV residual result (in brackets).
HP	Hand penetrometer test.
K (F)	Falling head permeability test.
K (R)	Rising head permeability test.
K (C)	Constant head permeability test.
K (P)	Packer permeability test.
PT	Pressuremeter test.
PID	Photo ionisation detector test.
FID	Flame ionisation detector test.
S	Standard Penetration Test (SPT) using the split barrel sampler (shoe). The corresponding uncorrected 'N' value is given in the test result column with more detailed information provided in the In-Situ Testing Enclosures where applicable. Testing has been conducted in accordance with BS EN ISO 22476-3: 2005.
C	Denotes SPT test using a solid cone in preference to the split barrel sampler (usually in coarse granular soil) with all other reporting requirements as outlined above for the split barrel sampler.
S/C result of e.g. 1/2.94	Denotes where full penetration has not been achieved during the SPT test. In such cases the penetration (mm) per blow is recorded in the test result column e.g. 1/2.94 is 2.94mm of penetration per single blow.
SV	In-situ down-the-hole shear vane test. The remoulded shear strength is given in brackets.

ROCK QUALITY AND CORE RECOVERY

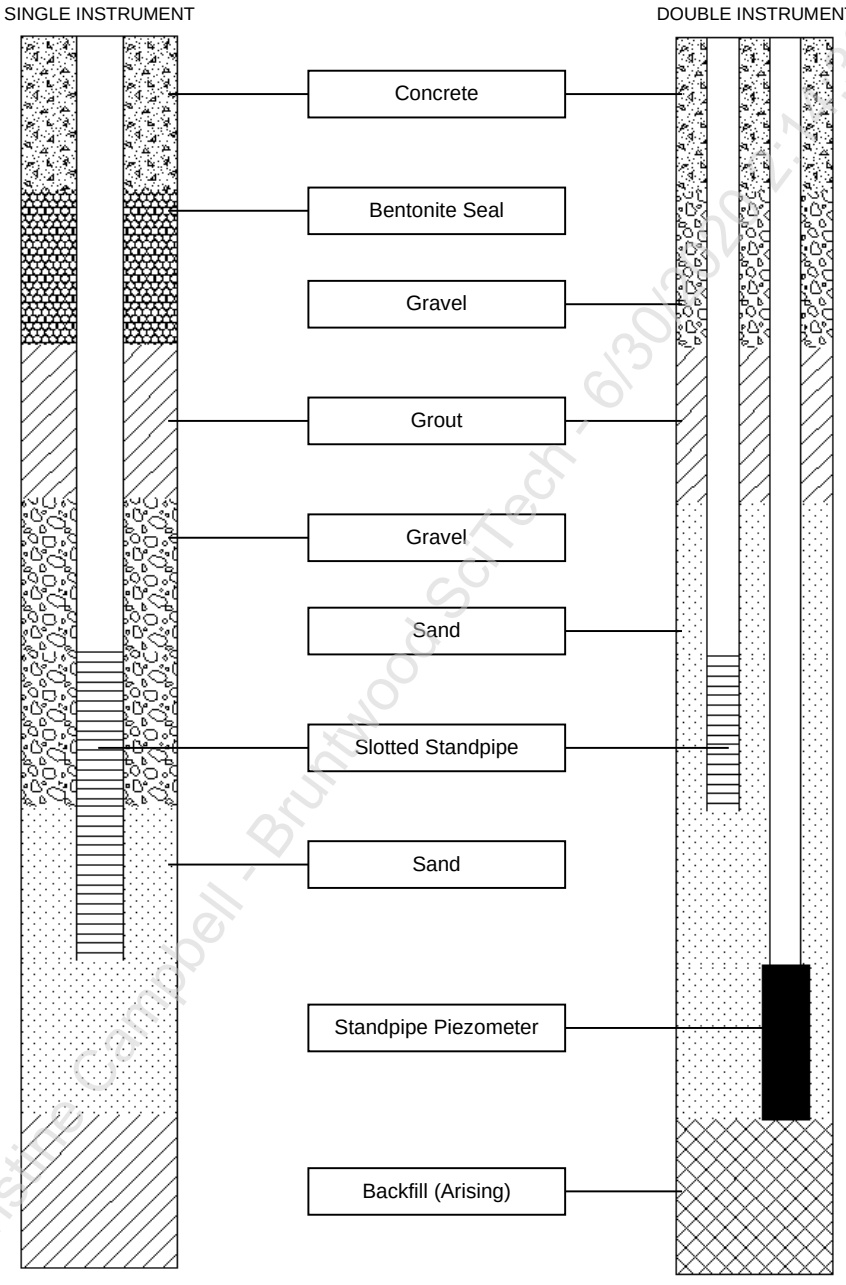
TCR	Total Core Recovery - the length of the recovered core expressed as a percentage of the length of core run.
SCR	Solid Core Recovery - the sum length of all core pieces that are recovered with at least one full diameter, expressed as a percentage of the length of core run.
RQD	Rock Quality Designation - The sum length of all core pieces that are 100mm or longer (measured along the centre of the core), expressed as a percentage of the length of core run.
FI	Fracture Index - The number of fractures per 1000mm length of solid core.
NI	Non-intact - The material recovered in a non-intact state.
NR	No recovery from the core run. These zones are based on the interpretation of the logging engineer and are therefore potentially subjective.

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Key Sheets

Symbols and Abbreviations: Explanation of Instrumentation Legends Used



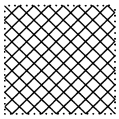
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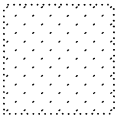
Symbols and Abbreviations: Explanation of Legends Used

Soils	Rocks		
	Sedimentary	*Metamorphic*	*Igneous*

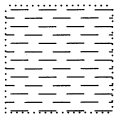

Made Ground


Cobbles and Boulders

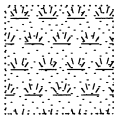

Gravel


Sand


Silt

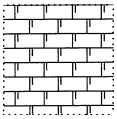

Clay

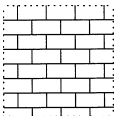

Peat

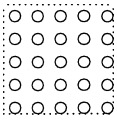

Topsoil

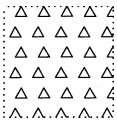
Note: Composite soil types will be signified by combined symbols e.g.

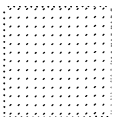

Silty Sand

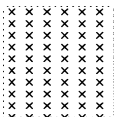

Chalk


Limestone


Conglomerate


Breccia


Sandstone


Siltstone

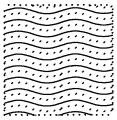

Mudstone

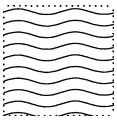

Shale


Coal

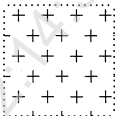

Pyroclastic (Volcanic Ash)

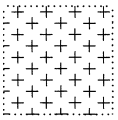

Gypsum


Coarse Grained


Medium Grained


Fine Grained


Coarse Grained


Medium Grained


Fine Grained

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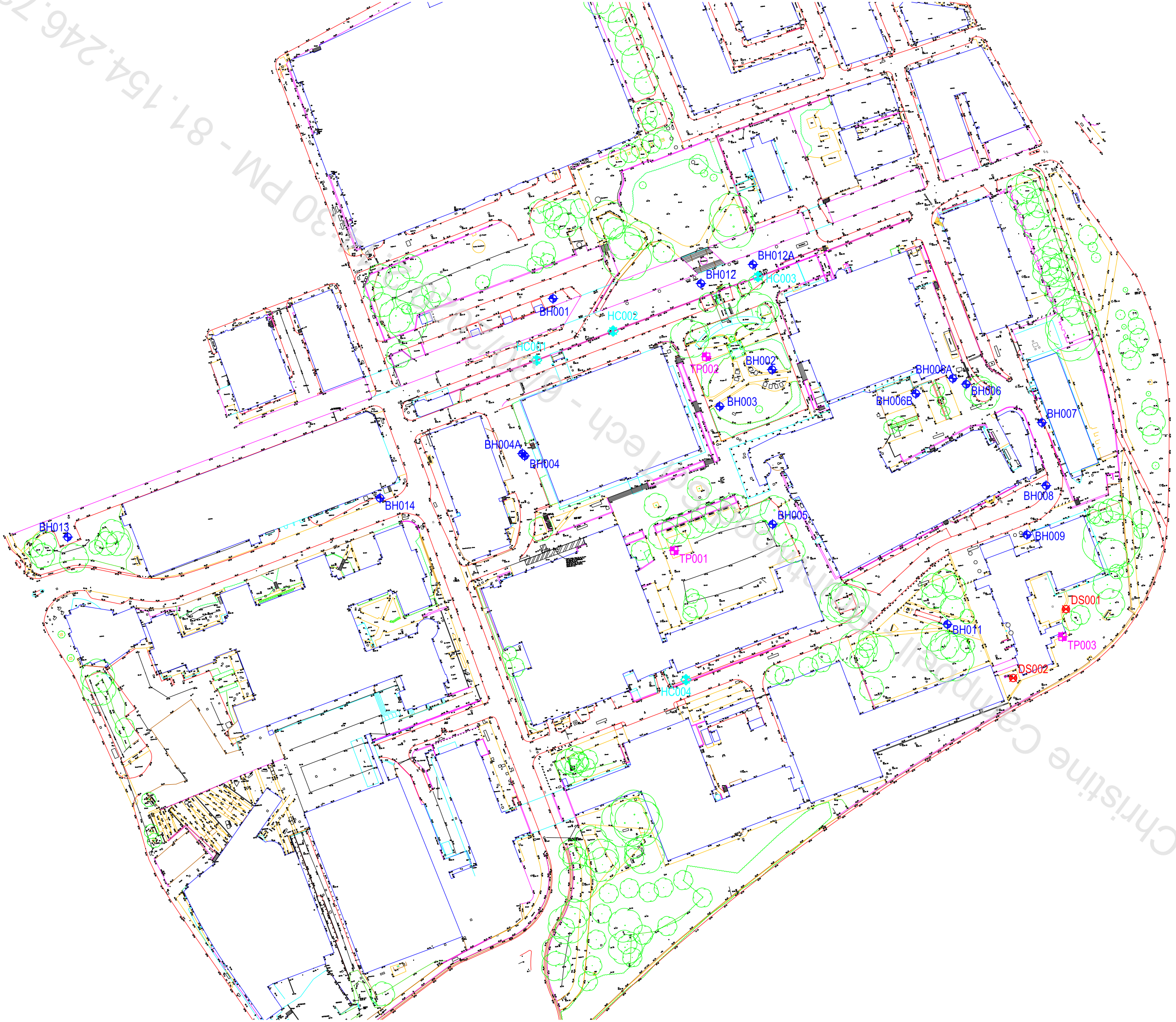
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FIELD DATA ENCLOSURE 1

Exploratory Hole Location Plan

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(Tel): 0191 387 4700
(Fax): 0191 387 4710
(Email): enquiries@aeg.uk.net

KEY:

BOREHOLE/DRILLHOLE

DYNAMIC SAMPLE HOLE

TRIAL PIT

CONCRETE CORING

N
W E
S

Base Plan Supplied by Consulting Engineer

Drawing Title:
ENC 01 : Exploratory Hole Location Plan

Drawing No.:
AEG/NW1588/03

Contract Title:
ID Manchester Preliminary Ground Investigation

Client:
University of Manchester

Consultant:
Arup
6th Floor, 3 Piccadilly Place,
Manchester, M1 3BN

Contract No.:
NW1588

Scale:
1:1500 @ A3

Date:
14/04/2020

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FIELD DATA ENCLOSURE 2

Borehole Records

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Borehole Summary Table

Exploratory Hole Number	Drilling Method	Completion Depth (m BGL)	Depth of instrumentation (m BGL)	Instrumentation Response zone (m BGL)	Remarks
BH001	CP/RC	15.50	15.50	10.00-15.50	Advanced to required depth.
BH002	CP	4.00	2.50	0.50-3.00	Terminated due to refusal.
			4.00	3.20-4.00	
BH003	CP	5.40	-	-	Terminated due to refusal.
BH004	CP/RC	14.00	14.00	11.00-14.00	Advanced to required depth.
BH004A	CP	4.00	4.00	1.00-4.00	Advanced to required depth.
BH005	CP/RC	21.50	21.50	18.50-21.50	Advanced to required depth.
BH006	CP	1.60	-	-	Terminated due to obstruction.
BH006A	CP	1.30	-	-	Terminated due to concrete obstruction.
BH006B	CP	0.70	-	-	Terminated due to concrete obstruction.
BH007	CP/RC	13.60	13.60	10.60-13.60	Advanced to required depth.
BH008	CP	6.50	6.50	0.30-6.50	Advanced to required depth.
BH009	CP	4.80	1.70	0.50-1.70	Terminated due to refusal
BH011	CP/RC	13.00	13.00	6.00-13.00	Advanced to required depth.
BH012	CP	0.35	-	-	Terminated due to concrete obstruction.
BH012A	CP	10.80	6.00	2.00-6.00	Advanced to required depth.
BH013	CP/RC	16.50	16.50	11.00-16.50	Advanced to required depth.
BH014	CP	10.50	-	-	Advanced to required depth.

Any relevant photographs are presented after the applicable Borehole Record
CP = Cable Percussion, RO = Rotary Openhole, RC = Rotary Coring, DS = Dynamic Sampling
All installations comprise 50mm diameter slotted standpipes

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Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH001
Client: University of Manchester	**Location:** Manchester E:384566.052 N:397646.557	
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 37.810 / **Start Date:** 26/10/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				37.71		0.10	MADE GROUND (Macadam).	
0.20	J1			37.41		0.40	MADE GROUND (Brown yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular ad includes sandstone, limestone and brick).	
0.20	ES2							
0.20-0.40	B3							
0.50	J4						MADE GROUND (Soft brown sandy gravelly clay with low cobble content with fragments of pottery, glass and wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone and brick. Cobbles are angular and include sandstone and brick).	
0.50	ES5							
0.50-1.00	B6							
1.00	J7							
1.00	ES8							
1.00-1.20	B9							
1.20-1.65	U10	(35)					at c.0.50m BGL ... slightly sandy slightly gravelly clay of intermediate plasticity.	
1.65	J11							
2.00	ES12						at c.2.00m BGL ... clay is of intermediate plasticity.	
2.00-2.45	B14							
2.00-2.45	SJ13	N8				(3.80)		
3.00	ES15						at c.3.00m BGL ... sandy slightly gravelly clay of low plasticity.	
3.00-3.45	B17	(10)						
3.00-3.45	SJ16	N10						
4.00	ES18			33.61		4.20		
4.00-4.45	B20							
4.00	SJ19	50/250mm		33.41		4.40	Soft black brown silty sandy gravelly CLAY with interbeds of silt and fragments of pottery and glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone and coal. (Engineer notes possible remanence of infilled river channel). at c.4.30m BGL ... clay is of intermediate plasticity.	
4.30	ES21							
4.30	J22							
5.00-5.45	B24							
5.00	SJ23	50/100mm				(1.60)	Very dense red clayey slightly gravelly SAND with clay pockets. Sand is fine to coarse. Gravel is fine to medium angular to subangular and includes sandstone. (Possible weathered sandstone).	
5.50	SJ25	50/125mm						
				31.81		6.00		
							Boring complete at 6.00m BGL - continued by rotary drilling.	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
26/10/2019	0.00	0.00	200	
26/10/2019	1.20	1.00	200	Dry
27/10/2019	1.20	1.00	200	Dry
27/10/2019	3.84	3.84	200	
27/10/2019	6.00	5.80	150	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
4.40 - 5.50	2:30	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.00-15.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

Print Date and Time: 16/04/2020 11:35:18

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Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH001
Client: University of Manchester	**Location:** Manchester E:384566.052 N:397646.557		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 37.810	**Start Date:** 26/10/2019	**Sheet:** 1 of 5

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
6.00 (102mm)	0 (0) 0	NR		31.81		6.00	6.00-8.90m ... no recovery.	(1) Red SANDSTONE.	
6.50 (102mm)	0 (0) 0						6.50m ... J26		
8.00 (102mm)	40 (33) 7					(2.90)			
9.50 (102mm)		NI 7		28.91		8.90	8.90-9.00m ... non-intact. 9.00-10.20m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured with inclusions of fine to medium subrounded quartz and quartzite.	
	60 (47) 30					(1.50)	9.50m ... J27		

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
29/10/2019	6.00	5.80	

Standard Penetration Test		
Depth	Type	Result
9.50	S	60/20mm

Flush		
From - To	Type	Returns (%)
6.00 - 6.50	Water	100
6.50 - 8.00	Water	100
8.00 - 9.50	Water	100
9.50 - 11.00	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.00-15.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. **NW1588**

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH001
Client: University of Manchester	**Location:** Manchester E:384566.052 N:397646.557		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 37.810	**Start Date:** 26/10/2019	**Sheet:** 2 of 5

RUN DETAILS			Water	STRATA				
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
(102mm)		NI		27.41		10.40	10.20-10.40m ... non-intact.	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured with inclusions of fine to medium subrounded quartz and quartzite. *(continued)*	
		NR					10.40-11.30m ... no recovery.	(1) Red SANDSTONE.	
11.00						(0.90)			
	80 (67) 0			26.51		11.30			
(102mm)		11					11.30-12.30m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth rough open clean discontinuities.	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured with inclusions of fine to medium quartz and quartzite.	
		NI					12.30-12.50m ... non-intact.		
12.50									
	87 (80) 18	NR					12.50m ... J28 12.50-12.70m ... no recovery.		
		NI					12.70-12.80m ... non-intact.		
		11					12.80-15.15m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		
(102mm)						(4.20)			
14.00									

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing

Standard Penetration Test

Depth	Type	Result
12.50	S	27/10mm

Flush

From - To	Type	Returns (%)
11.00 - 12.50	Water	100
12.50 - 14.00	Water	100
14.00 - 15.50	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.00-15.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH001
Client: University of Manchester	**Location:** Manchester E:384566.052 N:397646.557		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 37.810	**Start Date:** 26/10/2019	**Sheet:** 3 of 5

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
(102mm)	90 (83) 9	NI NR		22.31		15.50	15.15-15.35m ... non-intact. 15.35-15.50m ... no recovery.	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured with inclusions of fine to medium quartz and quartzite. *(continued)*	
							15.50m ... J29	*Complete at 15.50m BGL.*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
29/10/2019	15.50	15.50	0.00	15.50	S	100/30mm				(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 50mm diameter slotted standpipe installed between 10.00-15.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH001
Client: University of Manchester	**Location:** Manchester E:384566.052 N:397646.557		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 37.810	**Start Date:** 26/10/2019	**Sheet:** 4 of 5

Figure BH001.1
BH001 8.00-11.00m BGL



Figure BH001.2
BH001 11.00-12.50m BGL



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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH001
Client: University of Manchester	**Location:** Manchester E:384566.052 N:397646.557		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 37.810	**Start Date:** 26/10/2019	**Sheet:** 5 of 5

Figure BH001.3
BH001 12.50-14.00m BGL



Figure BH001.4
BH001 14.00-15.50m BGL



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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH002
Client: University of Manchester	**Location:** Manchester E:384655.294 N:397617.594		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 33.265	**Start Date:** 02/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				33.17		0.10	MADE GROUND (Soft brown sandy clay with many rootlets. Sand is fine to coarse).	
0.10	J1							
0.30	ES2						MADE GROUND (Medium dense brown yellow red black clayey very sandy gravel with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, clinker, wood, glass and brick).	
0.50	B3							
1.00	ES4							
1.20	B5							
1.70-2.20	CB6	N24				(3.60)		
2.40	J7							
2.50	ES8							
2.70-3.20	CB9	50/239mm					at c.2.70m BGL ... very dense/possible obstruction.	
3.40	B10							
3.50	ES11			29.57		3.70		
3.70-4.00	B13						Very dense red clayey gravelly SAND. Sand is fine to coarse. (Possible weathered sandstone).	
3.70-4.00	SJ12	50/21mm		29.27		4.00		
4.00	S14	100/14mm					*Terminated at 4.00m BGL - due to refusal.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
02/11/2019	0.00	0.00	200	
02/11/2019	4.00	4.00	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
3.70 - 4.00	1:00	1.20 - 4.00

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Double installation: Two 50mm diameter slotted standpipe installed betweeen 0.50-3.00m and 3.20-1.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. **NW1588**

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH003
Client: University of Manchester	**Location:** Manchester E:384633.942 N:397602.655		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 33.095	**Start Date:** 02/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1			32.80		0.30	MADE GROUND (Soft brown sandy clay with many rootlets. Sand is fine to coarse).	
0.30	ES2						MADE GROUND (Medium dense brown yellow red black sandy gravel with fragments of wood and glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, clinker and brick).	
0.50	B3							
1.00	ES4							
1.20	B5							
1.70-2.20	CB6	N29					at c.1.70m BGL ... clayey very gravelly sand with cobbles noted.	
						(4.10)		
2.40	J7							
2.50	ES8							
2.70-3.20	CB9	N15						
3.40	B10							
3.50	ES11							
3.70-4.20	CB12	N37					at c.3.70m BGL ... dense.	
				28.70		4.40		
4.40	J13						Very dense red clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to medium angular and includes sandstone. (Possible weathered sandstone).	
4.50	ES14							
4.70-5.20	B16							
4.70-5.20	SJ15	51/182mm				(1.00)		
5.20	SJ17	50/29mm		27.70		5.40		
5.40	S18	100/22mm					*Terminated at 5.40m BGL - due to refusal.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
02/11/2019	0.00	0.00	200	
02/11/2019	5.40	5.40	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
5.20 - 5.40	1:00	1.20 - 4.40

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH004
Client: University of Manchester	**Location:** Manchester E:384554.516 N:397582.476	
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.223 / **Start Date:** 02/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				34.12		0.10	MADE GROUND (Macadam).	
				33.92		0.30	MADE GROUND (Brown yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone).	
0.30	ES1							
0.30-0.65	B2							
0.70	J3						MADE GROUND (Medium dense to dense brown yellow black clayey sandy gravel with fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick, clinker and limestone).	
0.80	ES4							
0.80-1.20	B5							
1.40-1.90	SB6	N39					at c.1.40m BGL ... very clayey gravelly sand. Clay fines are of low plasticity.	
2.00-2.50	B8							
2.00-2.45	SJ7	N14						
2.30	ES9					(4.20)		
3.00	B11							
3.00-3.50	SJ10	N33						
3.30	ES12							
4.00-4.50	SB13	50/200mm					at c.4.00m BGL ... very dense/possible obstruction.	
4.30	ES14			29.72		4.50		
5.00-5.50	B16						MADE GROUND (Soft to firm brown yellow grey black sandy gravelly clay with bands of gravel and fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, clinker and brick).	
5.00	SJ15	50/150mm					at c.5.00m BGL ... cobbles with much sandy gravelly clay of low plasticity.	
5.30	ES17					(2.50)		
6.00-6.50	CB18	N43						
6.30	ES19							
				27.22		7.00		
7.00	J20						Very dense brown clayey very gravelly SAND with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded and includes sandstone. Cobbles are rounded and include sandstone.	
7.30	ES21					(1.00)		
7.50-7.80	CB22	50/150mm					at c.7.50m BGL ... laboratory notes tile, wood and brick fragments (possible fall in from above).	
				26.22		8.00		

Boring complete at 8.00m BGL - continued by rotary drilling.

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
02/11/2019	0.00	0.00	200		7.80 - 8.00	0:30	7.20 - 8.00	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 50mm diameter slotted standpipe installed between 11.00m and 14.00m BGL.
02/11/2019	8.00	7.90	200	7.48				

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH004
Client: University of Manchester	**Location:** Manchester E:384554.516 N:397582.476		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.223	**Start Date:** 02/11/2019	**Sheet:** 1 of 3

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
8.00 (102mm) 8.75	0 (0) 0	NR		26.22		8.00	8.00-10.00m ... no recovery.	(1) Red SANDSTONE with gravel inclusions.	
(102mm) 9.50	0 (0) 0					(2.00)	8.75m ... J24		
(102mm) 11.00	67 (0) 0			24.22		10.00	9.50m ... J25		
		NI					10.00-11.00m ... non-intact.	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured.	
(102mm) 12.00	100 (100) 15	13					11.00m ... J26 11.00-12.50m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing
16/11/2019	8.00	7.90	

Standard Penetration Test

Depth	Type	Result
8.75	S	50/48mm
9.50	S	50/36mm
11.00	S	50/30mm

Flush

From - To	Type	Returns (%)
8.00 - 8.75	Water/Polymer	100
8.75 - 9.50	Water/Polymer	100
9.50 - 11.00	Water/Polymer	100
11.00 - 12.00	Water/Polymer	100
12.00 - 12.50	Water/Polymer	100

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 11.00m and 14.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. **NW1588**

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH004
Client: University of Manchester	**Location:** Manchester E:384554.516 N:397582.476		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.223	**Start Date:** 02/11/2019	**Sheet:** 2 of 3

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
(102mm) 12.50	100 (100) 80					(4.00)		Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured. *(continued)*	
(102mm)	73 (73) 17	NR					12.50-12.90m ... no recovery.		
		16					12.90-14.00m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		
				20.22		14.00	14.00m ... J27	*Complete at 14.00m BGL.*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
16/11/2019	14.00	14.00	0.00	14.00	S	50/25mm	12.50 - 14.00	Water/Polymer	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 50mm diameter slotted standpipe installed between 11.00m and 14.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH004
Client: University of Manchester	**Location:** Manchester E:384554.516 N:397582.476		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.223	**Start Date:** 02/11/2019	**Sheet:** 3 of 3

Figure BH004.1
BH004 9.50-12.00m BGL



Figure BH004.2
BH004 12.00-13.50m BGL



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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH004A
Client: University of Manchester	**Location:** Manchester E:384553.588 N:397583.415		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 34.187	**Start Date:** 17/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				34.09		0.10	MADE GROUND (Macadam).	
				33.89		0.30	MADE GROUND (Brown yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone).	
						(3.70)	MADE GROUND (Brown yellow black clayey sandy gravel with fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick, clinker and limestone).	
				30.19		4.00	*Complete at 4.00m BGL.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
17/11/2019	0.00	0.00	200	
17/11/2019	4.00	4.00	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) No samples taken. Advanced to install instrumentation.
(4) 50mm diameter slotted standpipe installed between 1.00m and 4.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424	**Start Date:** 16/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10 0.20	J1 ES2			33.12		0.30	MADE GROUND (Grass over topsoil consisting of brown silty gravelly sand with rootlets. Sand is fine to medium. Gravel is fine to coarse subangular to angular and includes sandstone and limestone).	
0.50 0.80 1.00	J3 B4 ES5					(1.20)	MADE GROUND (Red brown very clayey very sandy gravel with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, brick and limestone. Cobbles are angular and include brick).	
1.50 1.50-2.00	J6 CB7	50/97mm		31.92		1.50	Medium dense brown to light brown clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular and includes sandstone, quartz and siltstone. at c.1.50m BGL ... very dense/probable instruction.	
2.30 2.30 2.50	J8 ES9	N20				(1.60)		
3.10 3.20 3.30	J11 B12 SJ13	50/48mm		30.32 30.02		3.10 3.40	Extremely weak red brown SANDSTONE. (Recovered as sand and gravel. Sand is fine. Gravel is fine to medium subrounded). *Boring complete at 3.40m BGL - continued by rotary drilling.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
16/11/2019	0.00	0.00	200	
16/11/2019	3.40	3.40	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
1.50 - 1.60	0:30	1.20 - 3.40
3.30 - 3.40	1:00	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Between 9.50-14.00m BGL driller notes sand washing into borehole. Advanced 150mm diameter casing to 7.30m BGL and continued with geobore.
(4) 50mm diameter slotted standpipe installed between 18.50m and 21.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645	
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424 / **Start Date:** 16/11/2019	**Sheet:** 1 of 8

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
3.50		RO		30.02		3.40	3.40-3.50m ... rotary openhole drilling.	(1) Red brown SANDSTONE.	
4.50 (102mm)	0 (0) 0	NR					3.50-6.00m ... no recovery.		
5.00 (102mm)	0 (0) 0					(2.60)			
5.50 (102mm)	0 (0) 0								
6.50 (102mm)	50 (0) 0								
		NI		27.42		6.00	6.00-6.50m ... non-intact.	Extremely weak red brown fine grained SANDSTONE highly weathered. (Recovered as sand and gravel. Gravel is fine to coarse).	
				26.92		(0.50) 6.50			
7.00 (102mm)	40 (18) 0	NR					6.50-6.80m ... no recovery.	Extremely weak to weak red brown fine grained SANDSTONE moderately weathered to destructured. (Engineer notes some loss of strength within 20mm from apertures with some dark red and black surface staining).	
		NI		26.42		(0.50) 7.00	6.80-7.00m ... non-intact.		
(102mm)	0 (0) 0	NR					7.00-8.75m ... no recovery.	(1) Red SANDSTONE.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
24/11/2019	3.40	3.40	2.70	3.40	S	100/30mm	3.50 - 4.50	Water	50	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Between 9.50-14.00m BGL driller notes sand washing into borehole. Advanced 150mm diameter casing to 7.30m BGL and continued with geobore. (4) 50mm diameter slotted standpipe installed between 18.50m and 21.50m BGL.
							4.50 - 5.00	Water	50	
							5.00 - 5.50	Water	50	
							5.50 - 6.50	Water	50	
							6.50 - 7.00	Water	50	
							7.00 - 7.50	Water	50	

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645	
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424 / **Start Date:** 16/11/2019	**Sheet:** 2 of 8

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
7.50								(1) Red SANDSTONE. *(continued)*	
(102mm)	0 (0) 0					(1.75)			
8.00									
(102mm)	25 (3) 0								
				24.67		8.75			
9.00		NI					8.75-9.00m ... non-intact.	Extremely weak to weak red brown fine grained SANDSTONE moderately weathered to destructured. (Engineer notes some loss of strength within 20mm from apertures with some dark red and black surface staining).	
(102mm)	80 (48) 0	NR					9.00-9.10m ... no recovery.		
		NI					9.10-9.50m ... non-intact.		
9.50									
(102mm)	83 (65) 43	NR					9.50-9.75m ... no recovery.		
		7					9.75-11.00m ... subhorizontal (5-30 degrees) closely to medium spaced planar to undulating smooth infilled (sand and gravel) discontinuities.		
						(3.75)			
11.00									
	80 (75) 37	NR					11.00-11.30m ... no recovery.		
		13					11.30-12.50m ... subhorizontal (5-30 degrees) closely		

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing
24/11/2019	9.50	9.50	6.45
25/11/2019	9.50	9.50	7.00

Standard Penetration Test

Depth	Type	Result

Flush

From - To	Type	Returns (%)
7.50 - 8.00	Water	50
8.00 - 9.00	Water	50
9.00 - 9.50	Water	50
9.50 - 11.00	Water	50
11.00 - 12.50	Water	50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Between 9.50-14.00m BGL driller notes sand washing into borehole. Advanced 150mm diameter casing to 7.30m BGL and continued with geobore.
(4) 50mm diameter slotted standpipe installed between 18.50m and 21.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645	
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424 / **Start Date:** 16/11/2019	**Sheet:** 3 of 8

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
(102mm) 12.50				20.92		12.50	to very closely spaced planar to undulating smooth infilled (sand) discontinuities.	Extremely weak to weak red brown fine grained SANDSTONE moderately weathered to destructured. (Engineer notes some loss of strength within 20mm from apertures with some dark red and black surface staining). *(continued)*	
(102mm)	37 (32) 0	NR		19.97		(0.95) 13.45	12.50-13.45m ... no recovery.	(1) Red SANDSTONE. (Driller describes as 'broken').	
14.00		12		19.42		(0.55) 14.00	13.45-14.00m ... subhorizontal (5-30 degrees) closely to very closely spaced planar to undulating smooth infilled (sand) discontinuities.	Extremely weak to weak red brown fine grained SANDSTONE moderately weathered to destructured. (Engineer notes some loss of strength within 20mm from apertures with some dark red and black surface staining).	
(102mm)	90 (87) 62	7					14.00-15.50m ... horizontal (0-5 degrees) closely spaced planar rough to smooth partly open clean discontinuities.	Weak to medium strong red brown coarse grained SANDSTONE partially weathered.	

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing
25/11/2019	14.00	14.00	8.10
29/11/2019	14.00	14.00	

Standard Penetration Test

Depth	Type	Result

Flush

From - To	Type	Returns (%)
12.50 - 14.00	Water	50
14.00 - 15.50	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Between 9.50-14.00m BGL driller notes sand washing into borehole. Advanced 150mm diameter casing to 7.30m BGL and continued with geobore.
(4) 50mm diameter slotted standpipe installed between 18.50m and 21.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645	
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424 / **Start Date:** 16/11/2019	**Sheet:** 4 of 8

RUN DETAILS			Water	STRATA				
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
15.50								Weak to medium strong red brown coarse grained SANDSTONE partially weathered. *(continued)*	
	93 (73) 51	NI					15.50-15.80m ... non-intact.		
		9					15.80-18.50m ... horizontal (0-5 degrees) to subhorizontal (5-30 degrees) closely spaced tight to partly open clean discontinuities.		
(102mm)									
17.00									
	100 (100) 60					(7.50)			
(102mm)									
18.50									
	80 (50) 0	NI					18.50-19.00m ... non-intact.		
(102mm)									
19.00									
	100 (100) 60	8					19.00-21.50m ... horizontal (0-5 degrees) to subhorizontal (5-30 degrees) closely spaced tight to partly open clean discontinuities.		

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
29/11/2019	17.00	17.00	0.00
30/11/2019	17.00	17.00	4.65

Standard Penetration Test		
Depth	Type	Result
17.00	S	100/35mm

Flush		
From - To	Type	Returns (%)
15.50 - 17.00	Water	100
17.00 - 18.50	Water	50
18.50 - 19.00	Water	50
19.00 - 20.00	Water	50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Between 9.50-14.00m BGL driller notes sand washing into borehole. Advanced 150mm diameter casing to 7.30m BGL and continued with geobore.
(4) 50mm diameter slotted standpipe installed between 18.50m and 21.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424	**Start Date:** 16/11/2019	**Sheet:** 5 of 8

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
(102mm)								Weak to medium strong red brown coarse grained SANDSTONE partially weathered. *(continued)*	
20.00									
(102mm)	100 (93) 73			11.92		21.50			
								Complete at 21.50m BGL.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
30/11/2019	21.50	21.50	3.95				20.00 - 21.50	Water	50	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Between 9.50-14.00m BGL driller notes sand washing into borehole. Advanced 150mm diameter casing to 7.30m BGL and continued with geobore. (4) 50mm diameter slotted standpipe installed between 18.50m and 21.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. **NW1588**

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424	**Start Date:** 16/11/2019	**Sheet:** 6 of 8

Figure BH005.1
BH005 3.50-11.00m BGL.



Figure BH005.2
BH005 11.00-14.00m BGL.



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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424	**Start Date:** 16/11/2019	**Sheet:** 7 of 8

Figure BH005.3
BH005 14.00-17.00m BGL.



Figure BH005.4
BH005 17.00-20.00m BGL.



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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH005
Client: University of Manchester	**Location:** Manchester E:384655.497 N:397554.645		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.424	**Start Date:** 16/11/2019	**Sheet:** 8 of 8

Figure BH005.5
BH005 20.00-21.50m BGL.



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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH006
Client: University of Manchester	**Location:** Manchester E:384734.367 N:397611.677		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 33.967	**Start Date:** 03/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				33.87		0.10	MADE GROUND (Macadam).	
				33.64		0.33	MADE GROUND (Brown yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone and limestone).	
0.35	J1							
0.40	ES2							
0.40-1.00	B3					(1.27)	MADE GROUND (Brown yellow black sandy gravel with fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick, clinker and limestone).	
1.20	ES4							
1.40-1.60	CB5	50/10mm		32.37		1.60	at c.1.60m BGL ... (1) Obstruction. *Terminated at 1.60m BGL - due to obstruction.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
03/11/2019	0.00	0.00	200	
03/11/2019	1.60	1.60	200	Damp

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
1.60 - 1.60	0:30	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Relocated to BH006A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH006A
Client: University of Manchester	**Location:** Manchester E:384728.887 N:397614.035		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 33.996	**Start Date:** 17/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				33.98		0.02	MADE GROUND (Grey macadam).	
				33.94		0.06	MADE GROUND (Black macadam).	
				33.88		0.12	MADE GROUND (Light grey macadam).	
0.30	J1			33.50		(0.38) 0.50	MADE GROUND (Brown black sandy gravel with fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, clinker, brick, ash and limestone).	
0.40	ES2							
0.50	J3							
0.80	B4					(0.80)		
1.00	ES5			32.70		1.30	MADE GROUND (Red brown clayey sand and gravel with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, brick and limestone. Cobbles are angular and includes brick). at c.1.30m BGL ... (1) Concrete. *Terminated at 1.30m BGL - due to concrete obstruction.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
17/11/2019	0.00	0.00	200	
17/11/2019	1.30	1.30	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Relocated from BH006.
(4) Relocated to BH006B.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH006B
Client: University of Manchester	**Location:** Manchester E:384713.826 N:397607.847		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 33.497	**Start Date:** 17/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
0.10	J1			33.47		0.03	MADE GROUND (Grey macadam).	
0.20	ES2			33.44		0.06	MADE GROUND (Black macadam).	
0.40	B3			33.38		0.12	MADE GROUND (Light grey macadam).	
0.60	ES4			33.20		0.30	MADE GROUND (Light grey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes limestone).	
						(0.40)	MADE GROUND (Red brown clayey very sandy gravel with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, brick and limestone. Cobbles are angular and include brick). at c.0.70m BGL ... (1) Concrete.	
				32.80		0.70	*Terminated at 0.70m BGL - due to concrete obstruction.*	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
17/11/2019	0.00	0.00	200					(1) Description derived from drillers daily report.
17/11/2019	0.70	0.60	200	Dry				(2) Inspection pit dug prior to drilling.
								(3) Relocated from BH006A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH007
Client: University of Manchester	**Location:** Manchester E:384765.207 N:397596.049		
Method (Equipment): K.R/P.D (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.684	**Start Date:** 08/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.05	B1			34.58		0.10	MADE GROUND (Macadam).	
0.20	ES2			34.38		0.30	MADE GROUND (Concrete).	
0.30	J3						MADE GROUND (Brown yellow black clayey sandy gravel with cobbles noted and fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and clinker).	
0.60	B4							
1.00	ES5					(1.90)		
1.20	J6							
1.50-2.00	CB7	N16					at c.1.50m BGL ... medium dense.	
				32.48		2.20		
2.20	J8						MADE GROUND (Medium dense yellow brown black clayey very sandy gravel with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular and includes ash, sandstone, brick and clinker. Cobbles are subangular and include brick and concrete. at c.2.50m BGL ... clay is of low plasticity. Metal fragments noted.	
2.30	ES9							
2.50-3.00	B11							
2.50-3.00	SJ10	N20						
3.20	B12							
3.30	ES13							
3.50-4.00	B15							
3.50	SJ14	N16						
4.20	J16					(4.20)		
4.30	ES17							
4.50-5.00	SJ18	N10					at c.4.50m BGL ... loose and medium dense.	
				28.28		6.40		
6.40	J19						Loose and medium dense red brown clayey very gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse subangular to rounded and includes sandstone. (Possible Reworked River Bed).	
6.50-7.00	CB20	N10				(0.80)		
				27.48		7.20		
7.10	B21							
7.20	SJ22	50/61mm					Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured. (Recovered as sand).	
				27.18		7.50		
7.50	SJ23	100/39mm					*Boring complete at 7.50m BGL - continued by rotary drilling.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
08/11/2019	0.00	0.00	200	
08/11/2019	1.20	0.00	200	Dry
09/11/2019	1.20	0.00	200	Dry
09/11/2019	7.50	7.50	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
4.30 - 4.40	1:00	1.20 - 7.50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.60m and 13.60m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH007
Client: University of Manchester	**Location:** Manchester E:384765.207 N:397596.049	
Method (Equipment): K.R/P.D (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.684 / **Start Date:** 08/11/2019	**Sheet:** 1 of 4

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
7.50	100 (67) 0	NI		27.18		7.50	7.50-7.70m ... non-intact.	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured.	
(102mm)		23					7.70-8.10m ... subhorizontal (10 degrees) very closely spaced planar rough undulating smooth and rough open clean discontinuities.		
8.10	100 (80) 30	NI					8.10-8.20m ... non-intact.		
(102mm)		11					8.20-9.40m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		
		NI					9.40-9.60m ... non-intact.		
9.60	60 (60) 13	NR					9.60-10.20m ... no recovery.		
(102mm)		7					10.20-11.10m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		
						(6.10)			
11.10	0 (0) 0	NR					11.10m ... J24 11.10-12.10m ... no recovery.		

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
17/11/2019	7.50	7.50	

Standard Penetration Test		
Depth	Type	Result
11.10	S	50/30mm

Flush		
From - To	Type	Returns (%)
7.50 - 8.10	Water/Polymer	100
8.10 - 9.60	Water/Polymer	100
9.60 - 11.10	Water/Polymer	100
11.10 - 12.10	Water/Polymer	100

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.60m and 13.60m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH007
Client: University of Manchester	**Location:** Manchester E:384765.207 N:397596.049		
Method (Equipment): K.R/P.D (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.684	**Start Date:** 08/11/2019	**Sheet:** 2 of 4

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
(102mm) 12.10								Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured. *(continued)*	
(102mm)	100 (67) 37	28					12.10-12.30m ... subhorizontal (10 degrees) very closely spaced planar rough undulating smooth and rough open clean discontinuities.		
		NI					12.30-12.80m ... non-intact.		
		8					12.80-13.60m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		
				21.08		13.60			
							13.60m ... J25	*Complete at 13.60m BGL.*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
17/11/2019	13.60	13.60	0.00	13.60	S	50/40mm	12.10 - 13.60	Water/Polymer	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 50mm diameter slotted standpipe installed between 10.60m and 13.60m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH007
Client: University of Manchester	**Location:** Manchester E:384765.207 N:397596.049		
Method (Equipment): K.R/P.D (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.684	**Start Date:** 08/11/2019	**Sheet:** 3 of 4

Figure BH007.1
BH007 7.50-9.60m BGL



Figure BH007.2
BH007 9.60-12.10m BGL



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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH007
Client: University of Manchester	**Location:** Manchester E:384765.207 N:397596.049		
Method (Equipment): K.R/P.D (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.684	**Start Date:** 08/11/2019	**Sheet:** 4 of 4

Figure BH007.3
BH007 12.10-13.60m BGL



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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH008
Client: University of Manchester	**Location:** Manchester E:384766.896 N:397570.397		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 34.051	**Start Date:** 10/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				34.00		0.05	MADE GROUND (Macadam).	
						(0.45)	MADE GROUND (Concrete).	
0.40	J1			33.55		0.50		
0.50	ES2						MADE GROUND (Brown yellow black cobbles with much clayey sandy gravel with fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and ash).	
0.60	B3					(0.70)		
0.80	ES4			32.85		1.20		
1.50-2.00	CB5	N16					MADE GROUND (Medium dense yellow brown clayey sandy gravel with cobbles noted and fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and ash. Cobbles are subangular and include brick and concrete).	
2.10	J6							
2.20	ES7							
2.50-3.00	CB8	N16					at c.2.50m BGL ... clayey sand and gravel with cobbles noted.	
						(3.30)		
3.10	J9							
3.20	ES10							
3.50-4.00	CB11	N17						
4.10	J12							
4.20	ES13			29.55		4.50		
4.50-5.00	B15						MADE GROUND (Loose brown clayey very sandy gravel with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone and brick).	
4.50	SJ14	N6						
5.10	B16							
5.20	ES17					(1.80)		
5.50	B19							
5.50-6.00	SJ18	N9						
6.10	J20							
6.20	SJ21	50/44mm		27.75		6.30		
				27.55		6.50	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured. (Recocvered as sand).	
6.50	SJ22	100/52mm					*Complete at 6.50m BGL.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
10/11/2019	0.00	0.00	200	
10/11/2019	6.50	6.50	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
2.30 - 2.50	0:30	1.20 - 6.50
6.20 - 6.50	0:30	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 0.30m and 6.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH009
Client: University of Manchester	**Location:** Manchester E:384759.087 N:397550.391		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 34.203	**Start Date:** 09/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				34.10		0.10	MADE GROUND (Macadam).	
						(0.40)	MADE GROUND (Concrete).	
0.40	B1			33.70		0.50		
0.50	ES2						MADE GROUND (Brown yellow black clayey very sandy gravel with fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and ash).	
0.80	J3							
1.00	B4					(1.20)		
1.20	ES5							
				32.50		1.70		
1.70-2.20	B7						MADE GROUND (Medium desne red sand with bands of gravel. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and brick).	
1.70-2.15	SJ6	N20						
2.50	J8							
2.60	ES9							
2.70-3.20	B11							
2.70-3.15	SJ10	N23				(2.90)		
3.50	J12							
3.70-4.20	B14						at c.3.70m BGL ... dense clayey gravelly sand.	
3.70-4.15	SJ13	N37						
4.50	B15			29.60		4.60		
4.60	SJ16	25/6mm		29.40		4.80	Extremely weak red fine to coarse grained SANDSTONE distinctly weathered to destructured. (Recovered as sand).	
4.80	SJ17	100/16mm					*Terminated at 4.80m BGL - due to refusal.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
09/10/2019	0.00	0.00		
09/10/2019	2.50	2.50		Dry
10/10/2019	2.50	2.50		Dry
10/10/2019	4.80	4.60		Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
1.20 - 1.50	1:00	1.20 - 2.50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installer between 0.50-1.70m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH011
Client: University of Manchester	**Location:** Manchester E:384726.701 N:397513.893		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.051	**Start Date:** 09/11/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				33.95		0.10	MADE GROUND (Concrete paving slab).	
0.20	J1					(0.40)	MADE GROUND (Concrete).	
0.30	ES2			33.55		0.50		
0.80	B3					(3.10)	MADE GROUND (Medium dense to dense brown yellow black clayey very sandy gravel with cobbles noted and fragments of glass. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick, ash and limestone).	
1.00	ES4							
1.20	J5							
1.70-2.20	CB6	N39						
2.50	J7							
2.60	ES8							
2.70-3.20	CB9	N23						
				30.45		3.60		
3.60	J10					(0.80)	MADE GROUND (Medium dense yellow brown black slightly gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, ash and brick).	
3.60	ES11							
3.70-4.20	B13							
3.70	SJ12	N17						
				29.65		4.40		
4.50	B14					(2.10)	Medium dense red very clayey slightly gravelly fine to coarse SAND. Gravel is fine to medium angular to subangular and includes sandstone. (Weathered Sandstone).	
4.60	ES15							
4.70-5.20	B17							
4.70-4.70	SJ16	N25						
5.30	ES18							
5.50	SJ19	50/11mm					from c.5.50m BGL ... very dense.	
6.20	SJ20	50/18mm						
				27.55		6.50		
6.50	SJ21	100/22mm					*Boring complete at 6.50m BGL - continued by rotary drilling.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
09/10/2019	0.00	0.00	200	
09/10/2019	6.50	6.50	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
6.20 - 6.50	1:00	1.20 - 6.50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.00m and 13.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.P/D.S	Contract No. **NW1588**

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH011
Client: University of Manchester	**Location:** Manchester E:384726.701 N:397513.893		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.051	**Start Date:** 09/11/2019	**Sheet:** 1 of 3

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
6.50	0 (0) 0	NR		27.55		6.50	6.50-7.95m ... no recovery.	(1) Red brown SANDSTONE with gravel.	
(102mm)						(0.50)			
7.50				27.05		7.00		(1) Red brown SANDSTONE. (Driller describes as 'broken').	
	55 (18) 0					(0.95)			
(102mm)		NI		26.10		7.95	7.95-8.50m ... non-intact.	Extremely weak to very weak red brown fine grained SANDSTONE partially to distinctly weathered, in places destructured with some local dark red and black surface staining.	
8.50									
	88 (82) 42	NR					8.50-8.65m ... no recovery.		
		13					8.65-9.80m ... subhorizontal (5-30 degrees) very closely to closely spaced planar to undulating smooth open infilled (sand) discontinuities.		
(102mm)									
9.80									
	77 (74) 21	NR					9.80-10.15m ... no recovery.		
		10					10.15-11.30m ... subhorizontal (5-30 degrees) very closely to closely spaced planar to undulating smooth open infilled (sand) discontinuities.		
						(5.05)			

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
23/11/2019	6.50	6.50	4.75

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)
6.50 - 7.50	Water	50
7.50 - 8.50	Water	0
8.50 - 9.80	Water	0
9.80 - 11.30	Water	0

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.00m and 13.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.P/D.S	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH011
Client: University of Manchester	**Location:** Manchester E:384726.701 N:397513.893		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.051	**Start Date:** 09/11/2019	**Sheet:** 2 of 3

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
(102mm)								Extremely weak to very weak red brown fine grained SANDSTONE partially to distinctly weathered, in places destructured with some local dark red and black surface staining. *(continued)*	
11.30									
	70 (55) 0	NR					11.30-11.60m ... no recovery.		
(102mm)		8					11.60-12.30m ... subhorizontal (5-30 degrees) very closely to closely spaced planar to undulating smooth open infilled (sand) discontinuities.		
							11.90-11.95m ... non-intact.		
12.30							12.20-12.23m ... non-intact.		
	86 (86) 47	NR					12.30-12.40m ... no recovery.		
(102mm)		5					12.40-13.00m ... subhorizontal (5-30 degrees) very closely to closely spaced planar to undulating smooth open infilled (sand) discontinuities.		
				21.05		13.00			
								Complete at 13.00m BGL.	

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
23/11/2019	13.00	13.00	10.10

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)
11.30 - 12.30	Water	0
12.30 - 13.00	Water	0

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 10.00m and 13.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.P/D.S	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH011
Client: University of Manchester	**Location:** Manchester E:384726.701 N:397513.893		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 34.051	**Start Date:** 09/11/2019	**Sheet:** 3 of 3

Figure BH011.1
BH011 6.50-9.80m BGL.



Figure BH011.2
BH011 9.80-13.00m BGL.



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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH012
Client: University of Manchester	**Location:** Manchester E:384626.310 N:397652.656		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 38.151	**Start Date:** 26/10/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10 0.20	B1 ES2			38.10 37.80		0.05 0.35	MADE GROUND (Concrete paving slab). MADE GROUND (Brown slightly silty very sandy gravel. Sand is fine to coarse. Gravel is fine to medium subrounded and includes sandstone and brick). at c.0.35m BGL ... concrete obstruction. *Terminated at 0.35m BGL - due to concrete obstruction.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
26/10/2019	0.00			
26/10/2019	0.35			Dry

Chiselling	
From - To	Duration (hh:mm)

Water Added
From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Relocated to BH012A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: J. Myall	Contract No. **NW1588**

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH012A
Client: University of Manchester	**Location:** Manchester E:384647.478 N:397660.412		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 38.269	**Start Date:** 26/10/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				38.22		0.05	MADE GROUND (Concrete paving slab).	
0.20	J1			37.97		0.30	MADE GROUND (Concrete).	
0.30	ES2			37.87		0.40	MADE GROUND (Granite and tar cobble sets).	
0.50	B3						MADE GROUND (Loose and medium dense dark brown slightly clayey very sandy gravel with cobbles noted and fragments of glass. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes brick, sandstone and clinker. Cobbles are angular and include brick).	
0.60	J4						between c.1.10-1.20m BGL ... 125mm ceremic redundant land drain running 047 degrees.	
1.00	ES5							
1.50	B6							
1.70-2.20	B8						at c.1.70m BGL ... dense.	
1.70-2.15	SJ7	N10						
2.50	J9							
2.60	ES10							
2.70-3.20	B12							
2.70-3.15	SJ11	N12						
						(6.10)		
3.50	B13							
3.60	ES14							
3.70-4.20	B16						at c.3.70m BGL ... medium dense and dense.	
3.70-4.15	SJ15	N7						
4.60	ES17							
4.70-5.20	B19							
4.70-5.15	SJ18	N11						
6.00	ES20							
				31.77		6.50		
6.50-7.00	B22						MADE GROUND (Loose brown very clayey very sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes brick, sandstone and clinker).	
6.50-6.95	SJ21	N10					at c.6.50m BGL ... clay is of low to intermediate plasticity.	
						(1.90)		
7.50	ES23							

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
26/10/2019	0.00	0.00	200	
26/10/2019	3.20	3.20	200	Dry
27/10/2019	3.20	3.20	200	Dry

Chiselling	
From - To	Duration (hh:mm)

Water Added
From - To
1.20 - 3.20
3.20 - 10.80

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 2.00m and 6.00m BGL.
(4) Relocated from BH012.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: J. Myall	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH012A
Client: University of Manchester	**Location:** Manchester E:384647.478 N:397660.412		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 38.269	**Start Date:** 26/10/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
8.00	J24			29.87		8.40		
8.50-8.95	U25	(39)					Medium dense brown occasionally grey very clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine subangular and includes sandstone. (Possible Made Ground).	
9.00	J26							
9.00	B28							
9.00-9.50	SJ27	N19				(2.00)		
9.80	ES29							
10.00	B30			27.87		10.40		
10.50	SJ31	50/0mm		27.47		(0.40) 10.80	Weak red fine grained SANDSTONE distinctly weathered. (Recovered as slightly gravelly sand. Sand is fine. Gravel is fine to medium angular and includes sandstone).	
10.80	SJ32	100/5mm					*Complete at 10.80m BGL.*	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
27/10/2019	10.80	10.80	200	Dry	10.50 - 10.80	1:00		(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 50mm diameter slotted standpipe installed between 2.00m and 6.00m BGL. (4) Relocated from BH012.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: J. Myall	Contract No. **NW1588**

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH013
Client: University of Manchester	**Location:** Manchester E:384368.382 N:397549.440		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.078	**Start Date:** 28/10/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				32.98		0.10	MADE GROUND (Macadam).	
0.20	J1			32.68		0.40	MADE GROUND (Brown yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, limestone and brick).	
0.30	ES2							
0.80	B3						MADE GROUND (Medium dense brown yellow black clayey very sandy gravel and cobbles. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, limestone and brick. Cobbles are angular and include brick).	
1.00	ES4							
1.50	B5							
1.70-2.20	CB6	N34						
2.30	J7							
2.50	ES8							
2.70-3.20	CB9	N21				(4.90)		
3.30	B10							
3.50	ES11							
3.70-4.20	CB12	N30						
4.30	ES13							
4.70-5.20	CB14	N17						
				27.78		5.30		
5.50	ES15						Medium dense brown clayey very gravelly SAND with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded and includes sandstone. Cobbles are rounded and include sandstone.	
6.00-6.50	CB16	N20				(2.70)		
7.00	ES17							
7.20	J18							
7.50-8.00	CB19	N16						
				25.08		8.00		

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
28/10/2019	0.00	0.00	200	
28/10/2019	6.50	6.50	200	Dry
29/10/2019	6.50	6.50	200	Dry

Chiselling	
From - To	Duration (hh:mm)
1.20 - 1.70	1:00
8.00 - 8.40	1:00

Water Added
From - To
1.20 - 6.50
6.50 - 10.50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 11.00m and 16.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH013
Client: University of Manchester	**Location:** Manchester E:384368.382 N:397549.440		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.078	**Start Date:** 28/10/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
8.00	SJ20	50/9mm					Very dense red SAND. Sand is fine to coarse. (Weathered Sandstone).	
9.00	SJ21	50/14mm				(2.50)		
10.40	SJ22	100/12mm		22.58		10.50	*Boring complete at 10.50m BGL - continued by rotary drilling.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
29/10/2019	10.50	10.50	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
10.40 - 10.50	1:00	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 11.00m and 16.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. **NW1588**

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH013
Client: University of Manchester	**Location:** Manchester E:384368.382 N:397549.440		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.078	**Start Date:** 28/10/2019	**Sheet:** 1 of 4

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
10.50 (102mm)	93 (80) 37	NR NI 7		22.58		10.50	10.50-10.60m ... no recovery. 10.60-10.80m ... non-intact. 10.80-13.35m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.	Extremely weak to weak red fine to coarse grained SANDSTONE partially to distinctly weathered with inclusions of fine to medium subrounded and includes quartz and quartzite.	
12.00 (102mm)	90 (90) 40								
13.50 (102mm)	93 (93) 23	NR 7				(6.00)	13.35-13.50m ... no recovery. 13.50-14.90m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
30/10/2019	10.50	10.50	

Standard Penetration Test		
Depth	Type	Result
10.50	S	100/6mm
13.50	S	100/50mm

Flush		
From - To	Type	Returns (%)
10.50 - 12.00	Water	100
12.00 - 13.50	Water	100
13.50 - 15.00	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 11.00m and 16.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation		**Exploratory Hole No.** BH013
Client: University of Manchester	**Location:** Manchester E:384368.382 N:397549.440	
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.078 / **Start Date:** 28/10/2019	**Sheet:** 2 of 4

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
15.00		NR					14.90-15.00m ... no recovery.	Extremely weak to weak red fine to coarse grained SANDSTONE partially to distinctly weathered with inclusions of fine to medium subrounded and includes quartz and quartzite. *(continued)*	
(102mm)	100 (100) 25	9		16.58		16.50	15.00-16.50m ... subhorizontal (10 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.		
								Complete at 16.50m BGL.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
30/10/2019	16.50	16.50	0.00	16.50	S	100/25mm	15.00 - 16.50	Water	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 50mm diameter slotted standpipe installed between 11.00m and 16.50m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH013
Client: University of Manchester	**Location:** Manchester E:384368.382 N:397549.440		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.078	**Start Date:** 28/10/2019	**Sheet:** 3 of 4

Figure BH013.1
BH013 10.50-12.00m BGL



Figure BH013.2
BH013 12.00-13.50m BGL



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DRILLHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH013
Client: University of Manchester	**Location:** Manchester E:384368.382 N:397549.440		
Method (Equipment): Percussion/Coring (Dando 2000/Comacchio GEO 205)	**Ground Level (m):** 33.078	**Start Date:** 28/10/2019	**Sheet:** 4 of 4

Figure BH013.3
BH013 13.50-15.00m BGL



Figure BH013.4
BH013 15.00-16.50m BGL



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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH014
Client: University of Manchester	**Location:** Manchester E:384495.592 N:397565.295		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 35.705	**Start Date:** 28/10/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				35.41		0.30	MADE GROUND (Reinforced concrete with 10mm rebar).	
0.40	J1			35.11		0.60	MADE GROUND (Brown yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, limestone and brick).	
0.40	ES2							
0.40-0.60	B3							
0.70	J4						MADE GROUND (Medium dense brown yellow clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, limestone and brick).	
0.70	ES5							
0.70-1.20	B6							
1.20-1.65	B8					(1.60)		
1.20-1.65	SJ7	N23						
2.00	ES9			33.51		2.20		
2.00-2.45	B11							
2.00-2.45	SJ10	N12					MADE GROUND (Medium dense brown black clayey very sandy gravel with bands of clay. Sand is fine to coarse. Gravel is fine to coarse subangular and includes clinker, brick and sandstone).	
2.50	J12							
3.00-3.45	B14							
3.00-3.45	SJ13	N14						
						(3.60)		
4.00	ES15							
4.00-4.45	B17							
4.00-4.45	SJ16	N17						
5.00	ES18						at c.5.00m BGL ... dense.	
5.00-5.45	B20							
5.00-5.45	SJ19	N37						
				29.91		5.80		
6.00	J21						Medium dense yellow brown orange clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subrounded and includes sandstone.	
6.00	ES22					(0.90)		
6.00-6.45	B24							
6.00-6.45	SJ23	N18						
				29.01		6.70		
7.00	J25					(0.70)	Brown orange silty SAND. Sand is fine to coarse.	
				28.31		7.40		
7.50-7.95	B27						Very dense brown sandy GRAVEL and COBBLES. Sand is fine to coarse. Gravel is fine to coarse subrounded and includes sandstone. Cobbles are rounded and include sandstone.	
7.50	SJ26	50/200mm						

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
28/10/2019	0.00	0.00	200	
28/10/2019	5.00	4.80	200	Dry
29/10/2019	5.00	4.80	200	Dry

Chiselling	
From - To	Duration (hh:mm)
7.70 - 8.10	1:00

Water Added
From - To
8.00 - 10.50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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BOREHOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** BH014
Client: University of Manchester	**Location:** Manchester E:384495.592 N:397565.295		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 35.705	**Start Date:** 28/10/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
8.50	J28					(2.00)	Very dense brown sandy GRAVEL and COBBLES. Sand is fine to coarse. Gravel is fine to coarse subrounded and includes sandstone. Cobbles are rounded and include sandstone. *(continued)*	
9.00-9.45	CB29	N46		26.31		9.40	at c.9.00m BGL ... dense.	
9.50-9.95	B31						Red brown SAND. Sand is fine to coarse. (Weathered Sandstone).	
9.50	SJ30	50/190mm				(1.10)		
10.00	J32							
10.00-10.45	B34							
10.00	SJ33	50/105mm		25.21		10.50		
							Complete at 10.50m BGL.	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
29/10/2019	10.50	9.80	200	0.71

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
9.40 - 10.00	2:00	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Portsmouth	Contract No. NW1588

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FIELD DATA ENCLOSURE 3

Dynamic Sample Hole Record

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DYNAMIC SAMPLE HOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** DS001
Client: University of Manchester	**Location:** Manchester E:384774.985 N:397520.083		
Method (Equipment): Rotary Coring (Comacchio GEO 205)	**Ground Level (m):** 34.217	**Start Date:** 30/11/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.05	J1						MADE GROUND (Topsoil consisting of soft dark brown sandy slightly gravelly clay with many rootlets. Sand is fine to coarse. Gravel is fine subangular and includes clinker).	
0.10	ES2			33.917		0.30		
0.20-0.30	B3						MADE GROUND (Soft brown grey clayey very sandy gravel with cobbles noted and glass and metal fragments. Sand is fine to coarse. Gravel is fine to coarse angular to subangular and includes sandstone, concrete, brick and clinker. Cobbles are angular and include brick).	
0.40	J4					(0.90)		
0.60	ES5							
0.70-1.00	B6			33.017		1.20		
1.20	$U7_{(SS)}$						MADE GROUND (Black grey clayey slightly gravelly sand with pockets of sandy slightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes mudstone, brick and sandstone. Cobbles are angular to subrounded and includes sandstone).	
1.50-1.80	$ES16_{(U7)}$					(1.20)		
2.20	$U9_{(SS)}$			31.817		2.40		
2.20	SJ8	N4					MADE GROUND (Firm black grey sandy slightly gravelly clay with cobbles noted. Gravel is fine to coarse angular to subrounded and includes sandstone, mudstone and brick. Cobbles are angular to rounded and include sandstone and brick).	
2.40-2.70	$ES17_{(U9)}$					(0.80)		
3.20	SJ10	N25		31.017		3.20	(1) MADE GROUND (Medium dense sand and gravel. Gravel includes brick).	
						(1.20)		
4.50	SJ11	N24		29.817		4.40	(1) MADE GROUND (Black silt with river ballast gravel). at c.4.50m BGL ... brown dark grey slightly silty slightly gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular to sounrded and includes sandstone, mudstone and brick.	
						(4.50)		
7.00	C12	50/11mm					at c.7.00m BGL ... very dense/possible obstruction.	
7.50	U*13							

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
30/11/2019	0.00	0.00	150	
30/11/2019	1.20	1.20	150	
01/12/2019	1.20	1.20	150	

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 2.00m and 4.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DYNAMIC SAMPLE HOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** DS001
Client: University of Manchester	**Location:** Manchester E:384774.985 N:397520.083		
Method (Equipment): Rotary Coring (Comacchio GEO 205)	**Ground Level (m):** 34.217	**Start Date:** 30/11/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
							(1) MADE GROUND (Black silt with river ballast gravel). *(continued)*	
8.60		50/11mm		25.317		8.90	at c.8.60m BGL ... very dense/possible obstruction.	
				24.917		(0.40) 9.30	(1) Red SANDSTONE.	
9.30	C15	50/47mm					*Complete at 9.30m BGL.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
01/12/2019	9.30	7.50	150	

Liner Sample Information			
From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 2.00m and 4.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. **NW1588**

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DYNAMIC SAMPLE HOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** DS002
Client: University of Manchester	**Location:** Manchester E:384753.487 N:397492.025		
Method (Equipment): Rotary Coring (Comacchio GEO 205)	**Ground Level (m):** 34.087	**Start Date:** 01/12/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				33.787		0.30	MADE GROUND (Topsoil consisting of soft dark brown sandy slightly gravelly clay with many rootlets. Sand is fine to coarse. Gravel is fine subangular and includes clinker).	
0.30	ES1						MADE GROUND (Soft brown grey clayey very sandy gravel with pockets of clay and cobbles noted and fragments of glass and metal. Sand is fine to coarse. Gravel is fine to coarse angular to subangular and includes sandstone, concrete, brick and clinker. Cobbles are angular and include brick).	
0.40	B2					(0.90)		
0.80	ES3							
0.80	B4			32.887		1.20		
1.20	$U5_{(SS)}$						at c.0.40m BGL ... clay pockets of low plasticity.	
1.70-2.20	$ES13_{(U5)}$						MADE GROUND (Black grey clayey gravelly sand with cobbles noted and pockets of sandy slightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes mudstone, brick and sandstone. Cobbles are angular to subrounded and include sandstone and brick).	
2.20	SJ6	50/68mm				(2.30)	at c.2.20m BGL ... very dense/possible obstruction.	
2.40-2.70	$ES14_{(U7)}$							
2.50	$U7_{(SS)}$							
				30.587		3.50		
3.50	SJ8	N47					MADE GROUND (Red grey brown sandy gravel. Sand is medium to coarse. Gravel is fine to coarse subangular to subrounded and includes brick, flint, chert, ash, sandstone and mudstone).	
						(0.90)		
				29.687		4.40		
4.40-5.40	C13			29.487		4.60	MADE GROUND (Red brick) (Recovered cobbles. Cobbles are subangular).	
							(1) MADE GROUND (Brick, concrete, ash, gravel, black silty fill).	
						(0.80)		
				28.687		5.40		
5.40-6.40	C14			28.487		5.60	MADE GROUND (Red brick) (Recovered as slightly sandy gravel and cobbles. Sand is fine to coarse. Gravel is coarse subangular. Cobbles are subangular).	
5.40	C9	50/27mm					at c.5.40m BGL ... very dense/possible obstruction.	
							(1) MADE GROUND (Brick, concrete, ash, gravel, black silty fill).	
6.40-7.40	C15						at c.6.40m BGL ... very dense/possible obstruction.	
6.40	C10	50/44mm				(2.50)		
7.40-8.40	C16						at c.7.40m BGL ... very dense/possible obstruction.	
7.40	C11	50/68mm						

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
01/12/2019	0.00	0.00	150	

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	101	90	Yes
2.50 - 3.50	101	80	Yes

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 8.15m and 9.90m BGL.
(4) Between 1.20-2.50 and 2.50-4.40m BGL redrilled using openhole techniques.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DYNAMIC SAMPLE HOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** DS002
Client: University of Manchester	**Location:** Manchester E:384753.487 N:397492.025		
Method (Equipment): Rotary Coring (Comacchio GEO 205)	**Ground Level (m):** 34.087	**Start Date:** 01/12/2019	**Sheet:** 2 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				25.987		8.10		
8.40-9.90 8.40	C17 C12	14/10mm				(1.50)	Medium strong red brown fine to medium grained SANDSTONE unweathered locally destructured.	
				24.487		9.60		
				24.187		9.90	(1) Red brown SANDSTONE.	
							Complete at 9.90m BGL.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
01/12/2019	9.90	9.90	146	7.40

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 8.15m and 9.90m BGL.
(4) Between 1.20-2.50 and 2.50-4.40m BGL redrilled using openhole techniques.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D.S/N.W	Contract No. NW1588

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DYNAMIC SAMPLE HOLE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** DS002
Client: University of Manchester	**Location:** Manchester E:384753.487 N:397492.025		
Method (Equipment): Rotary Coring (Comacchio GEO 205)	**Ground Level (m):** 34.087	**Start Date:** 01/12/2019	**Sheet:** 3 of 3

Figure DS002.1
DS002 - 4.40-9.60m BGL



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FIELD DATA ENCLOSURE 4

Concrete Core Hole Records

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CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC001
Client: University of Manchester	**Location:** Manchester E:384559.377 N:397621.484		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 34.344	**Start Date:** 09/11/2019	**Sheet:** 1 of 2

RUN DETAILS		STRATA			
Depth & (Core Ø)	Recovery %	Reduced Level	Legend	Depth (Thickness)	Description
0.000 (80mm)	100	34.34		(0.190) 0.190	MADE GROUND (Strong orange red brick with moderately strong light grey mortar, well bonded. (Facing brick)).
		34.34		(1.810) 2.000	MADE GROUND (Moderately weak to moderately strong dark to light orange red brick with weak dark grey mortar, poorly bonded).
					Complete at 2.000m BGL.

Drilling Progress and Water Observations			Flush		Samples		PAK Marker		General Remarks
Date	Depth	Water Standing	Depth	Flush	Depth	Type & No.	Depth	Result	
09/11/2019	0.00				0.00-2.00	C1			(1) Description derived from drillers daily report. (2) Horizontal core.
09/11/2019	2.00	Dry							

All dimensions in metres Scale 1:13.75	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. **NW1588**

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CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC001
Client: University of Manchester	**Location:** Manchester E:384559.377 N:397621.484		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 34.344	**Start Date:** 09/11/2019	**Sheet:** 2 of 2

Figure HC001.1
HC001 0.00-2.00m BGL



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CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC002
Client: University of Manchester	**Location:** Manchester E:384590.548 N:397633.327		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 34.307	**Start Date:** 03/11/2019	**Sheet:** 1 of 2

RUN DETAILS		STRATA			
Depth & (Core Ø)	Recovery %	Reduced Level	Legend	Depth (Thickness)	Description
0.000 (80mm)	100	34.31		(0.190) 0.190	MADE GROUND (Strong orange red brick with moderately strong light grey mortar, well bonded. (Facing Brick)).
		34.31		(1.810) 2.000	MADE GROUND (Moderately weak to medium strong dark to light orange red brick with weak dark grey mortar, poorly bonded).
					Complete at 2.000m BGL.

Drilling Progress and Water Observations			Flush		Samples		PAK Marker		General Remarks
Date	Depth	Water Standing	Depth	Flush	Depth	Type & No.	Depth	Result	
03/11/2019	0.00				0.00-2.00	C1			(1) Description derived from drillers daily report. (2) Horizontal core.
03/11/2019	2.00	Dry							

All dimensions in metres Scale 1:13.75	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. NW1588

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CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC002
Client: University of Manchester	**Location:** Manchester E:384590.548 N:397633.327		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 34.307	**Start Date:** 03/11/2019	**Sheet:** 2 of 2

Figure HC002.1
HC002 0.00-2.00m BGL



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CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC003
Client: University of Manchester	**Location:** Manchester E:384649.515 N:397655.474		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 34.771	**Start Date:** 02/11/2019	**Sheet:** 1 of 2

RUN DETAILS		STRATA			
Depth & (Core Ø)	Recovery %	Reduced Level	Legend	Depth (Thickness)	Description
0.000 (80mm)	100	34.77		0.100	MADE GROUND (Strong orange red brick with moderately strong light grey mortar, well bonded. (Facing brick)).
		34.77		(0.230) 0.330	MADE GROUND (Medium strong to strong light red brick with medium strong light grey mortar, well bonded).
		34.77		(0.220) 0.550	MADE GROUND (Strong light grey concrete with 2-4% voids. 70-80% of aggregate is fine to coarse subrounded to angular basalt, dolomite and limestone).
		34.77		(1.450) 2.000	MADE GROUND (Moderately weak to medium strong dark to light orange red brick with weak dark grey mortar, poorly bonded).
					Complete at 2.000m BGL.

Drilling Progress and Water Observations			Flush		Samples		PAK Marker		General Remarks
Date	Depth	Water Standing	Depth	Flush	Depth	Type & No.	Depth	Result	
02/11/2019	0.00				0.00-2.00	C1			(1) Description derived from drillers daily report. (2) Horizontal core.
02/11/2019	2.00	Dry							

All dimensions in metres Scale 1:13.75	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. **NW1588**

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CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC003
Client: University of Manchester	**Location:** Manchester E:384649.515 N:397655.474		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 34.771	**Start Date:** 02/11/2019	**Sheet:** 2 of 2

Figure HC003.1
HC003 0.00-2.00m BGL



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Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC004
Client: University of Manchester	**Location:** Manchester E:384620.234 N:397491.337		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 31.630	**Start Date:** 10/11/2019	**Sheet:** 1 of 2

RUN DETAILS		STRATA			
Depth & (Core Ø)	Recovery %	Reduced Level	Legend	Depth (Thickness)	Description
0.000 (80mm)	91	31.63		(0.420) 0.420	MADE GROUND (Extremely strong light grey concrete with 5% voids. 85% of agregate is fine to coarse subrounded to angular basalt, dolomite and limestone). at c.0.05-0.10m BGL ... 5mm diameter reinforcement bars noted. at c.0.36-0.42m BGL ... 8-10mm diameter reinforcement bars noted.
		31.63		0.460	MADE GROUND (Hardcore/Gravel. Engineer notes coarse angular material behind concrete wall). *Terminated at 0.460m BGL - due to unsuitable material.*

Drilling Progress and Water Observations			Flush		Samples		PAK Marker		General Remarks
Date	Depth	Water Standing	Depth	Flush	Depth	Type & No.	Depth	Result	
10/11/2019	0.00				0.00-0.42	C1			(1) Description derived from drillers daily report. (2) Horizontal core.
10/11/2019	0.46	Dry							

All dimensions in metres Scale 1:12.5	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. NW1588

Print Date and Time: 16/04/2020 11:48:00

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CONCRETE CORE RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** HC004
Client: University of Manchester	**Location:** Manchester E:384620.234 N:397491.337		
Method (Equipment): Concrete Coring (Xcalibre Vulcan)	**Ground Level (m):** 31.630	**Start Date:** 10/11/2019	**Sheet:** 2 of 2

Figure HC004.1
HC004 0.00-0.46m BGL



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FIELD DATA ENCLOSURE 5

Trial Pit Records

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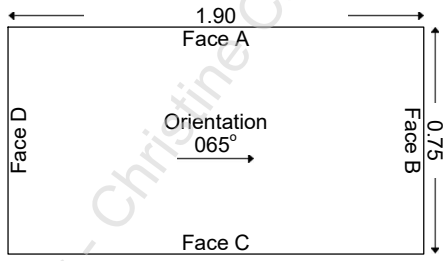
TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP001
Client: University of Manchester	**Location:** Manchester E:384615.418 N:397543.899		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 33.208	**Start Date:** 28/10/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
				32.91		0.30	MADE GROUND (Grass over topsoil consisting of dark brown gravelly sand with medium cobble and boulder content. Sand is fine to medium. Gravel is fine to coarse and includes sandstone, quartz and brick. Cobbles and boulders are subangular and includes sandstone).
0.25	B1						
0.25	J2						
0.25	ES3					(1.10)	
0.80	B4						MADE GROUND (Brown clayey very gravelly sandy with medium cobble and boulder content. Sand is fine to coarse. Gravel is fine to coarse subrounded to angular and includes sandstone, concrete, coal, clinker and brick. Cobbles are subrounded to angular and includes sandstone and brick. Boulders are angular and include sandstone).
0.80	J5						
0.80	ES6			31.81		1.40	
1.50	B7						Light brown clayey very gravelly SAND with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular and includes sandstone and quartz.
1.50	J8						
1.50	ES9					(1.20)	between c.1.40-2.60m BGL ... occasional pockets of brown sandy silt.
				30.61		2.60	
2.50	B10						*Terminated at 2.60m BGL - due to side stability.*
2.50	J11						

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides moderately unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
(1) Soakaway test attempted between 1.40-2.60m BGL but unable to fill pit due to infiltration rate. Engineer notes flow rate of 33 litres per minute.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. NW1588

Print Date and Time: 16/04/2020 11:48:28

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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP001
Client: University of Manchester	**Location:** Manchester E:384615.418 N:397543.899		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 33.208	**Start Date:** 28/10/2019	**Sheet:** 2 of 4

Figure TP001.1
TP001 Before investigation works



Figure TP001.2
TP001



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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP001
Client: University of Manchester	**Location:** Manchester E:384615.418 N:397543.899		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 33.208	**Start Date:** 28/10/2019	**Sheet:** 3 of 4

Figure TP001.3
TP001



Figure TP001.4
TP001 Spoil



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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP001
Client: University of Manchester	**Location:** Manchester E:384615.418 N:397543.899		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 33.208	**Start Date:** 28/10/2019	**Sheet:** 4 of 4

Figure TP001.5
TP001 Reinstatement



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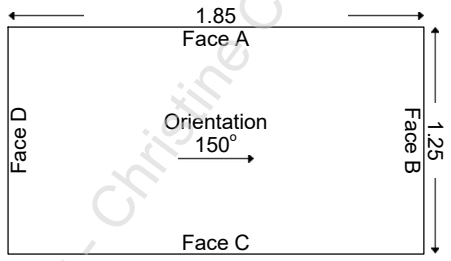
TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP002
Client: University of Manchester	**Location:** Manchester E:384628.470 N:397622.871		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 32.851	**Start Date:** 29/10/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
				32.80		0.05	MADE GROUND (Concrete flag slabs).
				32.55		0.30	MADE GROUND (Concrete).
				32.45		0.40	MADE GROUND (Brown grey gravel. Gravel is coarse subangular to angular and includes limestone (sub-base)).
0.40	B1						
0.40	J2						
0.40	ES3					(0.65)	
				31.80		1.05	MADE GROUND (Grey clayey very gravelly sand with medium cobble content and glass bottles. Sand is fine to coarse. Gravel is fine to coarse subrounded to angular and includes sandstone, quartz, coal, brick, concrete and clinker. Cobbles are subangular to angular and includes sandstone and brick).
1.00	B4						
1.00	J5						
1.00	ES6					(0.75)	
1.50	B7						
1.50	J8			31.05		1.80	MADE GROUND (Red brown gravelly sand with low cobble content. Sand is fine to medium. Gravel s fine to coarse rounded to subangular and includes sandstone and quartz).
1.50	ES9						
						(1.00)	MADE GROUND (Grey brown clayey very gravelly sand with medium cobble content and glass bottles. Sand is fine to coarse. Gravel is fine to coarse subrounded to angular and includes sandstone, quartz, coal, brick and clinker. Cobbles are subangular to angular and includes sandstone, masonary and brick).
2.50	B10						
2.50	J11						
2.50	ES12			30.05		2.80	
							Complete at 2.80m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. **NW1588**

Print Date and Time: 16/04/2020 11:48:38

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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP002
Client: University of Manchester	**Location:** Manchester E:384628.470 N:397622.871		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 32.851	**Start Date:** 29/10/2019	**Sheet:** 2 of 4

Figure TP002.1
TP002 Before investigation works



Figure TP002.2
TP002



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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP002
Client: University of Manchester	**Location:** Manchester E:384628.470 N:397622.871		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 32.851	**Start Date:** 29/10/2019	**Sheet:** 3 of 4

Figure TP002.3
TP002



Figure TP002.4
TP002



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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP002
Client: University of Manchester	**Location:** Manchester E:384628.470 N:397622.871		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 32.851	**Start Date:** 29/10/2019	**Sheet:** 4 of 4

Figure TP002.5
TP002 Spoil



Figure TP002.6
TP002 Reinstatement



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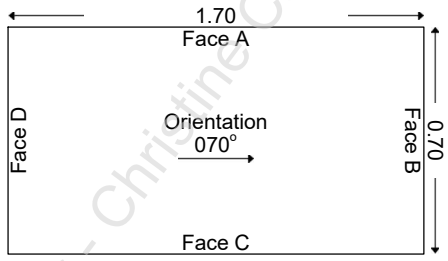
TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP003
Client: University of Manchester	**Location:** Manchester E:384773.569 N:397508.869		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 34.238	**Start Date:** 28/10/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
				33.99		0.25	MADE GROUND (Grass over topsoil consisting of dark black brown slightly silty sand with some rootlets. Sand is medium.
0.20	B1						
0.20	J2			33.74		0.50	MADE GROUND (Brown grey very gravelly sand with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone, concrete and brick. Cobbles are angular and includes brick).
0.20	ES3						
0.40	B4						
0.40	J5						
0.40	ES6						
1.00	B7						
1.00	J8						
1.00	ES9					(2.50)	MADE GROUND (Orange clayey gravelly sand with medium cobble and low boulder content and fragments of plastic, ceramic and iron. Sand is fine to medium. Gravel is fine to coarse rounded to subangular and includes sandstone, brick, quartz and coal. Cobbles are rounded to angular and includes sandstone and brick. Boulders are subrounded to angular and include sandstone).
2.00	B10						
2.00	J11						
				31.24		3.00	
3.00	B12						*Complete at 3.00m BGL.*
3.00	J13						

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides relatively stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: D. Susnik	Contract No. NW1588

Print Date and Time: 16/04/2020 11:48:52

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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP003
Client: University of Manchester	**Location:** Manchester E:384773.569 N:397508.869		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 34.238	**Start Date:** 28/10/2019	**Sheet:** 2 of 3

Figure TP003.1
TP003



Figure TP003.2
TP003



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TRIAL PIT RECORD

Status:- FINAL

Project: ID Manchester Preliminary Ground Investigation			**Exploratory Hole No.** TP003
Client: University of Manchester	**Location:** Manchester E:384773.569 N:397508.869		
Method (Equipment): Machine Excavated (TB240)	**Ground Level (m):** 34.238	**Start Date:** 28/10/2019	**Sheet:** 3 of 3

Figure TP003.3
TP003 Spoil



Figure TP003.4
TP003 Reinstatement



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FIELD DATA ENCLOSURE 6

Groundwater Monitoring Results

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Regional Office: Unit 30 Business Development Centre, Lowry Street, Ashington, NE63 8EL Tel: 01670 [illegible] Fax: [illegible]

GROUNDWATER MONITORING RESULTS

Monitoring Point	Date and Time	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Remarks
BH001	22/11/2019 12:30	15.50m 50mm SP	37.81	9.47	28.34	
BH001	03/12/2019 07:15	15.50m 50mm SP	37.81	9.53	28.28	
BH001	16/01/2020 15:30	15.50m 50mm SP	37.81	9.50	28.31	
BH001	06/02/2020 12:04	15.50m 50mm SP	37.81	9.77	28.04	
BH001	20/02/2020 15:40	15.50m 50mm SP	37.81	9.75	28.06	
BH001	06/03/2020 09:55	15.50m 50mm SP	37.81	9.80	28.01	
BH002	22/11/2019 13:25	3.00m 50mm SP	33.27	Wet at Tip		
BH002	03/12/2019 07:25	3.00m 50mm SP	33.27	Wet at Tip		
BH002	17/01/2020 10:15	3.00m 50mm SP	33.27	Dry		
BH002	06/02/2020 12:19	3.00m 50mm SP	33.27	Dry		
BH002	20/02/2020 15:55	3.00m 50mm SP	33.27	Dry		
BH002	06/03/2020 10:12	3.00m 50mm SP	33.27	Wet at Tip		
BH002	22/11/2019 13:25	4.00m 50mm SP	33.27	Dry		
BH002	03/12/2019 07:25	4.00m 50mm SP	33.27	Dry		
BH002	17/01/2020 10:15	4.00m 50mm SP	33.27	Dry		
BH002	06/02/2020 12:17	4.00m 50mm SP	33.27	Dry		
BH002	20/02/2020 15:55	4.00m 50mm SP	33.27	Dry		
BH002	06/03/2020 10:10	4.00m 50mm SP	33.27	Wet at Tip		
BH004	22/11/2019 12:20	14.90m 50mm SP	34.22	5.96	28.24	
BH004	06/12/2019 07:05	14.90m 50mm SP	34.22	6.01	28.21	

SP=Standpipe SPT = Standpipe Piezometer

Contract Title :-
ID Manchester Preliminary Ground Investigation

Client :-
University of Manchester

Certificate No. :-
GWMR/NW1583/1

Date of Issue :-
06/03/2020

Checked By :-

Approved By :-
LC

AE-H Contract No. :-
NW1583

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Regional Office: [illegible] Tel: 01772 255 202 Fax: 01772 [illegible]

GROUNDWATER MONITORING RESULTS

Monitoring Point	Date and Time	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Remarks
BH004	17/01/2020 09:00	14.00m 50mm SP	34.22	6.06	28.16	
BH004	05/02/2020 13:00	14.00m 50mm SP	34.22	6.15	28.07	
BH004	20/02/2020 15:34	14.00m 50mm SP	34.22	6.20	28.02	
BH004	03/03/2020 09:45	14.00m 50mm SP	34.22	6.20	28.02	
BH034A	22/11/2019 13:20	4.00m 50mm SP	34.19	Wet at Tip		
BH034A	03/12/2019 07:10	4.00m 50mm SP	34.19	Wet at Tip		
BH034A	17/01/2020 16:20	4.00m 50mm SP	34.19	Dry		
BH034A	05/02/2020 15:30	4.00m 50mm SP	34.19	Dry		
BH034A	20/02/2020 15:30	4.00m 50mm SP	34.19	Wet at Tip		
BH034A	03/03/2020 09:45	4.00m 50mm SP	34.19	Wet at Tip		
BH005	17/01/2020 13:30	21.50m 50mm SP	33.42	5.60	27.82	
BH005	05/02/2020 12:32	21.50m 50mm SP	33.42	5.27	28.15	
BH005	20/02/2020 16:10	21.50m 50mm SP	33.42	5.30	28.12	
BH005	03/03/2020 10:20	21.50m 50mm SP	33.42	5.25	28.17	
BH007	22/11/2019 13:35	13.60m 50mm SP	34.58	6.02	28.56	
BH007	03/12/2019 07:30	13.60m 50mm SP	34.68	3.00	31.68	
BH007	17/01/2020 11:20	13.60m 50mm SP	34.68	6.07	28.61	
BH007	05/02/2020 17:45	13.60m 50mm SP	34.68	6.27	28.41	
BH007	20/02/2020 15:20	13.60m 50mm SP	34.68	6.20	28.48	
BH007	03/03/2020 10:00	13.60m 50mm SP	34.68	6.10	28.58	

SP = Standpipe - SPIE = Standpipe Piezometer

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Certificate No. :- GWMR/NW1588/2

Date of Issue :- 05/03/2020

Checked By :-

Approved By :-

AEG Contract No. :- NW1588

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GROUNDWATER MONITORING RESULTS

Monitoring Point	Date and Time	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Remarks
BH008	22/11/2019 13:40	6.50m 50mm SP	34.05	5.32	28.73	
BH008	03/12/2019 07:40	6.50m 50mm SP	34.05	5.28	28.76	
BH008	17/02/2020 11:50	6.50m 50mm SP	34.05	Wet at Tip		
BH008	05/02/2020 13:20	6.50m 50mm SP	34.05	5.51	28.54	
BH008	20/02/2020 16:24	6.50m 50mm SP	34.05	5.50	28.55	
BH008	06/03/2020 10:40	6.50m 50mm SP	34.05	5.50	28.55	
BH008	22/11/2019 13:45	1.70m 50mm SP	34.20	Dry		
BH009	03/12/2019 07:45	1.70m 50mm SP	34.20	Dry		
BH009	17/02/2020 12:10	1.70m 50mm SP	34.20	Dry		
BH009	06/03/2020 10:41	1.70m 50mm SP	34.20	Dry		
BH009	20/02/2020 16:30	1.70m 50mm SP	34.20	Dry		
BH009	06/03/2020 10:50	1.70m 50mm SP	34.20	Wet at Tip		
BH011	03/12/2019 07:50	13.00m 50mm SP	34.05	5.56	28.49	
BH011	17/02/2020 12:40	13.00m 50mm SP	34.05	5.40	28.63	
BH011	05/02/2020 14:50	13.00m 50mm SP	34.05	5.65	28.40	
BH011	20/02/2020 17:05	13.00m 50mm SP	34.05	5.70	28.35	
BH011	06/03/2020 11:15	13.00m 50mm SP	34.05	5.60	28.45	
BH012A	22/11/2019 13:05	6.00m 50mm SP	38.27	5.99	32.28	
BH012A	03/12/2019 07:20	6.00m 50mm SP	38.27	5.98	32.29	
BH012A	17/02/2020 10:30	6.00m 50mm SP	38.27	Wet at Tip		

SP= Slotted uPVC + Standpipe Filter Material

Contract Title :
ID Manchester Preliminary Ground Investigation

Client :
University of Manchester

Certificate No.
(2)WMH/NW/1588/3

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Approved By :

AEG Contract No.
NW/1588

ID Manchester_Christine Campbell_Brentwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 19 Cobb Industrial Estate, Tarran Way, Cheadle, Stoke-on-Trent, ST10 1RS Tel: 01538 487400 Fax: 01538 487401
Regional Office: Unit 20 Bennett Development Centre, Newton Road, Rhuddlan, LL18 5SB Tel: 01745 590 845 Fax: 01745 730 995

GROUNDWATER MONITORING RESULTS

Monitoring Point	Date and Time	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Remarks
BH012A	06/02/2020 13:03	6.00m 50mm SP	38.27	5.98	32.29	
BH012A	20/02/2020 15:50	6.00m 50mm SP	38.27	Well at Tip		
BH012A	06/03/2020 10:05	6.00m 50mm SP	38.27	Well at Tip		
BH013	22/11/2019 13:15	16.50m 50mm SP	33.08	5.30	27.78	
BH013	05/12/2019 09:55	16.50m 50mm SP	33.08	5.33	27.75	
BH013	15/01/2020 15:30	16.50m 50mm SP	33.08	5.30	27.78	
BH013	05/02/2020 15:18	16.50m 50mm SP	33.08	5.40	27.68	
BH013	20/02/2020 15:15	16.50m 50mm SP	33.08	5.40	27.68	
BH013	06/03/2020 09:30	16.50m 50mm SP	33.08	5.30	27.78	
DS001	03/12/2019 08:05	4.00m 50mm SP	34.22	2.60	31.62	
DS001	17/01/2020 12:20	4.00m 50mm SP	34.22	Well at Tip		
DS001	05/02/2020 14:06	4.00m 50mm SP	34.22	3.17	31.05	
DS001	20/02/2020 16:40	4.00m 50mm SP	34.22	3.05	31.17	
DS001	06/03/2020 11:00	4.00m 50mm SP	34.22	3.00	31.22	
DS002	03/12/2019 08:30	9.90m 50mm SP	34.09	5.32	28.77	
DS002	17/01/2020 12:30	9.90m 50mm SP	34.09	5.70	28.39	
DS002	05/02/2020 14:30	9.90m 50mm SP	34.09	5.61	28.48	
DS002	20/02/2020 16:50	9.90m 50mm SP	34.09	5.48	28.61	
DS002	06/03/2020 11:05	9.90m 50mm SP	34.09	5.40	28.69	

SP = Slip Slips - SPIE = Standpipe Piezometer

Contract Title :-
ID Manchester Preliminary Ground Investigation

Client :-
University of Manchester

Certificate No. :-
GWMR/NW158804

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AEG Contract No. :-
NW589

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FIELD DATA ENCLOSURE 7

Gas Monitoring Results

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ID Manchester - Chantelle Campbell - Burnwood Section - 6/8/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 26 Fortress Close, Sandtoft Centre, Belton, Doncaster, DN9 1PP Tel: 01724 720 330 Fax: 01724 720 880

GAS MONITORING RESULTS

Monitoring Point	Date and Time	Weather Condition	Temperature °C	Instrument and Method	Ground Level (mAOD)	Water Depth (m BGL)	Rest Water Level (mAOD)	Flow Rate (l/hr)	Diff Pressure (mbar)	ATM Pressure (mbar)	Methane % v/v (P)	Methane % v/v (S)	Methane % LEL (P)	Methane % LEL (S)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (S)	Oxygen % v/v (D)	Oxygen % v/v (S)	Hydrogen Sulphide (ppm)	Flammable Monoxide (ppm)	Remarks
BH001	18/01/2020 16:56	Rain	10	15.00m 50mm SP	37.81	9.30	28.51	0.0	0.05	997	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.4	20.4	1	<1.0	
BH001	05/02/2020 13:04	Sunny	5	15.50m 50mm SP	37.81	9.75	28.06	0.0	0.06	1031	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.5	20.5	<1.0	<1.0	
BH001	20/02/2020 15:40	Fair	4	15.50m 50mm SP	37.81	9.75	28.06	0.0	0.07	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.4	20.4	<1.0	<1.0	
BH001	05/03/2020 09:53	Sunny	6	15.50m 50mm SP	37.81	9.80	28.01	0.0	0.06	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.1	20.2	20.5	<1.0	<1.0	
BH002	17/01/2020 10:15	Rain	9	3.00m 50mm SP	33.27	Dry		0.0	-0.05	1000	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.7	20.7	<1.0	<1.0	
BH002	05/02/2020 12:10	Sunny	5	3.00m 50mm SP	33.27	Dry		0.0	0.04	1030	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.1	20.1	<1.0	<1.0	
BH002	20/02/2020 15:05	Fair	4	3.00m 50mm SP	33.27	Dry		0.0	-0.05	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.1	20.3	20.3	<1.0	<1.0	
BH002	05/03/2020 10:12	Sunny	6	3.00m 50mm SP	33.27	Wet at Tip		0.0	-0.04	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.3	20.4	<1.0	<1.0	
BH002	17/01/2020 10:16	Rain	9	4.00m 50mm SP	33.27	Dry		0.0	-0.03	1000	<0.1	<0.1	<2.0	<2.0	0.0	0.0	20.9	20.9	<1.0	<1.0	
BH002	05/02/2020 12:17	Sunny	6	4.00m 50mm SP	33.27	Dry		0.0	-0.02	1031	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.0	20.0	<1.0	1.0	
BH002	20/02/2020 15:56	Fair	4	4.00m 50mm SP	33.27	Dry		0.0	-0.02	1001	<0.1	<0.1	<2.0	<2.0	0.4	0.4	20.0	20.1	<1.0	<1.0	

See attached Calibration Certificate for Model No. and any other details. SP = Standpipe - SPIC = Standpipe Piezometer. (P) = Peak - (S) = Steady - (D) = Decline.

Contract Title :-	Client :-	AEG Contract No :-
ID Manchester Preliminary Ground Investigation	University of Manchester	NW1588

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ID Manchester - Christina Campbell - Plymouth Science Park - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 23 Business Development Centre, Telford Way, Blackburn, BB1 5SL Tel: 01254 246 172 Fax: 01254 246 172

GAS MONITORING RESULTS

Monitoring Point	Date and Time of Reading	Weather Conditions	Temperature (°C)	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Flow Rate (l/hr)	Diff Pressure (mbar)	ATM Pressure Range (mbar)	Methane % v/v (P)	Methane % v/v (SS)	Methane % LEL (P)	Methane % LEL (SS)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (SS)	Oxygen % v/v (P)	Oxygen % v/v (SS)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
BH002	06/02/2020 12:10	Sunny	6	4.00m 50mm SP	33.27	Wet at Tip		0.0	-0.04	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.1	20.8	20.2	<1.0	<1.0	
BH004	17/01/2020 09:00	Rain	6	14.30m 50mm SP	34.22	6.00	28.16	0.0	0.05	1003	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.4	20.4	-	<1.0	
BH004	06/02/2020 13:05	Sunny	8	14.30m 50mm SP	34.22	6.15	28.07	0.0	0.10	1030	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.3	20.3	1.0	<1.0	
BH004	20/02/2020 15:34	Fair	4	14.30m 50mm SP	34.22	6.20	28.02	0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.6	20.6	<1.0	<1.0	
BH004	06/02/2020 09:45	Sunny	6	14.30m 50mm SP	34.22	6.20	28.02	0.0	0.07	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.1	20.5	20.5	<1.0	<1.0	
BH004A	17/01/2020 10:20	Rain	6	4.00m 50mm SP	34.18	Dry		0.0	0.02	999	<0.1	<0.1	<2.0	<2.0	1.3	1.3	19.6	19.6	-	<1.0	
BH004A	06/02/2020 15:30	Sunny	7	4.00m 50mm SP	34.18	Dry		0.0	0.02	1029	<0.1	<0.1	<2.0	<2.0	0.7	0.4	20.1	20.1	<1.0	<1.0	
BH004A	20/02/2020 15:50	Fair	4	4.00m 50mm SP	34.18	Wet at Tip		0.0	0.04	1001	<0.1	<0.1	<2.0	<2.0	0.5	0.2	20.3	20.3	<1.0	<1.0	
BH004A	06/02/2020 09:45	Sunny	6	4.00m 50mm SP	34.18	Wet at Tip		0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.6	0.7	20.1	20.0	<1.0	<1.0	
BH005	17/01/2020 09:30	Rain	6	21.50m 50mm SP	33.42	5.50	27.82	0.0	-0.01	1002	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.4	20.4	<1.0	<1.0	
BH005	06/02/2020 13:22	Sunny	6	21.50m 50mm SP	33.42	5.27	28.15	0.0	-0.07	1030	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.6	20.5	<1.0	<1.0	

See attached Calibration Certificate for Model No and any other details. SP = Standpipe - SHE = Standpipe Piezometer. (P) = Peak - (SS) = Steady - (D) = Dwelling.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 06/03/2020	Page No :- 2 of 6	Checked By :-	Approved By :- LC
Certificate No :- MON/NW1588/2			

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Deanside Development Centre, Eastern Way, Bury, Lancashire BL9 7TJ Tel: 0161 764 4030 Fax: 01772 735283

GAS MONITORING RESULTS

Monitoring Point	Date and Time	Weather Conditions	Temperature (°C)	Construction Details (Depth, Pipe, Slot)	Ground Level (mAOD)	Water Depth (m bgl)	Reduced Water Level (mAOD)	Flow Rate (l/hr)	Diff Pressure (kPa)	Atm Pressure (kPa)	Methane % v/v (P)	Methane % v/v (S)	Methane % LEL (P)	Methane % LEL (S)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (S)	Oxygen % v/v (P)	Oxygen % v/v (S)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
BH005	30/02/2020 16:10	Fair	4	21.50m 50mm SP	33.42	5.30	28.12	3.0	-0.01	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.1	20.1	<1.0	<1.0	
BH007	05/05/2020 10:20	Sunny	6	21.50m 50mm SP	33.42	5.75	28.17	3.0	-0.02	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.2	20.2	20.3	<1.0	<1.0	
BH007	17/01/2020 11:20	Rain	9	3.60m 50mm SP	34.68	6.07	28.61	0.0	0.05	1000	<0.1	<0.1	<2.0	<2.0	0.3	0.5	20.6	20.6	<1.0	<1.0	
BH007	06/03/2020 12:48	Sunny	6	13.60m 50mm SP	34.68	6.27	28.41	0.0	-0.10	1030	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.6	20.6	<1.0	<1.0	
BH007	20/02/2020 15:20	Fair	4	13.60m 50mm SP	34.68	6.20	28.48	0.0	-0.08	100	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.3	20.3	<1.0	<1.0	
BH007	06/03/2020 12:30	Sunny	6	13.60m 50mm SP	34.68	6.10	28.58	0.0	-0.08	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.3	20.4	<1.0	<1.0	
BH008	17/01/2020 11:50	Rain	9	6.50m 50mm SP	34.05	Wet at Tip		0.0	-0.03	1000	<0.1	<0.1	<2.0	<2.0	0.5	0.5	20.2	20.2	<1.0	<1.0	
BH008	06/03/2020 13:20	Sunny	6	6.50m 50mm SP	34.05	5.51	28.54	0.0	0.01	1030	<0.1	<0.1	<2.0	<2.0	0.4	0.5	20.1	20.1	<1.0	<1.0	
BH008	20/02/2020 15:24	Fair	4	6.50m 50mm SP	34.05	5.50	28.55	0.0	0.00	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.4	20.4	<1.0	<1.0	
BH008	06/03/2020 12:40	Sunny	6	6.50m 50mm SP	34.05	5.50	28.55	0.0	0.04	1001	<0.1	<0.1	<2.0	<2.0	0.1	<0.1	20.5	20.5	<1.0	<1.0	
BH009	17/01/2020 12:10	Rain	9	7.00m 50mm SP	34.20	Dry		0.0	-0.02	1000	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.6	20.6	<1.0	<1.0	

See attached Calibration Certificate for Model No. and any other details. SP = Standpipe - SPIE = Standpipe Piezometer - (P) = Peak - (S) = Steady - (D) = Decline.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester		AGS Contract No :- NW1588
Date of Issue :- 06/03/2020	Page No. :- 3 of 6	Checked By :-	Approved By :- LC
			Certificate No. :- MUN/NW1588/3

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ID Manchester - Chantelle Campbell - Bellwood Carbon - 6/30/2020 8:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 5D Glenmore Business Centre, Salem Wharf, Plymouth, PL1 5BL Tel: 01752 785 310 Fax: 01752 785 312

GAS MONITORING RESULTS

Location No. / Grid	Date and Time	Weather Conditions	Temperature °C	Depth and Type of Well	Ground Level (mAOD)	Water Strike (mBGL)	Recharged Water Level (mBGL)	Flow Tends (l/hr)	Diff Pressure (mbar)	ATM Pressure (mbar)	Methane % v/v (P)	Methane % v/v (S)	Methane % LEL (P)	Methane % LEL (S)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (S)	Oxygen % v/v (D)	Oxygen % v/v (S)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
BH009	06/02/2020 10:41	Sunny	5	1.70m 50mm SP	84.26	Dry		0.0	-0.02	1030	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.7	20.7	<1.0	<1.0	
BH009	20/02/2020 16:30	Wet	7	1.70m 50mm SP	84.26	Dry		0.0	-0.02	1001	<0.1	<0.1	<2.0	<2.0	0.1	<0.1	20.7	20.8	<1.0	<1.0	
BH009	06/03/2020 10:50	Sunny	5	1.70m 50mm SP	84.26	Wet at Tip		0.0	-0.05	1001	<0.1	<0.1	<2.0	<2.0	0.1	<0.1	20.4	20.5	<1.0	<1.0	
BH011	17/01/2020 12:40	Rain	9	13.00m 50mm SP	84.05	7.40	28.65	0.0	0.05	1000	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.8	20.8	<1.0	<1.0	
BH011	06/02/2020 14:50	Sunny	7	13.00m 50mm SP	84.05	5.66	28.40	0.0	0.07	1029	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.7	20.7	<1.0	<1.0	
BH011	20/02/2020 17:05	Fair	4	13.00m 50mm SP	84.05	5.70	28.35	0.0	0.04	1000	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.8	20.7	<1.0	<1.0	
BH011	06/03/2020 11:15	Sunny	5	13.00m 50mm SP	84.05	5.50	28.45	0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.5	20.5	<1.0	<1.0	
BH012A	17/01/2020 13:30	Rain	8	6.00m 50mm SP	38.27	Wet at Tip		0.0	-0.04	1000	<0.1	<0.1	<2.0	<2.0	0.6	0.1	20.5	20.6	<1.0	<1.0	
BH012A	06/02/2020 15:00	Sunny	7	6.00m 50mm SP	38.27	5.28	32.29	0.0	0.04	1029	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.6	20.[illegible]	<1.0	<1.0	
BH012A	20/02/2020 15:50	Fair	9	6.00m 50mm SP	38.27	Wet at Tip		0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.3	0.3	20.2	20.2	<1.0	<1.0	
BH017A	06/03/2020 10:26	Sunny	5	6.00m 50mm SP	38.27	Wet at Tip		0.0	0.05	1001	<0.1	<0.1	<2.0	<2.0	0.4	0.2	20.2	20.0	<1.0	<1.0	

See attached Calibration Certificate for Model No, and any other details. SP = Standpipe - SPIE = Standpipe Piezometer (P) = Peak - (S) = Steady - (D) = Decline

Contract Title :- Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 05/03/2020	Page No :- 4 of 6	Checked By :-	Approved By :- LC
			Certificate No. :- MCN/NW1588/4

ID Manchester - Contact Campbell Brailsford Stokes - 16/01/2020 14:30:54 - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

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GAS MONITORING RESULTS

Monitoring Point	Date and Time	Weather Condition	Atmospheric Pressure	Borehole Construction	Ground Level (mAOD)	Water Depth (mBGL)	Response Zone Water Level (mAOD)	Flow Rate (l/hr)	Tap Pressure (mbar)	ATM Pressure Range (mbar)	Methane % v/v (P)	Methane % v/v (S)	Methane % LEL (P)	Methane % LEL (S)	Carbon Dioxide % v/v (P)	Carbon Dioxide % v/v (S)	Oxygen % v/v (P)	Oxygen % v/v (S)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
BH013	15/01/2020 15:50	Rain	6	16.50m 50mm SP	33.98	6.30	27.68	0.2	0.50	999	<0.1	<0.1	<2.0	<2.0	0.5	0.5	20.3	20.3	1	<1.0	
BH013	06/02/2020 15:10	Sunny	7	16.50m 50mm SP	33.98	6.40	27.68	0.1	-0.09	1023	<0.1	<0.1	<2.0	<2.0	0.6	0.6	20.3	20.3	<1.0	<1.0	
BH013	20/02/2020 15:15	Fair	4	16.50m 50mm SP	33.98	6.40	27.68	0.0	-0.06	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.8	20.8	<1.0	<1.0	
BH013	05/03/2020 09:30	Sunny	6	16.50m 50mm SP	33.98	6.30	27.78	0.0	-0.04	1001	<0.1	<0.1	<2.0	<2.0	0.1	0.1	20.8	20.8	<1.0	<1.0	
DB001	17/01/2020 12:20	Rain	0	4.00m 50mm SP	34.22	Wet at Tip		0.0	-0.04	1000	<0.1	<0.1	<2.0	<2.0	0.4	0.4	20.2	20.2	<1.0	<1.0	
DB001	06/02/2020 14:06	Sunny	6	4.00m 50mm SP	34.22	3.17	31.05	0.0	0.27	1029	<0.1	<0.1	<2.0	<2.0	0.3	0.2	20.4	20.4	<1.0	<1.0	
DB001	20/02/2020 16:40	Fair	4	4.00m 50mm SP	34.22	3.05	31.17	0.0	0.12	1001	<0.1	<0.1	<2.0	<2.0	0.4	0.4	20.5	20.4	<1.0	<1.0	
DB001	05/03/2020 11:30	Sunny	6	4.00m 50mm SP	34.22	3.00	31.22	0.0	0.09	1001	<0.1	<0.1	<2.0	<2.0	0.2	0.2	20.2	20.2	<1.0	<1.0	
DB002	17/01/2020 12:30	Rain	0	9.00m 50mm SP	34.29	9.20	25.09	0.0	-0.08	1000	<0.1	<0.1	<2.0	<2.0	0.6	0.6	20.1	20.1	<1.0	<1.0	
DB002	06/02/2020 14:30	Sunny	6	9.00m 50mm SP	34.29	5.51	28.78	0.0	0.16	1029	<0.1	<0.1	<2.0	<2.0	0.5	0.5	20.1	20.1	<1.0	<1.0	
DB002	20/02/2020 16:50	Fair	4	9.00m 50mm SP	34.29	5.45	28.84	0.0	0.04	1001	<0.1	<0.1	<2.0	<2.0	0.4	0.4	20.3	20.3	<1.0	<1.0	

See attached Calibration Certificate for Model No. and any other details. SP = Standpipe - SPIE = Standpipe Piezometer. (P) = Peak - (S) = Steady - (D) = Decline.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester		AEG Contract No :- NW1588
Date of Issue :- 06/03/2020	Page No :- 5 of 6	Checked By :-	Approved By :- LC	Certificate No. :- MON/NW1588/5

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 35 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RX Tel: 0191 387 1500 Fax: 0191 388 4718
Regional Office: Unit 28 Business Development Centre, Lancaster Road, Preston, PR1 1HT Tel: 01772 735 300 Fax: 01772 735 999

GAS MONITORING RESULTS

Monitoring Point	Date and Time	Weather Condition	Temperature °C	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Flow Range (l/m)	Diff Pressure (+ve)	A.I.M Pressure Range (mbar)	Methane % v/v		Methane % LEL		Carbon Dioxide % v/v		Oxygen % v/v		Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Remarks
											(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)			
BH102	06/03/2020 09:05	Sunny	6	6.90m 50mm SP	34.08	5.40	28.68	0.0	0.06	100	<0.1	<0.1	<2.0	<2.0	0.8	0.8	20.4	20.4	<1.0	<1.0	

See attached Calibration Certificate for Model No. and any other details. SP = Standpipe - SPIC = Standpipe Piezometer. (P) = Peak - (S) = Steady - (D) = Decline.

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester		AEG Contract No :- NW1588
Date of Issue :- 06/03/2020	Page No. :- 6 of 6	Checked By :-	Approved By :- LC	Certificate No. :- MON/NW1588/6

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CERTIFICATION OF CALIBRATION

4533

Date Of Calibration: 21-Feb-2019

Certificate Number: G506065_2/22573

Issued by: QED Environmental Systems Ltd.

Customer: **Lombard North Central Plc**
Royal Bank of Scotland The Gemini Building 24-25 St Andrew Square
Edinburgh EH2 1AF UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G506065

UKAS Accredited results:

Methane (CH_4)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.8	0.41
15.0	14.8	0.64
49.9	49.3	0.94

Carbon Dioxide (CO_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.9	0.43
15.0	14.8	0.70
50.1	50.1	1.1

Oxygen (O_2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
21.0	21.1	0.31

All concentrations are molar.

CH_4, CO_2 readings recorded at : 33.1 °C ± 2.5 °C

O2 readings recorded at : 22.8 °C ± 2.5 °C

Barometric Pressure : 1013 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance (s): IGC Instance:N/A

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1498734

ID Manchester - Christine Campbell - Brunswood Systems - 6/30/2020 2:14:30 PM - 81.152.249.72

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CERTIFICATION OF CALIBRATION

4633

Date Of Calibration: 21-Feb-2019

Certificate Number: G506065_2/22573

Issued by: QED Environmental Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	Instrument Reading
1013	1013

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO	497	507
H_2S	257	257

Internal Flow	
Applied (l/hr)	Instrument Reading (l/hr)
5	5.2
10	10.3

Date of Issue: 25-Feb-2019 Approved by Signatory

Dawn Hemings

Laboratory Inspection

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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In-situ Test Report Certificate

IN-SITU TESTING ENCLOSURES

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Regional Office: Unit 130 Business Development Centre, Canon Wharf, Blackburn, BB1 5BL – Tel: 01254 503200 Fax: 01254 962 500

IN-SITU TESTING REPORT CERTIFICATE

1367

Contract Title: ID Manchester Preliminary Ground Investigation

AEG Reference: NW1588

Client Address: University of Manchester

I certify that *In-situ* testing was carried out on the above contract in accordance with techniques outlined in BS 1377: 1990: Part 9 or other appropriate standards as quoted, and the following results given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages.

For and on behalf of Allied Exploration & Geotechnics Limited

☐ Nick Vater (Managing Director)

☑ Kerry Wade (Technical Manager)

Signed _____ Date: 15 April 2020

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation

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IN-SITU TESTING REPORT CERTIFICATE

ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Test Report Certificate	N/A		2
1	Standard Penetration Test Results (SPT)	Yes	BS 1377 Part 9 1990	29
-	Hand Shear Vane Test Results	No		-
-	Variable Head Permeability Test Results	No	BS 5930 1999 Section 4	-
2	*In-situ* Water Quality Parameter Test Results	No		4
-	Density by Sand Replacement Method	Yes	BS 1377 Part 9 1990	-
-	Density by Core Cutter Method	Yes	BS 1377 Part 9 1990	-
-	Determination of the Vane Shear Strength (Down the Hole)	Yes	BS 1377 Part 9 1990	-
-	Shallow Pad (skip) Load Test Results	No	BS 1377 Part 9 1990	-
-	Determination of the California Bearing Ratio	Yes	BS 1377 Part 9 1990	-
-	Plate Loading Test Results	No	BS 1377 Part 9 1990	-
-	Apparent Resistivity of Soil	No	BS 1377 Part 9 1990	-
-	Redox Potential of Soil	No	BS 1377 Part 9 1990	-
-	Determination of the Soil Infiltration Rate for Soakaway Design	No	BRE Digest 365:1991	-

ID Manchester - Christine Campbell - Bluntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Standard Penetration Test Results

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ID Manchester - Christine Campbell - Burntwood SciTech (6/30/2020 2:14:30 PM GMT - 81.154.246.72)

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5a Clarke Nuttall Industrial Estate, Alpha Rd, Chester le Street, Co. Durham, DH3 3RG. Tel: 0191 492 4100 Fax: 0191 492 4113
Regional Office: Unit 2C Lakeside Development Centre, Forrest Park, Blackburn, BB1 5DL. Tel: 01772 [illegible] Fax: 01772 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Top of Hole Level (mAOD)	Water Depth (Strike)	Rod Length	SPT Hammer Ref.	Energy Ratio (%)	SEATING DRIVE: Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Total Pen (mm)	Total Blows (No.)	TEST DRIVE: Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Blows/mm	Total Pen (mm)	Total Blows (No.)	Rod Length Corr. (%)	Energy Ratio Corr. (%)	'N' (1000)/Blow	SPT 'N' Value	Shear Value (Mod.) (kPa)	Shoe or Core	Remarks
	(m)	(m)	(m)		(%)	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	mm	No.						SPT	
BH101	2.00 (30.31)	Dry (1.80)	2.00	AT-02	54	75	2	75	2	150	4	75	2	75	2	75	2	70	300	6	0.80	0.90	37.50	6	6	S	
BH201	3.00 (29.31)	Dry (2.80)	3.00	AT-02	54	75	2	75	2	150	4	75	2	75	2	75	2	75	300	10	0.72	0.90	30.00	10	6	S	
BH301	4.00 (28.81)	Dry (3.80)	4.00	AT-02	54	75	2	75	2	150	4	75	10	75	15	75	15	25	250	50	0.76	0.90	0.60	-	-	S	
BH401	5.00 (32.81)	Dry (4.80)	5.00	AT-02	54	75	6	75	11	150	17	75	20	25	30				100	50	0.80	0.90	2.00	-	-	S	
BH501	5.50 (32.81)	Dry (5.30)	5.50	AT-02	54	75	15	50	13	125	28	75	20	50	25				175	50	0.80	0.90	2.50	-	-	S	
BH601	0.50 (32.81)	0.50 (0.50)	0.50	AT-05	78	75	20	75	40	150	60	20	60						20	60	0.96	1.17	0.33	-	-	S	
BH02	12.50 (25.31)	0.00 (12.50)	12.50	ATH05	78	75	26	75	73	150	99	10	27						10	27	1.00	1.17	0.37	-	-	S	
BH02	15.50 (22.31)	0.00 (15.50)	15.50	ATH05	78	30	25			30	25	30	100						30	100	1.00	1.17	0.30	-	-	S	
BH03	[illegible] (21.97)	Dry (1.70)	[illegible]	ATH05	55	75	5	75	5	150	9	75	5	75	7	75	6	75	6	300	24	0.67	0.82	12.50	24	15	C	
BH04	2.70 (30.61)	Dry (2.70)	2.70	ATH05	55	75	3	75	3	150	12	75	3	75	12	75	20	14	10	239	50	0.90	0.95	4.79	-	-	C	

N.B. Please refer to site plan/borehole records for additional information and corresponding Exploratory Hole record for sampling details. *Uncorrected and corrected SPT'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 15/04/2020	Page No. :- 1 of 11	Checked By :- LC	Approved By :- KW
Certificate No :- SPT/NW1588/1			

UKAS TESTING 1367

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Registered Office: Unit 10 Business Development Centre, Simonstone, BB12 7BL. Tel: 01282 777 709 Fax: 01282 776 395

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	S.P.T. Hammer Ref.	Energy Ratio %	BEAT ADVANCE: Pen mm	BEAT ADVANCE: Blows No.	TEST DRIVE: 1st Pen mm	1st Blows No.	2nd Pen mm	2nd Blows No.	3rd Pen mm	3rd Blows No.	4th Pen mm	4th Blows No.	5th Pen mm	5th Blows No.	Total Pen mm	Total Blows No.	Rod Length Corr. Ce	Energy Ratio Corr. Cr	Pen (mm/Blow)	SPT 'N' Value	SPT 'N' Value (Corr.)	Soil Type	Remarks
BH002	3.70 (29.67)	Dry (3.70)	4.70	ATH01	65	38	25											75	50	0.75	0.93	0.67	-	-	S	
BH002	4.00 (29.37)	Dry (4.00)	4.00	ATH01	65	12	50											14	100	0.75	0.93	0.67	-	-	S	
BH003	3.70 (29.95)	Dry (3.70)	4.70	ATH01	65	75	3	75	5	150	8	75	5	75	6	75	7	75	14	300	35	0.67	0.93	0.34	29	19	C	
BH003	4.70 (29.40)	Dry (4.70)	4.70	ATH01	65	75	0	75	5	150	12	75	8	75	7	75	4	75	4	300	28	0.71	0.93	0.00	15	10	C	
BH003	4.70 (29.40)	Dry (3.70)	4.70	ATH01	65	75	1	75	0	150	-	75	5	75	8	75	17	75	9	300	37	0.79	0.93	0.51	37	25	C	
BH005	4.70 (27.90)	Dry (4.70)	4.70	ATH01	65	75	6	75	3	150	14	75	11	75	15	32	25			182	81	0.79	0.93	0.87	-	-	S	
BH005	5.00 (27.60)	Dry (5.00)	5.00	ATH01	65	38	25			38	25	38	30							150	80	0.81	0.93	0.59	-	-	S	
BH007	5.40 (27.70)	Dry (5.40)	5.40	ATH01	65	38	50			38	50	38	100							150	100	0.82	0.93	0.22	-	-	S	
BH004	3.40 (32.83)	Dry (3.20)	3.40	ATH01	80	75	4	75	6	150	12	75	14	75	10	75	8	43	7	300	39	0.60	1.00	0.08	39	26	S	
BH004	3.90 (32.22)	Dry (3.90)	3.90	ATH01	80	75	3	75	4	150	7	75	4	75	2	75	5	60	3	300	14	0.68	1.00	0.43	10	10	S	

NOTE: Please refer to Interpretive Report for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented for the attached graphics. Not relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 15/04/2020	Page No :- 2 of 11	Checked By :- LC	Approved By :- [signature]
Certificate No. :- SPT/NW1588/2			UKAS TESTING 1367

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Head Office: [illegible] Tel: 0151 [illegible] Fax: 0151 [illegible]
Regional Office: [illegible] Tel: 01772 [illegible] Fax: 01772 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (m below Ground Level)	Water Depth (Below GL)	Rod Length	Split Barrel Ref.	Energy Ratio (%)	SEAT N-2 DRIVE						TEST DRIVE										Total Corr. Factor Cr	Energy Ratio Corr. Cr	Fully Corr. 'N'	SPT 'N' Value	SPT 'N' Value (Corr.) N60	Stratum Code	Remarks
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.						SC	
BH004	3.00 (3.22)	Dry (4.82)	4.00	ATH07	82	75	3	75	4	150	7	75	4	75	8	75	10	75	11	300	33	0.72	1.00	5.09	35	33	S	
BH004	4.50 (5.22)	Dry (3.79)	4.50	ATH07	82	75	5	75	12	150	17	35	22	75	16	50	11			300	50	0.78	1.00	4.68	-	-	S	
BH004	5.00 (5.72)	Dry (4.82)	5.00	ATH07	82	75	7	75	8	150	15	75	19	75	31	0	6			150	30	0.80	1.00	3.00	-	-	S	
BH004	6.00 (6.72)	Dry (5.82)	6.00	ATH07	82	75	5	75	8	150	13	75	10	75	8	75	15	75	12	300	45	0.84	1.00	8.98	48	36	C	
BH004	7.50 (8.22)	7.12 (7.50)	7.50	ATH07	82	75	9	75	12	150	30	75	18	75	27	0	5			150	30	0.88	1.00	3.00			C	
BH004	8.00 (8.72)	7.45 (7.50)	8.00	ATH07	82	25	21			50	25	40	50							40	50	0.92	1.00	0.50	-	-	S	
BH004	8.75 (9.47)	8.20 (8.75)	8.75	ATH08	78	50	25			80	25	68	30							68	30	0.96	1.17	0.98	-	-	S	
BH004	9.50 (9.72)	9.00 (9.50)	9.50	ATH08	78	40	15			80	25	38	50							38	50	0.98	1.17	0.73	-	-	S	
BH004	11.00 (11.22)	9.00 (11.50)	11.00	ATH08	78	30	25			80	25	30	50							30	50	1.00	1.17	0.60	-	-	S	
BH004	14.00 (14.22)	9.00 (14.50)	14.00	ATH08	78	30	25			80	25	25	50							25	50	1.00	1.17	0.50	-	-	S	

NOTE: Please refer to calculation sheets for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester		AEG Contract No :- NW1588
Date of Issue :- 15/04/2020	Page No. :- 3 of 11	Checked By :- LC	Approved By :-	Certificate No. :- SPT/NW1588/3

UKAS 1367

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Head Office: Unit 23 Clyde Gateway Business Centre, Kelvin Way, Crossmyloof, Glasgow, G73 1XU. Tel: 0141 202 4120 Fax: 0141 202 4713
Regional Office: Unit 22 Business Development Centre, Eastern Green, Hednesford, WS12 5RD. Tel: 01543 420 820 Fax: 01543 420 888

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth / Reduced Level	Water Strike (Casing)	Rig / Method	SPT Hammer No.	Energy Ratio E$_r$	SEATING DRIVE						TEST DRIVE										Total Weight Corr.	Energy Ratio Corr.	N$_{60}$ Value	SPT 'N' Value (Corr.)	SHANP Value (Corr.)	Scale of Core	Remarks
	m	m	m		%	Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	+/- mm	Blows No.	Total Pen mm	Total Blows No.							
BH005	1.00 (30.92)	Dry (1.50)	1.50	ATHC1	74	75	8	75	10	150	18	75	27	22	23					97	50	0.00	0.92	1.84			S	
BH005	2.50 (29.42)	Dry (1.50)	3.50	ATHC1	74	75	3	75	4	150	7	75	5	75	5	75	6	75	3	300	20	0.70	0.92	16.00	20	15	C	
BH005	3.50 (28.42)	Dry (1.40)	3.50	ATHC1	74	50	25			50	25	48	50							48	50	0.75	0.92	0.96	-	-	S	
BH005	3.50 (28.02)	Dry (1.40)	3.50	ATHC1	74	32	50			82	50	30	100							30	100	0.74	0.92	0.50	-	-	S	
BH005	4.90 (26.42)	Dry (1.40)	4.90	ATHC1	74	38	100			88	100											1.00	0.92		-	-	S	
BH006	0.00 (32.67)	Dry (1.40)	1.40	ATHC1	74	75	8	50	17	125	25	10	50							10	50	0.00	1.00	2.00			C	
BH007	1.50 (30.16)	Dry (1.50)	1.50	ATHC1	74	75	3	75	4	150	8	75	2	75	3	75	3	75	3	300	16	0.99	0.92	18.75	16	10	C	
BH007	2.50 (29.16)	Dry (1.50)	3.50	ATHC1	74	75	3	75	4	150	7	75	4	75	4	75	4	75	2	300	20	0.97	0.92	16.00	20	13	S	
BH007	3.50 (28.16)	Dry (1.50)	3.50	ATHC1	74	75	3	75	2	150	7	75	4	75	5	75	6	75	2	300	18	0.96	0.92	18.75	18	11	S	
BH007	4.50 (28.16)	Dry (1.50)	4.50	ATHC1	74	75	10	75	5	150	24	75	2	75	2	75	5	75	3	300	10	0.95	0.92	9.00	10	7	C	

N.B. Please refer to calculation sheets for additional information and corresponding Dynamic Cone Penetrometer tested for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :-	Client :-	AEG Contract No :-
ID Manchester Preliminary Ground Investigation	University of Manchester	NW1588

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UKAS TESTING 1367

ID Manchester - Christine Campbell, Brentwood SciTech - 6430620 - 81154246.72

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STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Depth) m	Rod Length m	SPT Hammer Ref	Energy Ratio %	BEAT / DRIVE 1 Pen mm	1 Blows No.	2 Pen mm	2 Blows No.	Total Pen mm	Total Blows No.	TEST DRIVE 1 Pen mm	1 Blows No.	2 Pen mm	2 Blows No.	3 Pen mm	3 Blows No.	4 Pen mm	4 Blows No.	Total Pen mm	Total Blows No.	End Legrin Corr. C_n	Energy Ratio Corr. C_E	Fen (mm/Blow)	SPT'N' Value	SPT'N' Value ('Corr.') N_{60}	Shear Vane kPa	Remarks
BH007	6.50 (29.18)	Dry (6.50)	6.50	AT-01	65	75	2	75	4	150	4	75	3	75	2	75	2	75	2	300	10	0.98	0.97	30.00	10	9	8	
BH007	7.20 (27.48)	Dry (7.20)	7.20	AT-01	65	23	25			50	25	61	50							61	50	0.80	0.82	1.22	-	-	6	
BH007	7.50 (27.18)	Dry (7.50)	7.50	AT-01	65	21	50			71	50	99	100							99	100	0.90	0.92	0.99	-	-	5	
BH007	9.00 (25.68)	0.00 (12.18)	9.00	AT-01	65	25	25			50	25	50	50							100	50	1.00	1.02	0.50	-	-	3	
BH007	12.00 (23.18)	0.00 (12.18)	12.00	AT-01	65	30	25			55	25	40	50							90	50	1.00	1.02	0.50	-	-	3	
BH008	1.00 (27.68)	0.00 (1.50)	1.50	AT-01	65	0	2	75	4	150	7	75	4	75	3	75	3	75	3	300	13	0.68	0.69	18.75	10	10	6	
BH008	2.50 (26.18)	0.00 (2.50)	2.50	AT-01	65	75	2	75	5	150	7	75	5	75	4	75	4	75	3	300	16	0.70	0.72	18.75	10	10	6	
BH008	3.50 (25.68)	Dry (3.50)	3.50	AT-01	65	75	3	75	4	150	7	75	5	75	3	75	3	75	4	300	15	0.74	0.92	17.65	12	11	6	
BH008	4.50 (24.68)	Dry (4.50)	4.50	AT-01	65	75	2	75	1	150	3	75	2	75	1	75	2	75	1	300	6	0.75	0.92	50.00	6	6	6	
BH008	5.50 (23.68)	Dry (5.50)	5.50	AT-01	65	75	-	75	-	150	2	75	2	75	3	75	2	75	2	300	9	0.82	0.95	33.33	9	7	5	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphics plot relative to each Exploratory Hole.

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UKAS 1367

ID Manchester - Christine Campbell - Plumwood Scotch - 6390820214 - 81.154.246.72

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STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Top of Hole Level mOD	Water Strike (Casing)	Hole Length	SPT Hammer Ref.	Energy Ratio E$_r$	SEATING DRIVE Pen	SEATING DRIVE Blows	TEST DRIVE 1 Pen	TEST DRIVE 1 Blows	TEST DRIVE 2 Pen	TEST DRIVE 2 Blows	TEST DRIVE 3 Pen	TEST DRIVE 3 Blows	TEST DRIVE 4 Pen	TEST DRIVE 4 Blows	TEST DRIVE 5 Pen	TEST DRIVE 5 Blows	TEST DRIVE 6 Pen	TEST DRIVE 6 Blows	Total Pen	Total Blows	Pen Length Corr. Cp	Energy Ratio Corr. Ce	Uncorrected N Value	SPT'N' Value	SPTN Value (Open Hole)	Stream Core	Remarks
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.						S/C	
BH005	5.20 (37.35)	Dry (6.20)	6.20	ATH01	83	46	28			6	25	44	50									450	60	0.85	0.92	0.69			S	
BH006	3.50 (37.65)	Dry (6.50)	6.50	ATH01	83	40	50			20	50	82	100									450	100	0.85	0.92	0.81			S	
BH008	1.70 (39.50)	Dry (7.50)	7.70	ATH01	83	15	4	75	5	150	9	75	5	75	4	75	5	75	6	300	20	0.85	0.92	15.03	20	11	S	
BH009	3.70 (41.50)	Dry (7.70)	7.70	ATH01	83	15	8	75	5	150	7	75	5	75	6	75	6	75	7	300	23	0.85	0.92	13.04	23	11	S	
BH010	3.70 (39.40)	Dry (7.70)	7.70	ATH01	83	75	8	75	5	150	7	75	6	75	5	75	5	75	14	300	37	0.75	0.92	25.1	37	26	S	
BH011	4.50 (29.60)	Dry (8.50)	8.50	ATH01	83	75	17	75	25	80	42	0	25							6	25	0.75	0.92	0.24			S	
BH012	4.50 (29.40)	Dry (8.50)	8.50	ATH01	83	39	50			36	50	15	100							15	100	0.75	0.92	0.68	-	-	S	
BH013	1.70 (32.35)	Dry (1.70)	1.70	ATH01	83	75	12	75	5	150	20	75	10	75	9	75	9	75	11	450	59	0.85	0.92	7.23	39	23	C	
BH014	3.70 (31.35)	Dry (3.70)	3.70	ATH01	83	75	7	75	5	150	12	75	5	75	5	75	5	75	7	300	23	0.85	0.92	13.04	20	15	C	
BH015	3.70 (30.35)	Dry (3.70)	3.70	ATH01	83	75	5	75	5	150	7	75	5	75	4	75	5	75	4	300	17	0.85	0.92	11.55	17	12	S	

NOTE: Please refer to calculation sheet(s) for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N' values are presented in accordance with the requirements of BS EN ISO 22476-3:2005

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ID Manchester Preliminary Ground Investigation	University of Manchester	NW1588

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UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 1588 - 20-21 - 81-154-246-72

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STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reference Level) m	Water Level (Casing) m	Hole Depth m	SPT Hammer Ref.	Energy Ratio E_r %	SEATING DRIVE Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.	TEST DRIVE Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.	Rod Length Corr. C_R	Energy Ratio Corr. C_E	Pen. compaction	SPT 'N' Value	SPT 'N' Value (Corr.) N_60	Shear Strength kPa	Remarks
BH011	4.70 (26.38)	Dry (4.70)	4.70	ATHD1	68	75	3	75	2	150	5	75	5	75	5	75	6	75	9	300	25	0.79	0.92	12.00	25	16	5	
BH011	5.50 (25.58)	Dry (5.50)	5.50	ATHD1	68	25	25			50	25	11	50							11	50	0.82	0.92	8.27		-	5	
BH011	6.20 (27.48)	Dry (6.20)	6.20	ATHD1	68	25	25			25	25	18	50							18	50	0.85	0.92	0.90	-	-	5	
BH011	6.50 (27.55)	Dry (6.50)	6.50	ATHD1	68	33	50			35	50	22	100							22	100	0.86	0.92	0.92	-		5	
BH012A	1.70 (28.57)	Dry (1.70)	1.70	ATHD1	68	75	3	75	2	150	4	75	5	75	1	75	2	75	4	300	10	0.67	0.92	33.00	10	6	5	
BH012A	2.70 (28.57)	Dry (2.70)	2.70	ATHD1	68	75	3	75	2	150	5	75	2	75	5	75	3	75	2	300	12	0.71	0.92	25.00	12	7	5	
BH012A	3.70 (28.57)	Dry (3.70)	3.70	ATHD1	68	75	2	75	3	150	5	75	5	75	1	75	1	75	2	300	7	0.75	0.92	42.86	7	5	5	
BH012A	4.70 (28.57)	Dry (4.70)	4.70	ATHD1	68	75	3	75	4	150	7	75	7	75	2	75	2	75	3	300	11	0.79	0.92	27.27	11	8	5	
BH012A	6.50 (28.77)	Dry (6.50)	6.50	ATHD1	68	75	2	75	3	150	5	75	5	75	5	75	5	75	5	300	10	0.86	0.92	30.00	10	8	5	
BH012A	8.00 (28.27)	Dry (8.00)	8.00	ATHD1	68	75	2	75	4	150	6	75	9	75	9	75	8	75	5	300	19	0.93	0.92	15.79	19	17	5	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graphics plot relative to each Exploratory Hole.

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UKAS TESTING 1367

ID Manchester - Christine Campbell - Plymouth SciTech - 6360202 - 14/01/2021 - 81.154.246.72

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STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth / Instrumented Length (ft)	Water Depth / Casing (m)	Rod Length (m)	SPT Hammer Ref.	Energy Ratio E_r (%)	SEATING DRIVE Pen. (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Total Pen. (mm)	Total Blows (No.)	TEST DRIVE 1st (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Pen. (mm)	Blows (No.)	Total Pen. (mm)	Total Blows (No.)	Rod Length Corr. C_R	Energy Ratio Corr. C_E	Pen. mm/Blow	SPTN Value	SPTV Value (Corr.) $(N_1)_{60}$	Shear or Core (S/C)	Remarks
BH012A	32.50 (27.77)	Dry (10.66)	10.50	ATH01	65	44	25			44	25	0	50							0	50	1.00	0.97	0.00			S	
BH012A	32.50 (27.47)	Dry (10.66)	10.50	ATH01	65	17	52			17	52	0	100							5	100	1.00	0.93	0.05	-	-	S	
BH013	3.70 (3.38)	Dry (1.10)	1.70	ATH01	65	15	4	75	4	150	8	75	5	75	6	75	11	75	10	300	34	0.97	0.92	8.82	34	31	C	
BH013	3.70 (3.38)	Dry (2.10)	2.70	ATH01	65	75	9	75	11	150	20	75	4	75	5	75	6	75	5	300	21	0.71	0.97	14.29	21	14	C	
BH013	3.70 (3.38)	Dry (3.10)	3.70	ATH01	65	75	2	75	2	150	4	75	5	75	7	75	7	75	5	300	24	0.75	0.92	12.50	28	21	C	
BH013	4.70 (3.38)	Dry (4.10)	4.70	ATH01	65	75	3	75	5	150	8	75	5	75	4	75	5	75	3	300	17	0.79	0.92	17.65	17	12	C	
BH013	9.00 (27.08)	Damp (6.00)	9.00	ATH01	65	75	3	75	4	150	7	75	6	75	5	75	5	75	7	300	23	0.84	0.92	13.00	20	16	C	
BH013	7.50 (25.56)	Damp (7.50)	7.50	ATH01	65	75	2	75	2	150	4	75	5	75	4	75	5	75	5	300	19	0.90	0.92	15.79	16	13	C	
BH012	8.20 (26.08)	Damp (8.00)	8.00	ATH01	65	36	25			36	25	0	50							9	50	0.93	0.92	5.56	-	-	S	
BH012	9.00 (24.08)	Damp (8.00)	9.00	ATH01	65	17	25			17	25	11	50							14	50	0.95	0.92	0.00			S	

*OTL: Please refer to calibration certificate for additional information and corresponding exploratory hole record for sampling details. Uncorrected and corrected SPTV values are presented on the attached graphical plot relative to each Exploratory Hole.

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			Certificate No. :- SPT/NW1588/8

UKAS TESTING 1357

ID Manchester - Christopher Campbell - Brentwood Site Lab - 6360820 - 14/04/2020 - 81.154.246.72

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STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Ground Level)	Water Depth (Casing)	Hole Diameter	SPT Hammer Ref.	Energy Ratio (%)	SEATING DRIVE: 1st 150mm	Blows	Pen	Blows	Total Pen	Total Blows	TEST DRIVE: Pen	Blows	Pen	Blows	Pen	Blows	Pen	Blows	Total Pen	Total Blows	Rod Length Corr. Cr	Energy Ratio Corr. Ce	N-value (Blow)	SPT 'N' Value	SPT 'N' Value (Corr.) Ncor	Grade Core	Remarks
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.						S/C	
BH07	10.40 (25.08)	Damp (10.40)	10.40	ATH01	65	21	50			21	50	12	100							12	100	1.00	0.92	50/12	-	-	S	
BH07	10.50 (32.68)	Damp (10.50)	10.50	ATH01	65	15	50			15	50	6	100							6	100	1.00	0.92	50/6			S	
BH013	13.50 (19.85)	2.00 (13.50)	13.50	ATH05	70	20	25			20	25	50	100							50	100	1.00	1.17	150	-	-	S	
BH013	18.50 (16.85)	0.00 (18.50)	18.50	ATH05	70	30	25			30	25	25	100							25	100	1.00	1.17	125	-	-	S	
BH014	1.20 (34.87)	Dry (1.00)	1.20	ATH02	64	75	4	75	5	150	9	75	4	75	5	75	3	75	3	300	23	0.65	0.90	19.91	25	13	S	
BH014	2.00 (33.87)	Dry (1.80)	2.00	ATH02	64	75	-	75	3	150	3	75	3	70	3	75	3	75	3	300	12	0.65	0.90	25.00	12	7	S	
BH014	3.00 (32.87)	Dry (2.80)	3.00	ATH02	64	75	2	75	3	150	5	75	3	75	3	75	4	75	4	300	14	0.72	0.90	25.93	14	9	S	
BH014	4.00 (31.87)	Dry (3.80)	4.00	ATH02	64	75	3	75	4	150	7	75	-	75	3	75	4	75	4	300	17	0.78	0.90	17.65	17	12	S	
BH014	5.00 (30.87)	Dry (4.80)	5.00	ATH02	64	75	4	75	10	150	14	75	12	75	13	75	5	75	7	300	37	0.80	0.90	8.11	37	27	S	
BH014	6.00 (29.71)	Dry (5.80)	6.00	ATH02	64	75	5	75	4	150	9	75	2	75	5	75	4	75	5	300	18	0.82	0.90	16.67	18	14	S	

NOTE: Please refer to calibration certificate for additional information and conversion of Exploratory Hole record for sampling details. Uncorrected and corrected SPT 'N' values are presented on the attached graph(s) to be read Externally Now

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
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ID Manchester - Christie Campbell Blythwood Square (630268) 2020-04-30 14:30:54 - 81.154.246.72

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STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3; 2005)

Exploratory Hole No.	Top of Hole Reduced Level (m)	Water Depth (Cased) (m)	Total Depth (m)	SPT Hammer Ref.	Energy Ratio (%)	SEATING DRIVE: Pen (mm)	SEATING DRIVE: Blows (No.)	TEST DRIVE: Pen (mm)	TEST DRIVE: Blows (No.)	Total Pen (mm)	Total Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Pen (mm)	Blows (No.)	Total Pen (mm)	Total Blows (No.)	Rod Length Corr. (%)	Energy Ratio Corr. (%)	Pen to 1st Flow	SPT 'N' Value	SPT 'N' Value (Corr. Flo)	Shear Vane (kPa)	Remarks
BH01	7.50 (25.62)	Dry (7.50)	7.50	ATH02	58	75	6	70	11	150	17	75	14	75	22	50	14			200	50	0.50	0.90	4.00		-	S	
BH04	9.50 (31.17)	0.62 (3.60)	9.50	ATH02	58	75	4	75	9	150	13	75	10	75	11	75	11	75	14	300	45	0.46	0.90	1.50	46	46	D	
BH07	8.50 (25.62)	0.91 (3.00)	8.50	ATH02	58	75	7	75	11	150	18	75	14	75	20	50	16			100	50	0.98	0.90	6.50	-	-	S	
BH08	10.00 (25.7)	0.77 (9.80)	10.00	ATH02	58	75	10	37	15	112	25	75	27	50	33					125	50	1.10	0.90	7.50		-	S	
DS03*	9.50 (32.02)	Dry (2.20)	9.50	ATH01	55	75	1	75	0	150	1	75	1	75	1	75	1	75	1	300	4	0.36	0.92	75.00	4	3	S	
DS05*	9.50 (31.02)	1.68 (3.20)	9.50	ATH01	55	75	1	75	1	150	2	75	6	75	7	75	6	75	6	300	25	0.72	0.92	12.00	25	17	S	
DS07*	9.50 (29.72)	5.19 (4.50)	9.50	ATH01	55	75	5	75	5	150	10	75	6	75	5	75	4	75	6	300	21	0.70	0.92	12.50	24	17	S	
DS09*	7.50 (24.22)	2.11 (7.00)	7.50	ATH01	55	75	11	75	19	150	30	11	50							11	50	0.68	0.92	0.30	-	-	D	
DS10*	9.00 (25.62)	5.11 (7.00)	9.00	ATH01	55	75	13	75	16	150	30	11	50							11	50	0.84	0.92	0.70	-	-	D	
DS02*	9.50 (24.97)	2.15 (7.50)	9.50	ATH01	55	47	50			47	50											0.87	0.92	-	-	-	D	

NOTE: Please refer to calculation sheets for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation		Client :- University of Manchester	AEG Contract No :- NW1588
Date of Issue :- 15/04/2020	Page No. :- 10 of 17	Checked By :- LC	Approved By :- KW
			Certificate No. :- SPT/NW1588/10

UKAS 1367

ID Manchester - Christopher Campbell - Braintwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 409

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Block 3 Hillhouse Int. Estate, Picton Rd., Blackpool FY4 4BS Tel: 01253 767470 Fax: 01253 761616
Regional Office: Unit 20 Business Development Centre, Lower Philips Road, Blackburn, BB1 5BJ Tel: 01254 295300 Fax: 01254 295301

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level)	Water Depth (Casing)	Hole Length	SPT Hammer Ref.	Energy Ratio (E_r)	SEATING DRIVE Pen	SEATING DRIVE Blows	SEATING DRIVE Pen	SEATING DRIVE Blows	SEATING DRIVE Total Pen	SEATING DRIVE Total Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Pen	TEST DRIVE Blows	TEST DRIVE Total Pen	TEST DRIVE Total Blows	Rod Length Corr. C_R	Energy Ratio Corr. C_E	Pen (mm)/Blow	SPTN Value (Corr.) N	SPTN Value (Corr.) N60	Strata Comp.	Remarks
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.							
TP01	0.50 (0.50)	Dry (2.70)	2.20	ATH01	55	68	10			35	50											0.89	0.92				S	
TP02	3.50 (30.00)	Dry (3.50)	3.00	ATH01	55	15	5	75	1	150	15	75	5	75	11	75	12	75	17	300	77	0.71	0.92	0.39	47	32	S	
TP03	5.10 (28.89)	4.70 (5.40)	5.40	ATH01	55	27	50			27	50											0.82	0.92		-	-	C	
TP04	5.40 (28.59)	5.70 (5.40)	5.40	ATH01	55	44	50			44	50											0.86	0.92		-	-	C	
TP05	7.40 (26.59)	6.30 (7.40)	7.40	ATH01	55	68	50			68	50											0.99	0.92		-	-	C	
TP06	9.40 (24.59)	7.30 (9.40)	9.40	ATH01	55	75	50	75	35	150	50	10	14							>0	14	0.94	0.92	0.71	-	-	C	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole notes for sampling details. Uncorrected and corrected SPTN values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester	AEG Contract No :- NW1588	
Date of Issue :- 15/04/2020	Page No. :- 11 of 11	Checked By :- LC	Approved By :- KW
Certificate No. :- SPT/NW1588/11			

UKAS 1367

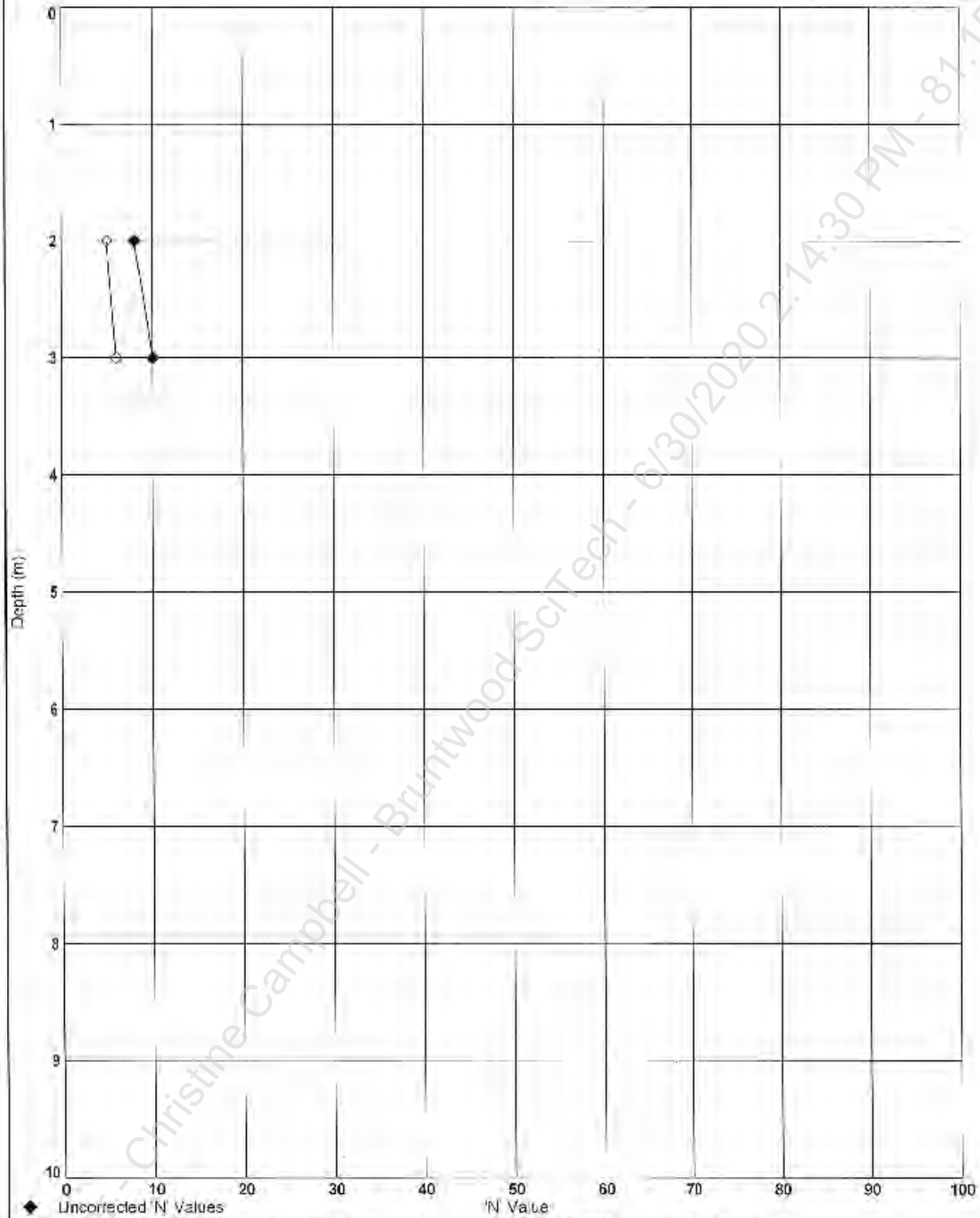
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 410

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office, Unit 25 Sixth Avenue Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2UG Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office, Unit 28 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL Tel: 01772 735 300 Fax: 01772 735 599

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH001



◆ Uncorrected 'N' Values
◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :-	Client :-
ID Manchester Preliminary Ground Investigation	University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH001	Operator :- L. Selkirk
Checked By :- LC	Approved By :- KW	AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

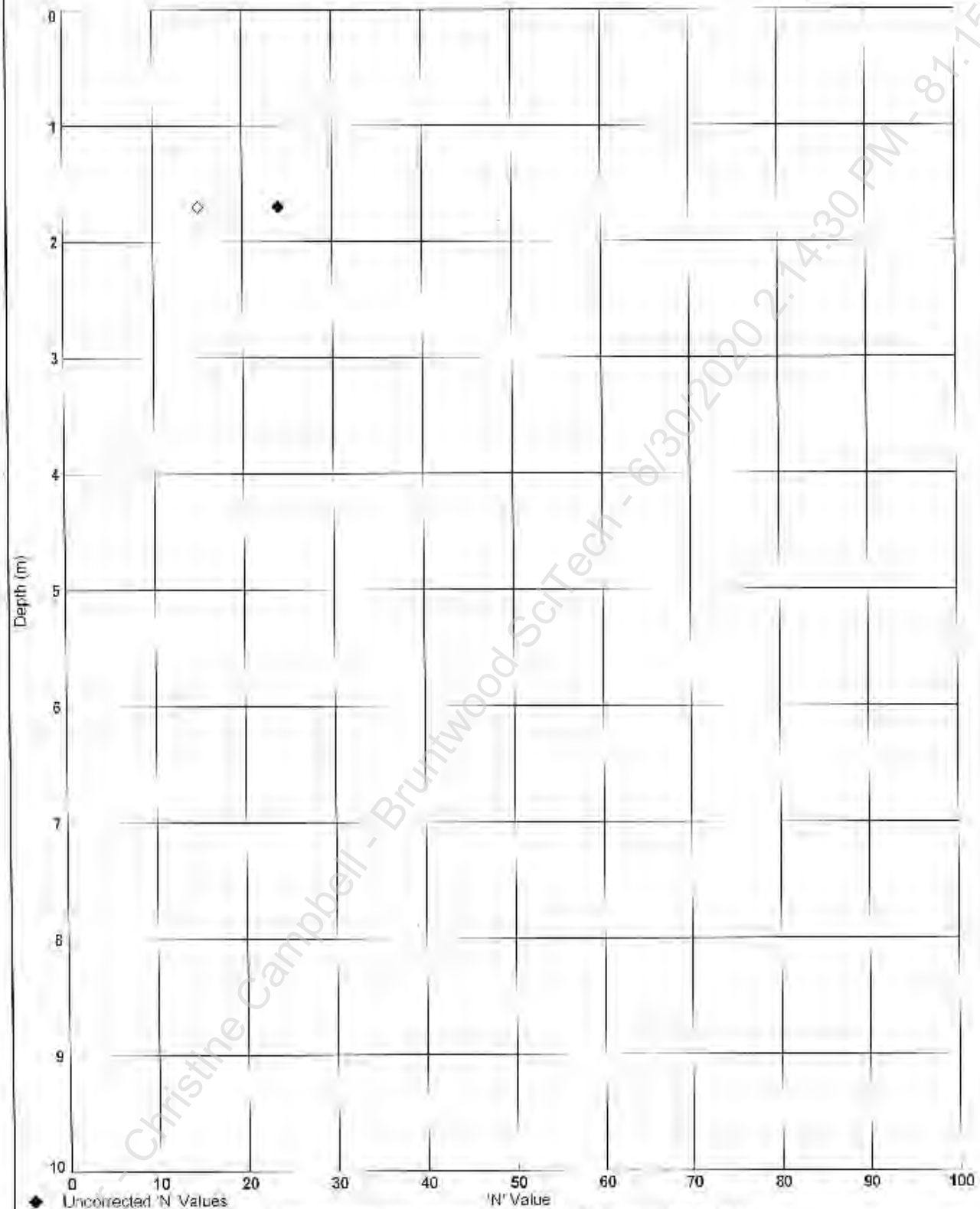
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ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office, Regional Office
Unit 20 Alpha Bit Industrial Estate, Pellon Lane, Chester-le-Street, Co. Durham, DH2 1AD
Unit 21 Business Development Centre, Eastern Way, Blackburn, BB1 5EL
Tel: 0191 387 1400 Fax: 0191 387 1401
Tel: 01772 735 303 Fax: 01772 735 555

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH002



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH002	Operator :- M. Snaith
Checked By :- LC	Approved By :- RW	AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72
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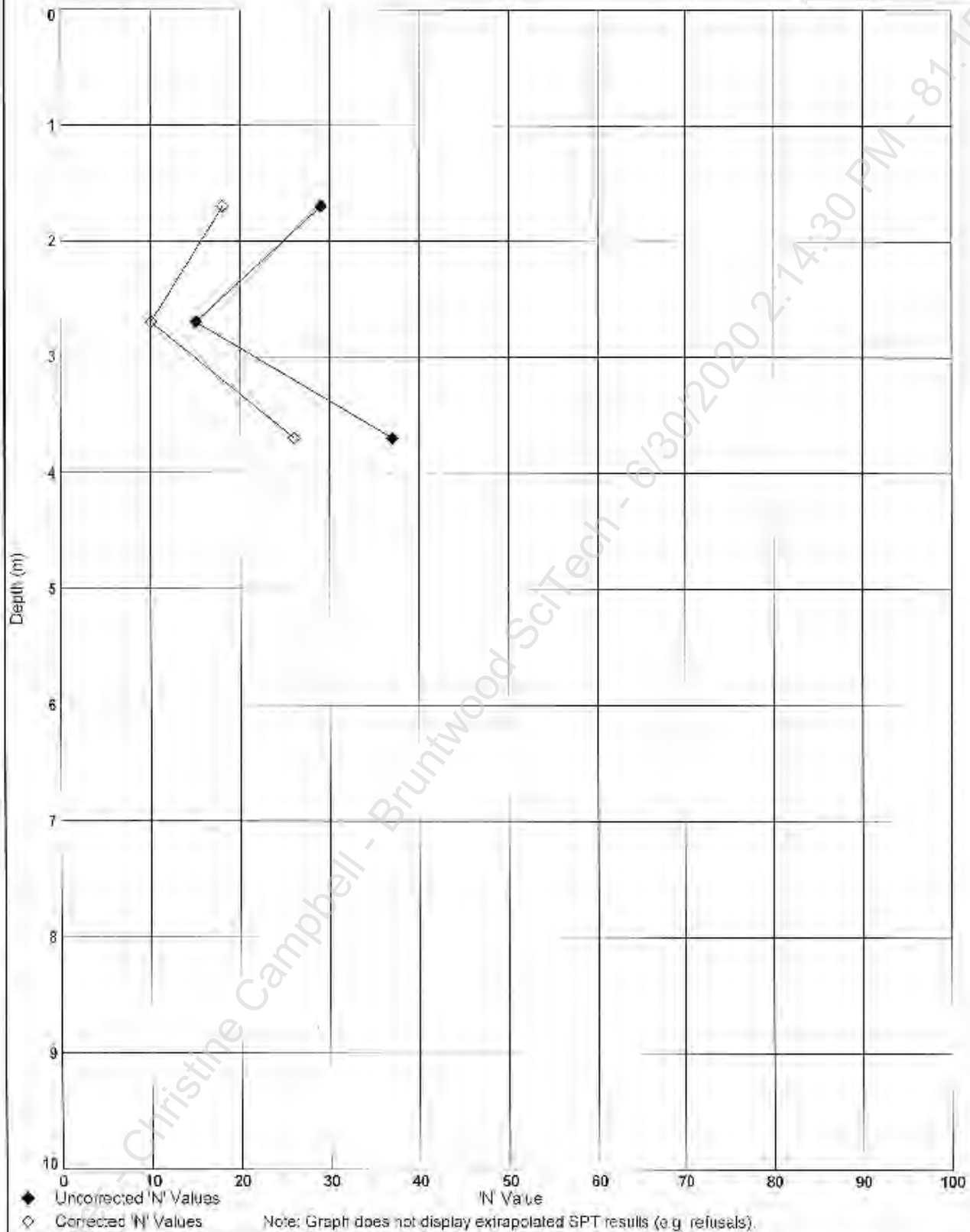
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 412

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 26 Scott Hall Industrial Estate, Acton Rd, Chorley, Lancashire, PR6 0HG Tel: 01257 267 470 Fax: 01257 267 471
Regional Office: Unit 26 Business Development Centre, Exeter Street, Blackburn, BB1 3BJ Info@allied-exploration.co.uk Fax: 01772 786 999

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH003



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH003
Checked By :- LC	Approved By :- KW
Operator :- M. Snaith	AEG Contract No :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

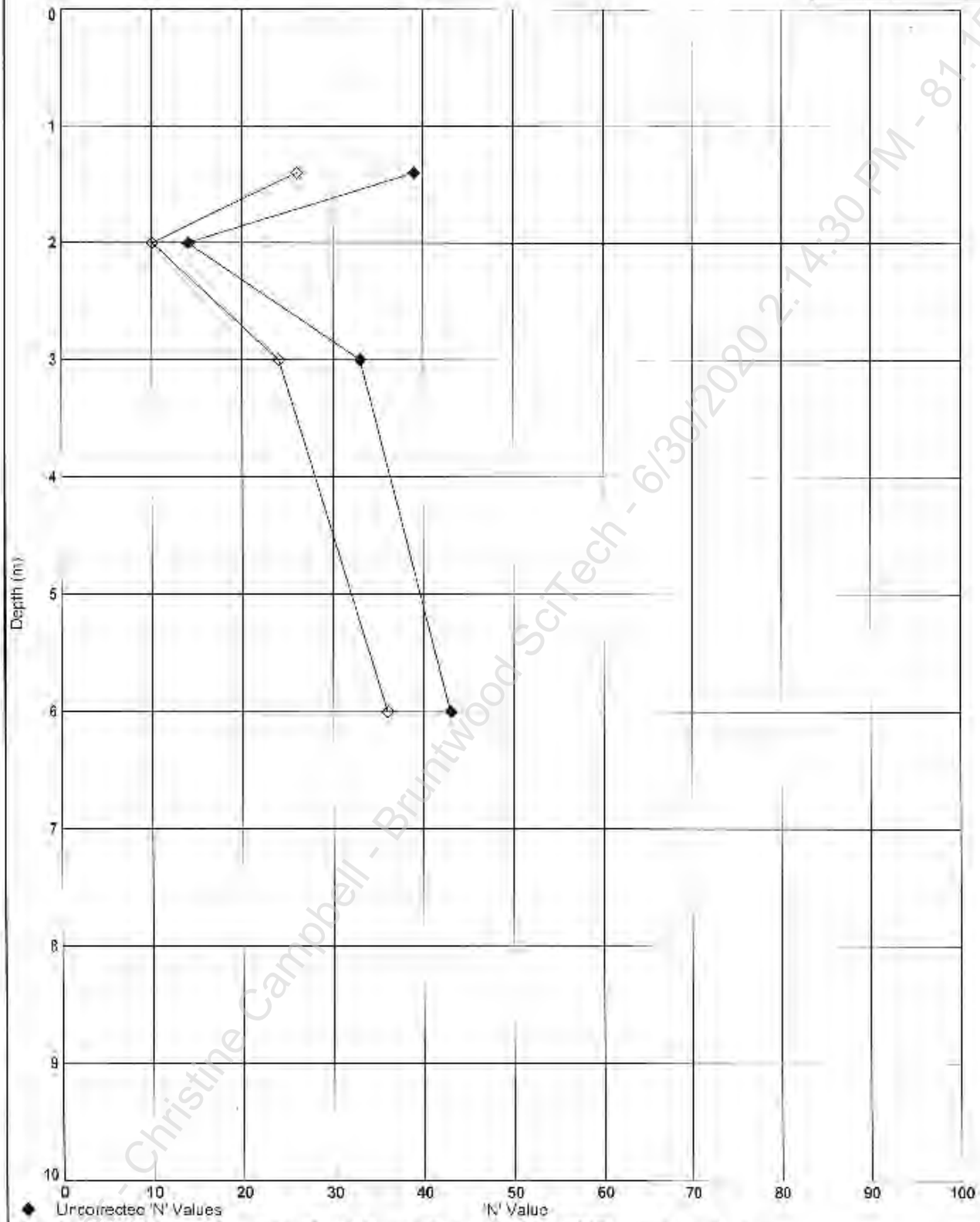
CONFIDENTIAL

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ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RX Tel: 0191 377 4700 Fax: 0191 377 4710
Regional Office: Unit 29, Business Development Centre, Stanley Wharf, Rawtenstall, BB4 8BT Tel: 01772 735 990 Fax: 01772 735 995

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH004



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH004
Operator :- P.B/P.D	
Checked By :- LC	Approved By :-
AEG Contract No. :- NW1588	

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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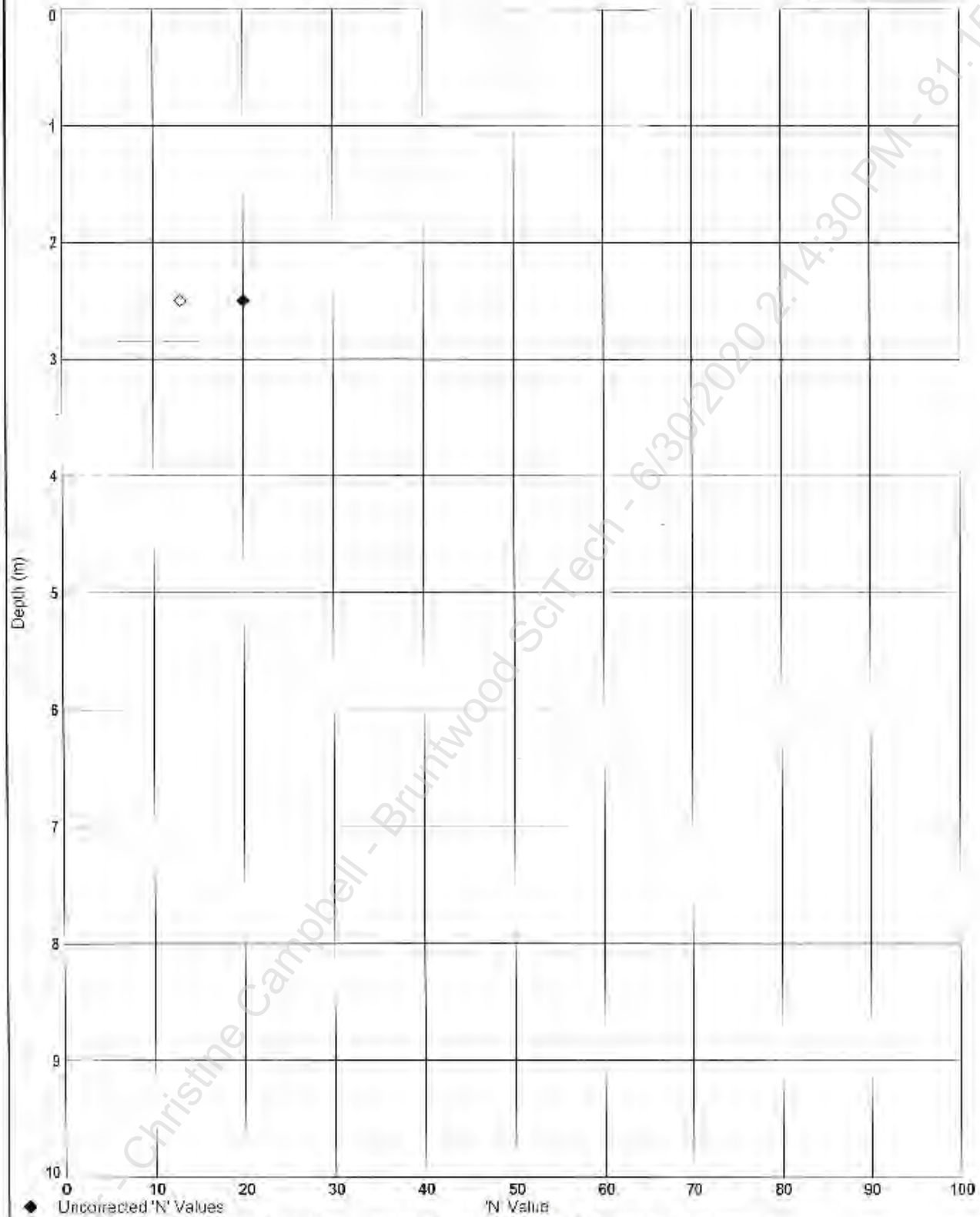
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 414

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Units 25 Sykes Green Industrial Estate, Peton Fell, Chesterle Street, Co. Durham, DH2 3RS Tel: 0191 492 1400 Fax: 0191 492 1410
Regional Office: Unit 20 Business Development Centre, Fulwood Wharf, Preston, PR2 9YL Tel: 01772 736 900 Fax: 01772 736 909

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH005



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-	Client :-
ID Manchester Preliminary Ground Investigation	University of Manchester

Date of issue :-	Certificate No :-	Operator :-
15/04/2020	SPT/NW1588/Graph/BH005	KR/P D
Checked By :-	**Approved By :-**	**AEG Contract No :-**
LC	KW	NW1588

UKAS TESTING 1367

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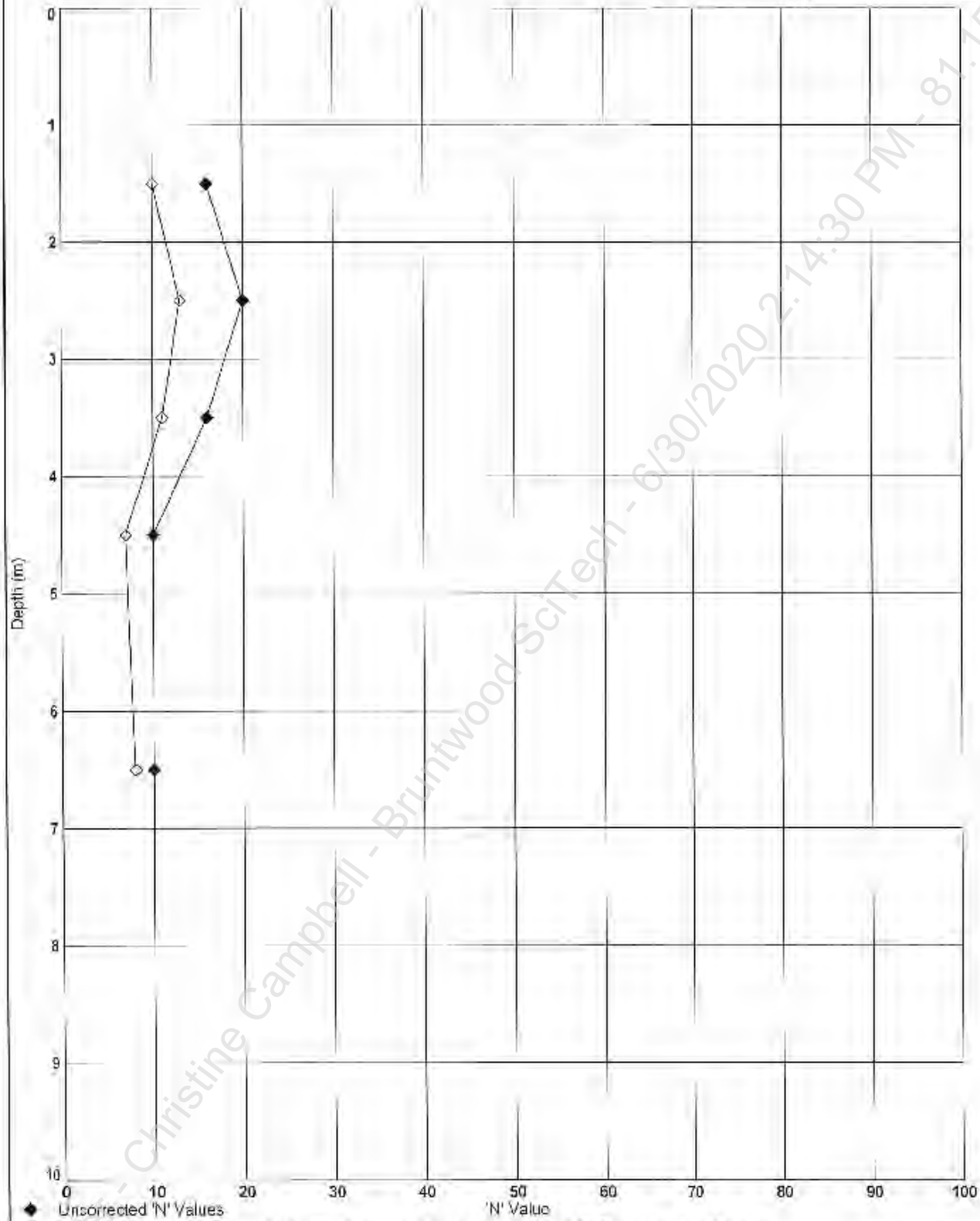
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 415

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2c Wells Gt Industrial Estate, Felton Rd, Cheshire Street, Ce Division, DH2 2RG
Regional Office: Unit 3C Business Development Centre, Point 5 Wharf, Rawtenstall, BB4 8PL
Tel: 01772 735 300 Fax: 01772 735 599

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH007



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- D Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH007
Operator :- K Rogerson	
Checked By :- LC	Approved By :-
AFG Contract No :- NW1588	

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ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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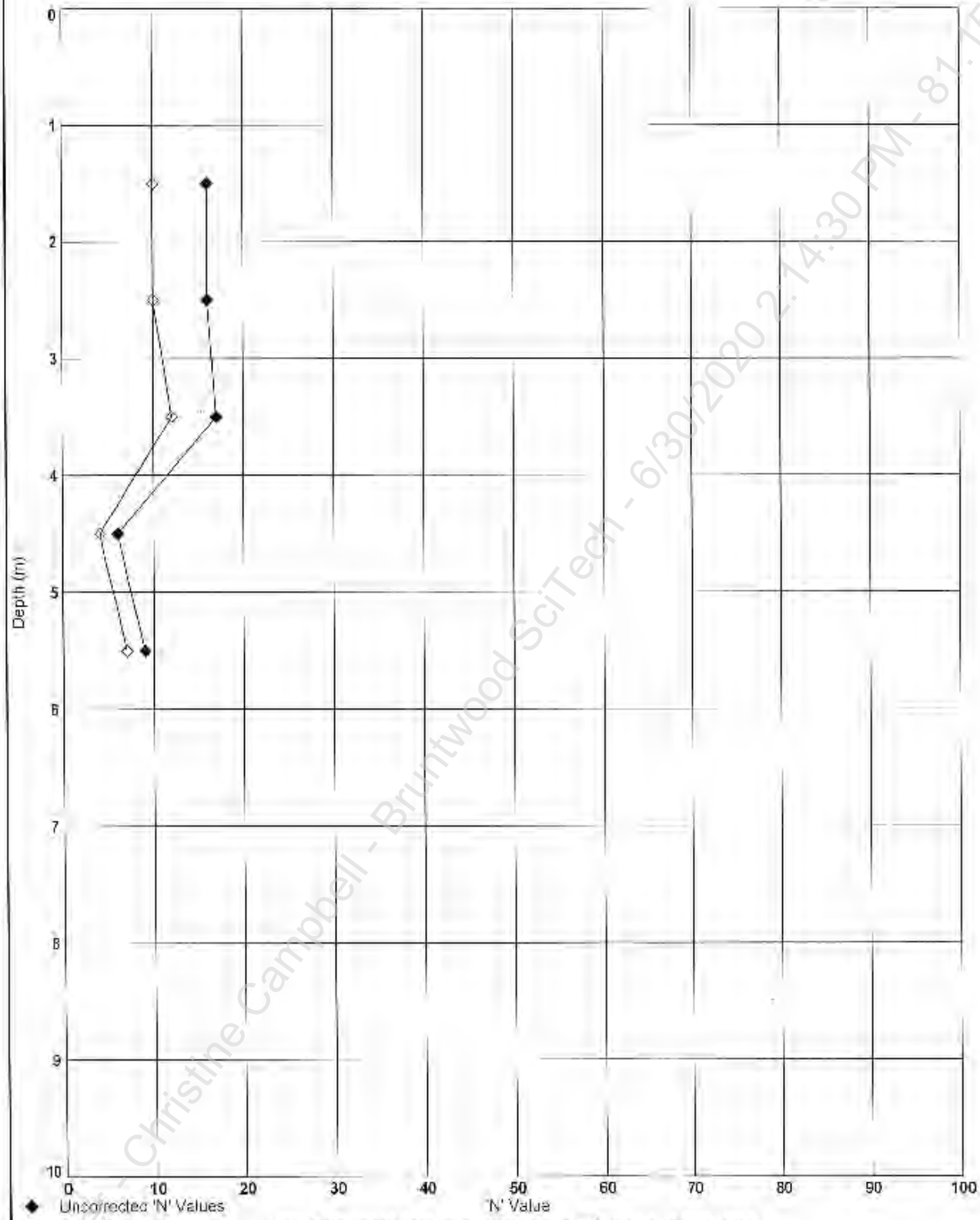
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Eaton Gill Industrial Estate, Rotton Fell, Chester-le-Street, Co. Durham, DH2 2RS Tel: 0191 389 4700 Fax: 0191 389 4717
Regional Office: Unit 23 Business Development Centre, Lytham Road, Blackpool, FY1 6JX Tel: 01772 735 300 Fax: 01772 735 500

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH008



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester

Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH008	Operator :- K. Rogerson
Checked By :- LC	Approved By :- KW	AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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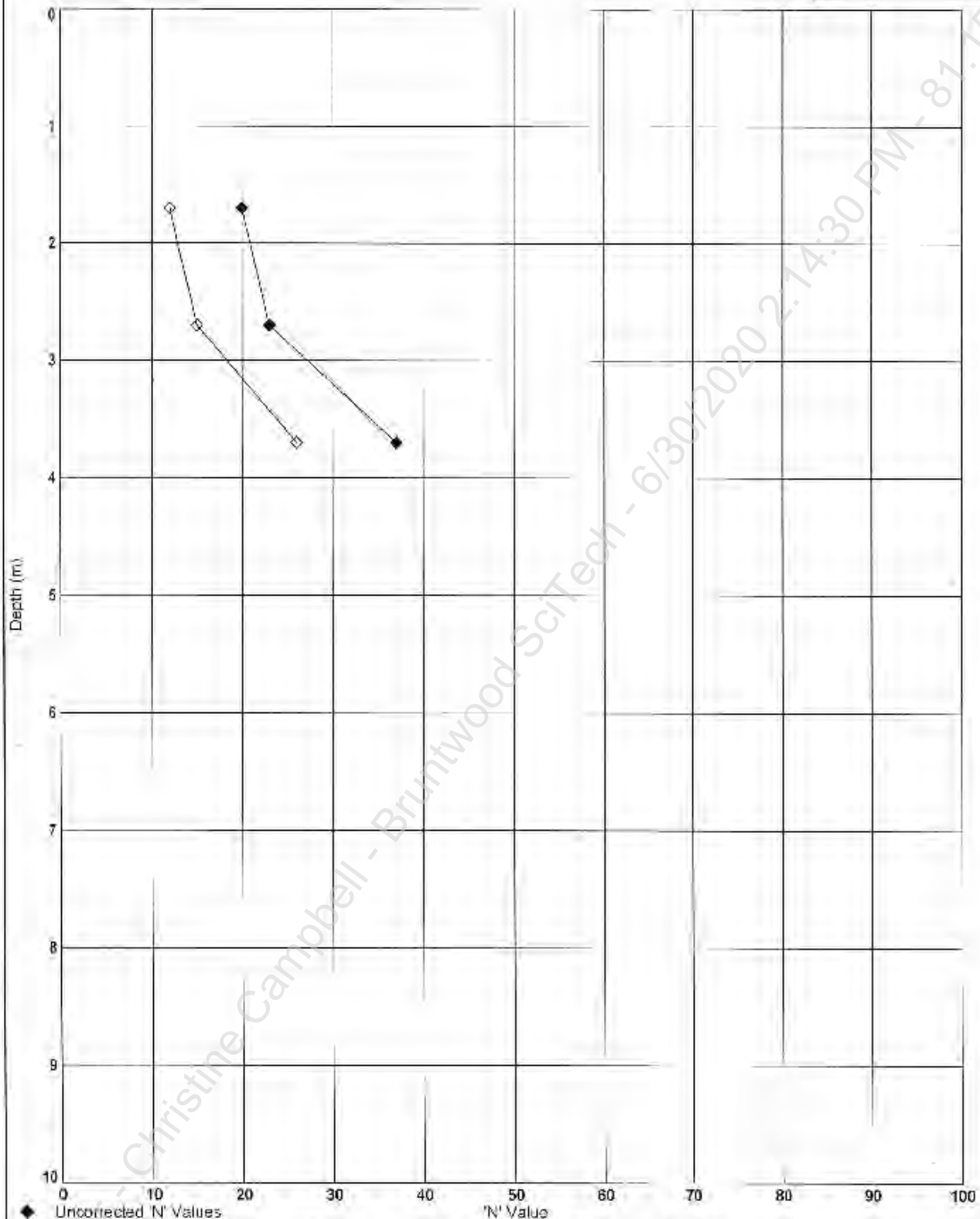
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 417

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cl Industrial Estate (Main Ent), Chester le Street, Co Durham DH2 2RB Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23 Business Development Centre, Bath Wharf, Blackburn BB1 5BL Tel: 01772 745 411 Fax: 01772 745 469

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH009



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :-
D Manchester Preliminary Ground Investigation

Client :-
University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH009	Operator :- M. Smith	UKAS TESTING 1367
Checked By :- LC	Approved By :- KW	AEG Contract No. :- NW1588	

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

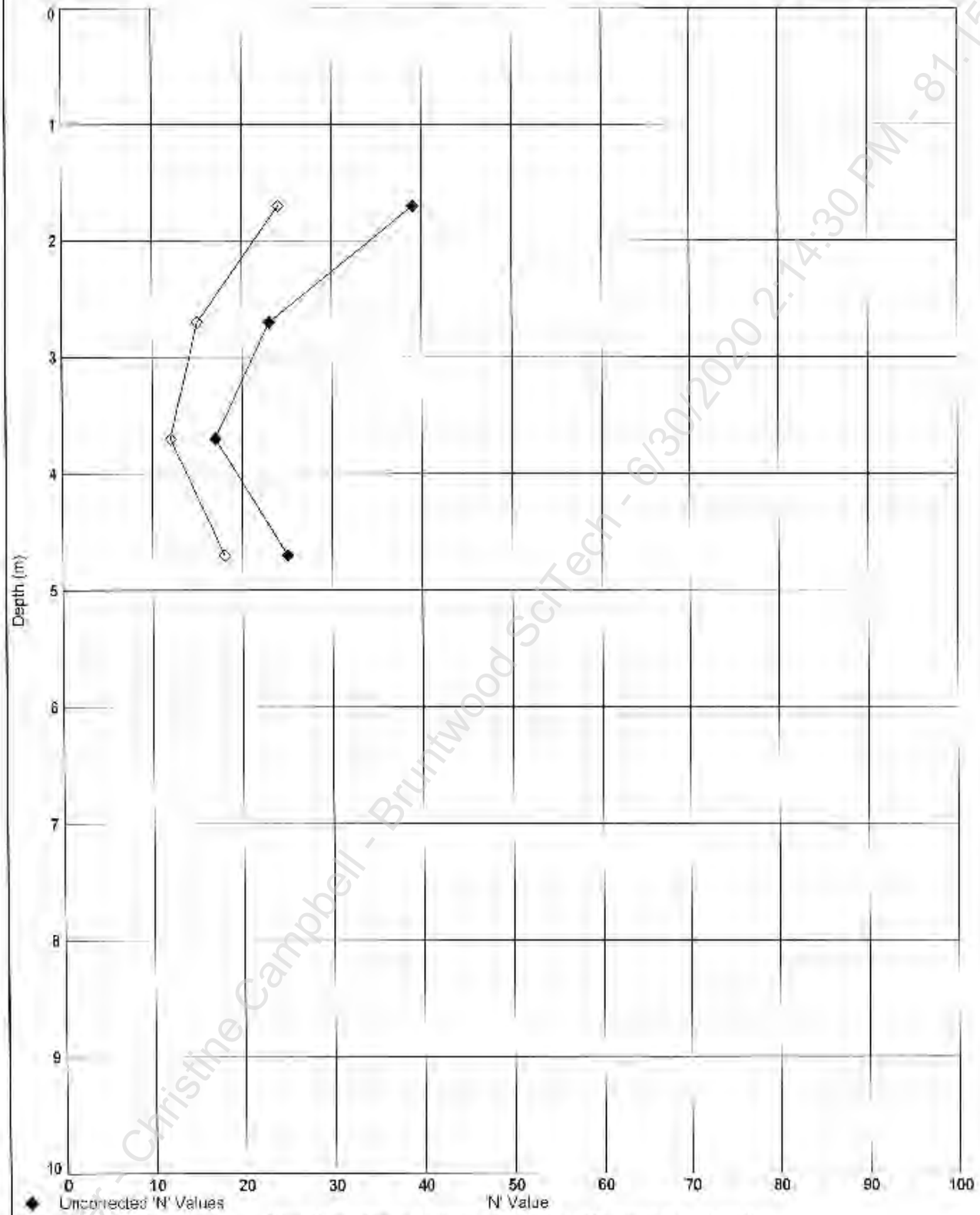
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ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham DH2 2RX Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 2BL Tel: 01772 335 911 Fax: 01772 335 993

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH011



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH011
Operator :- M.S/J.M	
Checked By :- LC	Approved By :-
AEG Contract No :- NW1588	UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72
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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 419

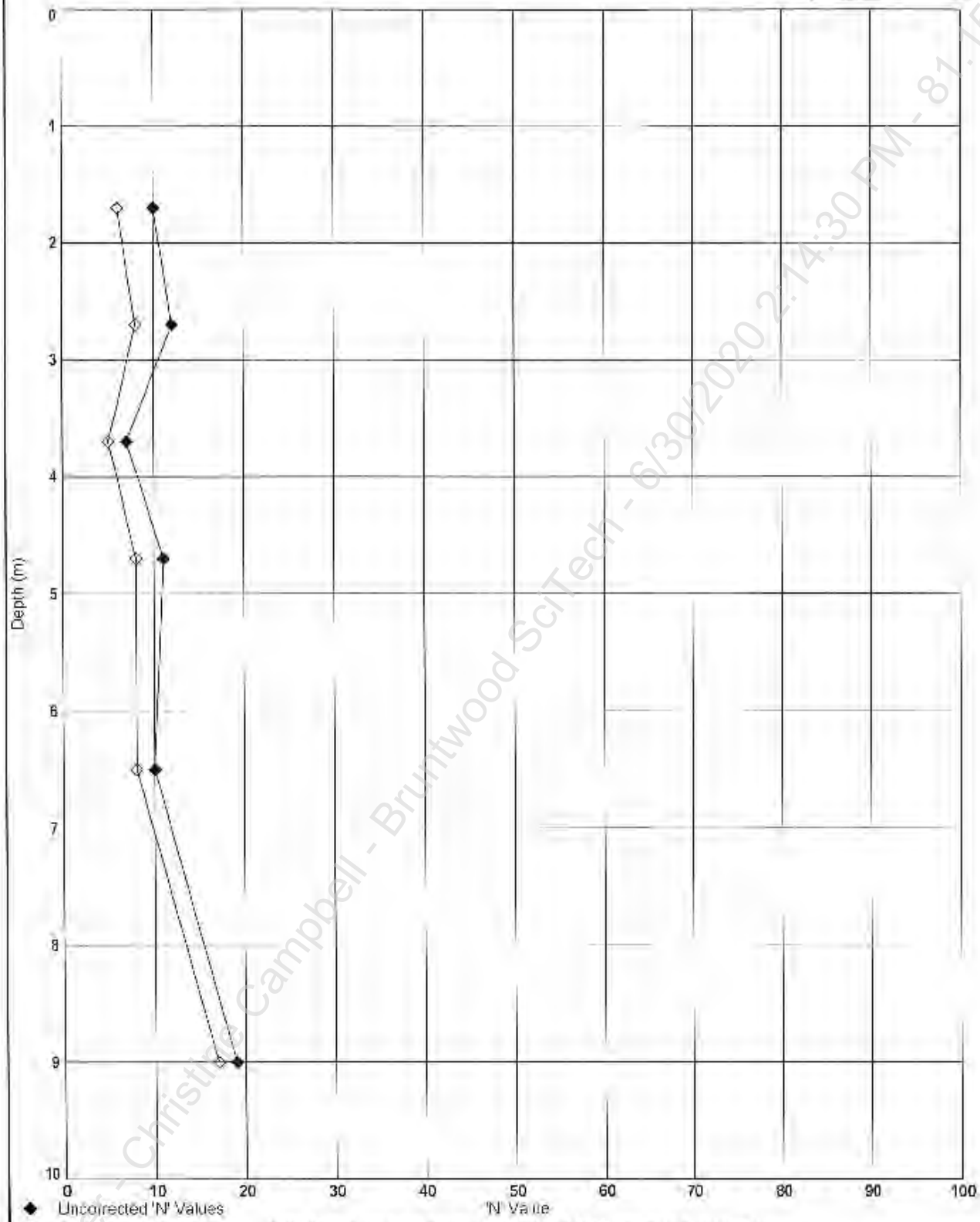
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Scott Grf Industrial Estate, Felton Fell, Chester-le-Street, Co. Durham, DH2 3RG Tel: 0191 387 4130 Fax: 0191 387 4131
Regional Office: Unit 20 Rural Development Centre, Tarporley Wood Lane, Cheshire, CW6 9BA Tel: 01772 736 300 Fax: 01772 736 202

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.

BH012A



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :-	Client :-
ID Manchester Preliminary Ground Investigation	University of Manchester

Date of issue :-	Certificate No :-	Operator :-
15/04/2020	SPT/NW1588/Graph/BH012A	M. Snaith
Checked By :-	**Approved By :-**	**AEG Contract No. :-**
LC	KW	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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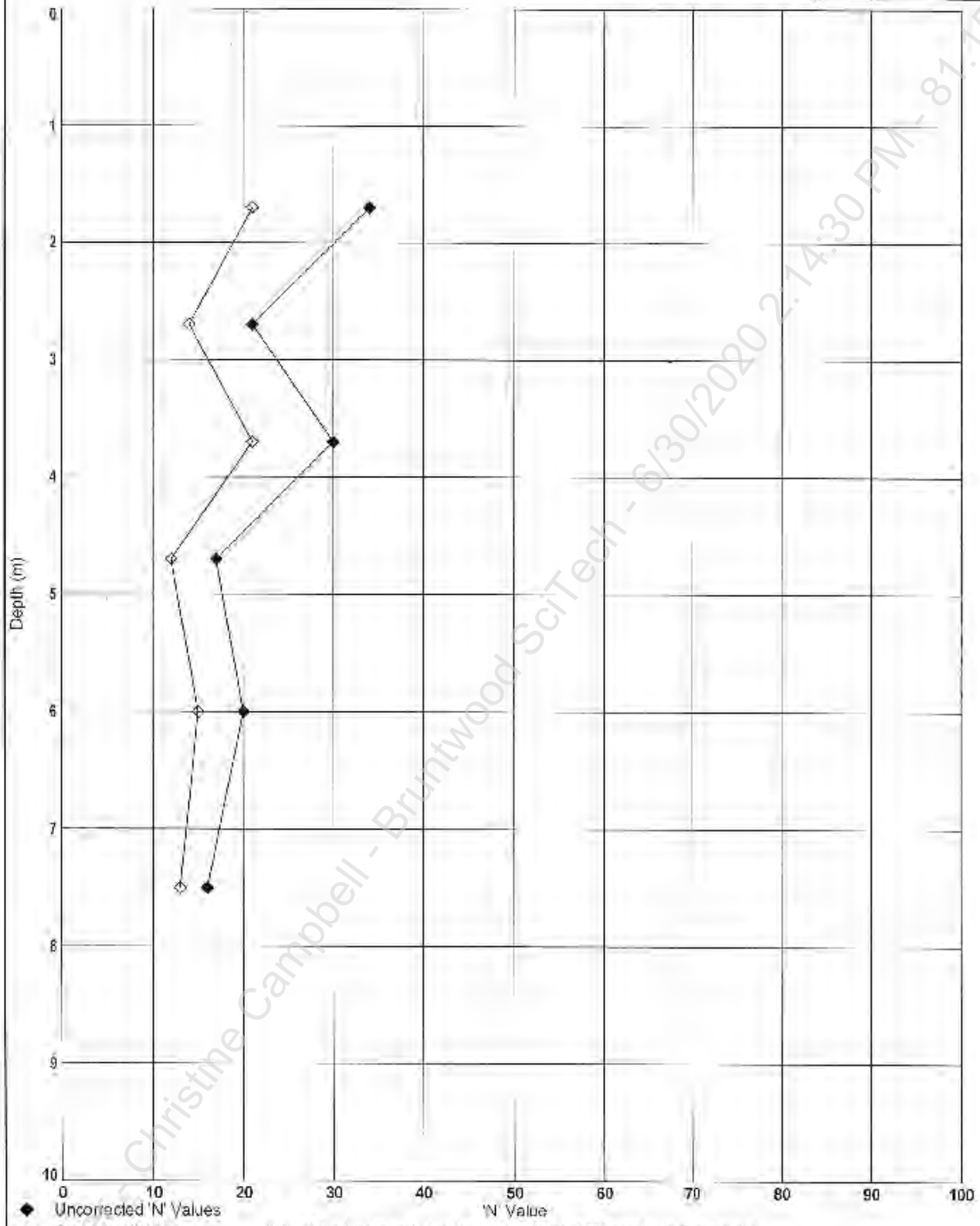
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 420

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 28 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG Tel: 0191 387 4701 Fax: 0191 387 0116
Unit 20, Business Development Centre, Swan Wharf, Blackburn, BB1 5UL Tel: 01772 735 302 Fax: 01772 735 312

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH013



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester

Date of Issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH013	Operator :- M.S/P.D
Checked By :- LC	Approved By :- AW	AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

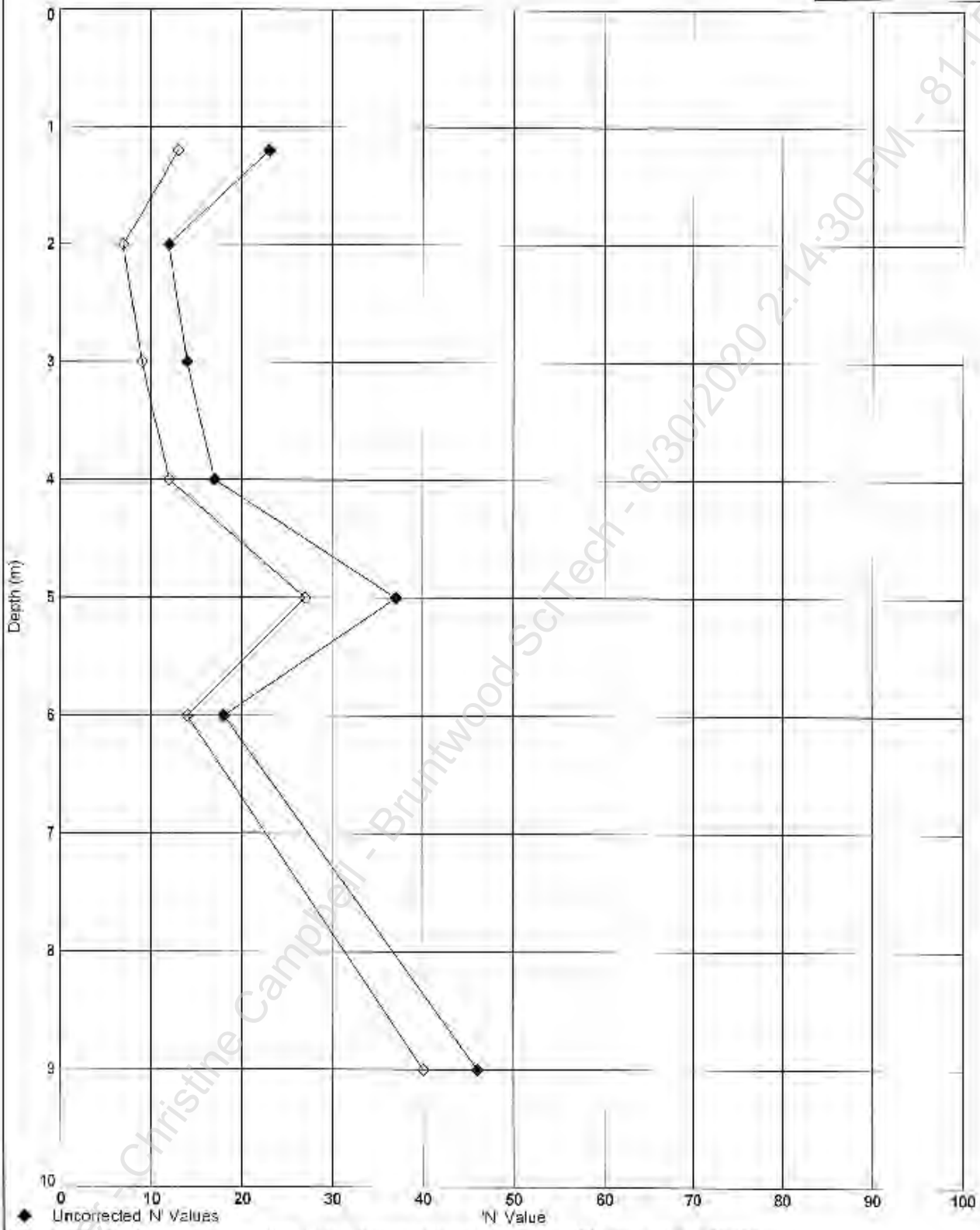
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 421

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Wells Bill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG Tel: 0191 387 4733 Fax: 0191 387 4773
Regional Office: Unit 20 Business Development Centre, Euxton West, Chorley, PR7 6GL Tel: 01772 736 300 Fax: 01772 736 593

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH014



Contract Title :-
ID Manchester Preliminary Ground Investigation

Client :-
University of Manchester

Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/BH014	Operator :- L. Selkirk	
Checked By :- LC	Approved By :-	AEG Contract No. :- NW1588	UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

CONFIDENTIAL

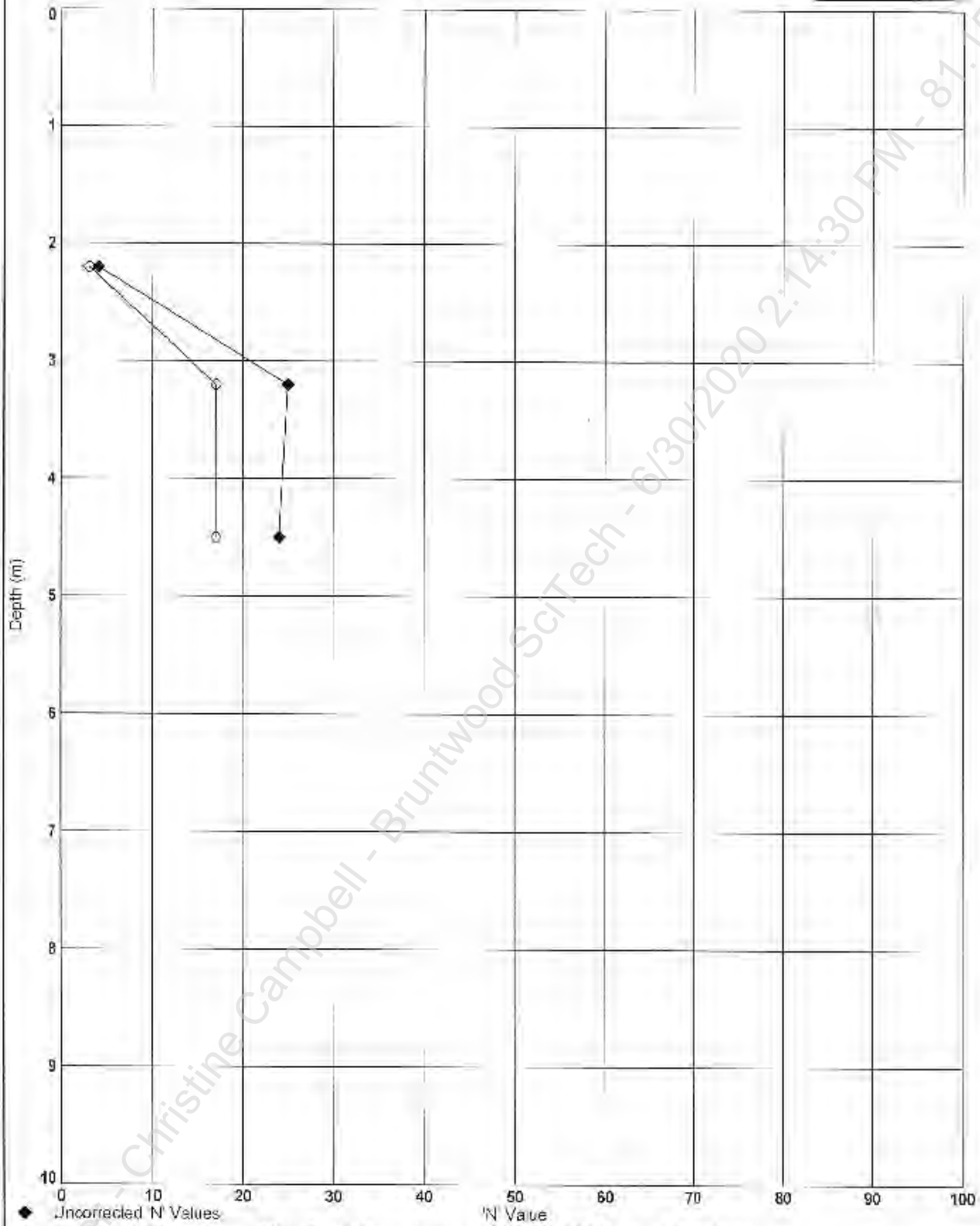
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 422

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Swalwell Industrial Estate, Fellon Rd, Chester-le-Street, Co. Durham DH2 1BG Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Darwen Vale, Blackburn BB1 8B. Tel: 01772 735 300, Fax: 01772 735 599

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
DS001



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW1588/Graph/DS001
Checked By :- LC	Approved By :-

Operator :- E. Bacon

AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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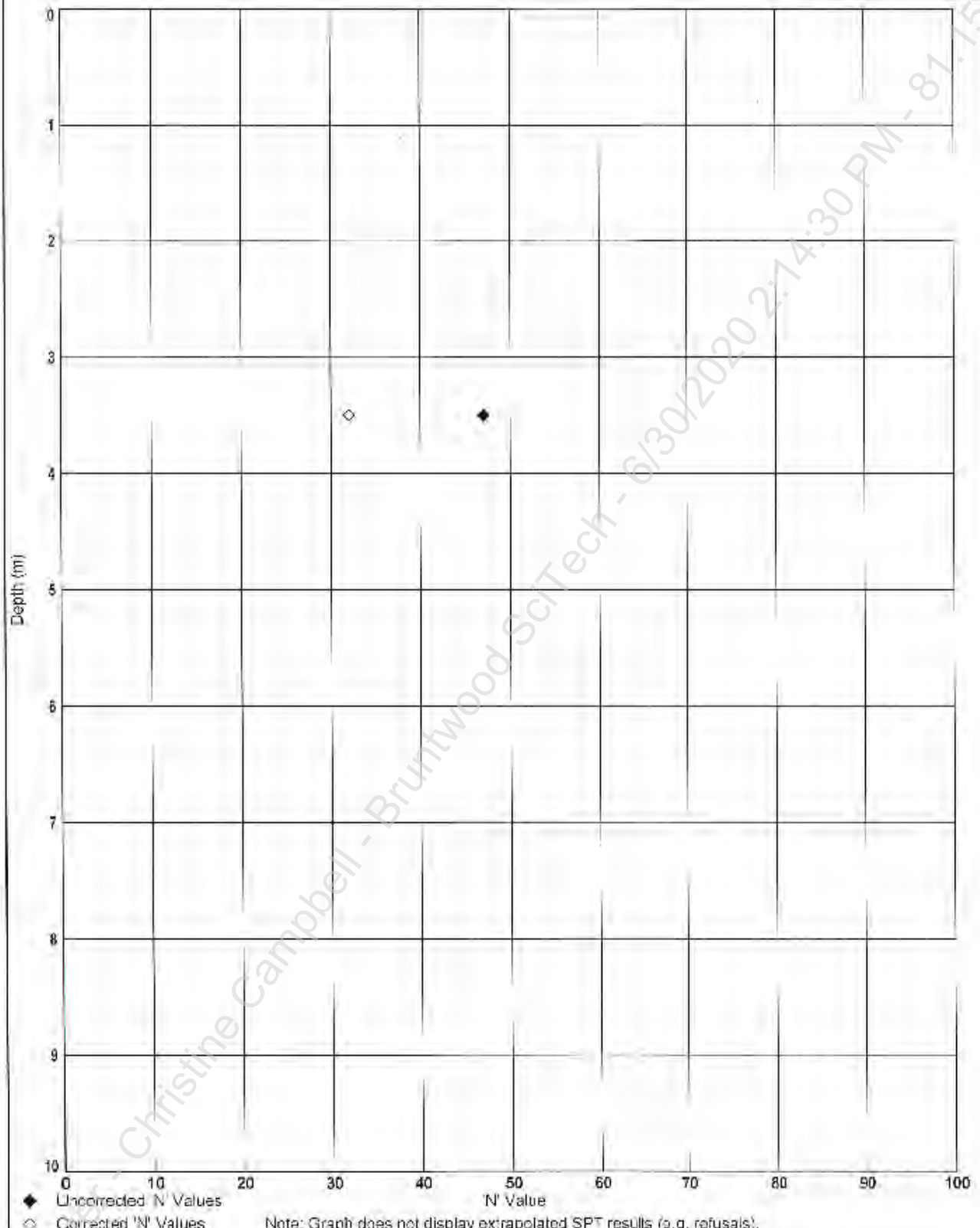
Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 423

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 26 Ends Of Pictorial Fibres, Tilton Rd, Chester-le-Street, Co Durham, DH2 1RE Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eastern Way, Bluebourn, BB1 5BL Tel: 01772 765300 Fax: 01772 765 999

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
DS002



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :- ID Manchester Preliminary Ground Investigation	Client :- University of Manchester
Date of issue :- 15/04/2020	Certificate No :- SPT/NW/1588/Graph/DS002
Operator :- J. Moyle	
Checked By :- LC	Approved By :-
AEG Contract No :- NW1588	

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brantwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Allied Exploration & Geotechnics Ltd.

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Ref:	ATH01
Test Date:	02/08/2019
Report Date:	07/08/2019
File Name:	ATH01.spt
Test Operator:	BP

QUALITY CONTROL CHECKED 07 AUG 2019

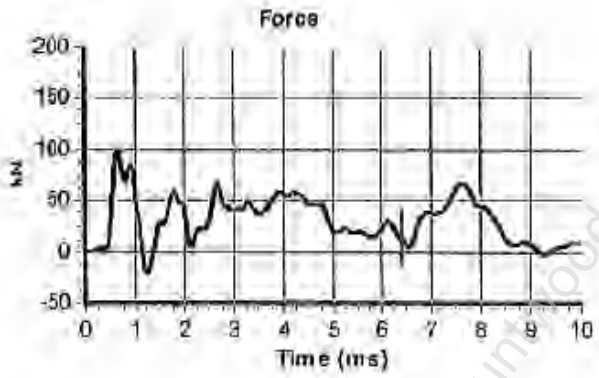
Instrumented Rod Data

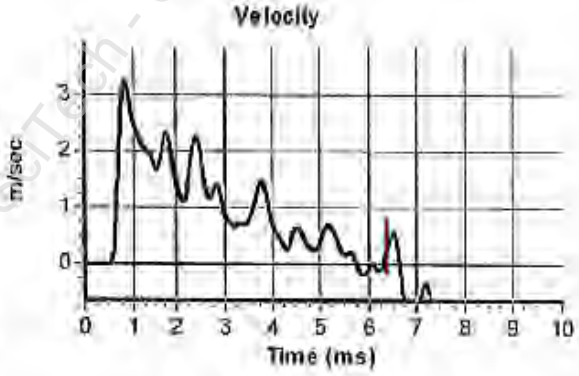
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

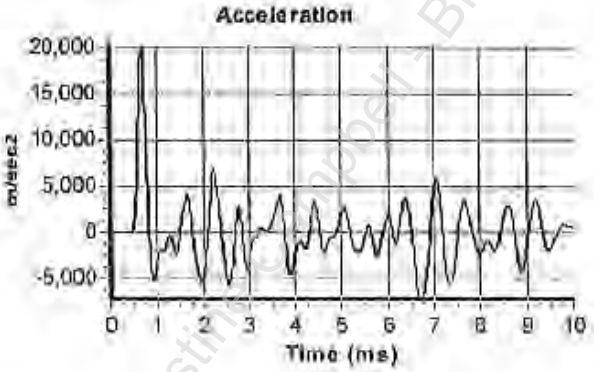
SPT Hammer Information

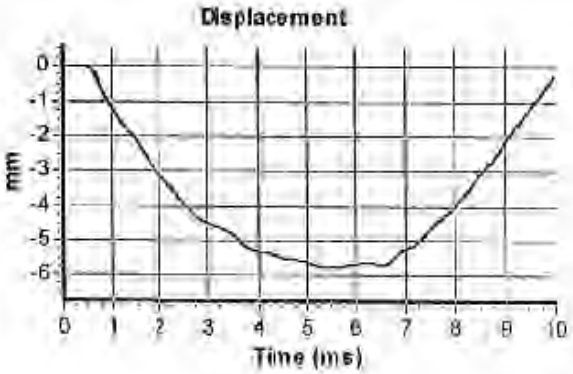
Hammer Mass m (kg):	63.8
Falling Height h (mm):	761
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	262

Energy Ratio E_r (%): 55

B Proctor

Signed: Brian Proctor

Title: Technician

The recommended calibration interval is 12 months

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Allied Exploration & Geotechnics Ltd.

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Ref:	ATH02
Test Date:	27/06/2019
Report Date:	28/06/2019
File Name:	ATH02.spt
Test Operator:	BP

QUALITY CONTROL CHECKED 28 JUN 2019

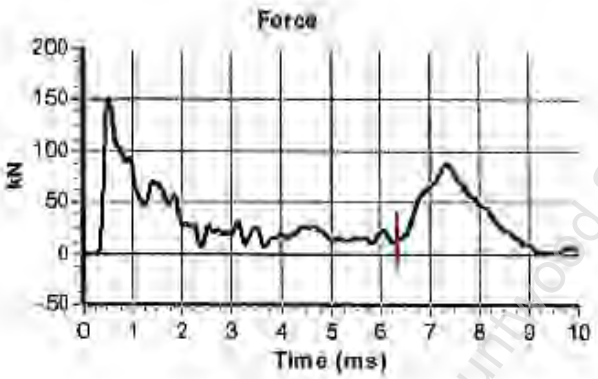
Instrumented Rod Data

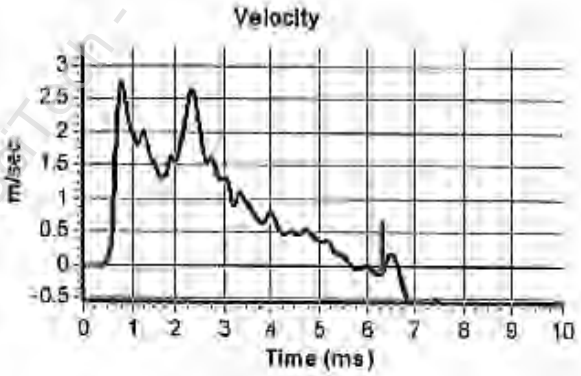
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

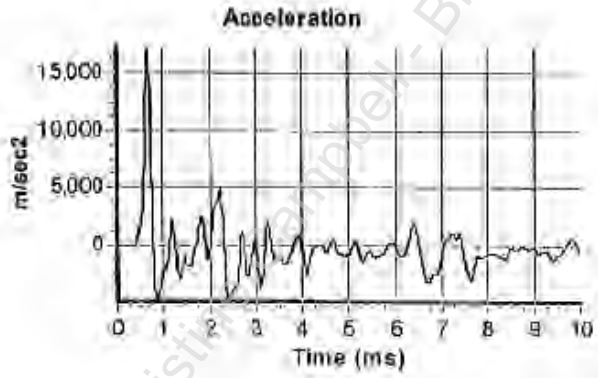
SPT Hammer Information

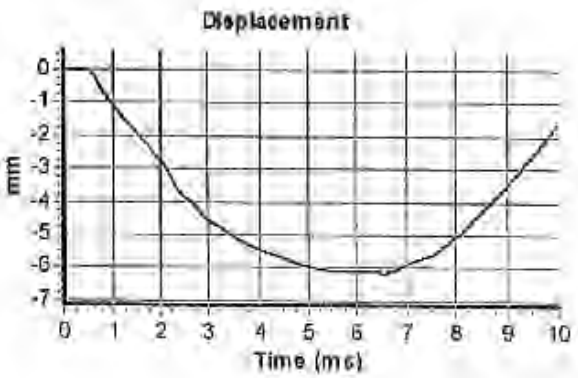
Hammer Mass m (kg):	63.7
Falling Height h (mm):	765
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	970
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	257

Energy Ratio E_r (%): 54

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

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Allied Exploration & Geotechnics Ltd.

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	ATH05
Test Date:	07/08/2019
Report Date:	07/08/2019
File Name:	ATH05.spt
Test Operator:	BP

QUALITY CONTROL CHECKED 07 AUG 2019

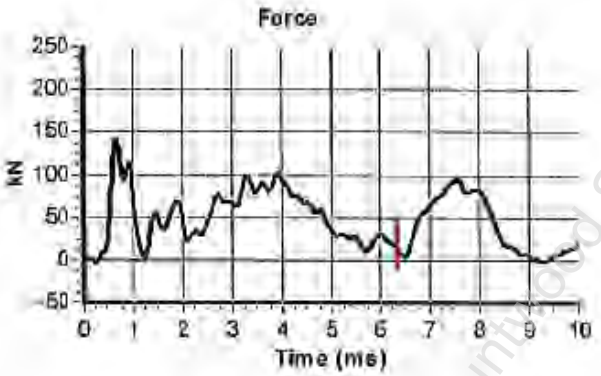
Instrumented Rod Data

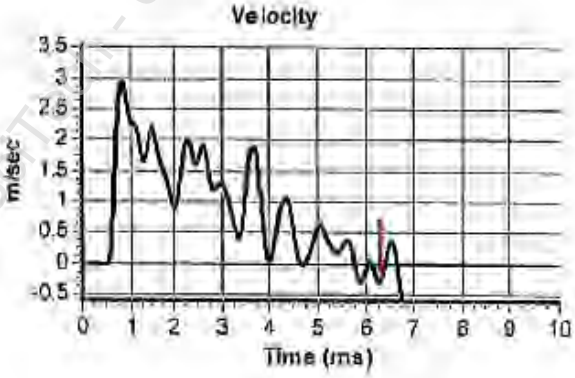
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

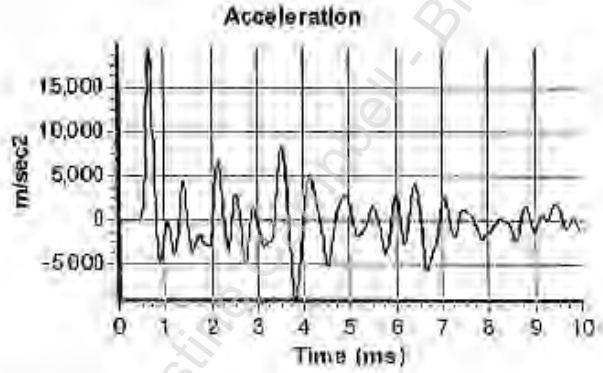
SPT Hammer Information

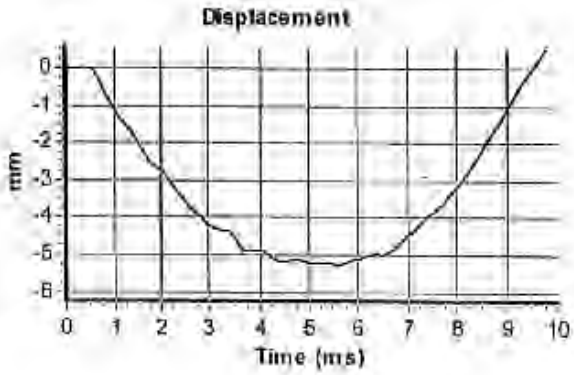
Hammer Mass m (kg):	63.5
Falling Height h (mm):	756
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	329

Energy Ratio E_r (%): 70

B Proctor

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

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Allied Exploration & Geotechnics Ltd.

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	ATH07
Test Date:	12/02/2019
Report Date:	12/02/2019
File Name:	ATH07.spt
Test Operator:	BP

QUALITY CONTROL CHECKED
13 FEB 2019
Signed

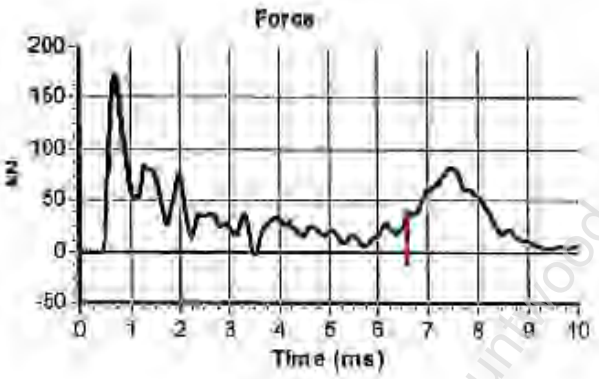
Instrumented Rod Data

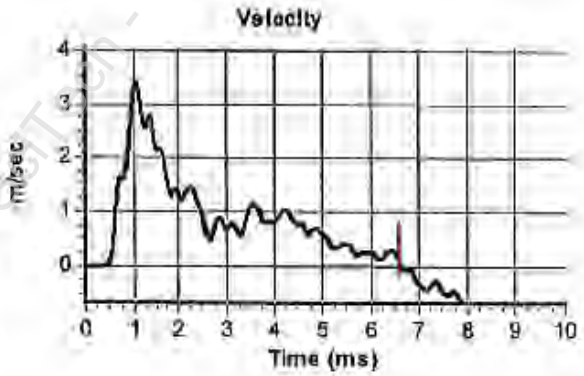
Diameter d_r (mm):	67
Wall Thickness t_r (mm):	8.7
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	6469
Accelerometer No.2:	11938

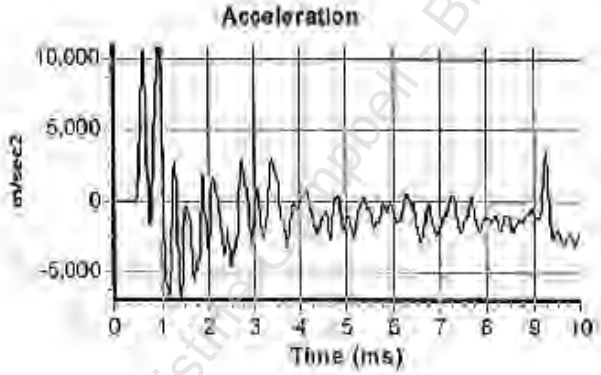
SPT Hammer Information

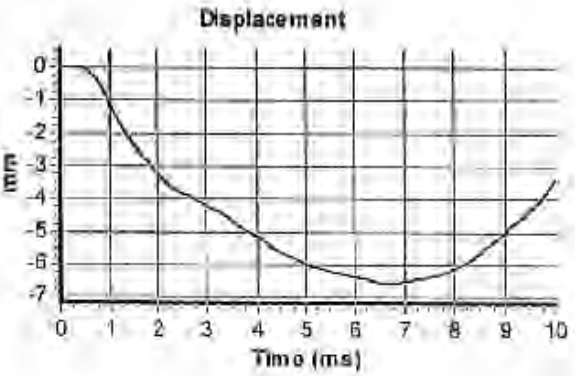
Hammer Mass m (kg):	63.2
Falling Height h (mm):	763
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	1593
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	283

Energy Ratio E_r (%): 60

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

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LABORATORY TESTING ENCLOSURES

Laboratory Report Certificate

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 25 Rivers Gill Industrial Estate, Consett, Co. Durham, DH8 6RG. Tel: 0191 3514000 Fax: 0191 3674710
Regional Office: Unit 20, Burnside Development Centre, Carnforth, Lancashire, LA5 9FP. Tel: 01772 705 330 Fax: 01772 705 339

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	15/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Fair (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH013	15:00:00	9.06	1190.7	0.72	256.0	25.10
	15:03:00	11.52	1072.0	0.70	263.0	22.40
	15:06:00	11.88	1061.1	0.69	267.1	23.50
	15:09:00	11.94	1059.2	0.69	271.6	23.50
	15:12:00	11.94	1064.9	0.69	278.5	23.41
	15:15:00	11.96	1084.2	0.71	291.7	23.20

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	University of Manchester

Checked By:	Approved By:	
LC	KW	
Date Issued: 22/01/2020	Page No. : 1 of 1	AEG Contract No.: NW1588

ID Manchester Preliminary Ground Investigation 81.154.246.72 15/01/2020 21:44:30 PM

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ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 35 Sir Bj Sill Industrial Estate, Potter Hill, Chesterle-Street, Co. Durham, DH2 2NU - Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23, Business Development Centre, Forest Street, Blackburn, BB1 3BB - Tel: 01254 264 342 Fax: 07 722 736 522

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	16/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Rain (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH001	15:49:00	12.81	859.7	0.56	173.7	74.83
	15:52:00	13.21	860.9	0.56	192.9	63.28
	15:55:00	13.35	860.1	0.56	215.2	63.21
	15:58:00	13.42	859.4	0.56	225.5	62.96
	16:01:00	13.51	858.2	0.56	230.8	61.84
	16:05:00	13.61	855.0	0.56	247.7	61.02

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:		Client:	
ID Manchester Preliminary Ground Investigation		University of Manchester	
Checked By: LC		Approved By: KW	
Date Issued: 22/01/2020	Page No: 1 of 1	AEG Contract No. : NW1583	

ID Manchester Preliminary Ground Investigation - 81.154.246.72 - 22/01/2020 21:44:30 PM

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ALLIED EXPLORATION GEOTECHNICS LIMITED

[illegible]

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	17/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Rain (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH004	09:02:00	12.00	1167.1	0.78	127.2	15.68
	09:05:00	16.69	1097.0	0.71	94.5	2.15
	09:08:00	16.93	1076.9	0.70	88.2	1.58
	09:13:00	16.94	1089.3	0.71	96.5	1.79
	09:16:00	16.96	1098.4	0.71	106.9	1.93
	09:19:00	16.94	1099.3	0.71	124.1	1.90
BH007	11:29:00	14.62	679.4	0.44	105.8	4.58
	11:32:00	15.73	688.9	0.45	226.6	1.94
	11:38:00	15.71	686.6	0.45	252.5	1.76
	11:43:00	15.68	688.4	0.45	282.5	1.66
	11:46:00	15.69	682.5	0.44	296.3	2.02
	11:49:00	15.75	685.4	0.44	306.7	1.68
BH011	13:01:00	10.19	1187.5	0.79	52.3	11.86
	13:04:00	12.23	1329.2	0.86	89.7	2.85
	13:07:00	12.76	1337.5	0.90	142.7	1.94
	13:09:00	12.73	1368.6	0.89	168.3	1.89
	13:11:00	12.75	1371.1	0.89	180.6	1.95

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	University of Manchester

Checked By: LC	Approved By: KW	
Date Issued: 22/01/2020	Page No.: 1 of 1	AEG Contract No.: NW1588

ID Manchester - Christine Shelley-Brunswood (SciTech - 6/30/2020 2:44:30 PM - 81.154.246.72

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ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 25 Stella G Enterprise Estate, Palma Mill, Chester Street, St. Helens, WA9 3BS. Tel 0161 351 4700 Fax 0161 351 4710
Regional Office: Unit 20, Business Development Centre, Forrest Street, Blackburn, BB1 5QL. Tel: 01772 205 330 Fax: 01772 705 989

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test:	17/01/2020	Operator:	A. Rees
Weather Condition (inc temperature) :	Rain (10°C)		

Monitoring Point	Time (hrs)	Temp (°C)	Electrical Conductivity (µs)	Total Dissolved Solids (ppm)	Redox Potential (mv)	Dissolved Oxygen (%)
BH005	13:46:00	14.34	257.3	0.17	352.3	1.55
	13:49:00	14.54	256.3	0.17	256.3	1.28
	13:59:00	13.56	187.5	0.12	453.1	1.70
	14:02:00	14.49	182.9	0.12	445.7	1.19
	14:05:00	14.67	178.5	0.12	445.9	1.22
	14:08:00	14.67	172.4	0.11	451.1	1.18
	14:11:00	14.67	167.6	0.11	455.2	1.39

Remarks :	Suspected faulty pH probe - Readings not reported

Contract Title:		Client:	
ID Manchester Preliminary Ground Investigation		University of Manchester	
Checked By: LC		Approved By: KW	
Date Issued: 22/01/2020	Page No: 1 of 1	AEG Contract No. : NW1588	

ID Manchester Ground Investigation 81.154.246.72 01/30/2020 2:44:30 PM

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In-situ Water Quality Parameter Test Results

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 20 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 3874700 Fax: 0191 3874710
Registered Office: Unit 20 Business Development Centre, Bersham Road, Blackburn, BB1 5BL - Tel: 01722 735 800 Fax: 01722 715 999

LABORATORY REPORT CERTIFICATE

UKAS TESTING 1367

Contract Title: ID Manchester Preliminary Ground Investigation

AEG Reference: NW1588

Client Address: University of Manchester

We certify that Laboratory testing was carried out on samples from the above contract in accordance with techniques outlined in BS 1377: 1990, BS EN ISO 17892 or other appropriate standards as quoted. The samples were received from October 2019 and the following results, given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages

For and on behalf of Allied Exploration & Geotechnics Limited

- ☐ Nick Vater (Managing Director)
- ☐ Kevin Warriner (HSE & Quality Director)
- ☑ Michelle Selkirk (Laboratory Manager)

Signed _____ Date: 22 January 2020

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation

Please note the material was derived from samples taken outside the control of the laboratory

ID Manchester - Christine Campbell - Brightwood Scheme - 30/1/2020 2:14:30 PM - 194.154.246.72

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LABORATORY REPORT CERTIFICATE

ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Laboratory Report Certificate	N/A		3
1	Sample Description Sheets	N/A		4
2	Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	2
2	Plasticity Index and Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	2
3	Particle Size Distribution Sieving	Yes	BS 1377 Part 2 1990	39
3	Particle Size Distribution Sedimentation	No	BS 1377 Part 2 1990	17
4	Determination of Total Sulphur, Sulphate and pH (Tested externally)	No	See DETS certificates	12
5	Determination of Dry Density/Moisture Content Relationship	Yes	BS 1377 Part 4 1990	4
6	Determination of One Dimensional Consolidation Properties	Yes	BS 1377 Part 5 1990	2
7	Consolidated Undrained Shear Strength in Triaxial Cell with Measurement of Pore Pressure	No	BS 1377 Part 8 1990	4
8	Moisture Content of Rock	Yes	ISRM 1981	1
9	Determination of Point Load Index (Some tested externally)	Yes	ISRM 1985	12
10	Determination of Unconfined Compressive Strength (Tested externally)	No	ISRM 1985	1

ID Manchester - Christine Campbell - Brimwood SoTech - 6/8/2021 2:30 PM - 84.154.246.72

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LABORATORY REPORT CERTIFICATE

ABBREVIATIONS

All the abbreviations used on the laboratory certificates are given below:

Br	Brittle	**PSD**	Particle Size Distrioution by sieve analysis
C	Compound	**SB**	Shear Box
CBR	California Bearing Ratio	**SED**	Sedimentation Analysis
CDT	Consolidated Drained Triaxial	**SO4**	Sulphate (total, water extract, groundwater)
CL	Chloride content (water or soil)	**CP2**	Dry Density/Moisture Content 2.5kg rammer
US	Unsuitable sample for test	**CP4**	As above using 4.5kg rammer
UUT	Undrained Unconsolidated Triaxial	**CPV**	As above using vibrating hammer
HSV	Vane Test	**CUT**	Consolidated Undrained Triaxial
IS	Insufficient sample for test	**R**	Remoulded
LOI	Loss On Ignition	**U**	Undisturbed
M	Multi-stage testing	**MC**	Moisture Content
MCV	Moisture Content Value	**PL**	Point Load
NAT	Natural preparation method	**NMC**	Natural (or as received) moisture content
P	Plastic	**PFH**	Permeability Falling Head Method
OED	Oedometer	**PTXL**	Permeability in Triaxial Cell
OMC	Optimum Moisture Content	**ORG**	Organic content
B	Large disturbed (bulk) sample	**PD**	Particle Density (SG)
J	Small disturbed (jar) sample	**PI**	Liquid limit, plastic limit and plasticity index

Typical Mode of Failure for Triaxial Testing



ID Manchester\Christine.Campbell - Brunswood Scheme - 6/3/2012 2:14:30 PM - 81.154.246.72

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LABORATORY TESTING ENCLOSURE 1

Sample Description Sheets

ID Manchester - Christine Campbell - Bruntwood SciTech 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Eldon Court, Eldon Way, Crossways Business Park, Dartford, DA2 6QL - Tel: 01322 292 666 Fax: 01322 292 667
Regional Office: Unit 2, Lakeside Business Park, Swan Valley, Northampton, NN4 9BT - Tel: 01604 767 822 Fax: 01604 767 823

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH001	0.50	B5	MADE GROUND (Brown slightly sandy slightly gravelly clay of intermediate plasticity. Gravel includes brick fragments).	MC PI PSD SED
BH001	1.20	U10	MADE GROUND (Soft and firm brown slightly sandy slightly gravelly clay with pockets of gravelly sand with a low cobble content. Cobble of brick).	CUT US for OED
BH001	1.65	J11	MADE GROUND (Brown slightly sandy slightly gravelly clay. Gravel includes brick fragments)	BRE
BH001	2.00	J13	MADE GROUND (Brown slightly sandy gravelly clay of intermediate plasticity)	MC PI
BH001	3.00	B17	MADE GROUND (Brown sandy slightly gravelly clay of low plasticity. Gravel includes brick and ceramic fragments).	MC PI PSD SED
BH001	4.30	J22	MADE GROUND (Brown slightly sandy slightly gravelly clay of intermediate plasticity. Gravel includes brick fragments)	MC PI
BH001	5.00	B24	Red brown clayey slightly gravelly SAND with clay pockets.	MC PSD SED
BH001	5.50	J25	Red brown SAND with clay pockets	BRE
BH001	12.50	J26	Red brown slightly gravelly SAND.	BRE
BH002	0.50	B3	MADE GROUND (Brown slightly clayey sandy grave with a medium cobble content. Gravel includes brick fragments)	US for CP2
BH002	1.20	B5	MADE GROUND (Red brown clayey very sandy gravel with a medium cobble content. Gravel includes brick fragments).	MC PSD BRE
BH002	3.70	B13	Brown clayey gravelly SAND.	MC PSD SED
BH003	1.20	B5	MADE GROUND (Brown clayey slightly gravelly sand. Gravel includes brick fragments).	BRE
BH003	1.70	B6	Brown clayey very gravelly SAND with a high cobble content.	MC PSD
BH003	4.70	J15	Brown SAND.	BRE
BH003	4.70	B16	Red brown clayey gravelly SAND.	MC PSD
BH004	0.80	B5	MADE GROUND (Red brown slightly clayey gravelly sand with clay pockets)	BRE
BH004	1.00	B6	MADE GROUND (Brown very clayey gravelly sand. Gravel includes brick fragments. (Clay of low plasticity))	MC PI PSD SED
BH004	2.00	B8	MADE GROUND (Black brown slightly sandy gravelly clay. Gravel includes brick fragments).	CP2
BH004	5.00	B15	MADE GROUND (Brown cobbles with much sandy gravelly clay of low plasticity. Gravel includes brick fragments)	MC PI PSD SED
BH004	5.30	B18	MADE GROUND (Brown slightly clayey gravelly sand. Gravel includes brick fragments)	BRE

Contract Title: ID Manchester Preliminary Ground Investigation

Client: University of Manchester

Signed: MBond

Name:

Page 1 of 1

Date of Issue: 22/01/2020

Certificate No.: SDS/NW1588/1

AGS Contract No.: NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Blomfield Street - 6/30/2020 2:11:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2F Bell Close Industrial Park, Platford Lane, Low Fell, Gateshead, Tyne & Wear, NE9 6RG. Tel: 0191 487 3737
Regional Office: Unit 5, Burnhall Close, Burnhall Road, Sherburn Village, Durham, DH6 1PX. Tel: 0191 372 0707 Fax: 0191 372 0707

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH004	7.50	B22	MADE GROUND (Brown clayey very gravelly sand with a medium cobble content. Gravel includes tile, wood and brick fragments).	MC PSD
BH005	0.50	J3	MADE GROUND (Brown slightly sandy gravelly clay. Gravel includes brick fragments).	BRE
BH006	0.80	B4	MADE GROUND (Brown very clayey very sandy gravel including brick fragments).	MC PSD SED
BH005	1.50	B7	Brown slightly clayey sandy GRAVEL.	MC CP2
BH005	2.40	B10	Brown clayey very sandy GRAVEL.	MC PSD
BH006	0.40	B3	MADE GROUND (Brown slightly clayey sandy gravel including tile and brick fragments).	U/S for CP2
BH006	1.40	B5	MADE GROUND (Brown clayey slightly sandy gravel including tarmac and brick fragments).	U/S for PSD and SED
BH006A	0.50	J3	MADE GROUND (Brown slightly clayey slightly sandy gravel including brick fragments).	BRE
BH006A	0.80	B4	MADE GROUND (Brown clayey sand and gravel with a high cobble content. Gravel includes tile and brick fragments).	MC PSD SED
BH006B	0.40	B3	MADE GROUND (Red brown clayey very sandy gravel with a medium cobble content).	MC PI(NP) PSD
BH007	0.80	B4	MADE GROUND (Brown clayey sandy gravel with a high cobble content. Gravel includes tile and brick fragments).	MC PSD
BH007	1.20	J6	MADE GROUND (Brown slightly clayey sandy gravel including brick fragments).	BRE
BH007	2.50	B11	MADE GROUND (Brown clayey very sandy gravel including metal and brick fragments). (Clay of low plasticity)	MC PI PSD SED
BH007	4.50	J18	MADE GROUND (Brown clayey slightly gravelly sand. Gravel includes brick fragments).	BRE
BH007	6.50	B20	Brown clayey very gravelly SAND.	MC PSD
BH007	7.20	J22	Red brown slightly clayey SAND.	BRE
BH008	0.60	B3	MADE GROUND (Brown cobbles with much clayey sandy gravel including brick fragments).	MC PSD
BH008	2.10	J6	MADE GROUND (Brown sandy slightly gravelly clay).	BRE
BH008	2.50	B8	MADE GROUND (Brown clayey sand and gravel with a high cobble content. Gravel includes brick fragments).	MC PSD
BH008	4.50	J14	MADE GROUND (Brown sandy slightly gravelly clay).	MC PI(S for 1)
BH008	4.50	B15	MADE GROUND (Brown clayey very sandy gravel with a medium cobble content. Gravel includes brick fragments).	PSD

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ALLIED EXPLORATION & GEOTECHNICS LIMITED
Registered Office, Unit 2C, Seaview Business Park, Riverside Way, Dundonald, Belfast, BT16 1FT. Tel: 028 9048 1539 Fax: 028 9048 1540

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH008	5.50	J16	Brown sandy slightly gravelly CLAY.	BRE
BH009	0.80	J3	MADE GROUND (Brown slightly clayey gravelly sand).	BRE
BH009	1.00	B4	MADE GROUND (Brown clayey very sandy gravel including brick fragments).	MC PSD
BH009	3.70	B14	Red brown clayey gravelly SAND.	MC PSD
BH011	0.80	B3	MADE GROUND (Brown sandy gravel including concrete and metal fragments).	CP2
BH011	1.20	J5	MADE GROUND (Brown slightly clayey gravelly sand. Gravel includes brick fragments)	BRE
BH011	2.70	B5	MADE GROUND (Brown clayey very sandy gravel with a medium cobble content).	MC PSD
BH011	4.70	B17	Red brown very clayey slightly gravelly SAND.	MC PSD SED
BH011	5.50	J19	Red brown slightly gravelly SAND.	BRE
BH012A	1.70	B8	MADE GROUND (Brown slightly clayey gravelly sand. Gravel includes brick fragments).	BRE
BH012A	3.50	J21	MADE GROUND (Brown slightly sandy slightly gravelly clay of low to intermediate plasticity. Gravel includes brick fragments).	MC PI
BH012A	6.50	B22	MADE GROUND (Brown very clayey very sandy gravel including tile and brick fragments). (Clay of low plasticity).	MC PI PSD SED
BH012A	8.50	U25	MADE GROUND (Brown sand becoming at 5.80m brown silty sand).	OED LS for CUT
BH012A	9.80	B28	MADE GROUND (Brown very clayey slightly gravelly sand)	MC PSD SED
BH012A	10.00	B30	MADE GROUND (Brown slightly clayey slightly gravelly sand. Gravel includes coal fragments)	BRE
BH013	0.80	B3	MADE GROUND (Brown slightly clayey sandy gravel with a high cobble content. Gravel includes brick fragments)	US for CP2
BH013	1.50	B5	MADE GROUND (Brown sandy gravel including brick fragments).	BRE
BH013	1.70	B6	MADE GROUND (Brown clayey very sandy gravel with a high cobble content. Gravel includes slag, wood, glass, ceramic, brick fragments).	MC PSD
BH013	5.20	B15	Brown clayey very gravelly SAND.	MC PSD
BH013	7.00	J20	Brown SAND	BRE
BH014	0.70	B6	MADE GROUND (Brown gravelly sand).	BRE

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Tel: 0131 537 4700 Fax: 0131 537 4710
Regional Office: Unit 20, Business Design West Centre, Bankhead Avenue, Edinburgh EH11 4EL. Tel: 0131 [illegible] Fax: 0131 [illegible]

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH014	1.20	B6	MADE GROUND (Brown clayey sandy gravel)	MC PSD
BH014	3.00	B14	MADE GROUND (Black brown clayey very sandy gravel including ash and clinker).	MC PI(NP) PSD
BH014	6.00	B24	Brown clayey slightly gravelly SAND.	MC PSD SED
DS001	0.40	J4	MADE GROUND (Brown clayey sandy gravel including brick fragments)	MC PI(IS for LL)
DS001	0.70	B6	MADE GROUND (Brown clayey very sandy gravel with a high cobble content. Gravel includes brick fragments).	PSD SED BRE
DS002	0.40	B2	MADE GROUND (Brown slightly clayey gravelly sand with occasional pockets of clay of low plasticity).	MC PI
DS002	0.80	B4	MADE GROUND (Brown clayey very sandy gravel including brick and tile fragments)	PSD SED
DS002	1.20	U5	MADE GROUND (Brown slightly clayey sandy gravel including brick fragments).	BRE
TP001	0.80	B4	MADE GROUND (Brown clayey very gravelly sand. Gravel includes brick fragments)	MC PSD SED
TP001	0.60	J5	Brown gravelly SAND	BRE
TP001	1.50	B7	Brown clayey very gravelly SAND	PSD CP?
TP002	1.00	B4	MADE GROUND (Red brown clayey very gravelly sand).	MC PSD
TP002	1.50	J8	MADE GROUND (Brown red gravelly sand)	BRE
TP002	2.50	B10	MADE GROUND (Brown clayey very gravelly sand. Gravel includes slag, glass and brick fragments)	MC PSD
TP003	1.00	B7	Red brown clayey gravelly SAND	MC PSD
TP003	3.00	B12	Red brown clayey gravelly SAND	MC PSD SED

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LABORATORY TESTING ENCLOSURE 2

Moisture Content/Plasticity Index and Moisture Content

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Regional Office: Unit 20, Business Development Centre, Bolton Road, Radcliffe, M26 2SP. Tel: 0161 723 2323 Fax: 0161 723 2999

MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH001	5.00	B24	5.00	3.9	22/11/2019	
BH002	1.20	B5	1.20	18.4	22/11/2019	
BH002	3.70	B13	3.70	29.2	26/11/2019	
BH003	1.70	B6	1.70	17.5	22/11/2019	
BH003	4.70	B16	4.70	18.4	26/11/2019	
BH004	7.50	B22	7.50	18.5	28/11/2019	
BH005	0.80	B4	0.80	16.2	02/12/2019	
BH005	1.50	B7	1.50	13.4	29/11/2019	
BH005	2.40	B10	2.40	7.5	29/11/2019	
BH006A	0.80	B4	0.80	15.5	02/12/2019	
BH007	0.60	B4	0.60	14.9	27/11/2019	
BH007	6.50	B20	6.50	17.6	27/11/2019	
BH008	0.60	B3	0.60	16.3	27/11/2019	
BH008	2.50	B8	2.50	19.1	27/11/2019	
BH009	1.00	B4	1.00	12.0	27/11/2019	
BH009	3.70	B14	3.70	15.0	27/11/2019	
BH011	2.70	B9	2.70	18.0	25/11/2019	
BH011	4.70	B17	4.70	14.5	28/11/2019	
BH012A	9.00	B28	9.00	16.3	29/11/2019	
BH013	1.70	B6	1.70	23.3	25/11/2019	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

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Date of issue :- 23/01/2020

Cert Table No :- MC/NW1588/1

AEC Contract No :- NW1588

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Head Office: Unit 18 Blyth Ind Estate, Delta Rd, Cheadle-on-Tyne, NE15 6PS Tel: 0191 267 4700 Fax: 0191 267 4713
Regional Office: Unit 2C, Business Development Centre, Bishop Wilkin, Bradford, BD1 5BY Tel: 01274 735 202 Fax: 01274 735 999

MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH013	6.00	B16	6.00	14.8	25/11/2019	
BH014	1.20	B8	1.20	8.3	25/11/2019	
BH014	6.00	B24	6.00	18.6	25/11/2019	
TP001	0.80	B4	0.80	16.4	26/11/2019	
TP002	1.00	B4	1.00	10.2	25/11/2019	
TP002	2.50	B10	2.50	16.2	22/11/2019	
TP003	1.00	B7	1.00	12.7	25/11/2019	
TP003	3.00	B12	3.00	17.1	25/11/2019	

For description of sample please refer to the Laboratory Sample Description Sheet

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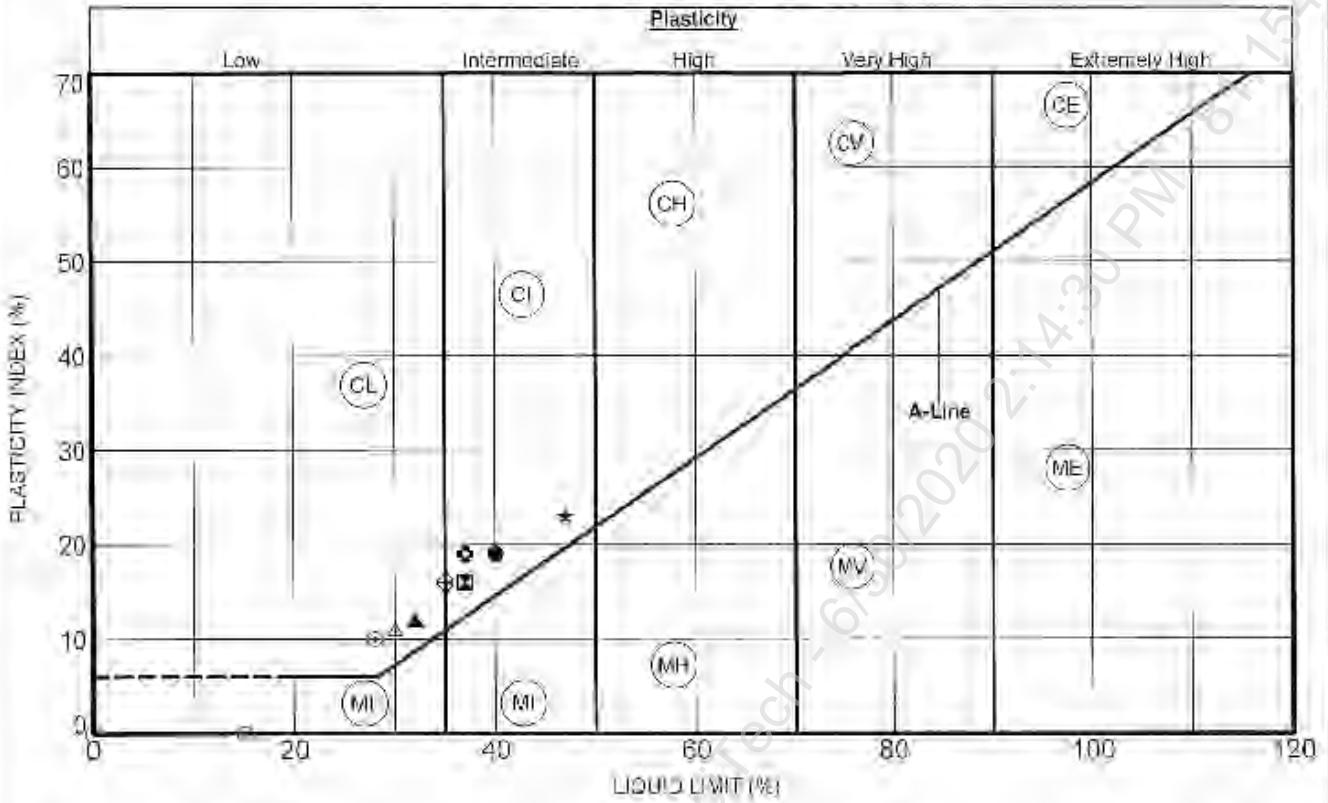
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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Sefton Lee Industrial Estate, Pool Lane, Antrobus, Northwich, Cheshire CW9 6JA. Tel: 01606 891 700 Fax: 01606 891 701
Regional Office: Unit 7, Beaconsfield Industrial Estate, Pool Lane, Wheelock, Sandbach, Cheshire CW11 4TX. Tel: 01270 767 766 Fax: 01270 767 880

ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested	
● BH001	0.50	B8	0.50	40	21	19	0.16	Natural	73.0	24.1	22/11/2019	
■ BH001	2.00	J13	2.00	37	21	16	0.46	Air Dried	54.0	28.3	27/11/2019	#
▲ BH001	3.00	B17	3.00	32	20	12	0.44	Air Dried	75.0	25.3	22/11/2019	#
★ BH001	4.30	J22	4.30	47	24	23	0.17	Natural		27.9	22/11/2019	
⊕ BH004	1.40	B5	1.40	28	18	10	0.33	Natural	73.0	21.3	27/11/2019	
✿ BH004	5.00	B16	5.00	37	18	19	0.35	Air Dried	28.0	24.6	27/11/2019	#
○ BH006B	0.40	B3	0.40	NP	NP	NP		Air Dried	27.0	12.6	02/12/2019	
⊗ BH007	2.50	B11	2.50	30	19	11	0.23	Natural	45.0	21.5	26/11/2019	#
⊛ BH008	4.50	J14	4.50		15			Natural		17.6	26/11/2019	
⊕ BH012A	6.50	J21	6.50	35	19	16	0.11	Natural		20.8	22/11/2019	#

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point LL
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve

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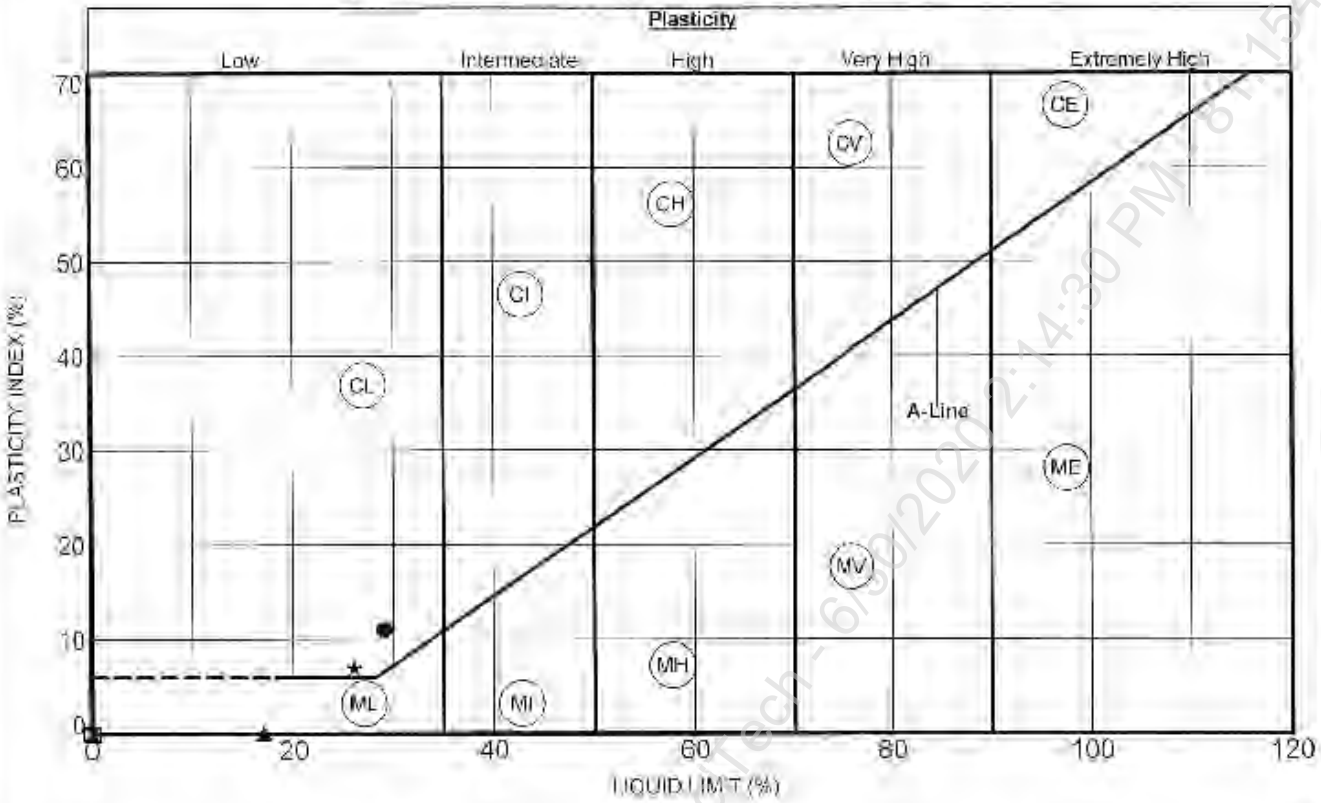
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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 1 Phoenix Court, Hawks Road, Alloa, Clackmannanshire, FK10 2NG - Tel: 01259 [illegible]
Regional Office: 20 Business Development Centre, Lanark Business Park, Lanark, ML11 8SR - Tel: 01555 [illegible]

ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3 & 4.1 to 4.4 & 5 : 1990



Exploratory Hole No	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	IL	Preparation Method	<0.425mm (%)	mc (%)	Date Tested	
● BH012A	6.50	B22	6.50	29	18	11	0.35	Air Dried	49.0	21.8	25/11/2019	#
⊠ BH014	3.00	B14	3.00	NP	NP	NP		Natural	28.0	25.7	22/11/2019	
▲ DS001	0.40	J4	0.40		17			Air Dried	58.0	16.9	09/12/2019	
★ DS002	0.40	B2	0.40	26	19	7	-0.77	Natural		13.6	09/12/2019	

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

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LABORATORY TESTING ENCLOSURE 3

Particle Size Distribution Sieving and Sedimentation

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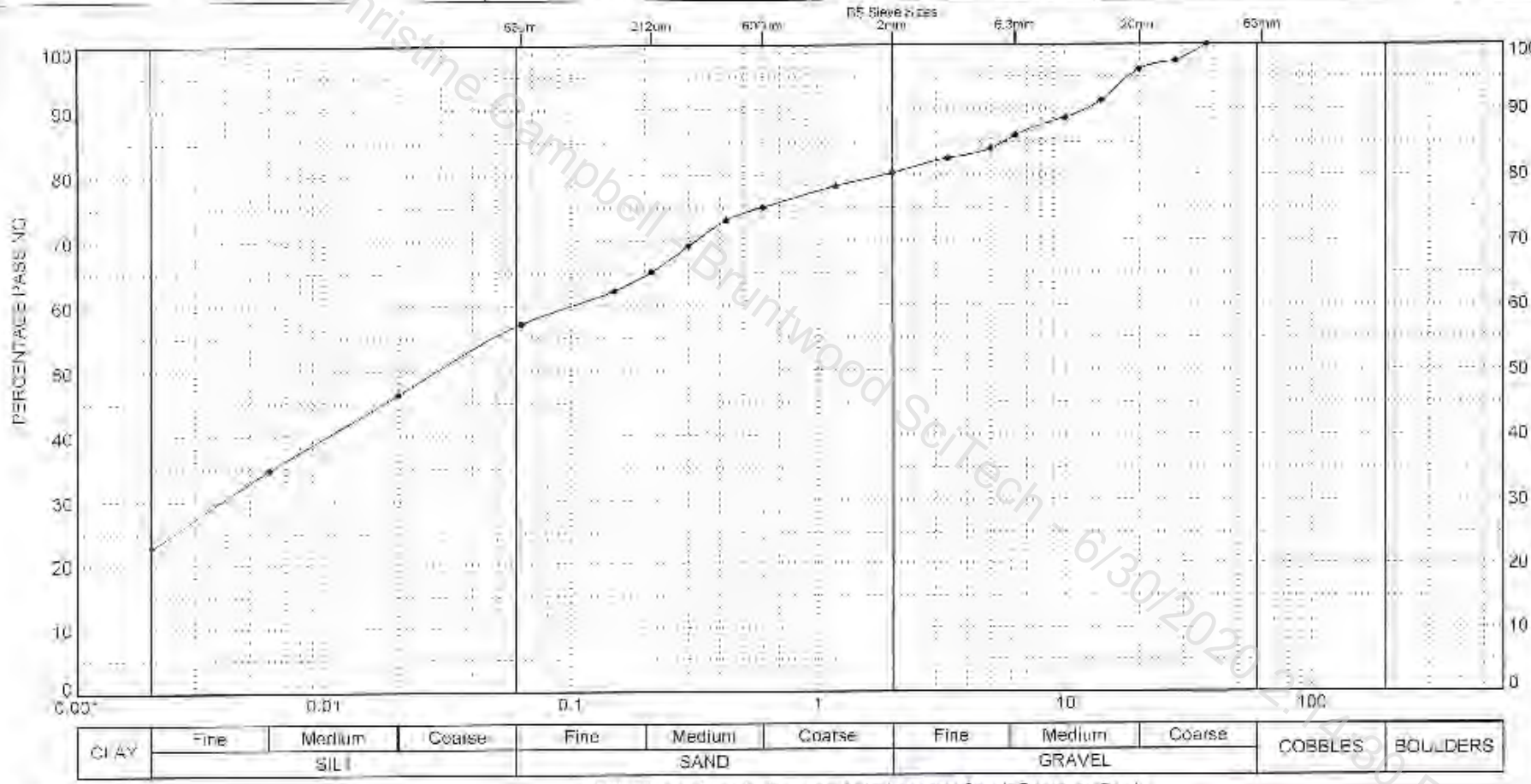
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Swan Hill Industrial Estate, Pelham Hall, Chelmsford, Essex, CM2 6XG Tel: 01621 787 400 Fax: 01621 787 410
Regional Office: Unit 23, Business Development Centre, Eastern Way, Blackburn, BB1 5BL Tel: 01772 735 300 Fax: 01772 735 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH001	Depth (m) :- 0.50	Sample Type & No :- B6	Specific Depth (m) :- 0.50	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	97.4
20	96.1
14	91.3
10	88.7
6.3	86.0
5	84.0
3.35	82.5
2	80.3
1.18	78.3
0.6	75.1
0.425	73.1
0.3	69.2
0.212	65.2
0.15	62.3
0.063	57.2
0.02	46.4
0.006	34.8
0.002	22.8

For description of sample please refer to the Laboratory Sample Description Sheet

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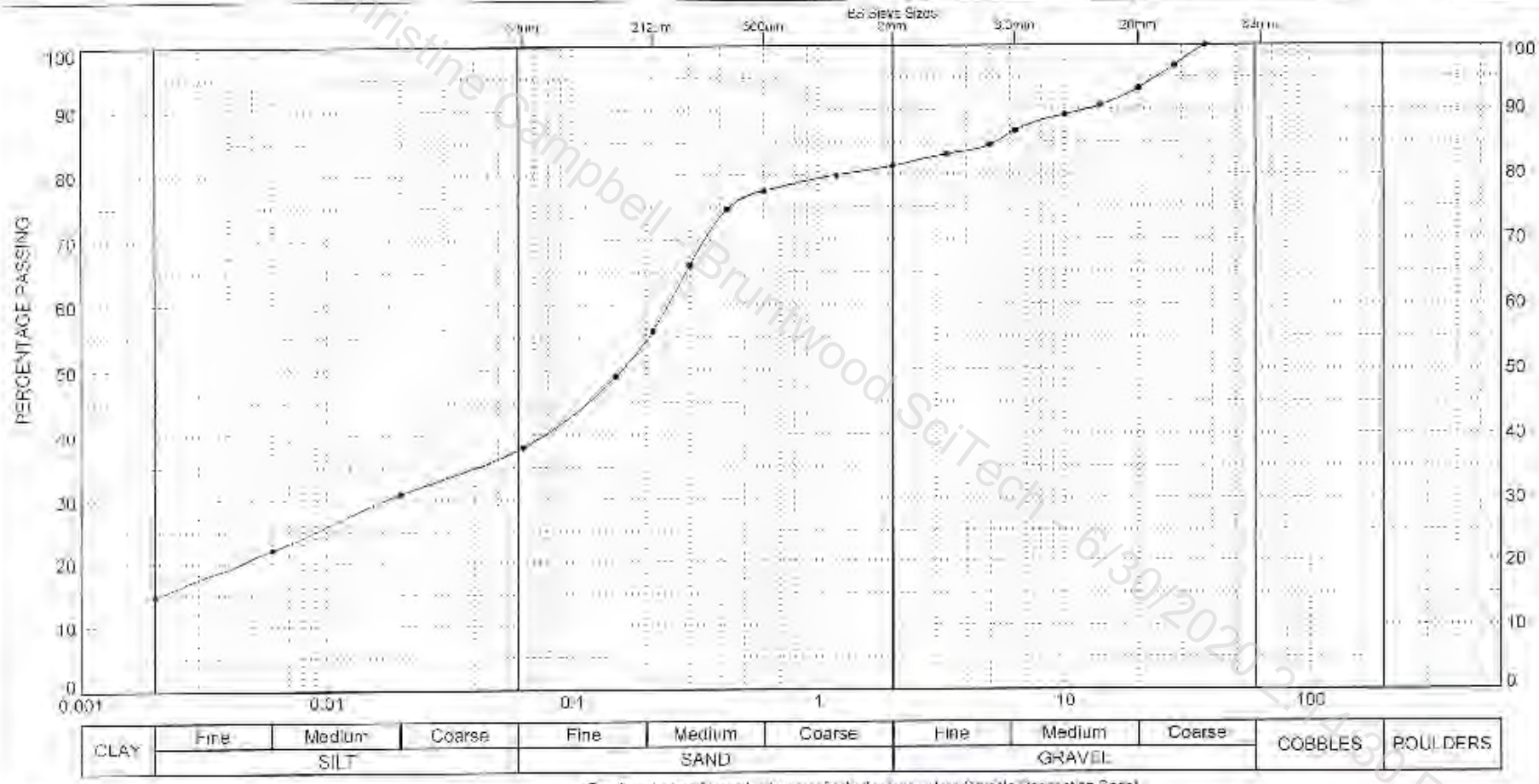
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Sadler Forlong Industrial Estate, Rotary Way, Consett, Co. Durham, DH8 6BP. Tel: 01207 505031 Fax: 01207 505 010
Regional Office: Unit 30, Business Quarter, Ellice Way, Wrexham Industrial Estate, Wrexham, LL13 9PW. Tel: 01978 661006 Fax: 01978 661 007

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH001	3.00	B17	3.00	22/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	96.8
20	93.3
14	90.6
10	89.2
6.3	86.7
5	84.6
3.35	83.1
2	81.3
1.18	79.9
0.6	77.5
0.425	74.7
0.3	66.1
0.212	56.0
0.15	49.0
0.063	38.1
0.02	30.9
0.006	22.0
0.002	14.8

For description of sample please refer to the Laboratory Sample Description Sheet

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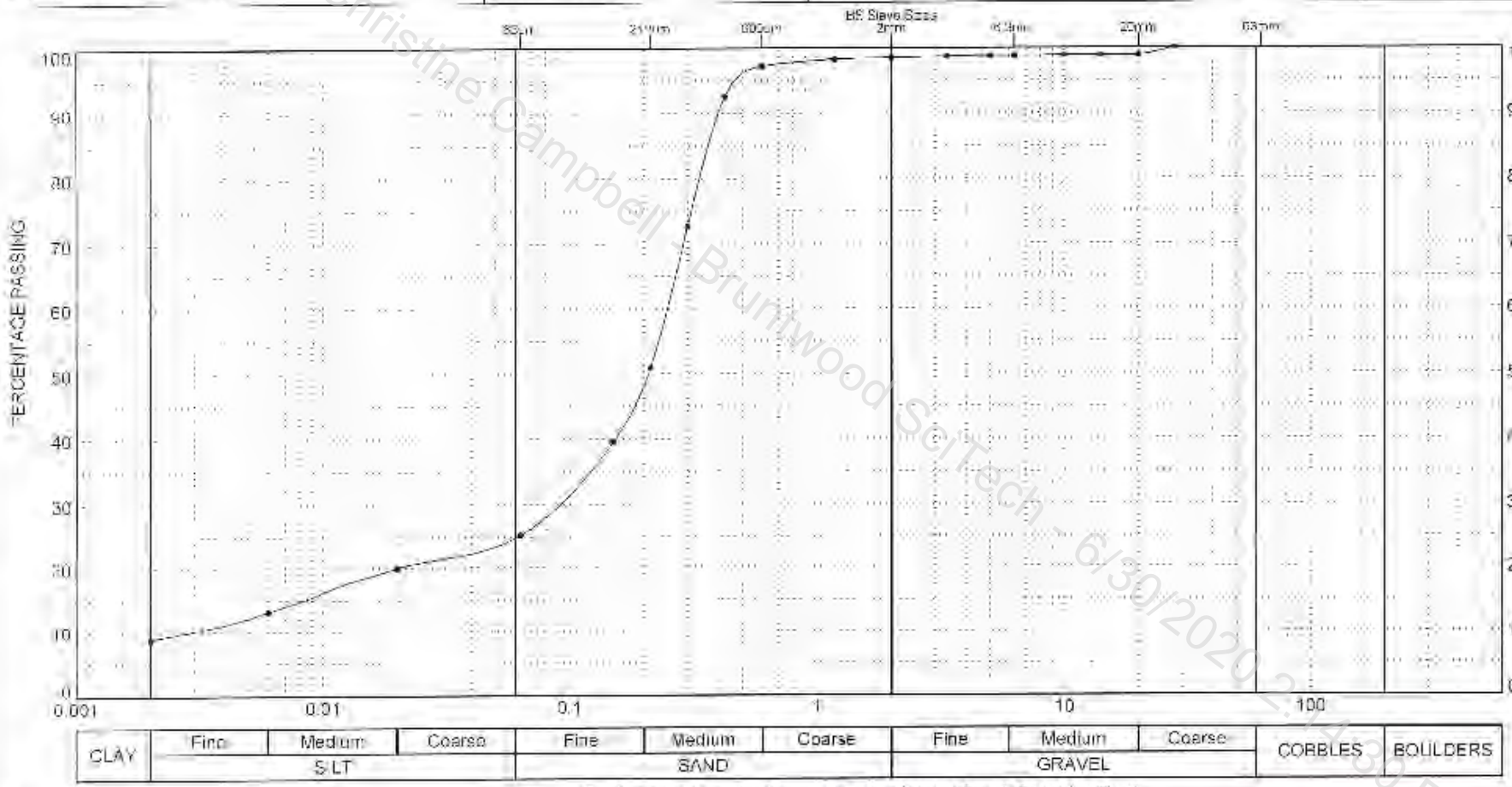
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Head Office : 2 Kidsdale Industrial Estate, Pelham Rd, Gateshead, Co. Durham, DH9 7QG - Tel: 0191 487 4700 Fax: 0191 487 4713
Regional Office : 12 Thornbank Development Centre, Lamor Wood, Barnsley, S81 0BL - Tel: 01772 793300 Fax: 01772 795 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH001	Depth (m) :- 5.00	Sample Type & No :- B24	Specific Depth (m) :- 5.00	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	98.8
14	98.8
10	98.8
6.3	98.7
5	98.7
3.35	98.6
2	98.4
1.18	98.2
0.6	97.2
0.425	92.6
0.3	72.7
0.212	50.9
0.15	39.6
0.063	25.3
0.02	19.9
0.006	13.1
0.002	8.8

For description of sample please refer to the Laboratory Sample Description Sheet

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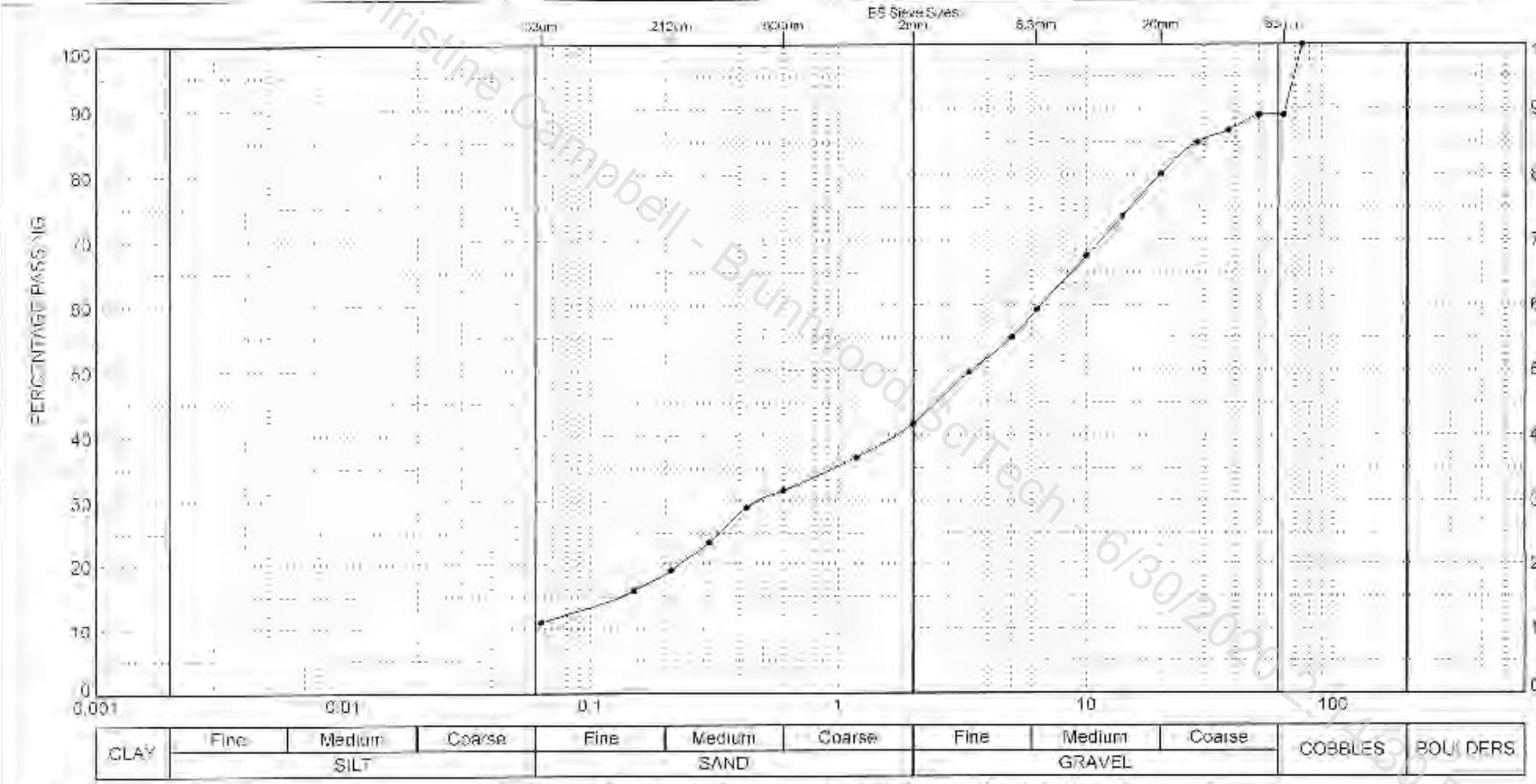
Head Office: Unit 20, Station Road Industrial Estate, Fullerton, Fail Dr Lapwing Street, Co Durham, DH2 2WG Tel: 0191 387 4700 Fax: 0 91 387 4710
Regional Office: Unit 27, Thistle Park Ltd, Bankhead Avenue, Sighthill Industrial Estate, Edinburgh, EH11 4BL Tel: 01772 735 300 Fax: 01772 23 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH002	Depth (m) :- 1.20	Sample Type & No :- B5	Specific Depth (m) :- 1.20	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	89.1
50	89.1
37.5	86.7
28	84.9
20	80.1
14	73.7
10	67.5
6.3	59.3
5	55.0
3.35	49.7
2	41.8
1.18	36.7
0.6	31.6
0.425	29.0
0.3	23.8
0.212	19.1
0.15	16.9
0.063	11.1

For description of sample please refer to the Laboratory Sample Description Sheet

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University of Manchester	D Manchester Preliminary Ground Investigation	NW1588

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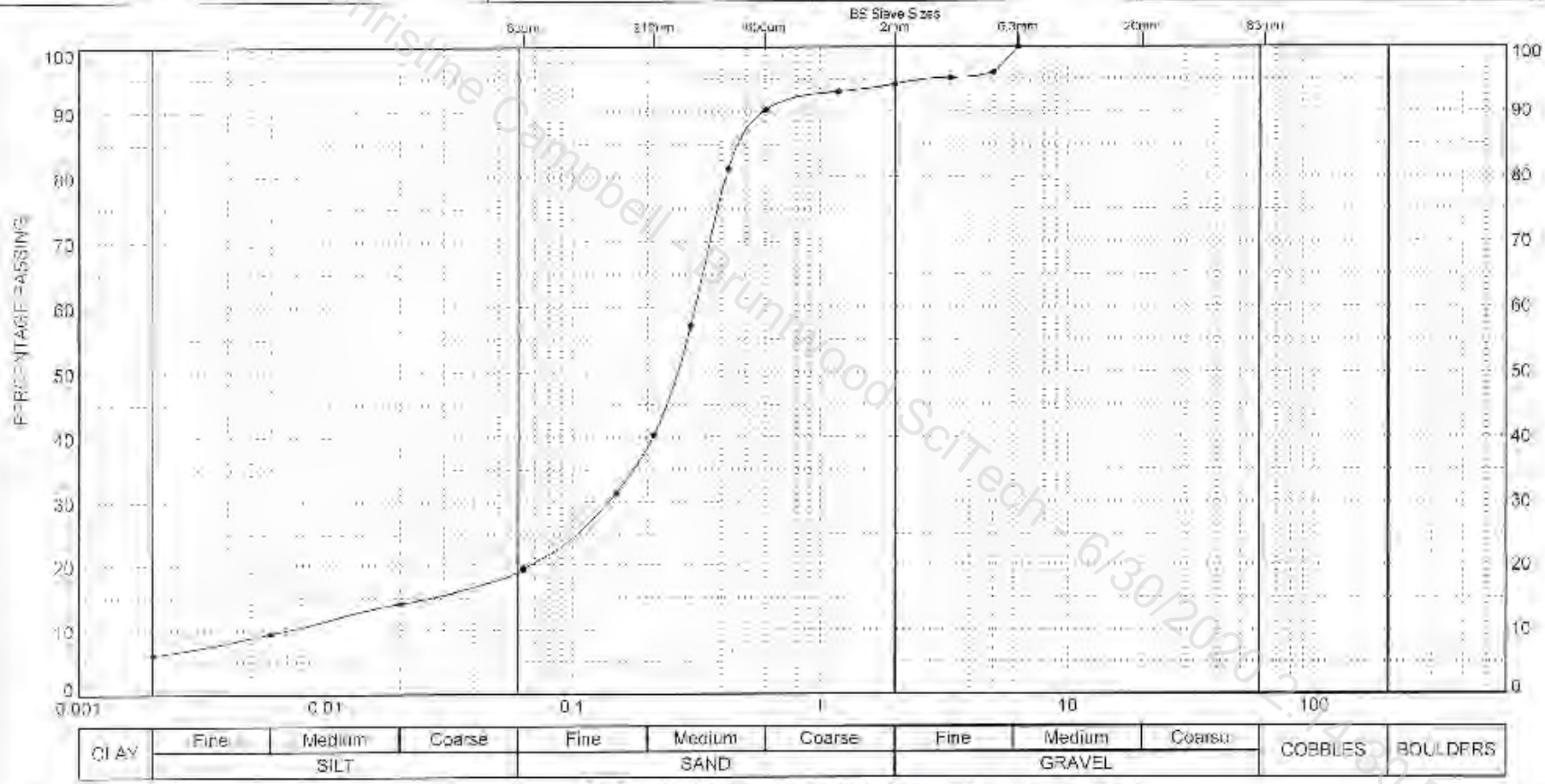
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2A, Alpha 66 Industrial Estate, Pollitt Rd, Chester le Street, Co. Durham, DH2 1RG - Tel: 0191 387 4700 Fax: 0191 387 4712
Regional Office: Unit 20, Business Development Centre, Carron Wharf, Bainsford, FK2 7RS - Tel: 01324 630 300 Fax: 01324 630 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH002	Depth (m) :- 3.70	Sample Type & No :- B13	Specific Depth (m) :- 3.70	Date Tested :- 06/12/2019



Sieve Size (mm)	Passing (%)
6.3	100.0
5	96.1
3.35	95.2
2	94.2
1.18	93.1
0.6	90.3
0.425	81.3
0.3	57.2
0.212	40.4
0.15	31.5
0.063	19.4
0.02	14.1
0.006	9.4
0.002	6.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1586/BH002/B13/3.70	msnp		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1586

UKAS TEST No. 1367

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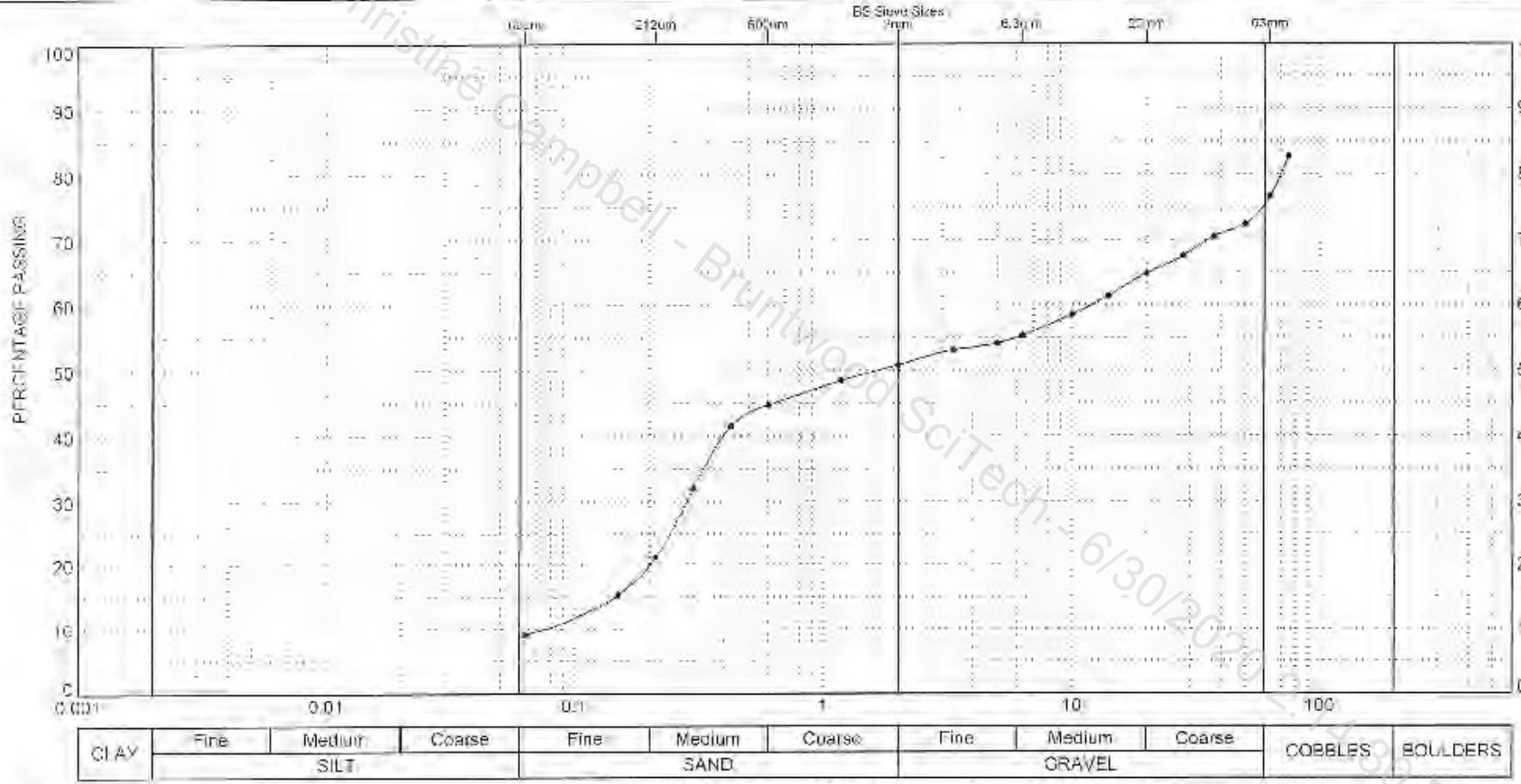
Head Office: Unit 25 Fields Gill Industrial Estate, Penketh, Warrington, Cheshire WA5 2UG. Tel: 01925 727 770 Fax: 01925 727 771
Regional Office: Unit 20, Business Development Centre, Fairclough Street, Bolton BL1 2BJ. Tel: 01204 795 010 Fax: 01204 795 011

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH003	1.70	B6	1.70	22/11/2019



Sieve Size (mm)	Passing (%)
75	82.7
63	76.6
50	72.1
37.5	70.8
28	67.3
20	64.8
14	61.4
10	58.5
6.3	55.3
5	54.1
3.35	53.1
2	50.8
1.18	48.4
0.6	44.7
0.425	41.5
0.3	32.0
0.212	21.2
0.15	15.3
0.063	9.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :	Page 1 of 1
22/01/2020	PSD/NW1588/BH003/B6/1.70	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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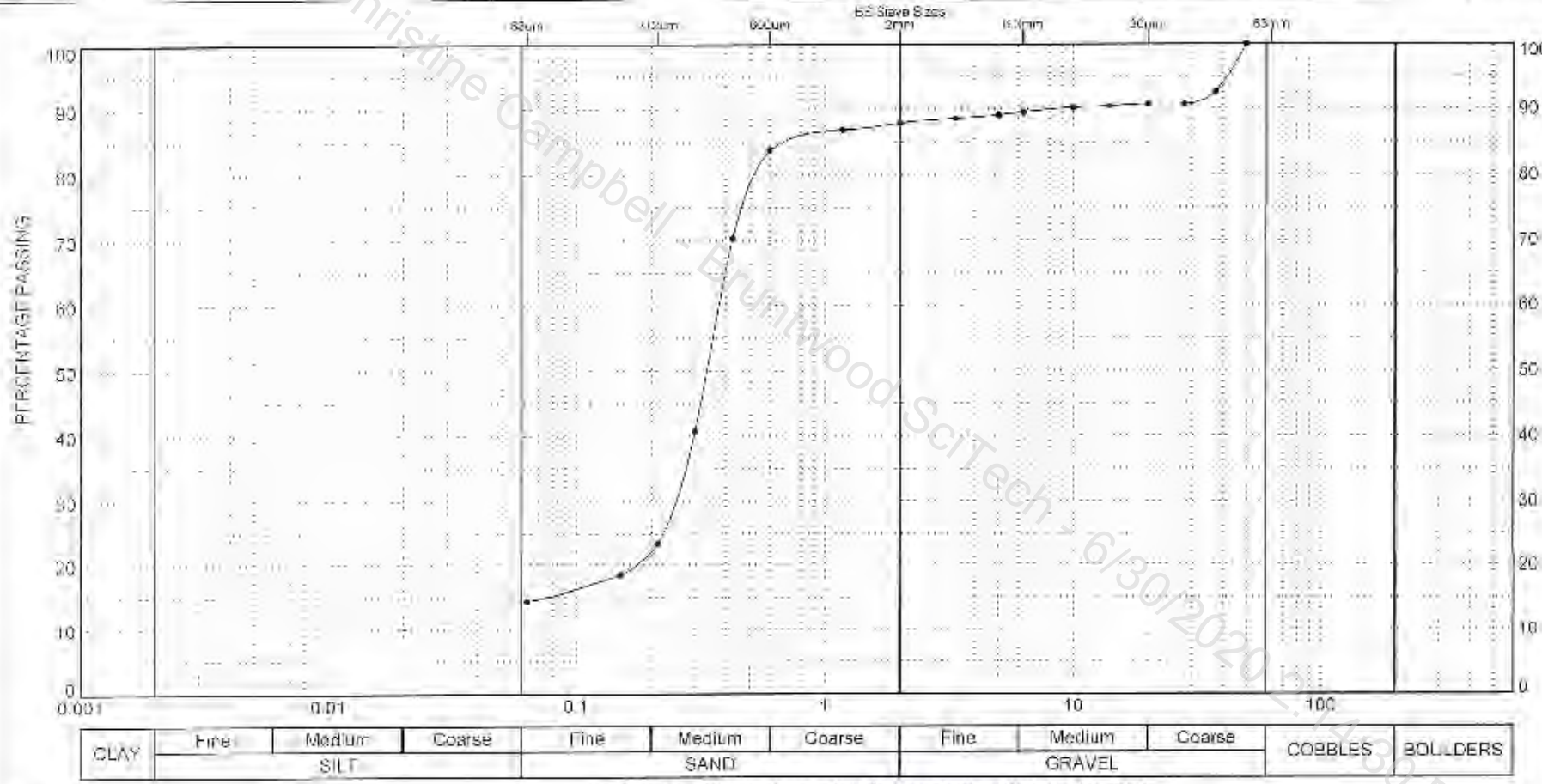
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Sketh Grt Industrial Estate, Auckland Road, Dunston, Gateshead, Co. Durham, DH9 4TQ. Tel: 0191 387 4700 Fax: 0191 387 4773
Regional Office: Unit 23, Parkside Development Centre, Lumley Road, Chester-le-Street, DH3 2SL. Tel: 01772 735 300 Fax: 01772 735 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH003	Depth (m) :- 4.70	Sample Type & No :- B16	Specific Depth (m) :- 4.70	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	92.7
28	90.7
20	90.7
14	90.4
10	90.2
6.3	89.5
5	89.1
3.35	88.5
2	87.9
1.18	86.9
0.6	83.8
0.425	79.3
0.3	40.8
0.212	23.5
0.15	18.5
0.063	14.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
27/07/2020	PSD/NW1588/BH003/B16/4.70			

Client :-	Contract Title :-	AEG Contract No :-
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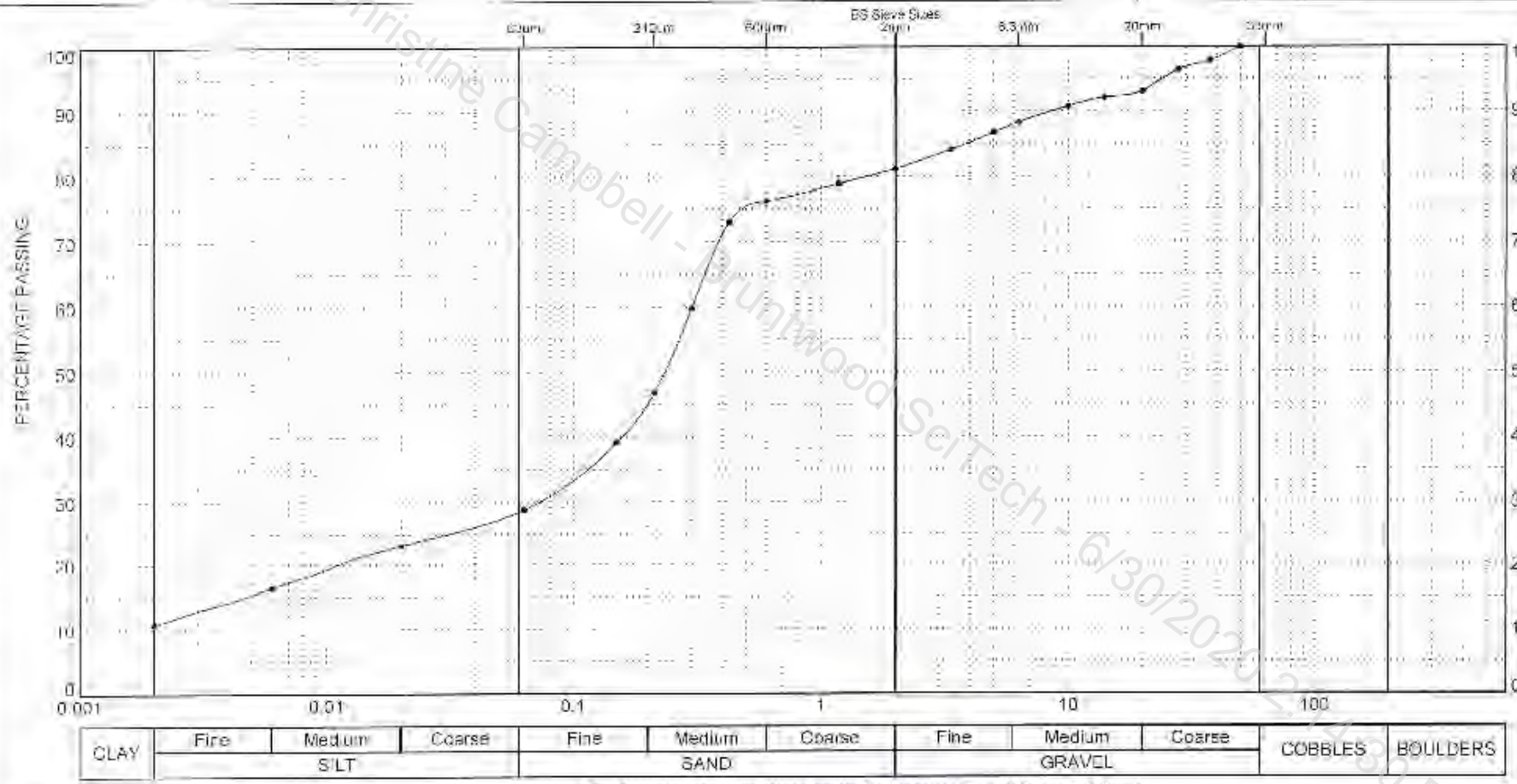
Head Office: Unit 2, Site B, Gil Industrial Estate, Fallin, Nr. Stirling, FK7 7XG. Tel: 01786 817 470 Fax: 01786 817 410
Regional Office: Unit 29, Business Development Centre, Turnhouse Road, Edinburgh, EH12 0NJ. Tel: 0131 539 7555 Fax: 0131 539 7556

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH004	1.40	B5	1.40	27/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	97.7
28	96.4
20	93.1
14	92.1
10	90.7
6.3	88.3
5	86.7
3.35	84.1
2	81.2
1.18	78.9
0.6	76.2
0.425	73.0
0.3	59.8
0.212	46.8
0.15	39.2
0.063	28.8
0.02	26.7
0.006	16.4
0.002	10.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	
22/07/2020	PSD/NW1588/BH004/B5/1.40	MSone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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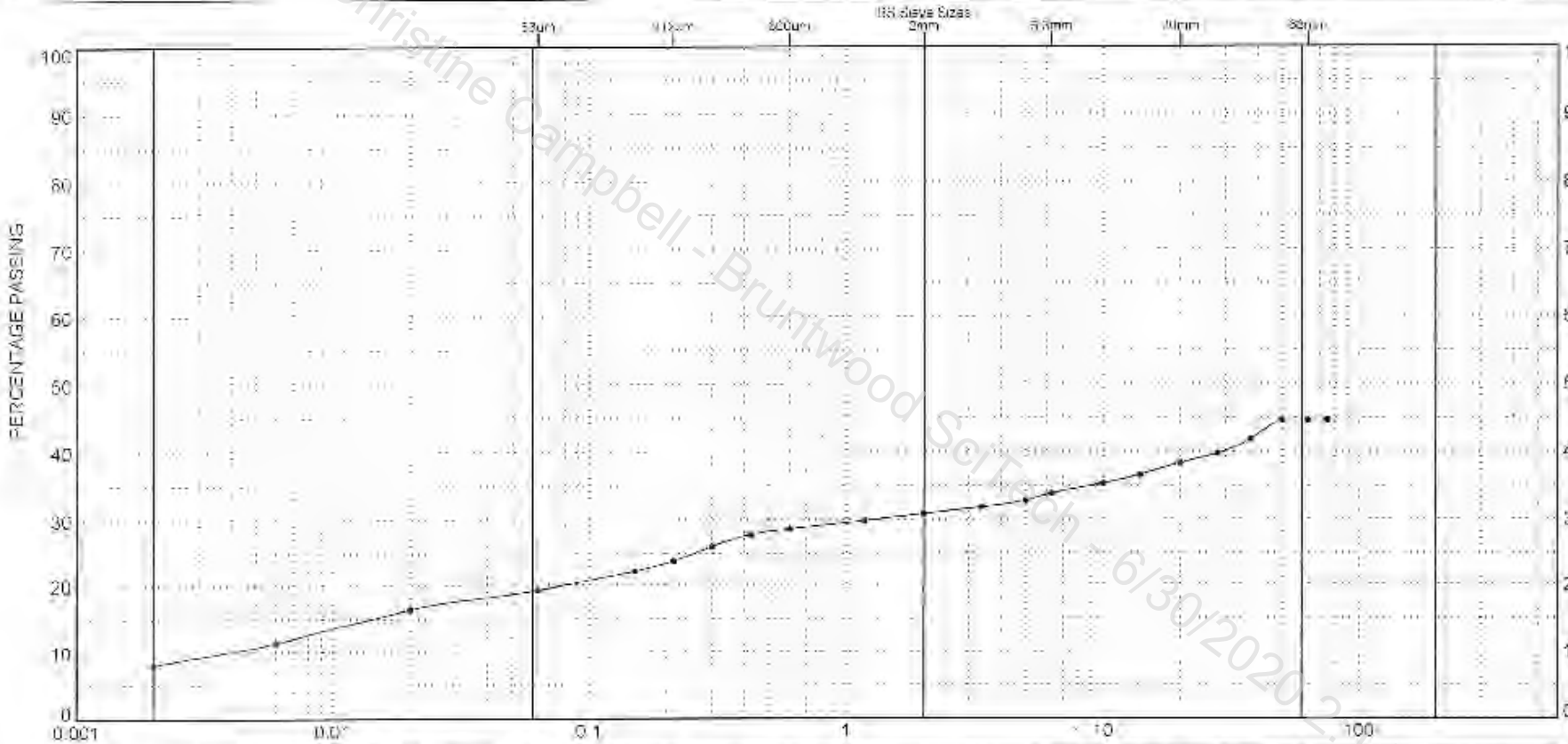
Head Office: Unit 23 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co Durham, DH2 2RG Tel: 0191 387 1733 Fax: 0191 387 1710
Regional Office: Unit 21 Preston Farm Business Centre, Bamber Bridge, Preston, PR5 6QL Tel: 01772 735 560 Fax: 01772 735 599

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH004	Depth (m) :- 5.00	Sample Type & No :- B16	Specific Depth (m) 5.00	Date Tested :- 27/11/2019



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Sieve Size (mm)	Passing (%)
75	44.6
63	44.6
50	44.6
37.5	41.8
28	39.7
20	38.3
14	36.6
10	35.3
6.3	33.8
5	32.8
3.35	31.8
2	30.8
1.18	29.8
0.6	28.6
0.425	27.6
0.3	26.0
0.212	23.9
0.15	22.2
0.063	19.3
0.02	16.3
0.006	11.4
0.002	8.4

For description of sample please refer to the Laboratory Sample Description Sheet.

Date of issue	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH004/B16/5.00			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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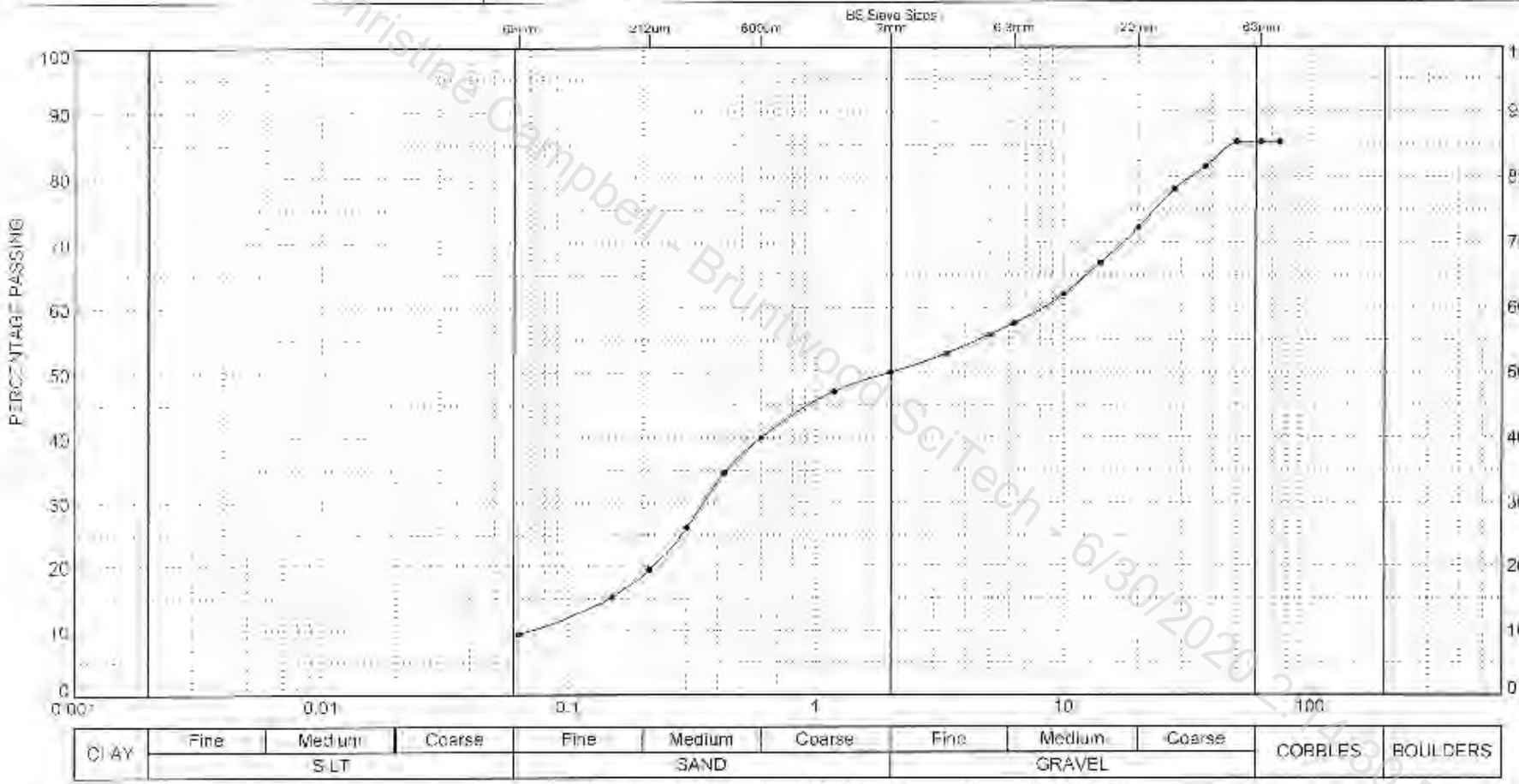
Head Office: Unit 05 Birch Grove Industrial Estate, Heyrod Rd, Chesterfield Street, Ashton-U-Lyne, OL6 7TG - Tel: 0161 367 4700 Fax: 0161 367 4710
Registered Office: Unit 20, Business Development Centre, Lyndon West, Shirebrook, NG20 8RY - Tel: 01623 330 393 Fax: 01623 745 894

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH004	Depth (m) :- 7.50	Sample Type & No :- B22	Specific Depth (m) :- 7.50	Date Tested :- 28/11/2019



Sieve Size (mm)	Passing (%)
75	85.4
63	85.4
50	85.4
37.5	81.7
28	78.2
20	72.3
14	66.9
10	62.1
6.3	57.6
5	55.8
3.35	52.9
2	50.0
1.18	47.1
0.6	40.0
0.425	34.6
0.3	26.2
0.212	19.4
0.15	15.2
0.063	9.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH004/B22/7.50	MSone		

Client :-	Contract Title :-	AEG Contract No :-
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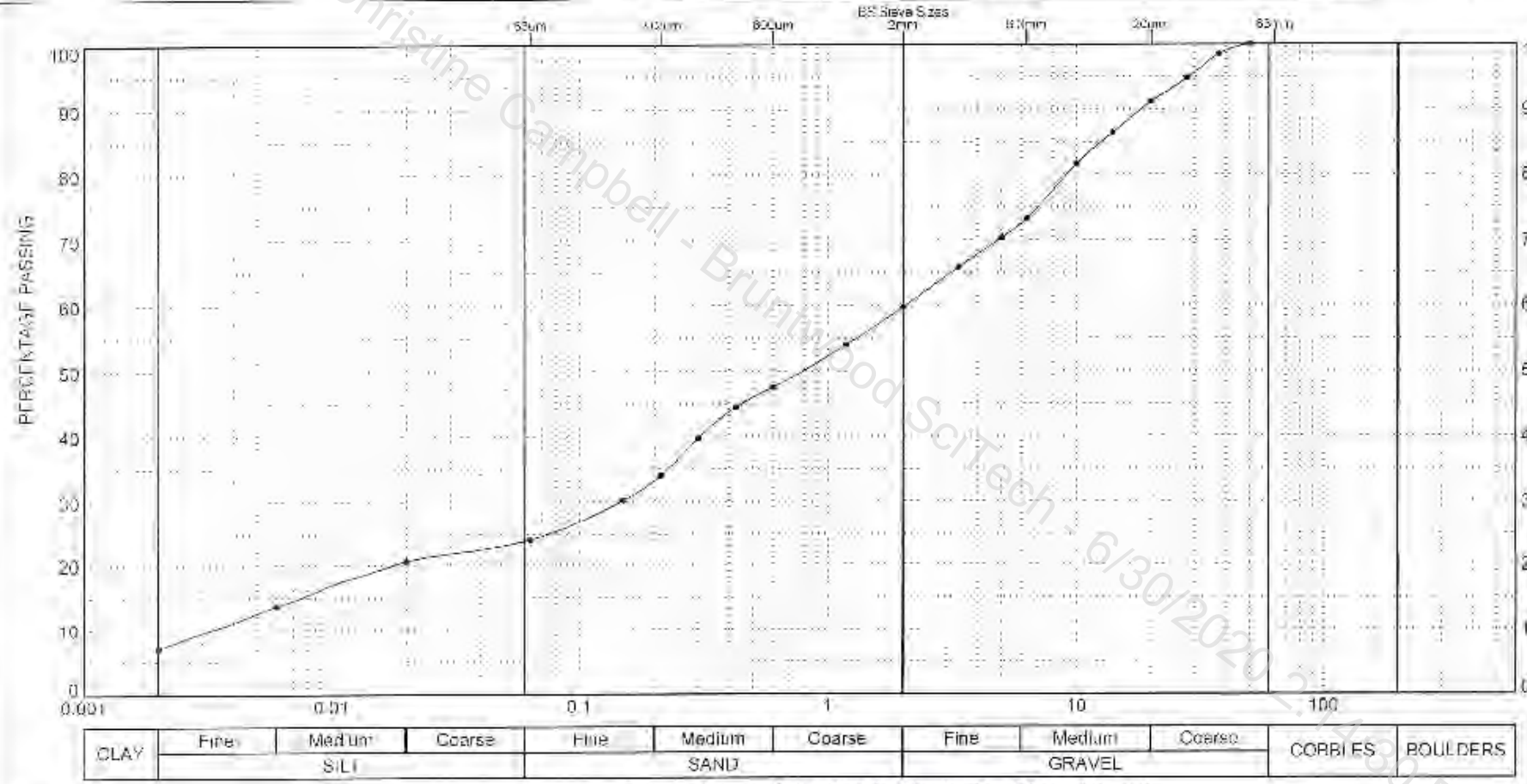
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5, Block G1, Industrial Estate, Pallion, Sunderland, Tyne & Wear, SR4 6SN. Tel: 0191 567 4709 Fax: 0191 567 4713
Regional Office: Unit 2D, Business Development Centre, Forrest Road, Boscastle, PL35 0BL. Tel: 01840 250 111 Fax: 01840 250 888

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH005	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) :- 0.80	Date Tested :- 02/12/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.4
28	94.8
20	91.2
14	86.4
10	81.6
6.3	73.2
5	70.3
3.35	65.8
2	59.7
1.18	54.0
0.6	47.5
0.425	44.5
0.3	39.7
0.212	34.0
0.15	30.2
0.063	24.2
0.02	20.5
0.006	13.6
0.002	7.2

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH005/B4/0.80	MSerd		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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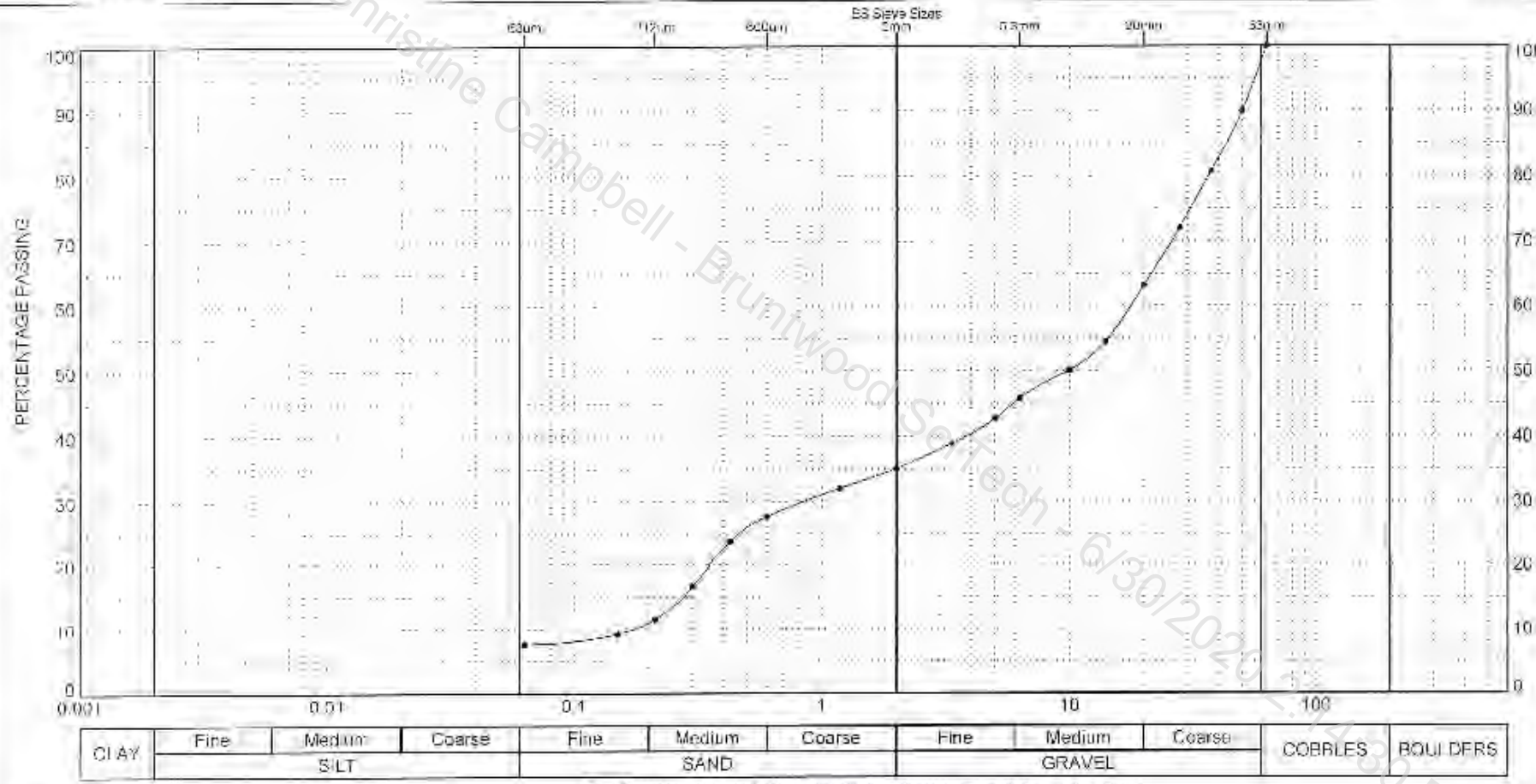
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2a Scotswood Industrial Estate, Tanfield Lea, Stanley, Co. Durham, DH9 9RG. Tel: +44 (0)191 497 4733 Fax: +44 (0)191 497 4710
Regional Office: Unit 2A Business Development Centre, Lower Street, Preston, PR1 1HT. Tel: +44 (0)1772 735 900 Fax: +44 (0)1772 735 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990
(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH005	2.40	B10	2.40	29/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	89.9
37.5	80.8
28	72.1
20	63.2
14	54.5
10	50.1
6.3	45.9
5	42.7
3.35	38.9
2	35.1
1.18	32.0
0.6	27.7
0.425	23.9
0.3	18.5
0.212	11.5
0.15	9.2
0.063	7.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :	Name :-	
22/01/2020	PSD/NW1588/BH005/B10/2.40	MSerq		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University Of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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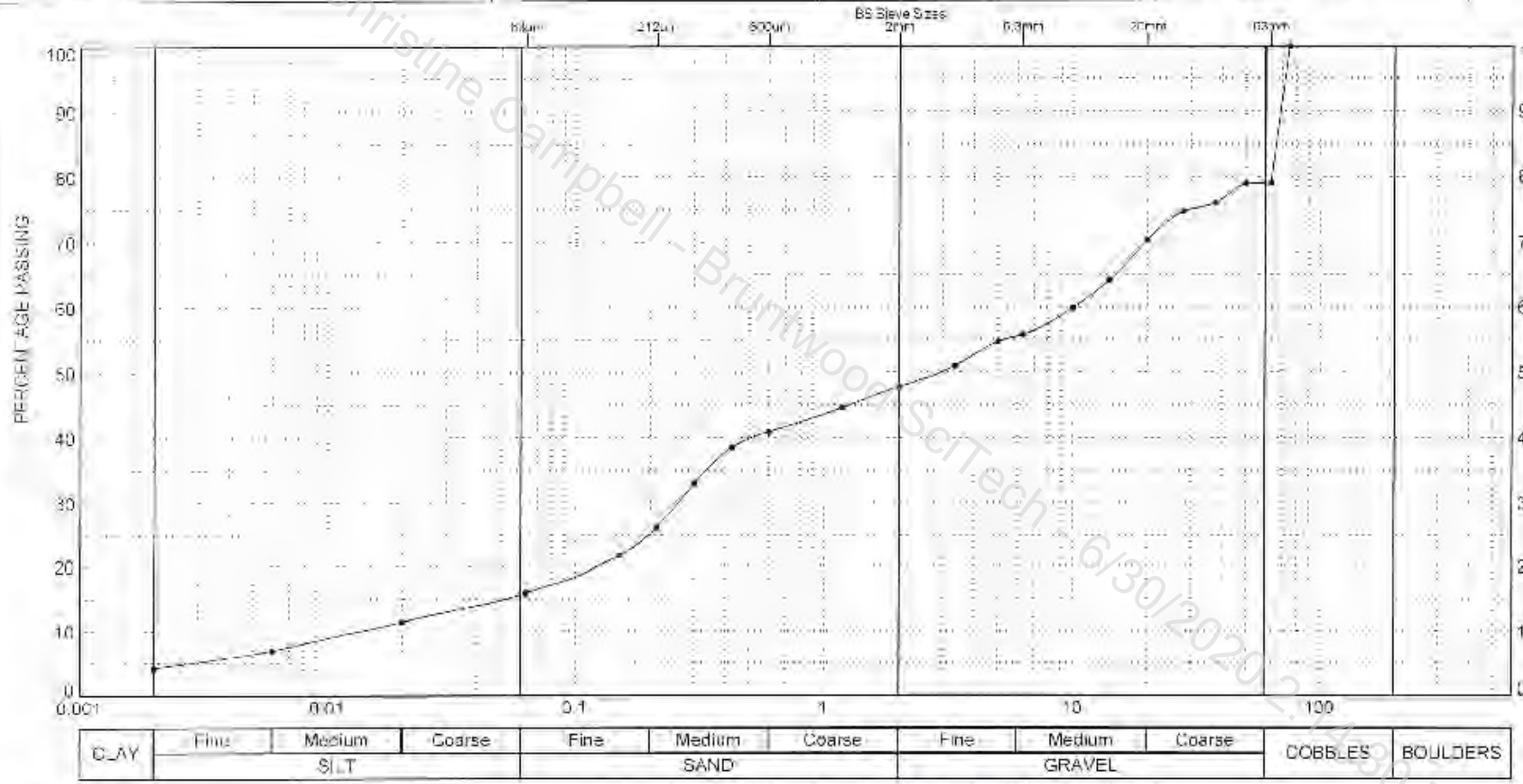
Head Office: Unit 25, Site A, Cliffe Industrial Estate, Potters Fell, Lancaster, Lancashire, LA2 0HS - Tel: 01524 38811 - Fax: 01524 38812
Regional Office: Unit 22, Express Development Centre, Severn Vale, Quedgeley, GL2 4RU - Tel: 01452 728 300 Fax: 01452 728 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No. - BH006A	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) - 0.80	Date Tested - 02/12/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	79.0
50	79.0
37.5	76.0
28	74.7
20	70.3
14	64.1
10	59.9
6.3	55.8
5	54.7
3.35	51.0
2	47.8
1.18	44.6
0.6	40.9
0.425	38.5
0.3	33.0
0.212	26.3
0.15	21.8
0.063	15.8
0.02	11.4
0.006	7.0
0.002	4.2

For description of sample classification see the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH006A/B4/0.80	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1357

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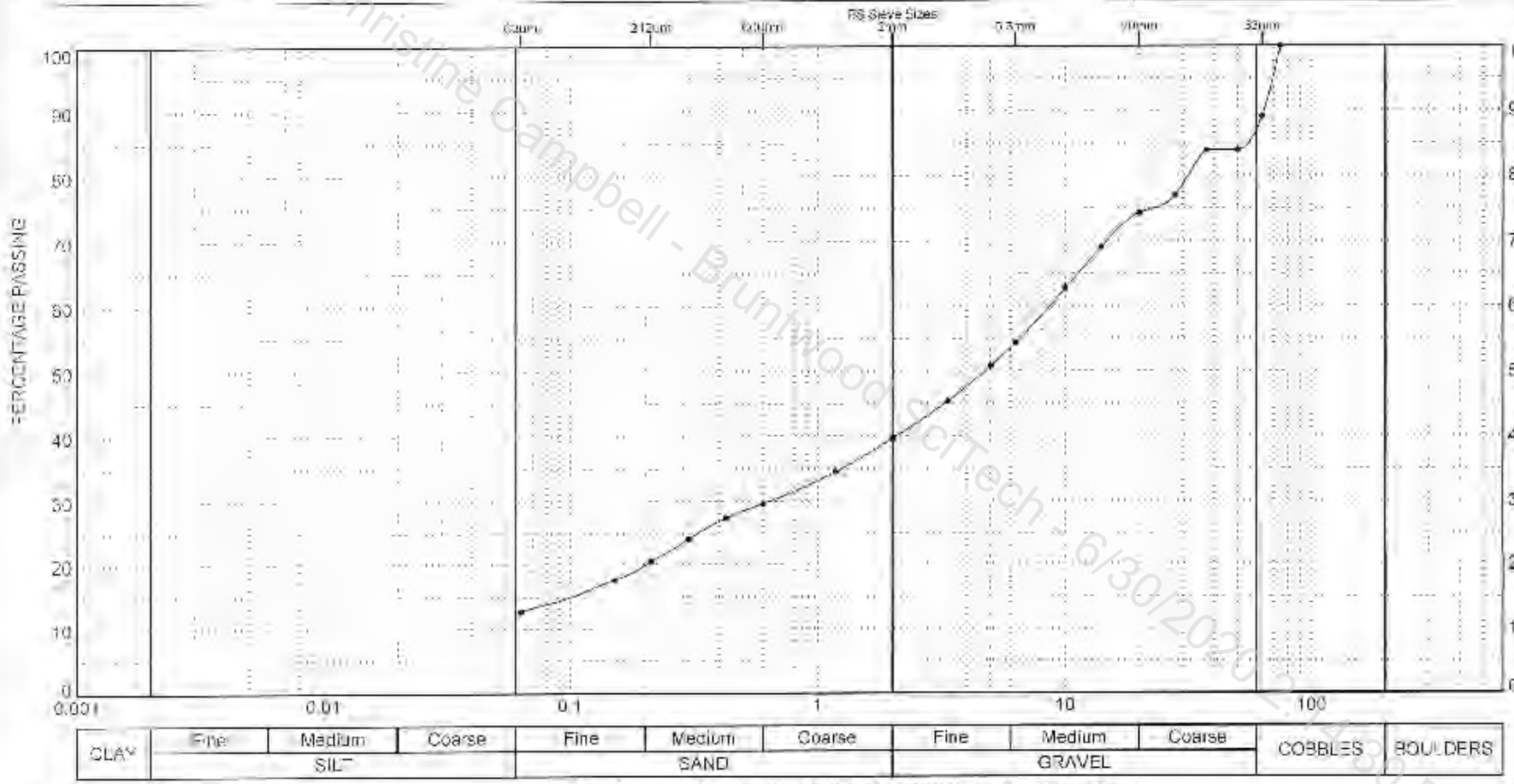
Head Office: Unit 2, Scots Gill Industrial Estate, Tattle Hill, Chester-le-Street, Co Durham, DH2 3RY. Tel: + 44 191 477 4700 Fax: 0 191 387 4710
Regional Office: Unit 29 Business Development Centre, Wharf Blackburn, BB1 3BL - Tel: 01772 734 000 Fax: 01772 [illegible] 899

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH006B	0.40	B3	0.40	02/12/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	89.1
50	88.9
37.5	83.9
28	77.3
20	74.3
14	69.1
10	62.7
6.3	54.4
5	50.8
3.35	45.4
2	39.6
1.18	34.5
0.6	29.6
0.425	27.4
0.3	24.2
0.212	20.4
0.15	17.5
0.063	12.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1598/BH006B/B3/0.40	MSDO		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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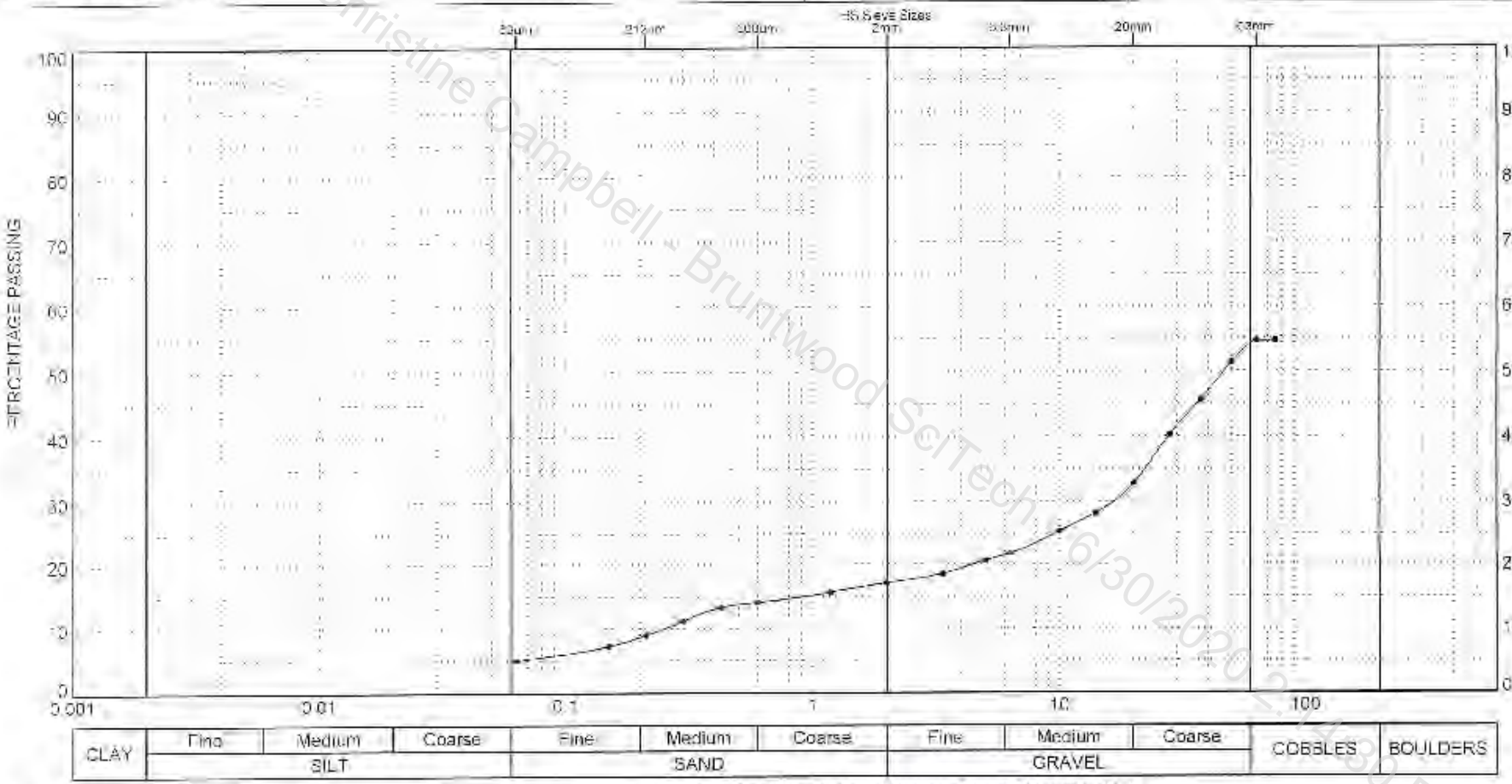
Head Office: Unit 25 Swale Close Industrial Estate, Alpha Road, Chesterfield, S41 9PZ - Tel: 01246 260400 Fax: 01246 260401
Regional Office: Unit 7B, Robocon Development Centre, Lower Wilkinson Way, Blackburn, BB1 3EL - Tel: 01254 295360 Fax: 01254 295361

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH007	0.60	B4	0.60	27/11/2019



Sieve Size (mm)	Passing (%)
75	54.7
63	54.7
50	51.4
37.5	45.7
28	40.3
20	32.8
14	28.2
10	25.4
6.3	21.8
5	20.5
3.35	18.6
2	17.0
1.18	15.6
0.6	14.1
0.425	13.2
0.3	11.2
0.212	8.9
0.15	7.3
0.063	5.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW/1588/BH007/B4/0.60			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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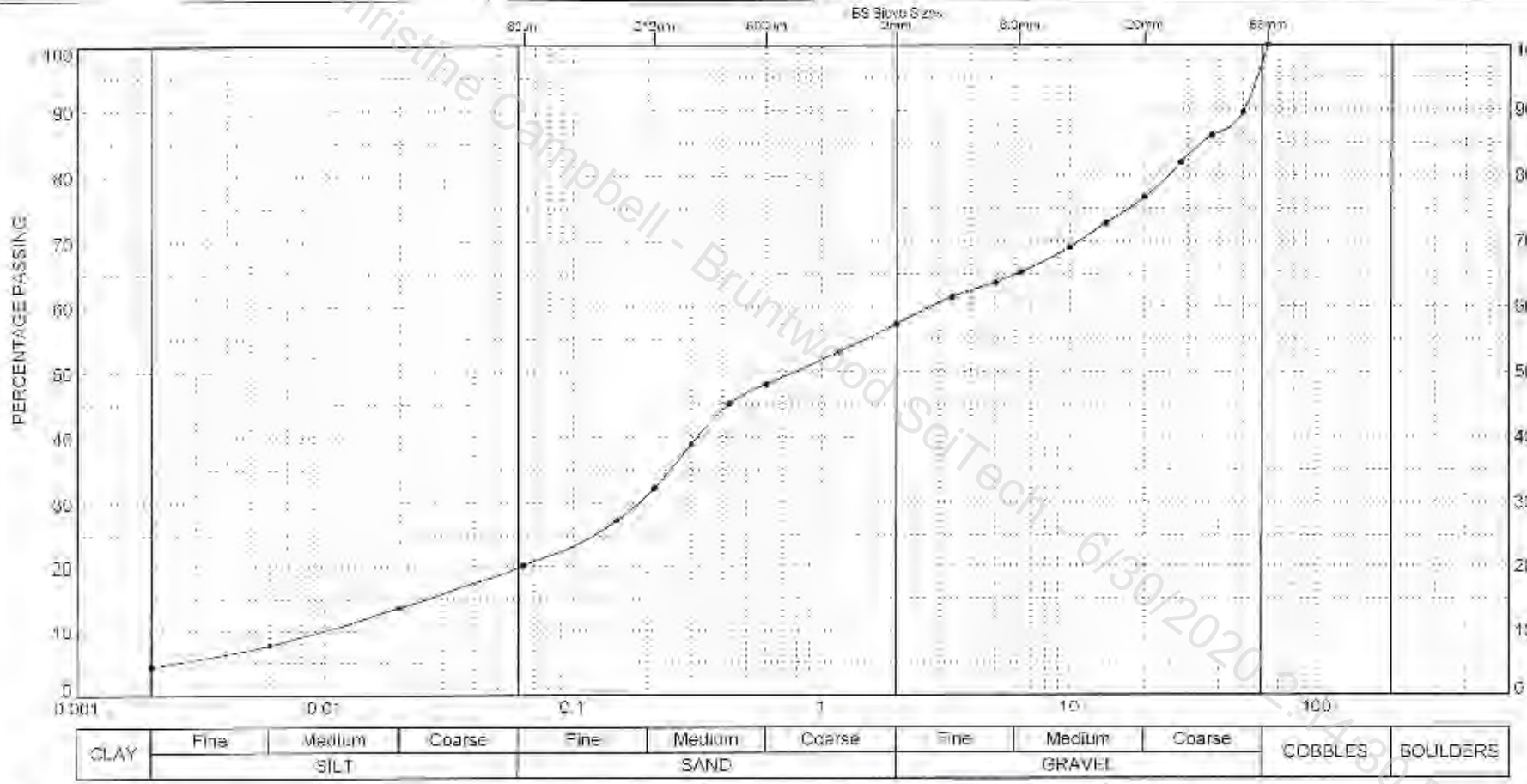
Head Office: Unit 25 Sidings Industrial Estate, Penistone Road, Grenoside, Sheffield, S35 8PQ - Tel: 0114 257 4700 Fax: 0114 257 4719
Regional Office: Unit 2, Business Centre 80, Lancaster Way, Ransomwood, Rainham, RM13 8BL - Tel: 01708 525 300 Fax: 01708 525 668

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No. : BH007	Depth (m) : 2.50	Sample Type & No :- B11	Specific Depth (m) :- 2.50	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	89.7
37.5	86.1
28	82.0
20	78.7
14	72.8
10	69.1
6.3	65.2
5	63.7
3.35	61.5
2	57.3
1.18	53.1
0.6	48.1
0.425	45.1
0.3	39.0
0.212	32.2
0.15	27.3
0.063	20.1
0.02	13.6
0.006	7.8
0.002	4.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH007/B11/2.50	MSeno		
Client :	**Contract Title :-**			**AEG Contract No :-**
University of Manchester	ID Manchester Preliminary Ground Investigation			NW1588

UKAS TESTING 1367

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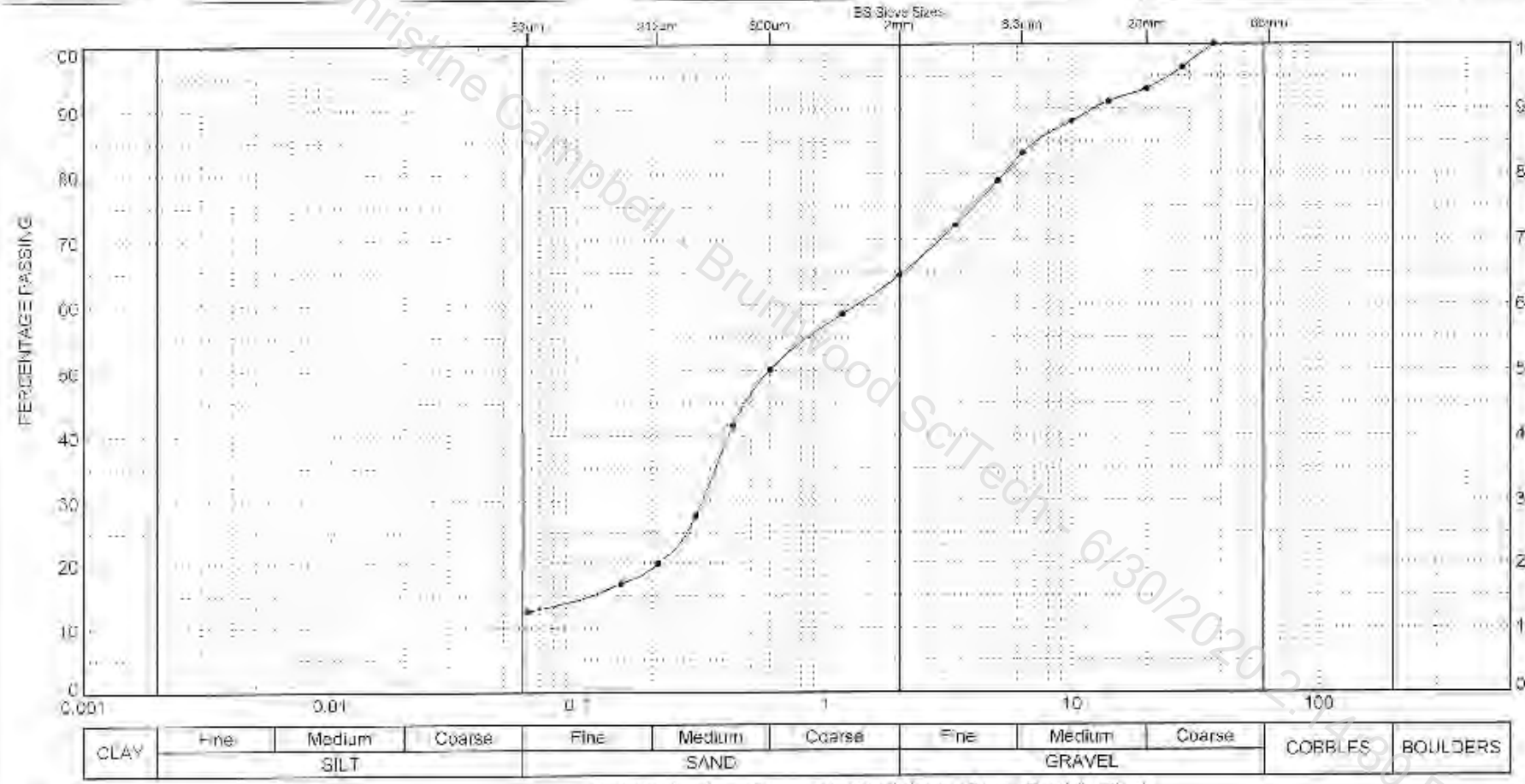
Head Office: Unit 2b Stockton Industrial Estate, Tatton Rd, Chesterton Street, Co Durham, DH2 1RD - Tel: 0191 332 4720 Fax: 0191 567 4710
Regional Office: Unit 4, Rowan Business Centre, Eaton Wood, Flockton, WF4 4BH - Tel: 01772 700700 Fax: 01772 735 888

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH007	6.50	B20	6.50	27/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	96.4
20	93.1
14	91.1
10	88.1
6.3	83.2
5	78.9
3.35	72.1
2	64.5
1.18	58.6
0.6	50.1
0.425	41.6
0.3	27.6
0.212	20.0
0.15	16.7
0.063	12.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH007/B20/6.50			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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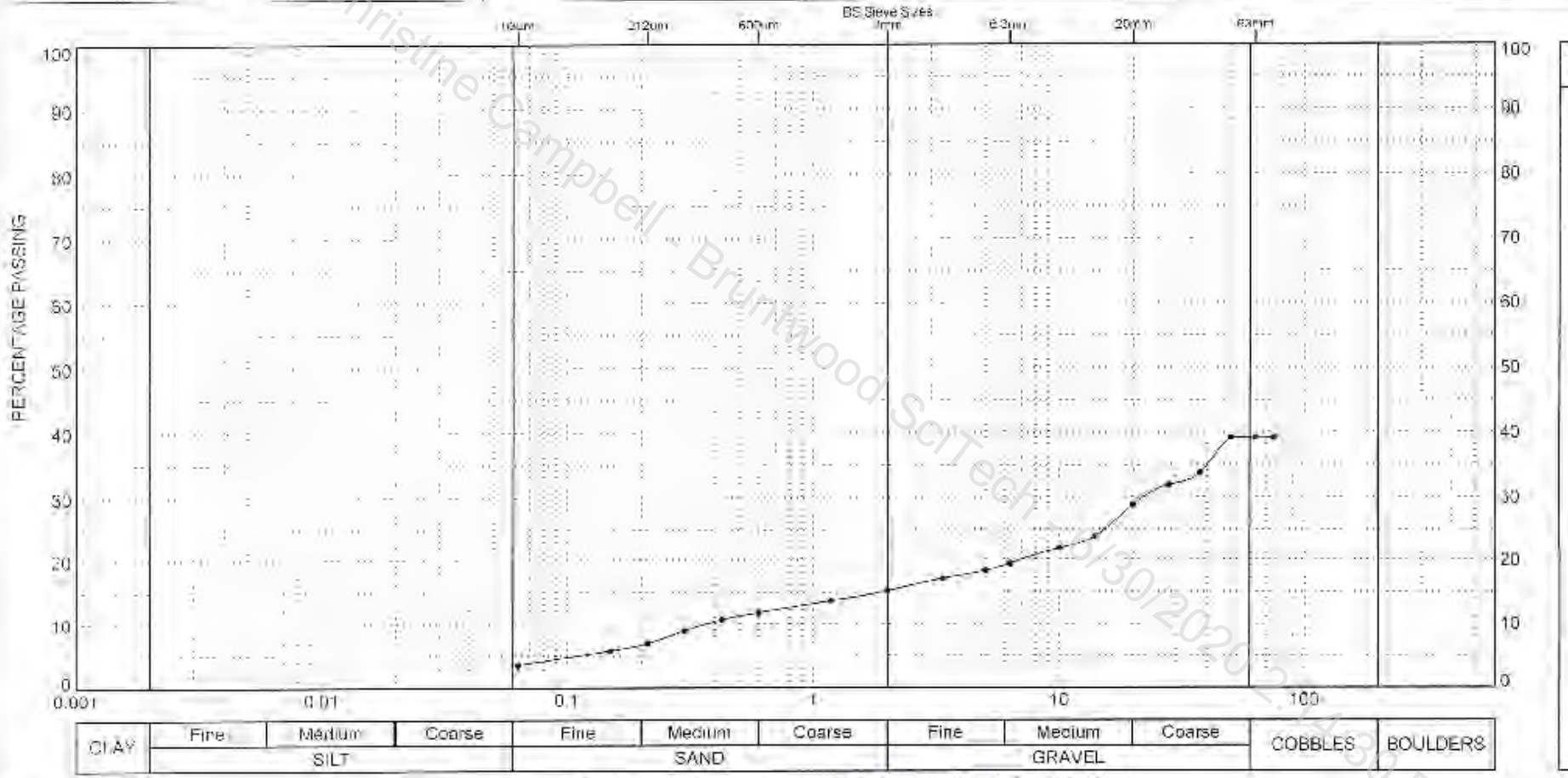
Head Office: Unit 35 Bluebell Industrial estate, Pelton Tel: 0191 387 0700 Fax: 0191 387 0701
Regional Office: Unit 20, Business Development Hub, Barnard Castle, Co. Durham, DL12 8BP Tel: 01833 695 900 Fax: 01833 695 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No. :- BH008	Depth (m) :- 0.60	Sample Type & No :- B3	Specific Depth (m) :- 0.60	Date Tested :- 27/11/2019



Sieve Size (mm)	Passing (%)
75	39.2
63	39.2
50	39.2
37.5	33.8
25	31.9
20	28.9
14	24.0
10	22.0
6.3	19.4
5	18.4
3.35	17.0
2	15.2
1.18	13.6
0.6	11.7
0.425	10.7
0.3	8.9
0.212	7.0
0.15	5.8
0.063	3.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	SD/NW1588/BH005/B3/0.60	MSeno		
Client :-	**Contract Title :-**			**AEG Contract No :-**
University of Manchester	ID Manchester Preliminary Ground Investigation			NW1588

UKAS TESTING 1367

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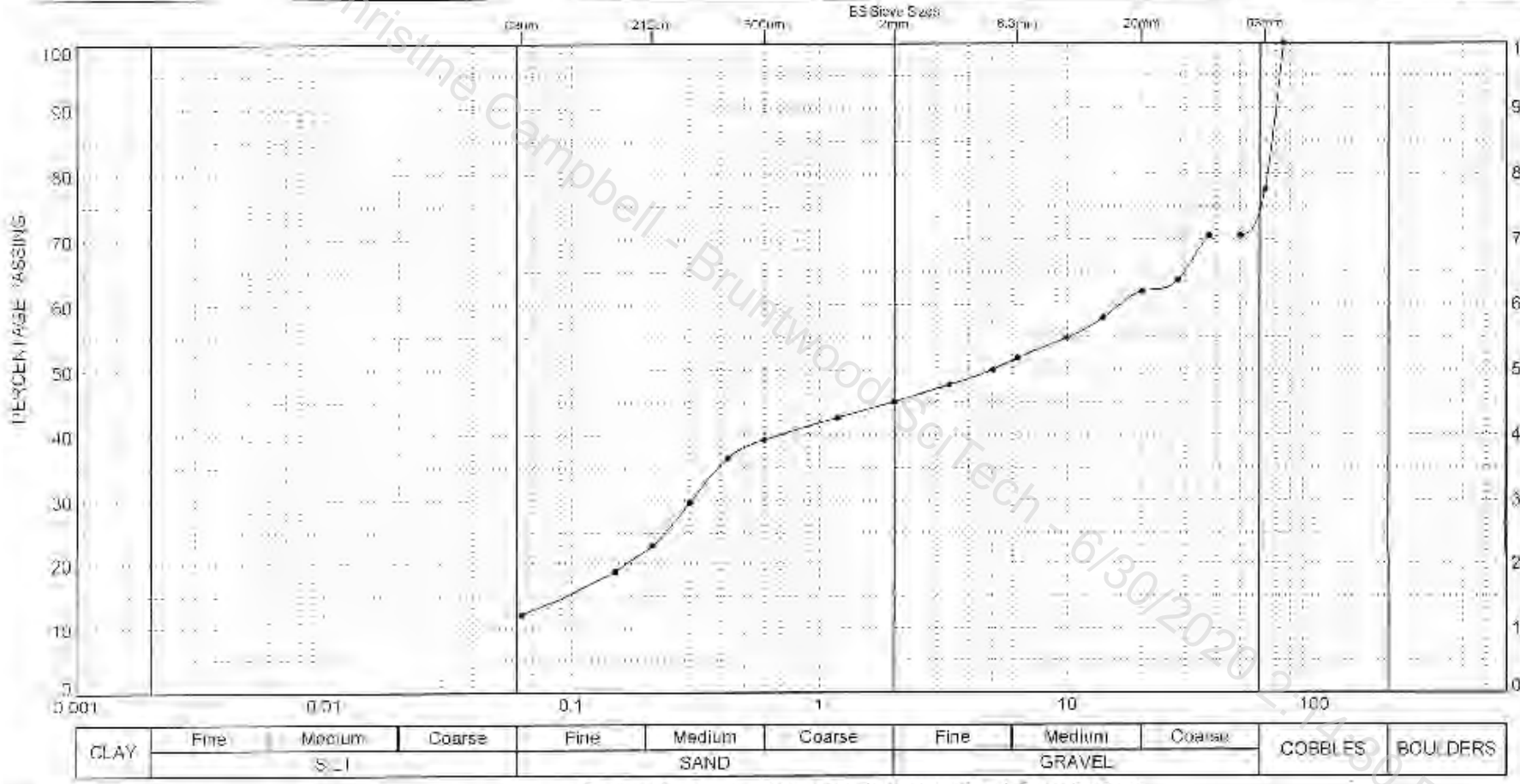
Head Office: Unit 29 Sutton Fields Industrial Estate, Hedon Rd, Hull, HU9 1NJ - Tel: 01482 701 121 Fax: 01482 701 122
Regional Office: Unit 29 Business Development Centre, Bessemer Drive, Stevenage, Herts, SG1 2DX - Tel: 01438 735 777 Fax: 01438 735 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH008	2.50	B8	2.50	27/11/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	77.6
50	70.5
37.5	70.5
28	63.7
20	62.0
14	58.0
10	54.9
6.3	51.8
5	50.0
3.35	47.7
2	45.1
1.18	42.7
0.6	39.3
0.425	36.5
0.3	29.7
0.212	23.1
0.15	18.9
0.063	12.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH008/B8/2.50	mSeal		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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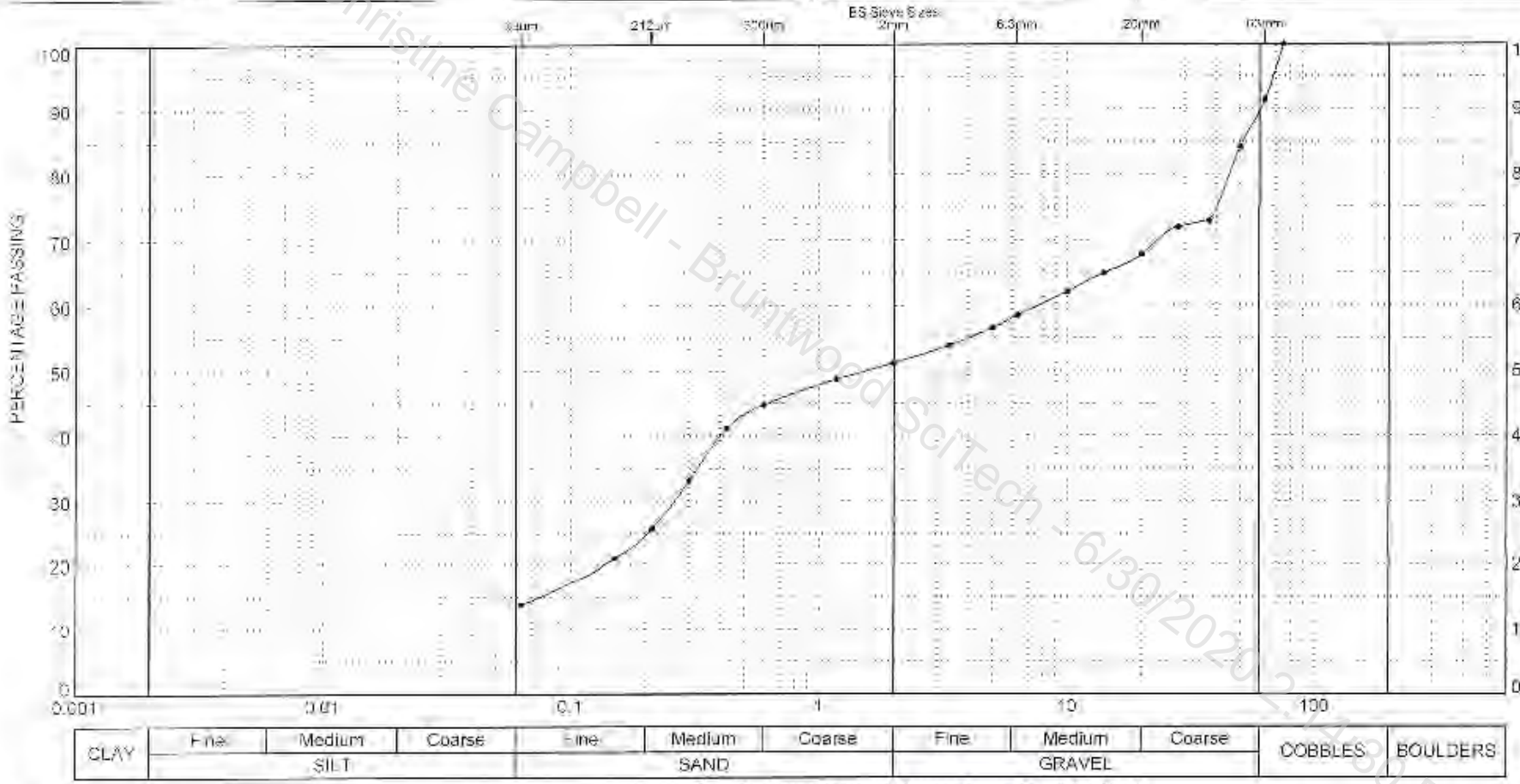
Head Office: Unit 2, Apollo Gate, Ironstone Estate, Tatton Park, Chester-le-Street, Co. Durham, DH2 2AG Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23, Rochdale Enterprise Centre, Sandbrook Way, Rochdale, OL11 1RY Tel: 01706 799 900 Fax: 01706 799 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH008	4.50	B15	4.50	27/11/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	91.4
50	84.2
37.5	72.9
28	71.9
20	67.8
14	64.9
10	62.1
6.3	58.5
5	56.8
3.35	53.9
2	51.2
1.18	48.7
0.6	44.8
0.425	41.2
0.3	33.2
0.212	25.8
0.15	20.9
0.063	13.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH008/B15/4.50	MSone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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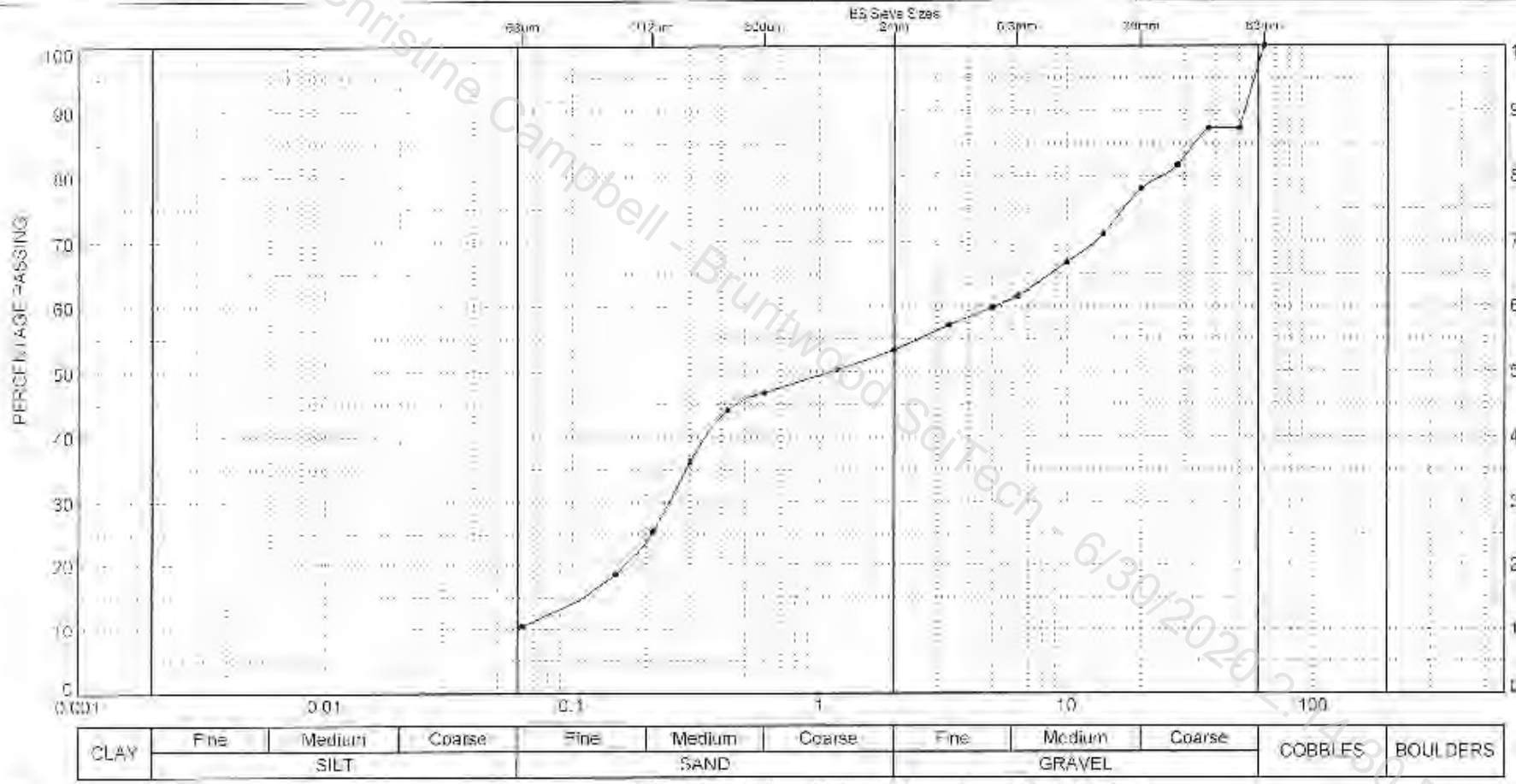
Head Office: Unit 25 Sixth Of Industrial Estate, Alton Rd, Crossens, Southport, PR9 8AG - Tel: 01704 397 470 Fax: 01704 397 470
Regional Office: Unit 20, Business Development Centre, Lower Wyre, Thornton, FY5 5LR - Tel: 01772 736 300 Fax: 01772 736 459

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH009	1.00	B4	1.00	27/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	87.3
37.5	87.3
28	81.7
20	78.1
14	71.1
10	66.8
6.3	61.6
5	59.8
3.35	57.1
2	53.3
1.18	50.3
0.6	46.8
0.425	44.1
0.3	36.2
0.212	25.4
0.15	18.6
0.063	10.5

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH009/B4/1.00	msone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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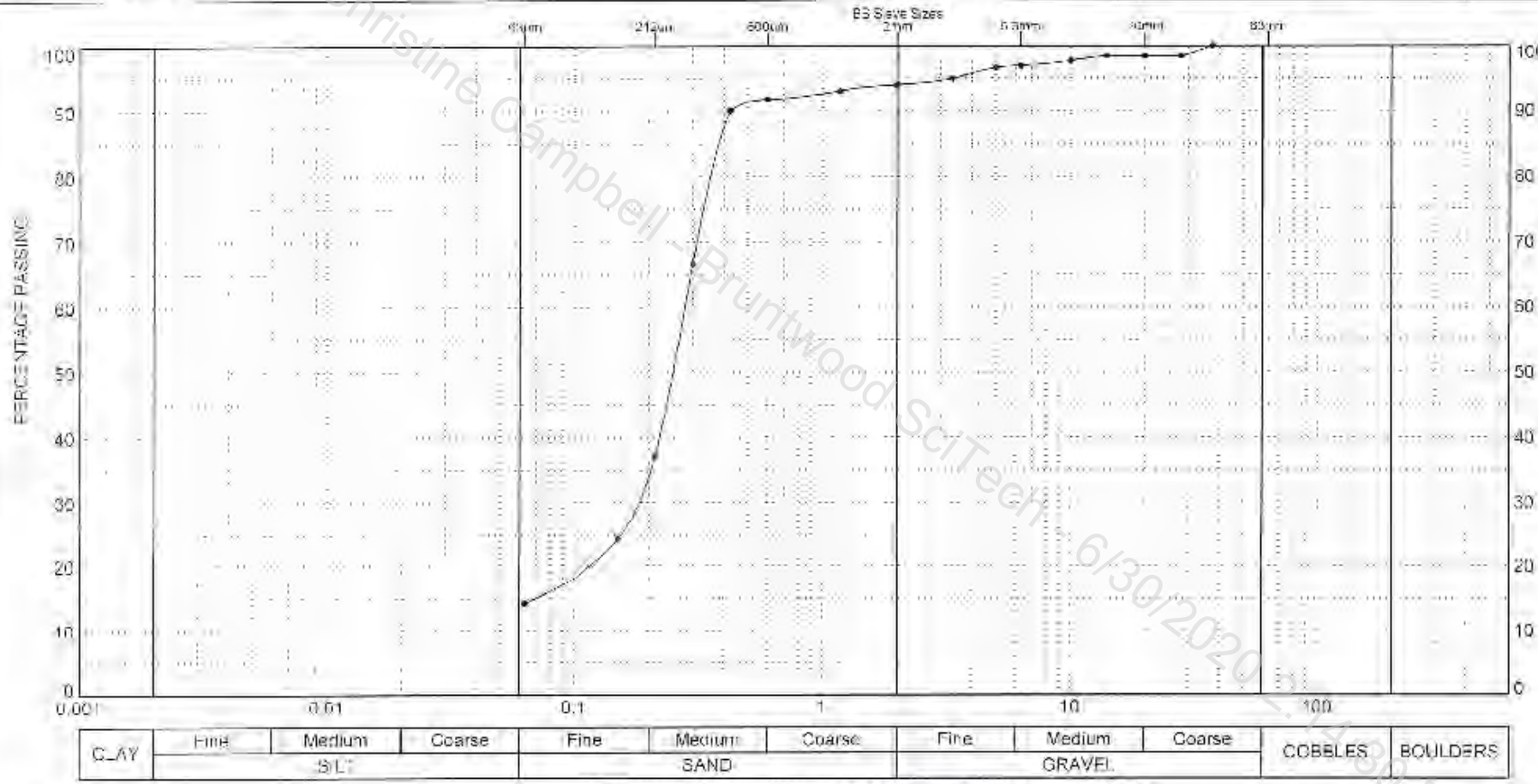
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: No. 2 Stella Grove Industrial Estate, Peterlee, County Durham, SR8 2BA. Tel. 0191 387 4700 Fax: 0191 387 4713
Regional Office: Unit 20, Business Development Centre, Cardiff Road, Barry, CF63 3EL. Tel: 01446 730900 Fax: 01446 733444

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No. - BH009	Depth (m) :- 3.70	Sample Type & No. - B14	Specific Depth (m) :- 3.70	Date Tested - 27/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	98.4
20	98.4
14	98.4
10	97.7
6.3	97.0
5	96.7
3.35	95.0
2	94.0
1.18	93.1
0.6	91.8
0.425	90.1
0.3	86.6
0.212	37.3
0.15	24.5
0.063	14.3

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH009/B14/3.70	MSene		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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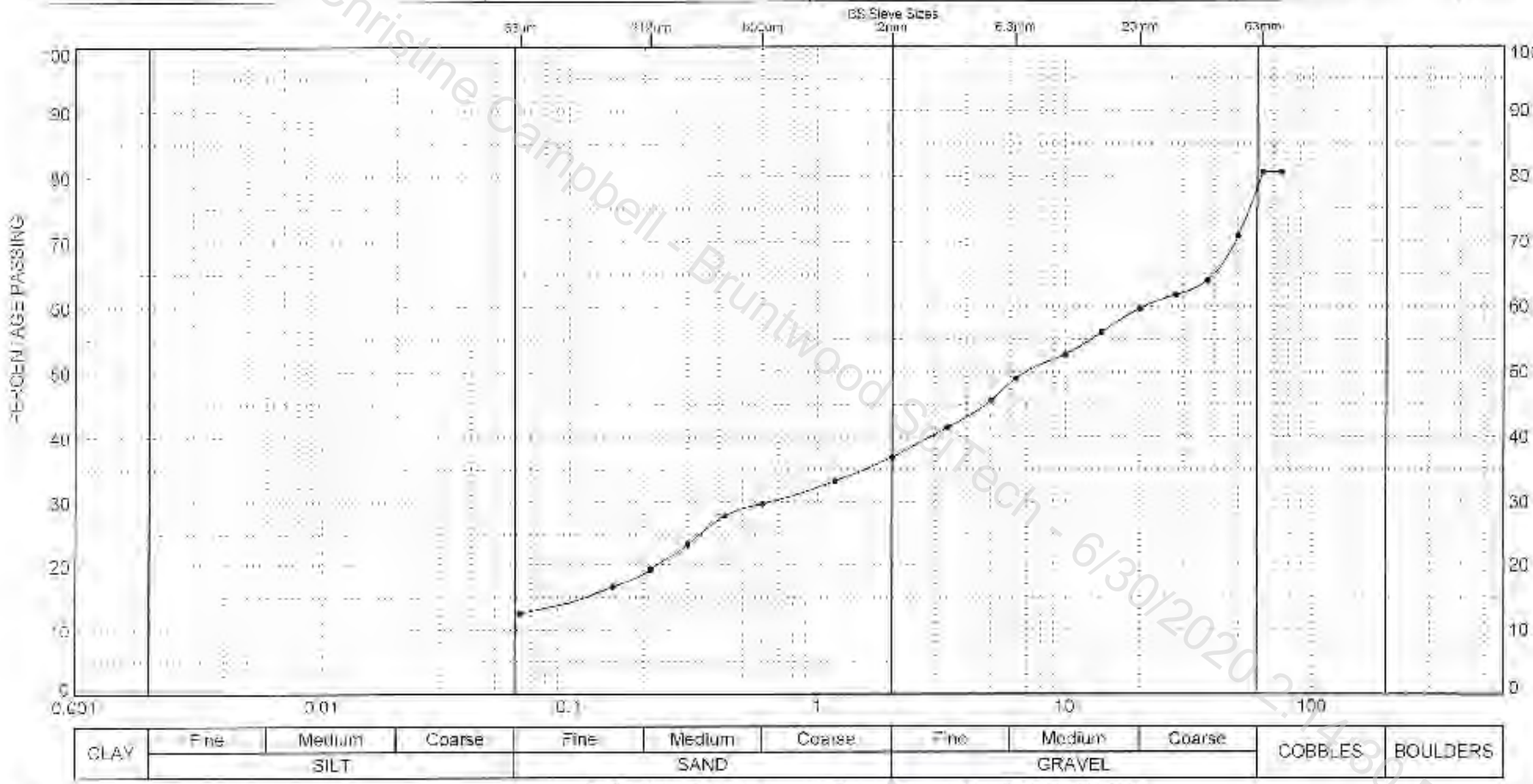
Head Office : 8-10 Eldon Street Industrial Estate, Peterlee, Co. Durham SR8 2RG - Tel: 0191 587 4700 Fax: 0191 587 47 0
Regional Office: Unit 22, Business Development Centre, Turnpike Way, Rochdale, OL11 3DL - Tel: 01706 359 900 Fax: 01706 359 905

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No : BH011	Depth (m) :- 2.70	Sample Type & No : B9	Specific Depth (m) :- 2.70	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
75	80.6
63	80.6
50	70.8
37.5	64.0
28	61.8
20	59.7
14	56.1
10	52.7
6.3	49.0
5	45.6
3.35	41.5
2	36.9
1.18	33.2
0.6	29.7
0.425	27.9
0.3	23.5
0.212	19.3
0.15	16.5
0.063	12.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue : 22/01/2020	Certificate No :- PSD/NW1588/BH011/B9/2.70	Signed :-	Name :-	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

UKAS TESTING 1367

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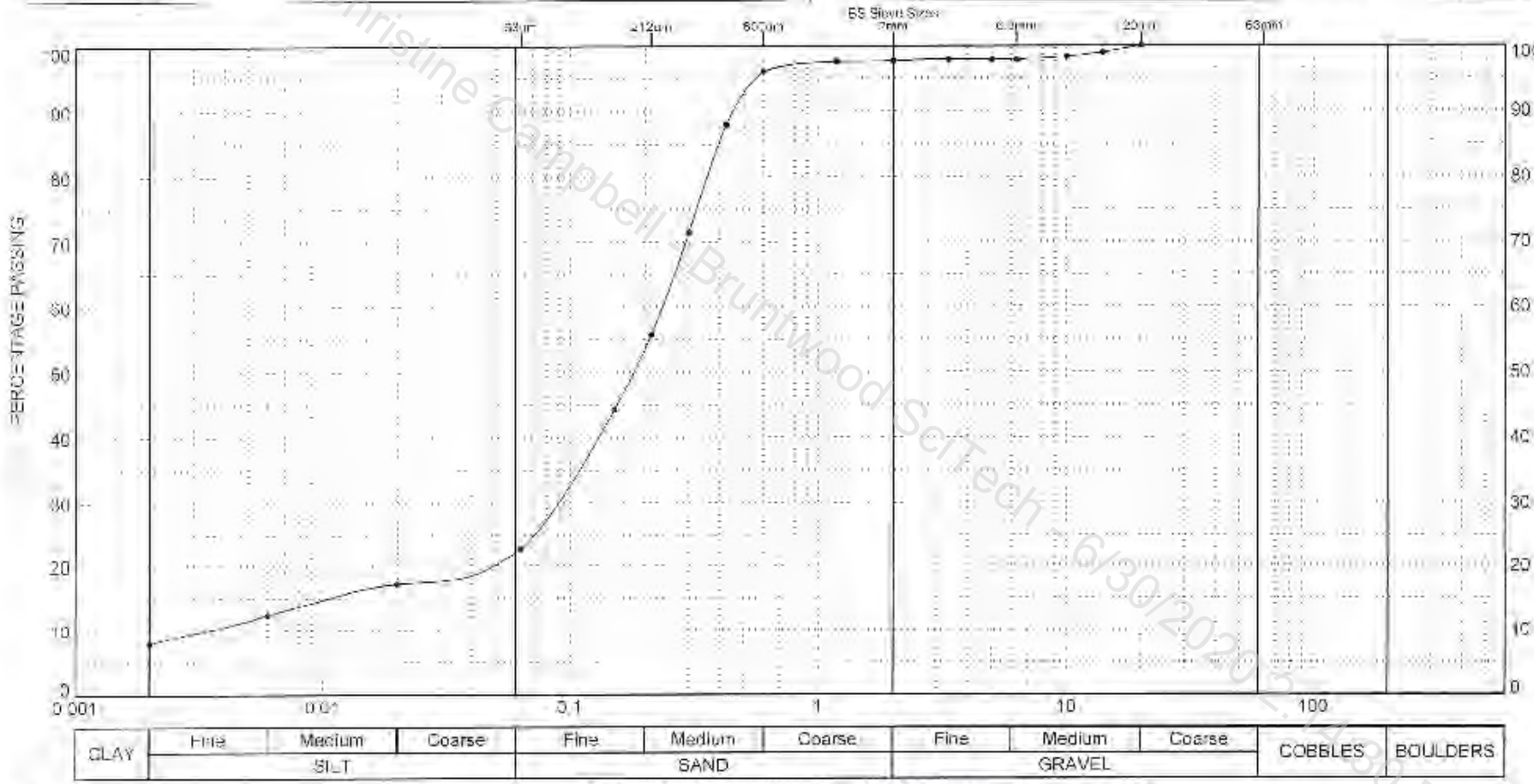
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office :- 9-25 Stella Close Industrial Estate, Potton, Sandy, Bedfordshire, SG19 2NG - Tel: 01767 262 400 - Fax: 01767 262 410
Regional Office: Unit 2C, Clarence Enterprise Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01254 735 111 - Fax: 01254 735 300

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH011	4.70	B17	4.70	26/11/2019



Sieve Size (mm)	Passing (%)
20	100.0
14	98.9
10	98.2
6.3	97.8
5	97.8
3.35	97.8
2	97.6
1.18	97.5
0.6	96.1
0.425	88.0
0.3	71.4
0.212	56.7
0.15	44.3
0.063	22.9
0.02	17.1
0.006	12.8
0.002	8.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed	Name :-	
22/01/2020	PSD/NW1588/BH011/B17/4.70	MBone		Page 1 of 1

Client :-	Contract Title :-	AEC Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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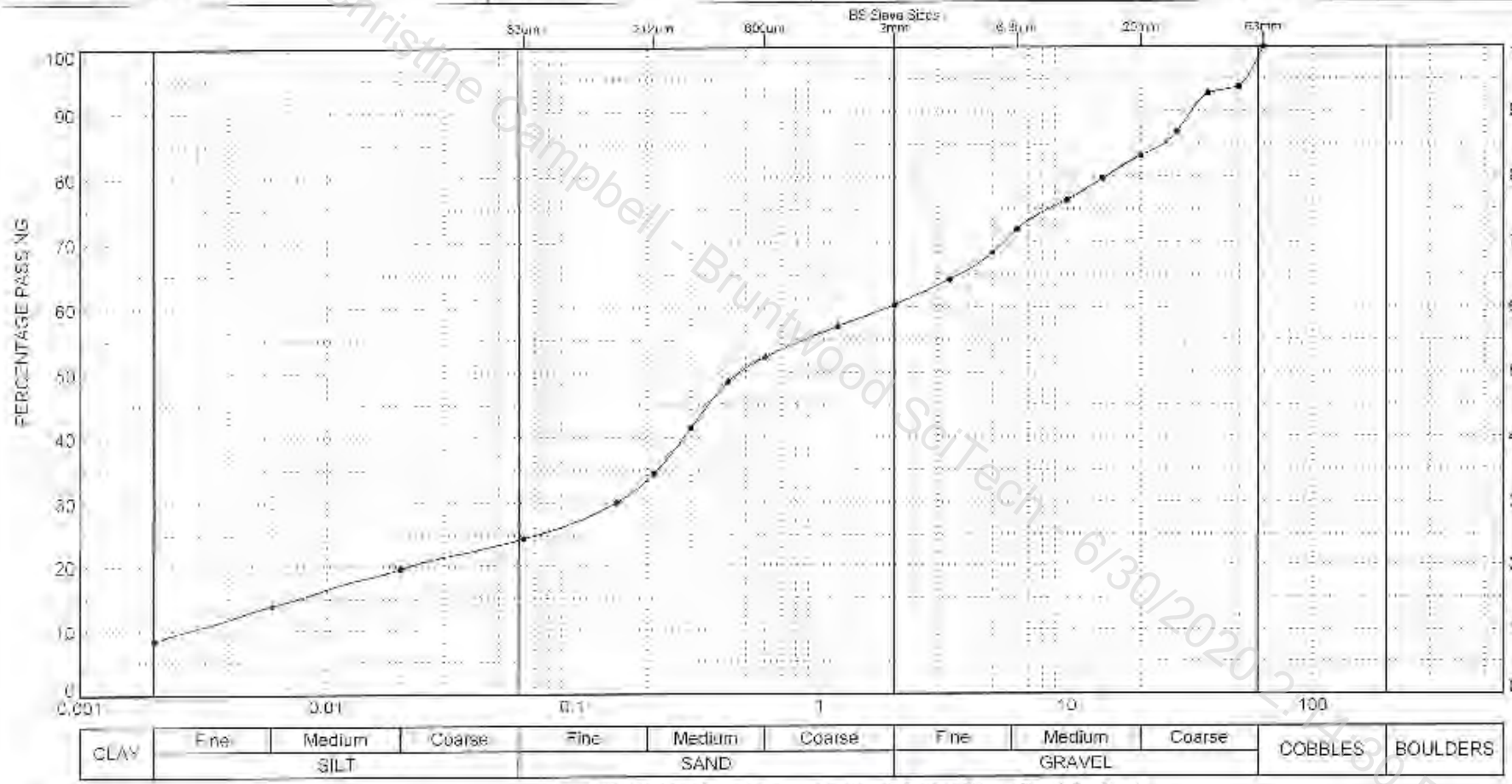
Head Office: Unit 25 Block 30 Thornhill Estate, Rolleston-on-Dove, Staffs, DE13 9AA. Tel: 01283 / 200... Fax: 01283 ...
Regional Office: Unit 20, Business Development Centre, Lower Wharf, Blackburn, BB1 5BL. Tel: 01772 ... Fax: 01772 ...

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH012A	6.50	B22	6.50	25/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	93.7
37.5	92.8
28	86.9
20	83.2
14	79.7
10	75.4
6.3	72.9
5	68.4
3.35	64.3
2	60.4
1.18	57.1
0.6	52.4
0.425	48.6
0.3	41.5
0.212	34.4
0.15	30.0
0.063	24.5
0.02	19.6
0.006	13.9
0.002	8.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH012A/B22/6.50			Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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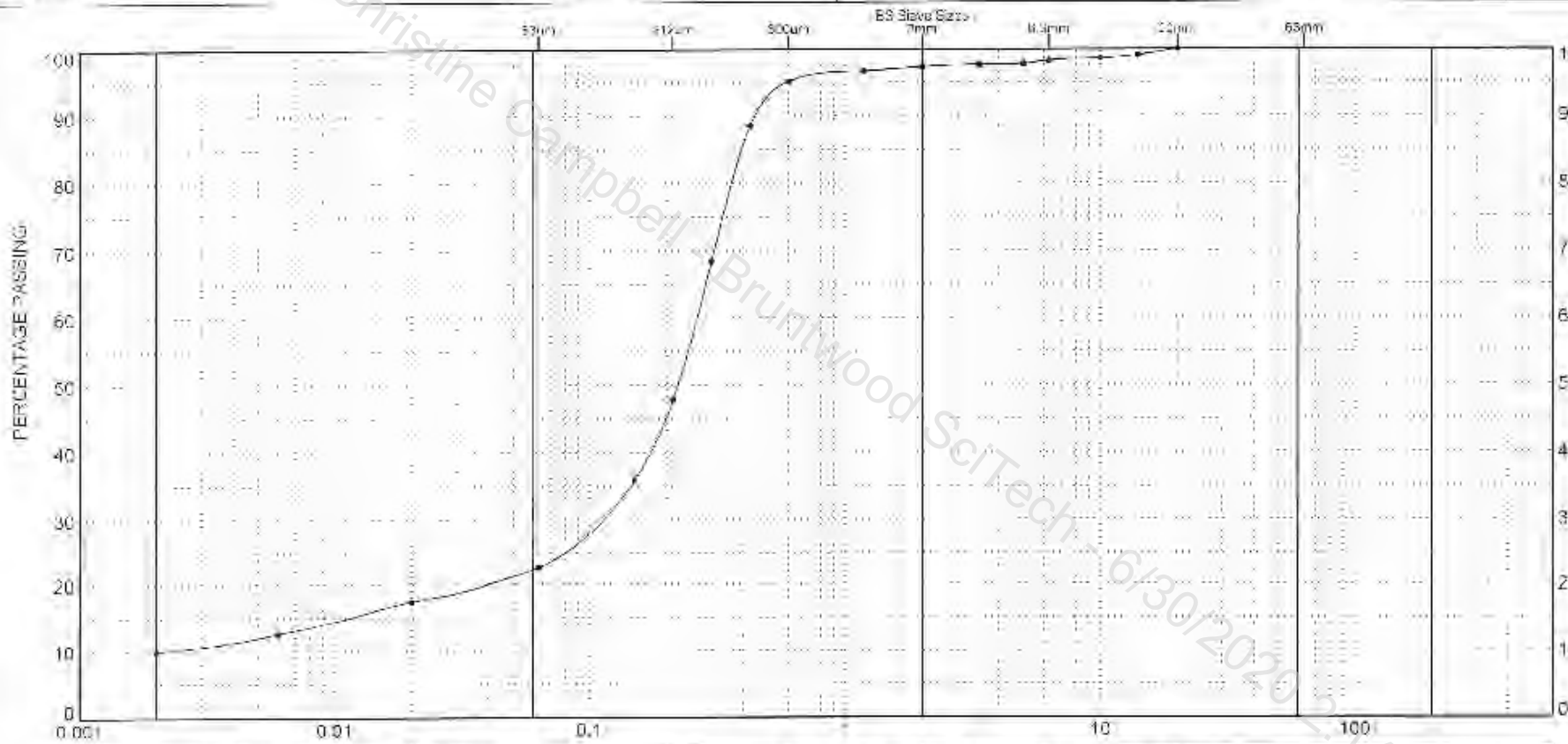
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office, Unit 20 Scots Gill Industrial Estate, Penrith CA11 0FA, Tel: 01768 867777 Fax: 01768 867778
Regional Office, Unit 2, Riverview Development Centre, Station Road, Cleckheaton, BD19 5PN - Tel: 01274 735 300 Fax: 01274 735 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH012A	9.00	B28	9.00	22/11/2019



Sieve Size (mm)	Passing (%)
20	100.0
14	99.0
10	98.5
6.3	98.2
5	97.7
3.35	97.6
2	97.3
1.18	96.8
0.6	95.2
0.425	88.6
0.3	68.4
0.212	47.8
0.15	35.9
0.063	22.8
0.02	17.3
0.006	12.5
0.002	9.9

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH012A/B28/9.00	MSorl		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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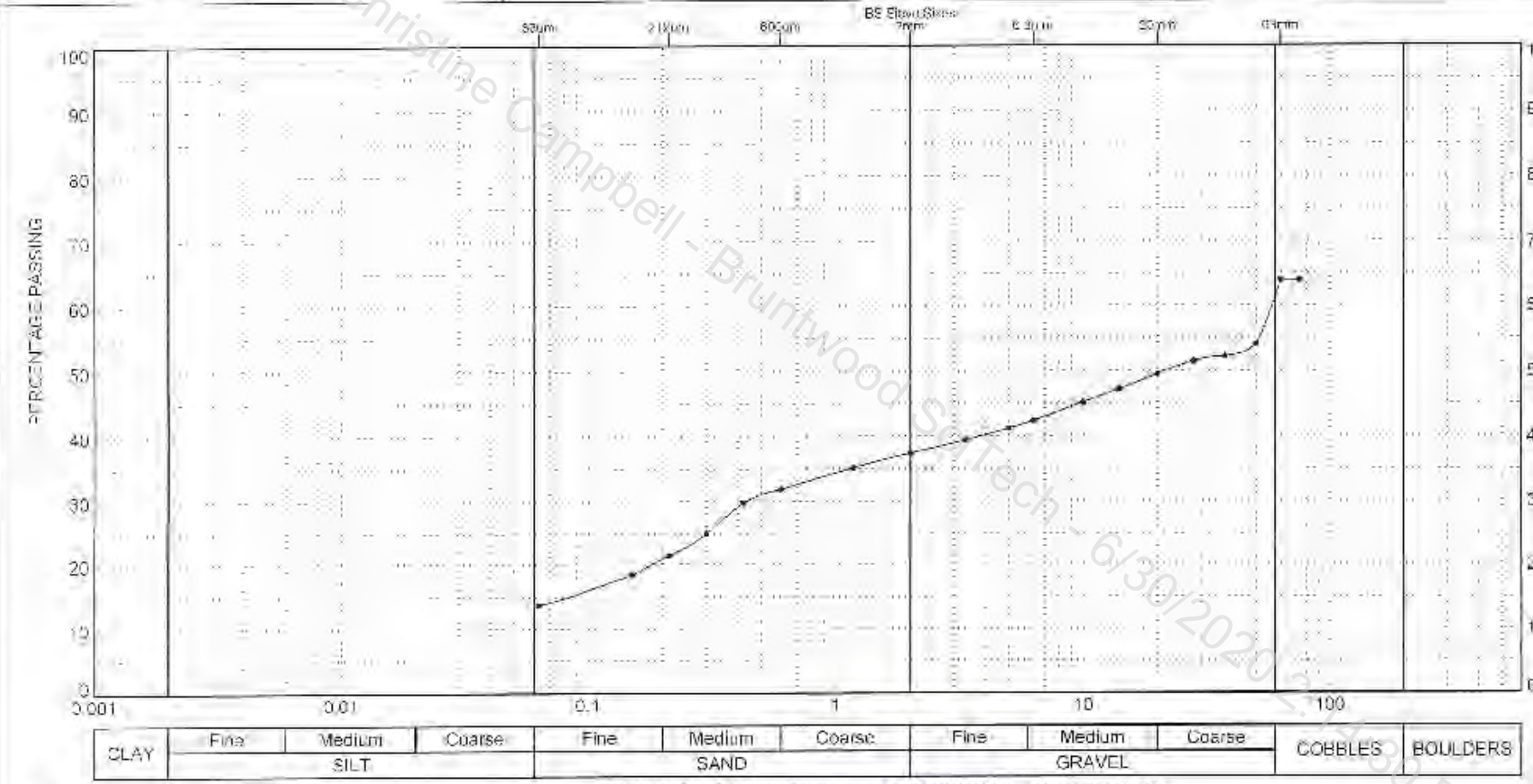
Head Office: Unit 2, Alpha 66 Industrial Estate, Pelton Fell Gateshead Street, Co. Durham, DH2 2RG. Tel: 0191 387 1400 Fax: 0191 387 1410
Regional Office: Unit 23, Business Centre, Tamar Wharf, Blackburn, BB1 3BL. Tel: 01772 795 100 Fax: 01772 795 200

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH013	1.70	B6	1.70	25/11/2019



Sieve Size (mm)	Passing (%)
75	63.9
63	63.9
50	54.1
37.5	52.2
28	51.5
20	49.5
14	47.2
10	45.2
6.3	42.4
5	41.2
3.35	39.4
2	37.4
1.18	35.2
0.6	31.9
0.425	29.8
0.3	25.1
0.212	21.4
0.15	18.5
0.063	13.7

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	
22/01/2020	PSD/NW1588/BH013/B6/1.70	MSone		Page 1 of 1

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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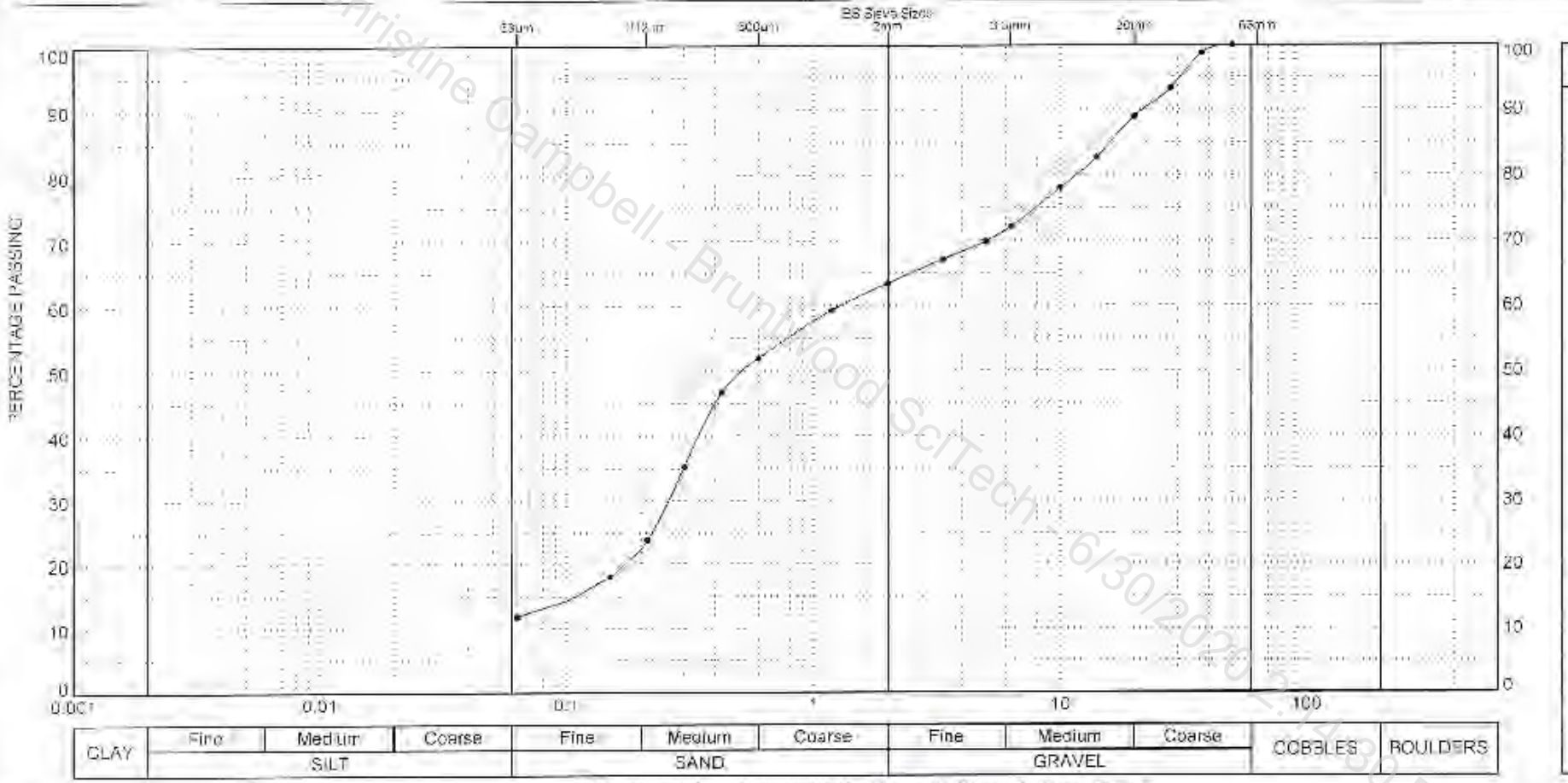
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 35 Wear Bridge Industrial Estate, Pelton Fell, Chester-le-Street, Co Durham, DH2 2UNG. Tel: 0191 387 4710 Fax: 0191 387 4719
Regional Office: Unit 2C, Business Development Centre, Bacon Wood Blackburn, BB1 5QL. Tel: 01772 735 303 Fax: 01772 736 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990
(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH013	Depth (m) :- 6.00	Sample Type & No :- B16	Specific Depth (m) :- 6.00	Date Tested :- 25/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.7
28	93.3
20	89.0
14	82.7
10	78.1
6.3	72.1
5	69.9
3.35	67.1
2	63.4
1.18	59.3
0.6	52.0
0.425	46.7
0.3	35.3
0.212	24.0
0.15	18.1
0.063	11.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue	Certificate No :-	Signed :-	Name :-	Page 1 of 1
27/01/2020	PSD/NW1588/BH013/B16/6.00	MSand		
Client :- University of Manchester	**Contract Title :-** ID Manchester Preliminary Ground Investigation			**AEG Contract No :-** NW1588

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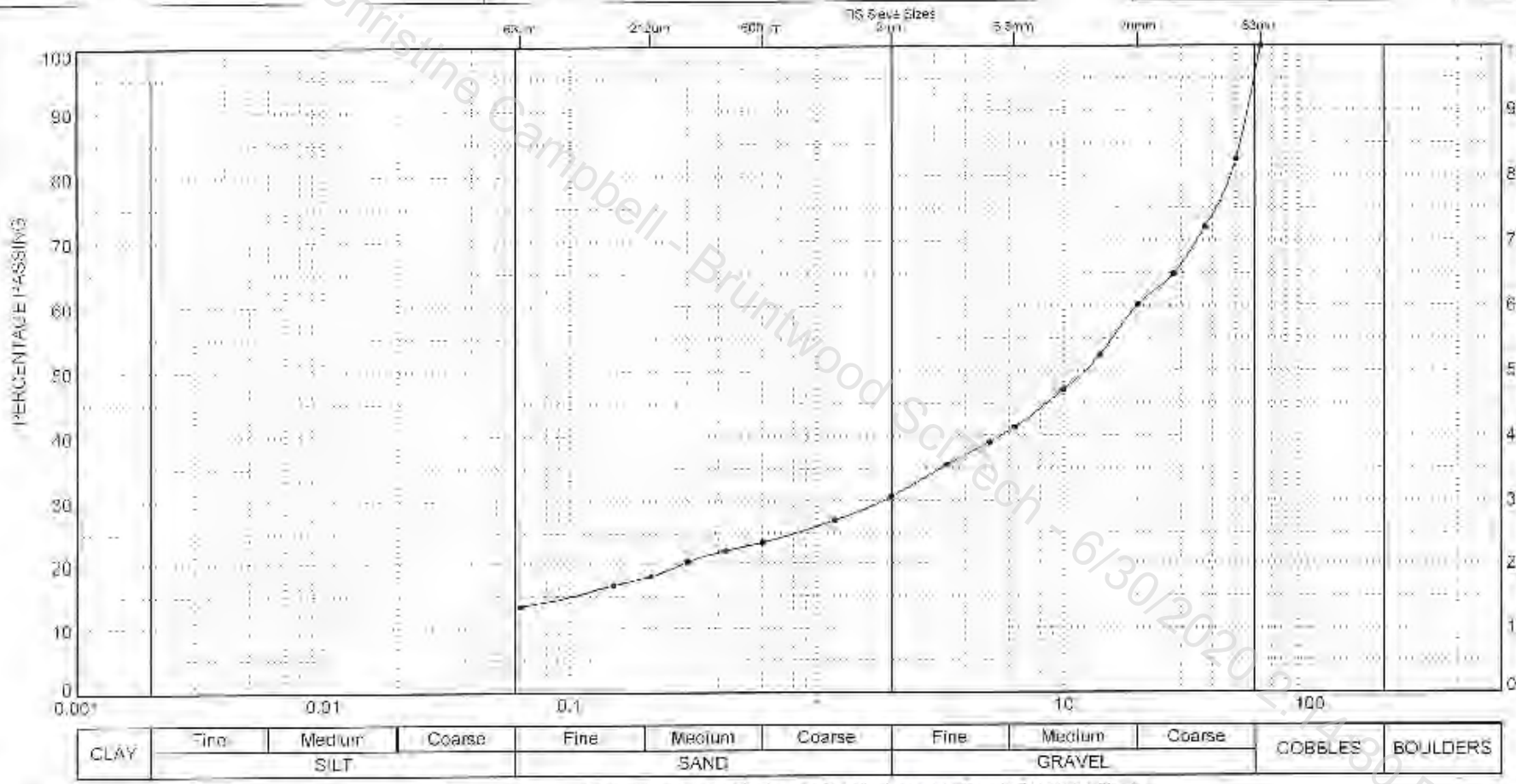
Head Office: Unit 20 Stella Six Industrial Estate, Derby Rd, Chesterfield, Derbyshire, S40 2EX, UK - Tel: 0 1246 200 200 Fax: 0 1246 200 210
Regional Office: Unit 2b, Grosvenor Business Centre, Edgar Wood Close, Bredbury, Stockport, SK6 2SD - Tel: 0 161 406 2000 Fax: 0 161 406 2001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH014	1.20	B8	1.20	25/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	82.5
37.5	72.1
28	64.9
20	60.2
14	52.1
10	47.1
6.3	41.3
5	39.0
3.35	35.5
2	30.6
1.18	27.0
0.6	23.6
0.425	22.2
0.3	20.2
0.212	18.1
0.15	16.5
0.063	13.3

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/BH014/B8/1.20	mscne		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:36 PM - 81.154.246.72

Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 477

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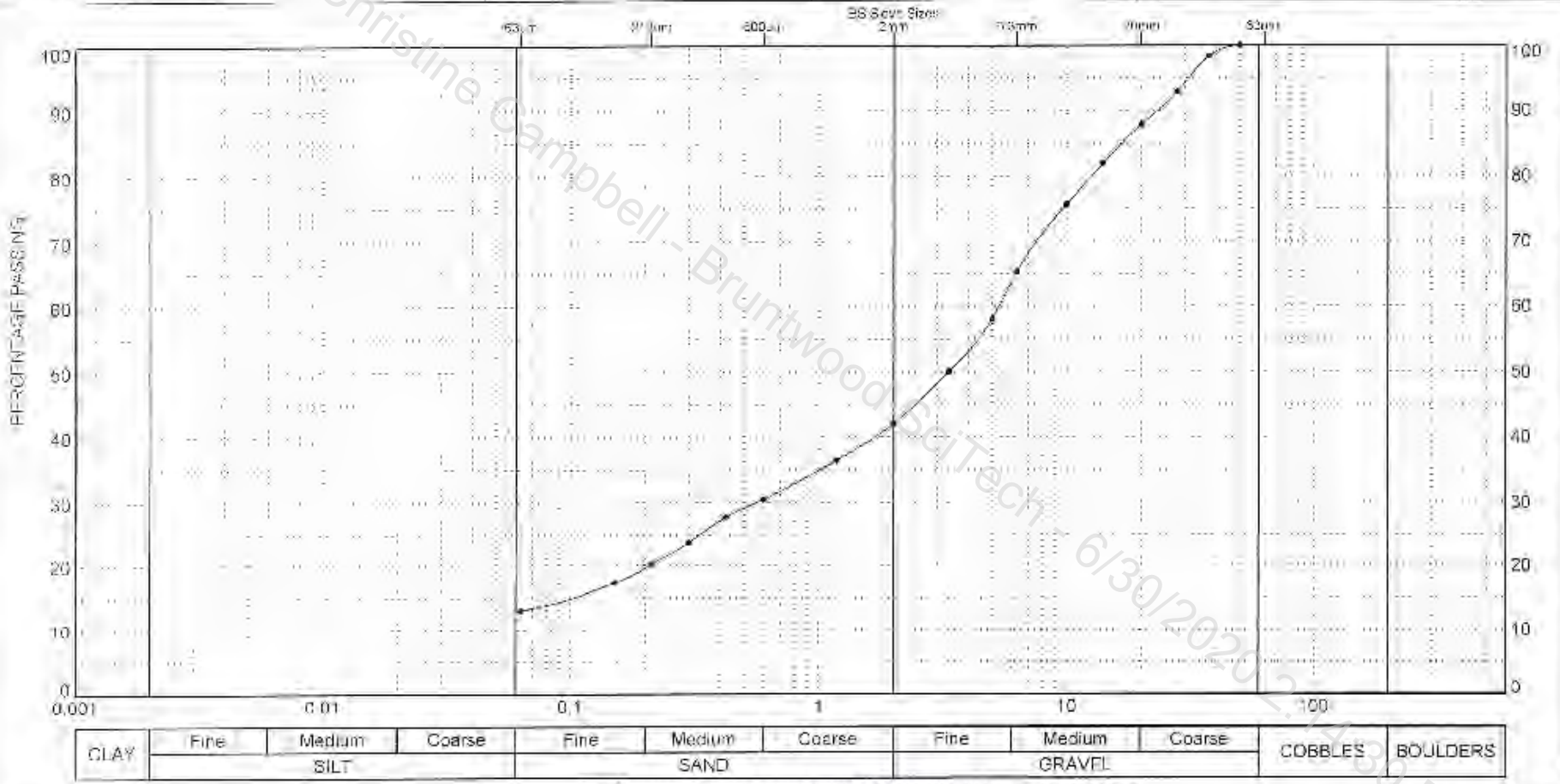
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Eaton Constantia Estate, Penketh, Warrington, Cheshire, WA5 2TG - Tel: 0161 320 4700 Fax: 0161 320 4710
Regional Office: Unit 20, Business Investment Centre, Eccles, Manchester, M30 0BL - Tel: 0161 775 5000 Fax: 0161 775 5001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH014	Depth (m) :- 3.00	Sample Type & No :- B14	Specific Depth (m) :- 3.00	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.3
28	92.9
20	87.9
14	81.9
10	75.7
6.3	65.3
5	58.1
3.35	50.1
2	42.1
1.18	36.5
0.6	30.6
0.425	27.8
0.3	23.9
0.212	20.2
0.15	17.3
0.063	12.9

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW/1588/BH014/B14/3.00	MSeng		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW/1588

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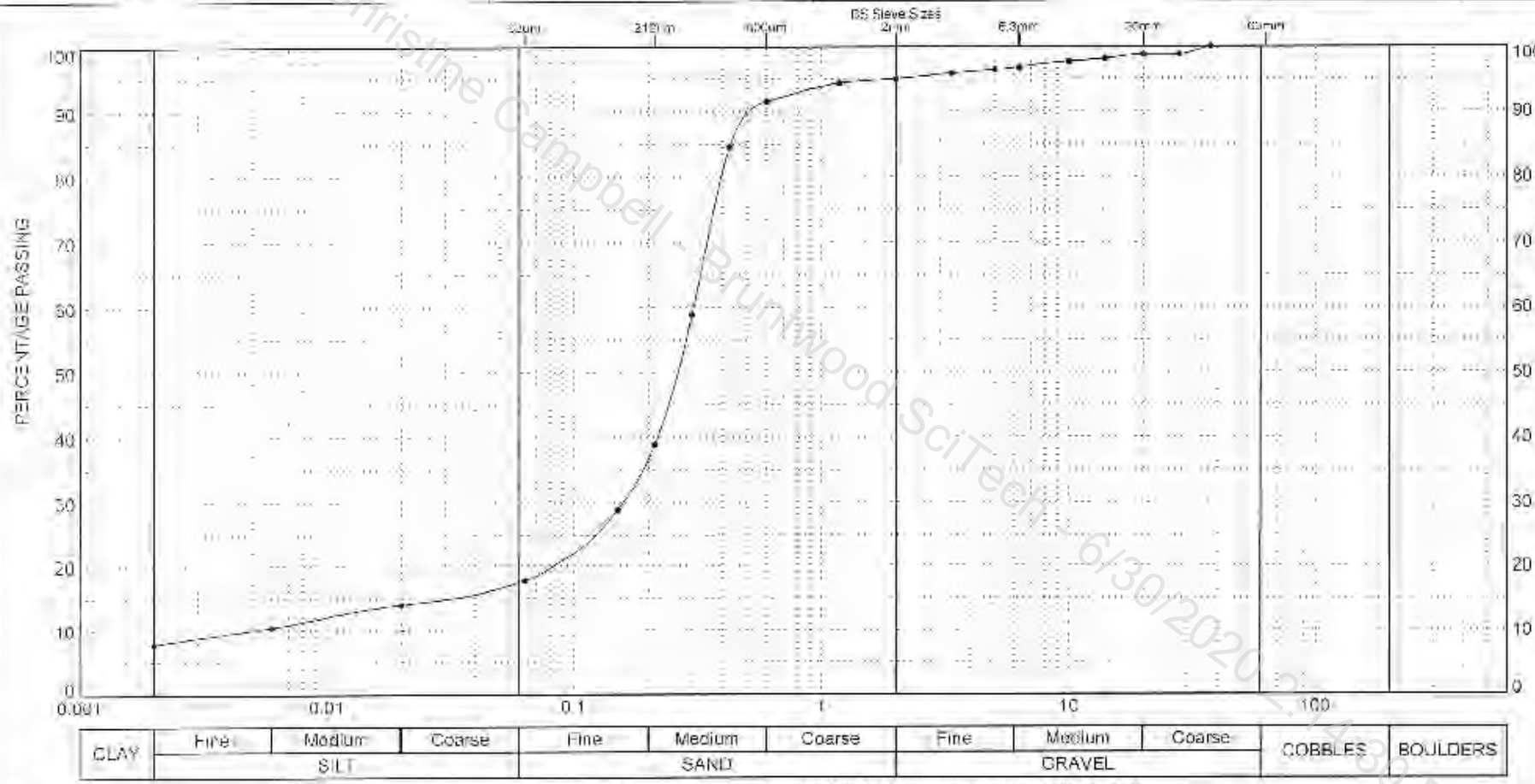
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Viola Grove, Viola Street, Derby, Derbyshire, DE23 8JS. Tel: 01332 387 709 Fax: 01332 387 710
Regional Office: Unit 2, Thornbridge Business Park, Eccleston Road, Ecclesfield, Sheffield, S11 9PE. Tel: 0114 235 9000 Fax: 0114 235 9009

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
BH014	6.00	B24	6.00	



Sieve Size (mm)	Passing (%)
37.5	100.0
28	98.7
20	98.7
14	98.0
10	97.6
6.3	96.8
5	96.4
3.35	95.9
2	95.0
1.18	94.3
0.6	91.5
0.425	84.6
0.3	58.9
0.212	38.9
0.15	28.9
0.063	17.7
0.02	14.0
0.006	10.5
0.002	7.9

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue	Certificate No :-	Signed :-	Name :-	Page 1 of 1
27/07/2020	PSD/NW/1588/BH014/B24/6.00	mSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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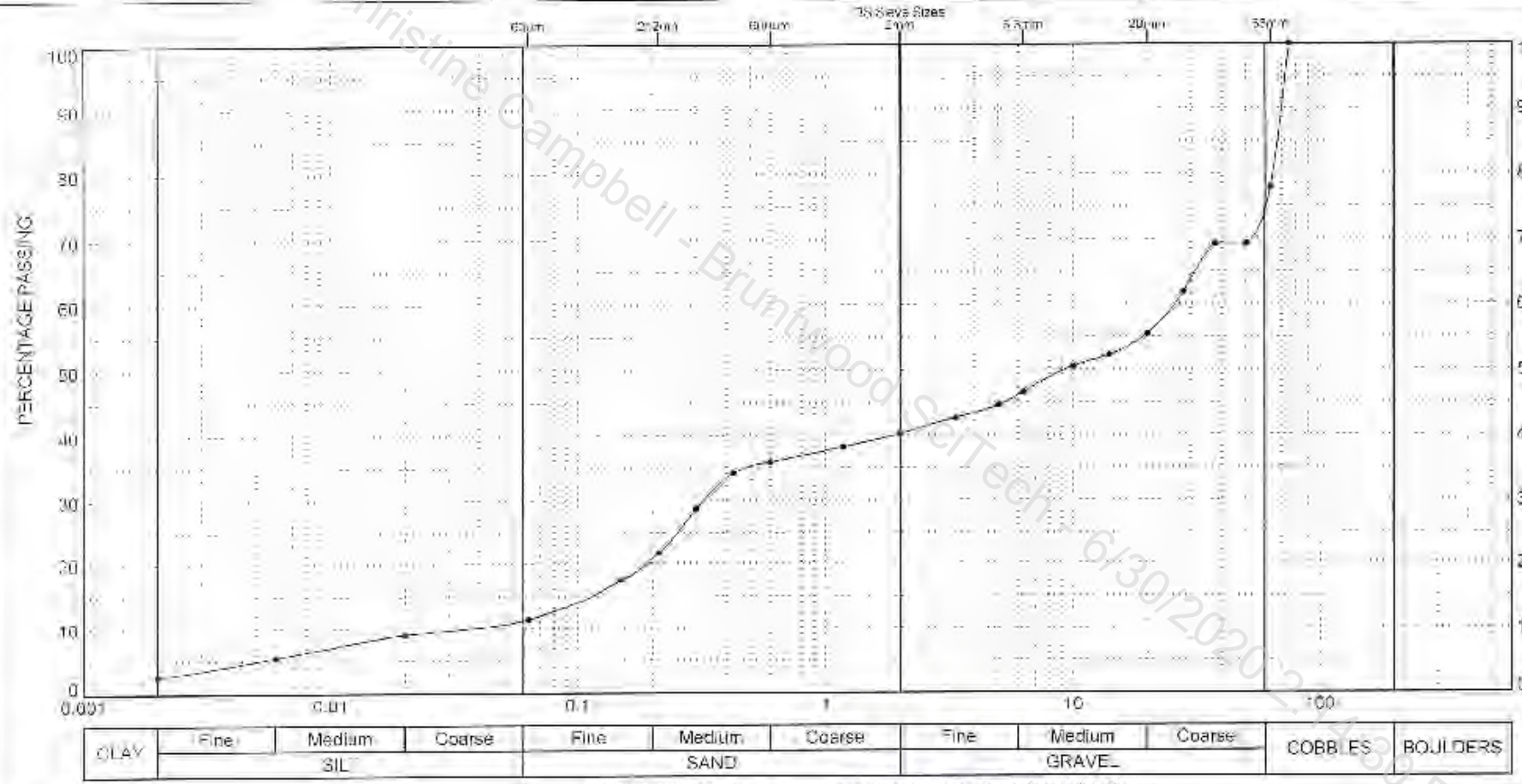
Head Office: Unit 25 Flint's Caravan Estate, Manor Rd, Chester-le-Street, Co. Durham, DH2 3HU. Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 2C, Dukesmead, Interpoint Centre, Eccles, Manchester, M30 0BH. Tel: 0772 730 909 Fax: 01772 751 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- DS001	Depth (m) :- 0.70	Sample Type & No :- B6	Specific Depth (m) :- 0.70	Date Tested :- 10/12/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	77.9
50	69.2
37.5	69.2
28	61.9
20	55.5
14	52.2
10	50.5
6.3	46.6
6	44.6
3.35	42.7
2	40.2
1.18	38.2
0.6	35.9
0.425	34.2
0.3	28.7
0.212	21.7
0.15	17.4
0.063	11.4
0.02	9.0
0.006	5.5
0.002	2.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 22/01/2020	Certificate No :- PSD/NW1588/DS001/B6/0.70	Signed :- MSone	Name :-	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation		AEG Contract No :- NW1588	UKAS TESTING 1367

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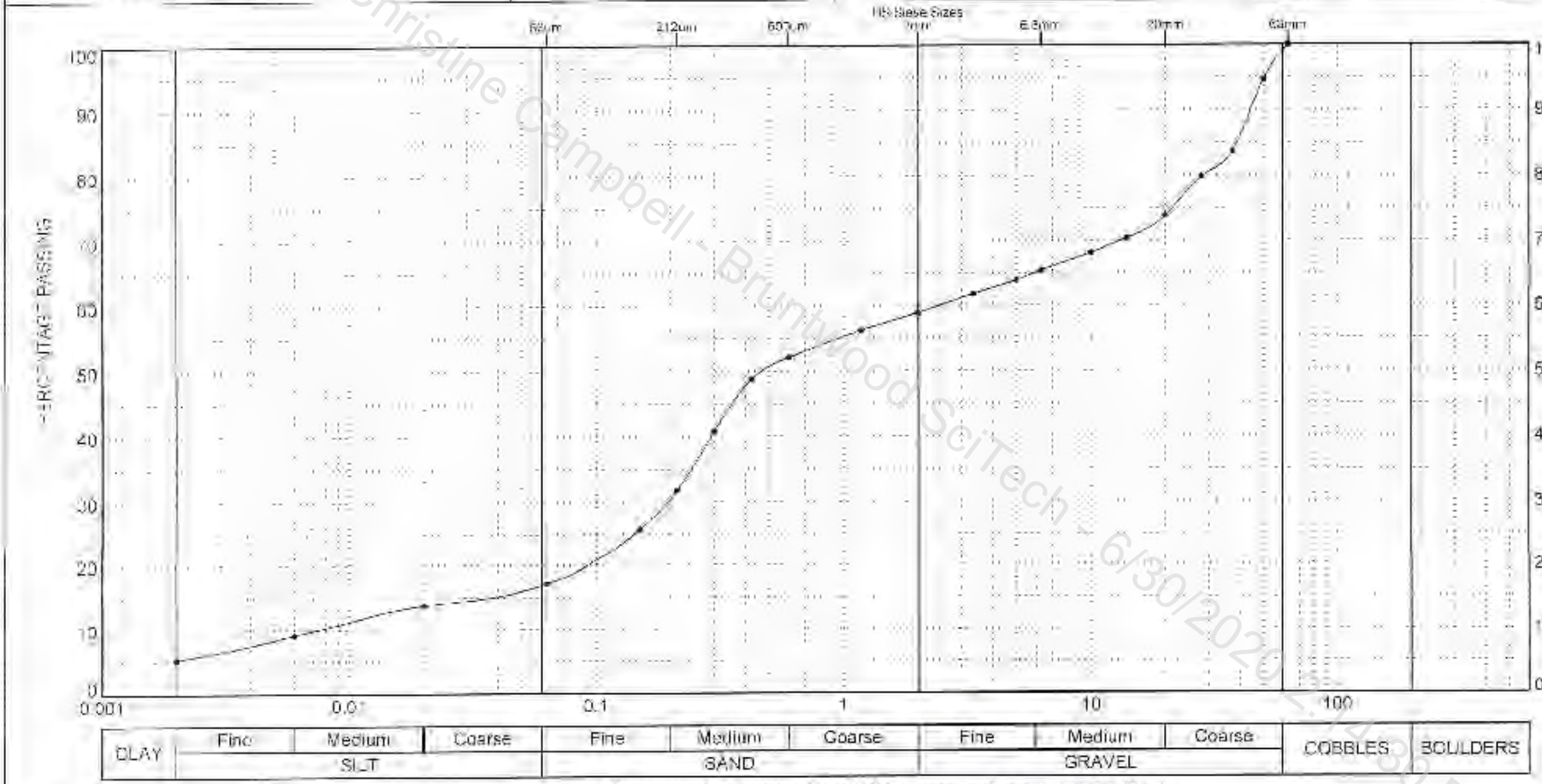
Head Office: Unit 3, Site 9 Gt. Industrial Estate, Pebble Hall, Cheshire Street, Gt. Harwood, BB6 7RG - Tel: 0161 764 4000 Fax: 0871 387 4711
Regional Office: Unit 20, Business Exchange, Eart Centre, Senate Wharf, Bolton, BL1 1RU - Tel: 01772 705 000 Fax: 01772 736 000

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- DS002	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) :- 0.80	Date Tested :- 10/12/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	94.5
37.5	83.7
28	79.8
20	73.8
14	70.4
10	68.1
6.3	65.4
5	63.9
3.35	61.8
2	58.9
1.18	56.2
0.6	52.1
0.425	46.8
0.3	40.8
0.212	31.8
0.15	25.8
0.063	17.0
0.02	13.7
0.006	9.1
0.002	5.3

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/DS002/B4/0.80	msone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

UKAS TESTING 1367

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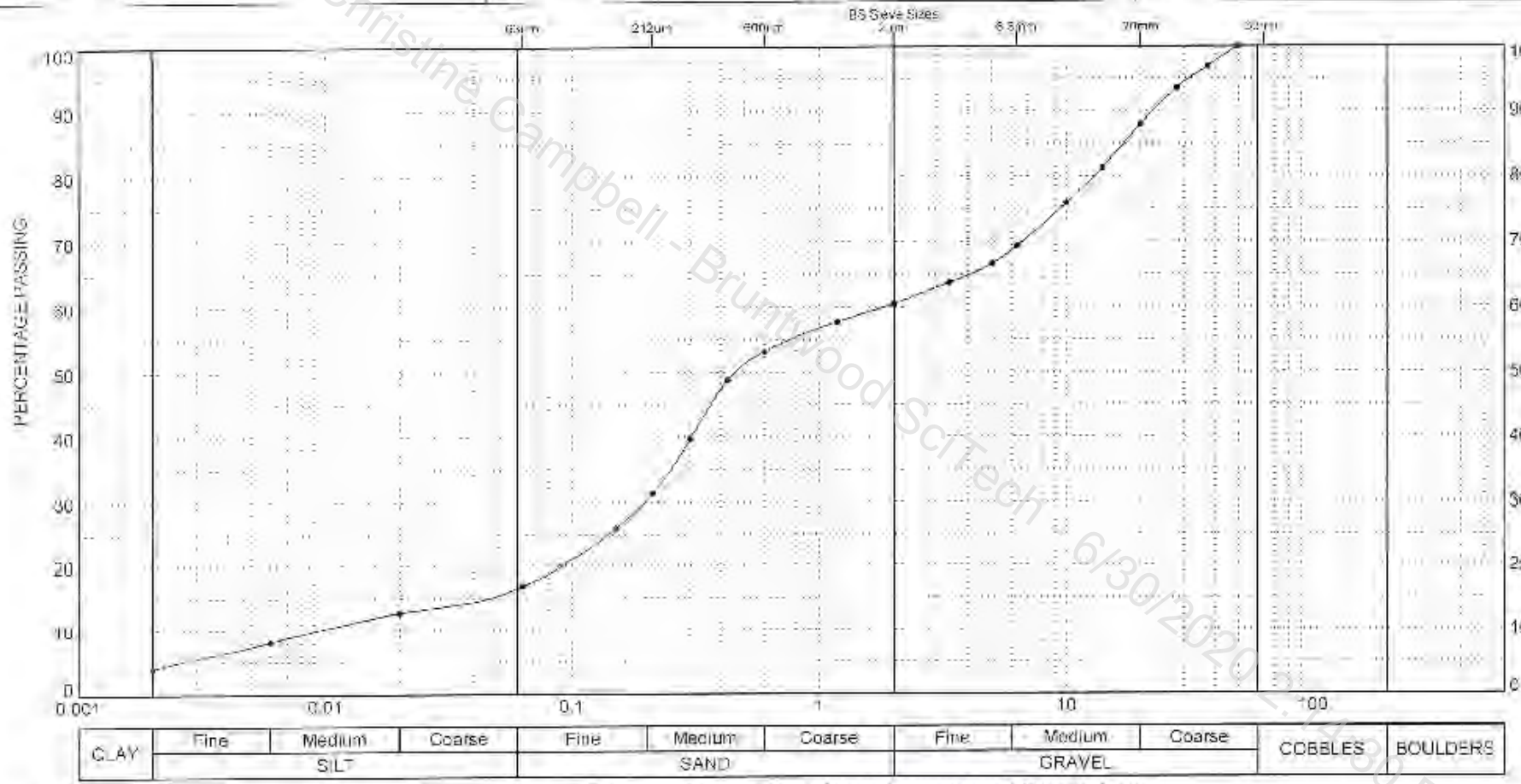
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2B Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 1RS. Tel: 0191 387 1010 Fax: 0191 387 1010
Regional Office: Unit 2A Business Development Centre, Bircham Way, Blackpool, FY1 5DL. Tel: 01772 736 800 Fax: 01772 736 899

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP001	Depth (m) :- 0.80	Sample Type & No :- B4	Specific Depth (m) :- 0.80	Date Tested :- 26/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	96.9
28	93.5
20	88.0
14	81.3
10	75.9
6.3	69.3
5	66.6
3.35	63.7
2	60.5
1.18	57.7
0.6	53.2
0.425	48.8
0.3	39.7
0.212	31.4
0.15	26.0
0.063	16.7
0.02	12.6
0.006	8.2
0.002	4.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP001/B4/0.80	MSCrd		

Client :-	Contract Title	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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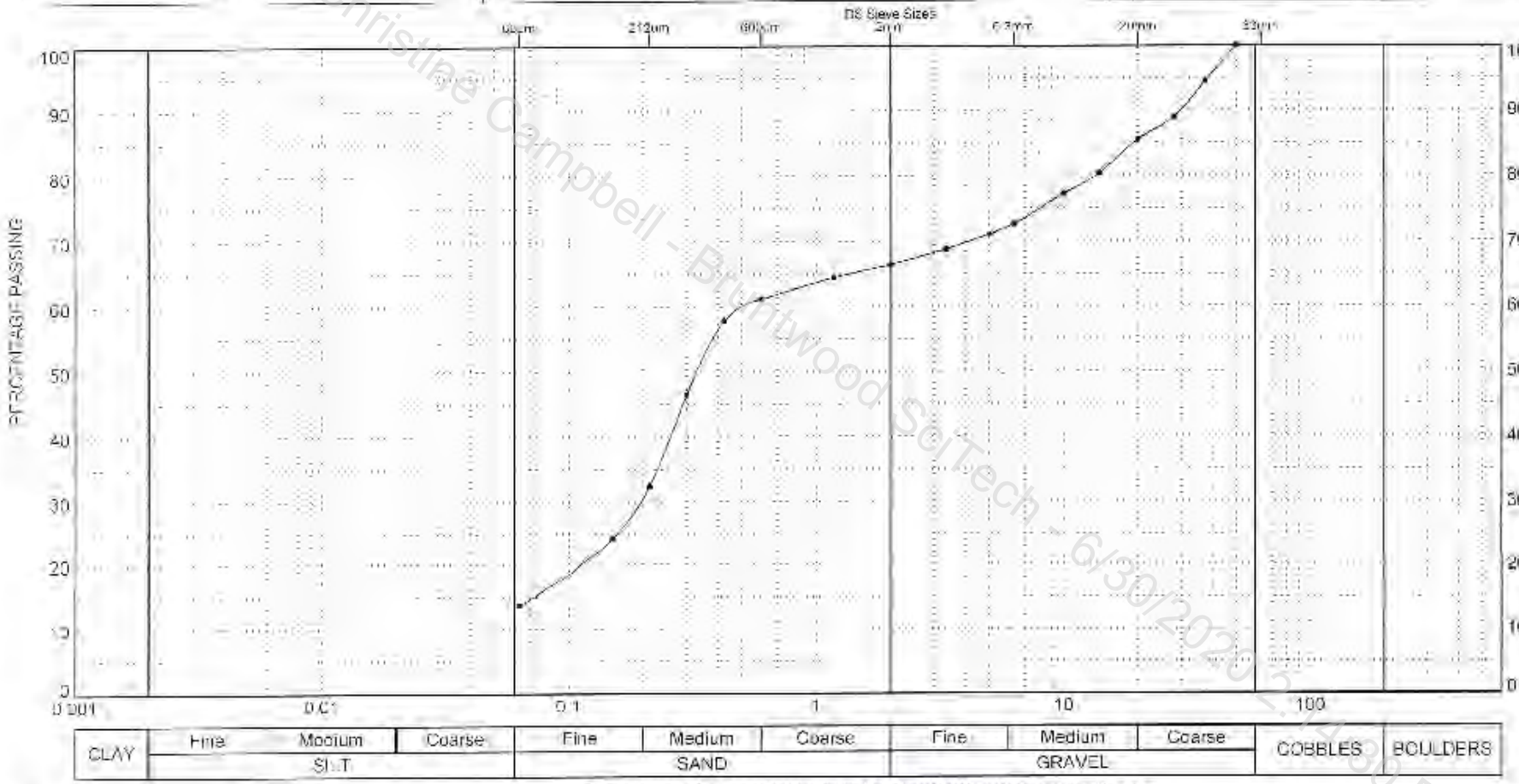
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Flora Gill Industrial Estate, Retford, Nottinghamshire, Durham, DH2 2RS - Tel: 0191 567 4700 Fax: 0191 567 4701
Regional Office: Unit 20, Business Development Centre, Forum Way, Blackburn, BB1 5BJ - Tel: 01772 205 300 Fax: 01772 205 333

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
TP001	1.50	B7	1.50	



Sieve Size (mm)	Passing (%)
50	100.0
37.5	94.5
28	89.0
20	85.5
14	80.4
10	77.2
6.3	72.6
5	71.0
3.35	68.0
2	66.4
1.18	64.4
0.6	61.1
0.425	57.8
0.3	46.4
0.212	32.4
0.15	24.3
0.063	19.7

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP001/B7/1.50	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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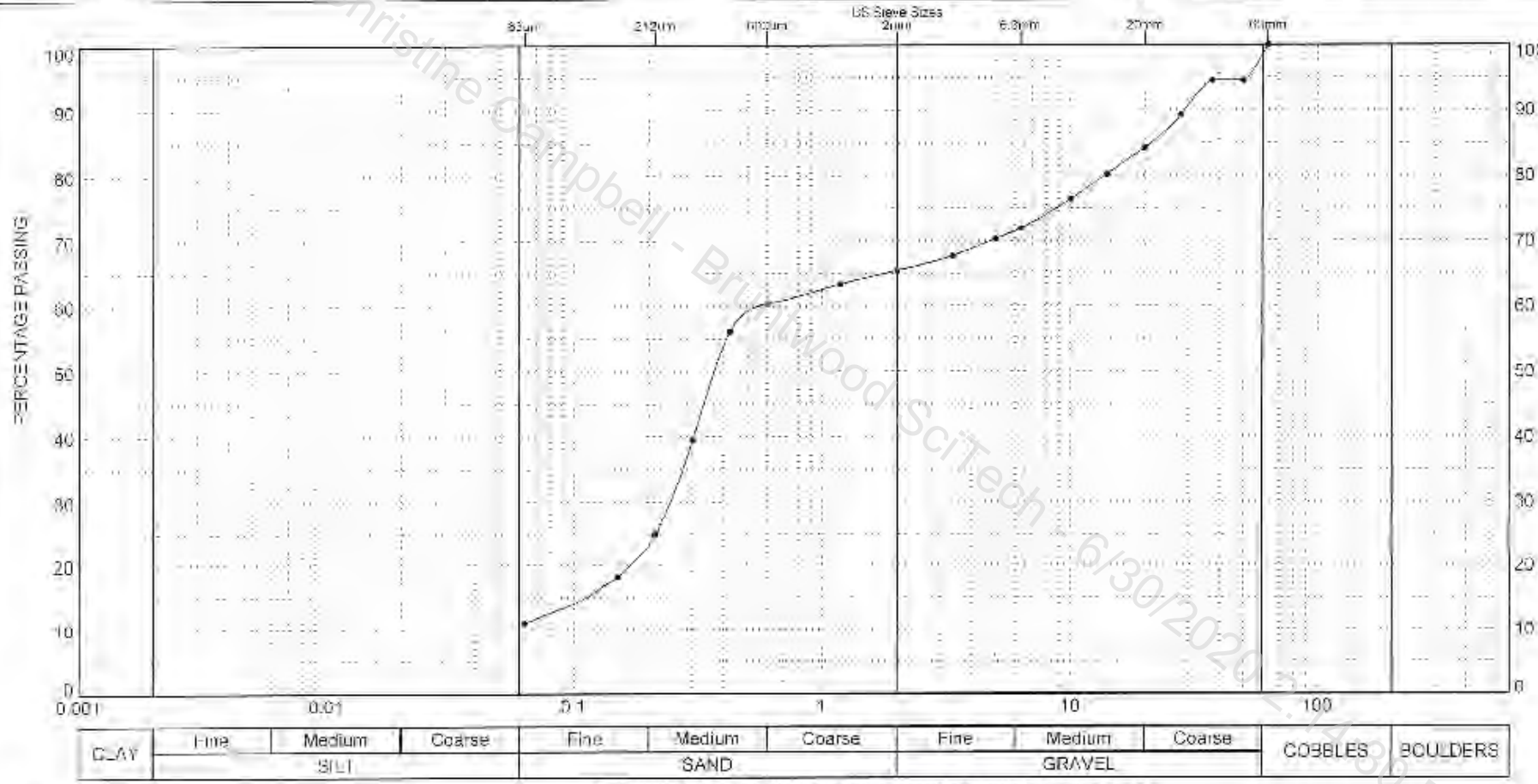
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office :- 9-25 Bilsta Ct, Industrial estate, Petrol Hill, Chester le Street, Co. Durham, DH2 2RS - Tel: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 23, Brookes Croston Ind Est, Fallow Field, Accrington, Lancs, BB5 5SL - Tel: 01772 735700 Fax: 01772 735 800

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
TP002	1.00	B4	1.00	25/11/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	94.5
37.5	94.5
28	89.3
20	84.3
14	80.2
10	76.4
6.3	71.9
5	70.3
3.35	67.7
2	65.4
1.18	63.3
0.6	60.3
0.425	56.1
0.3	39.5
0.212	25.0
0.15	18.2
0.063	11.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP002/B4/1.00			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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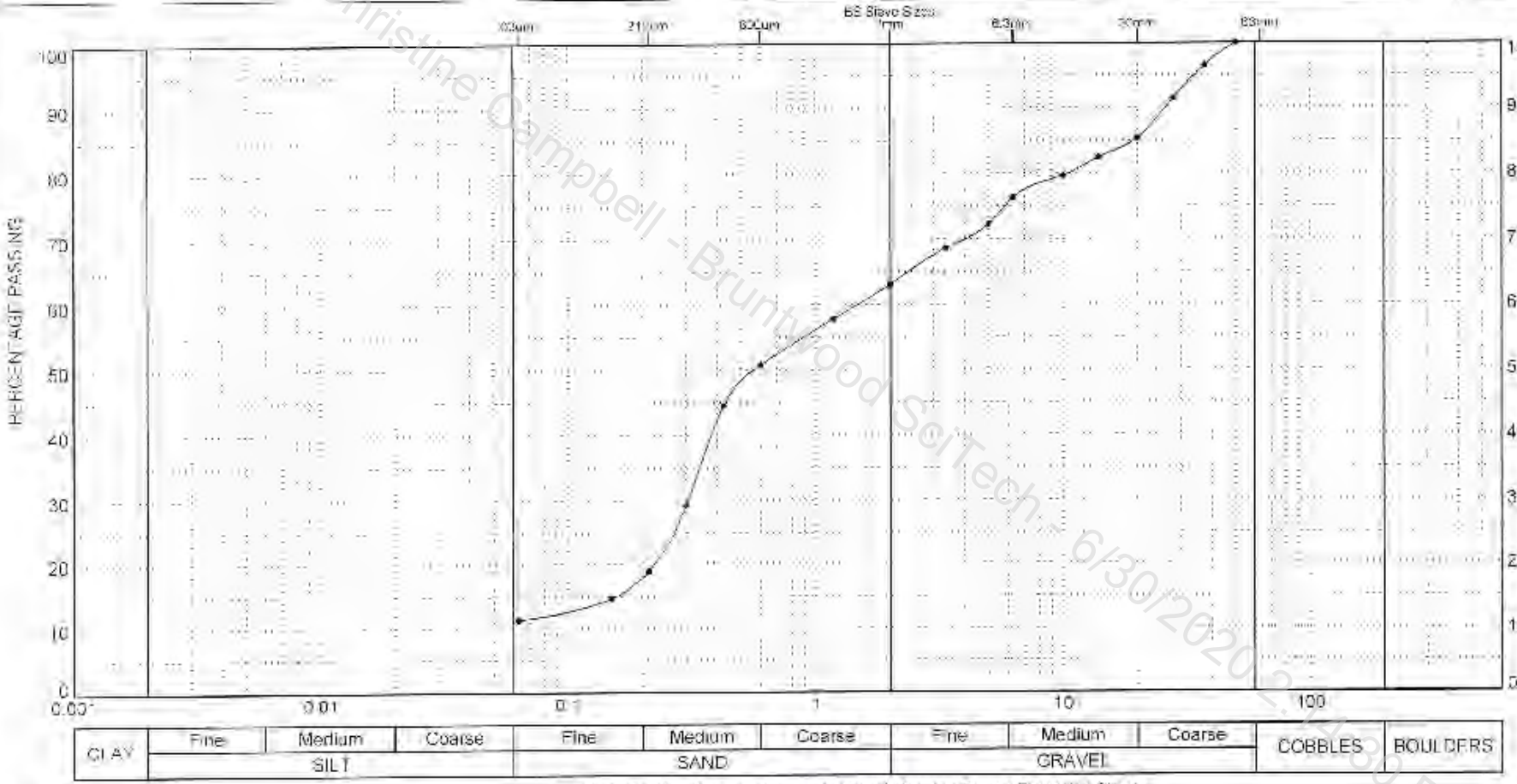
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Road Office: Unit 28 Falcon Cl, Industrial Estate, Irlam, Manchester, Gt. Britain, M44 5EG Tel: (0161) 777 4700 Fax: 0 161 777 4711
Regional Office: Unit 22 Burgess Development Centre, Burgess Road, Blackburn, BB1 5QL Tel: 01772 735 300 Fax: 01772 205 555

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP002	Depth (m) :- 2.50	Sample Type & No :- B10	Specific Depth (m) :- 2.50	Date Tested :- 22/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	96.5
28	91.4
20	85.4
14	82.4
10	79.6
6.3	76.3
5	72.3
3.35	68.6
2	63.1
1.18	57.8
0.6	50.9
0.425	44.5
0.3	29.3
0.212	18.9
0.15	14.7
0.063	11.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP002/B10/2.50	mSene		

Client :-	Contract Title :-	AEC Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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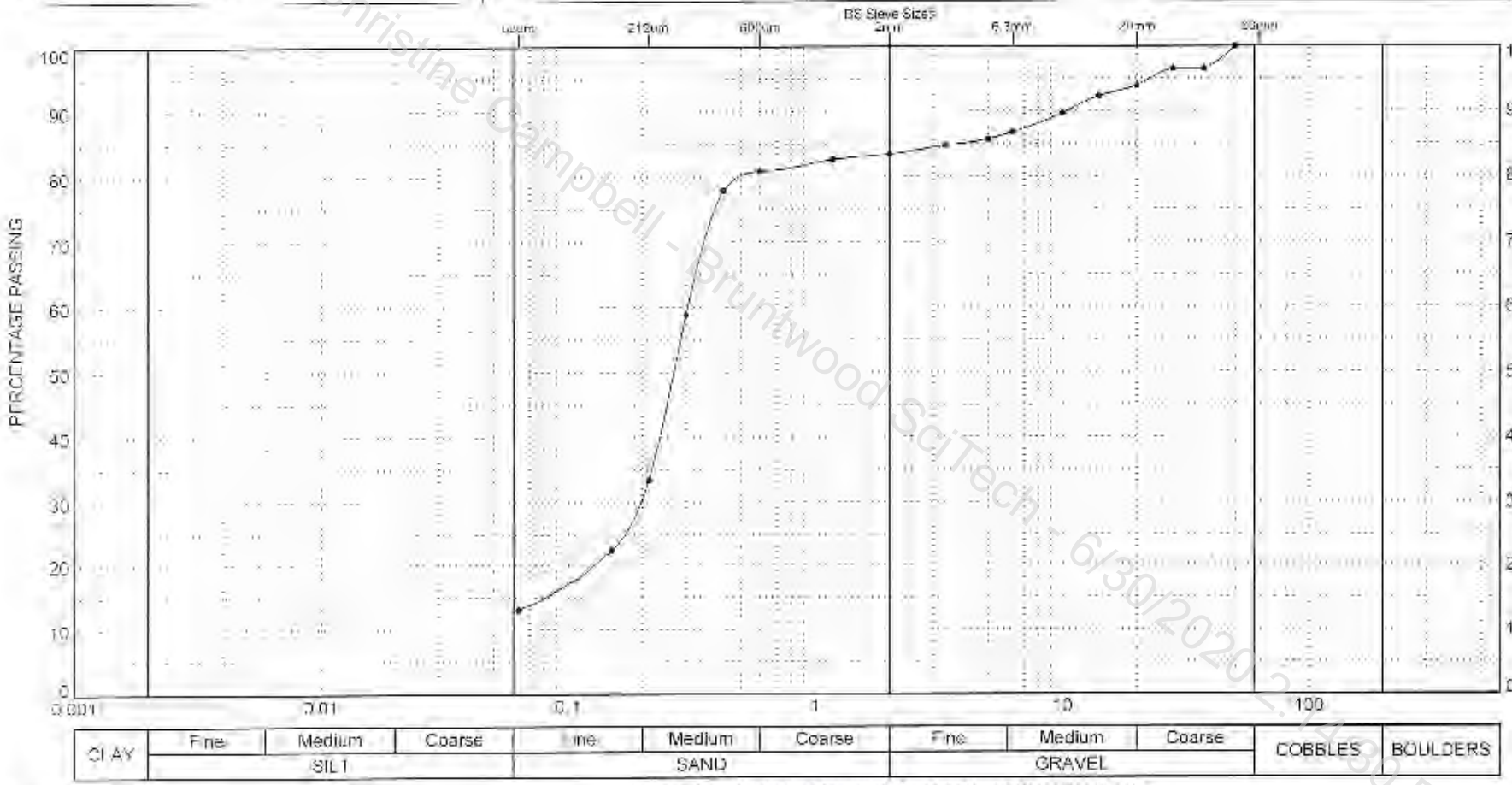
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Hyde Bridge Industrial Estate, Pollitt Street, Glossop, Derbyshire, SK13 8EN - Tel: 0161 367 1200 Fax: 0161 339 0177
Regional Office: Unit 23, Business Development Centre, Carnegie Road, Rhyl, Denbighshire, LL18 2PE - Tel: 01745 345 000 Fax: 01745 335 005

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :-	Depth (m) :-	Sample Type & No :-	Specific Depth (m) :-	Date Tested :-
TP003	1.00	B7	1.00	25/11/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	96.5
28	96.5
20	93.9
14	92.3
10	89.7
6.3	86.9
5	85.7
3.35	84.8
2	83.4
1.18	82.6
0.6	80.9
0.425	77.9
0.3	58.8
0.212	33.4
0.15	22.5
0.063	13.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :	Certificate No :	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP003/B7/1.00			

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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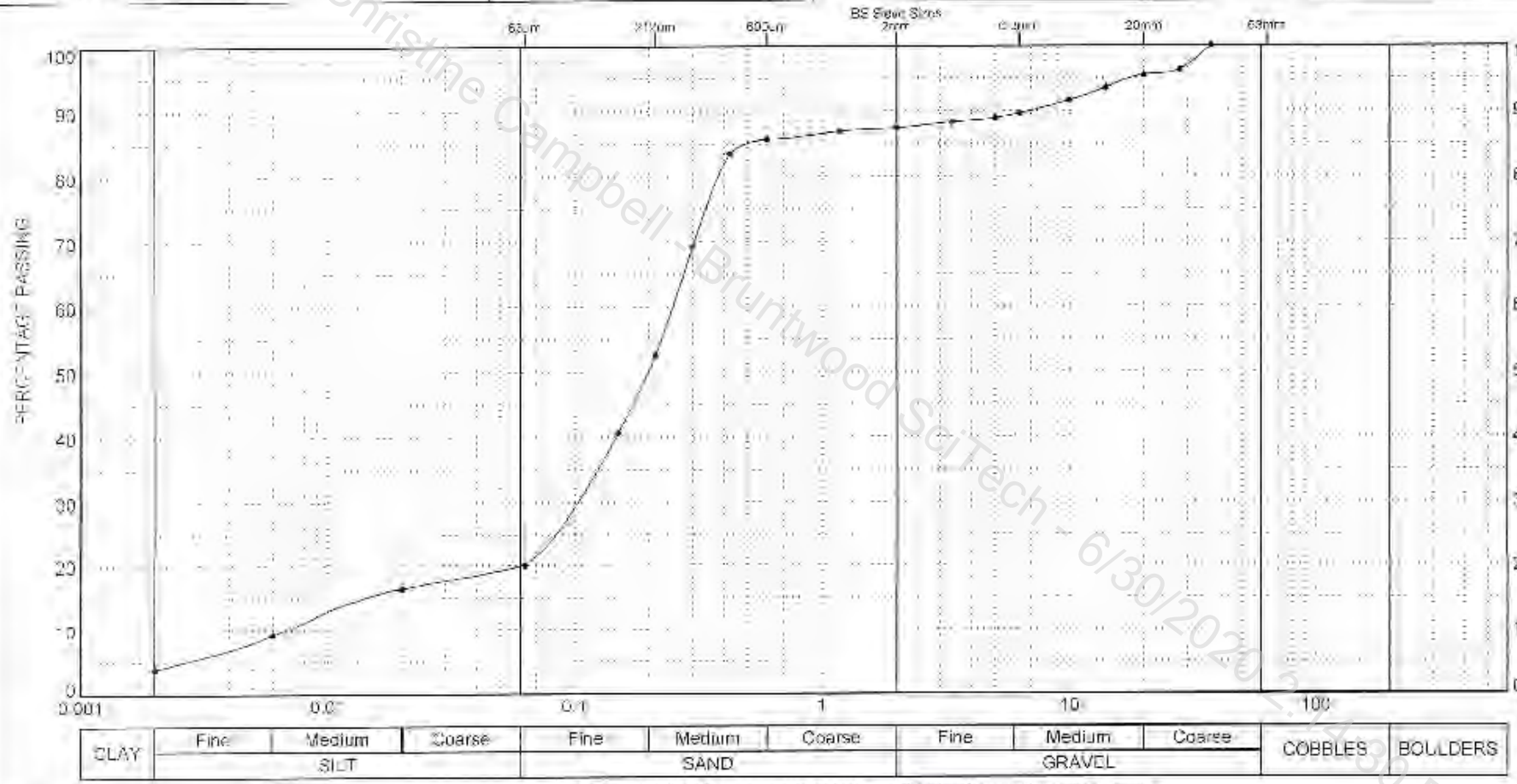
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Slate Office Park, Sandy Lane Industrial Estate, Stockton-on-Tees, Co. Durham, TS21 1RS - Tel: 01740 621000 Fax: 01740 621010
Regional Office: Unit 20, Business Development Centre, Bassett Walk, Blyth, Northumberland, NE24 4AX - Tel: 01670 356000 Fax: 01670 356001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP003	Depth (m) :- 3.00	Sample Type & No :- B12	Specific Depth (m) :- 3.00	Date Tested :- 25/11/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	96.3
20	96.5
14	93.5
10	91.6
6.3	89.6
5	88.9
3.35	88.3
2	87.4
1.18	86.9
0.6	85.7
0.425	83.5
0.3	69.2
0.212	52.6
0.15	40.7
0.063	20.0
0.02	16.3
0.006	9.2
0.002	3.9

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
22/01/2020	PSD/NW1588/TP003/B12/3.00	MSone		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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LABORATORY TESTING ENCLOSURE 4

Determination of Total Sulphur, Sulphate and pH

(Tested Externally)

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DETS

Certificate of Analysis

Certificate Number 19-24310

04-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-24310

Client Reference NW1588

Order No LA2256

Contract Title ID Manchester Preliminary Ground Investigation

Description 11 Soil samples.

Date Received 28-Nov-19

Date Started 28-Nov-19

Date Completed 04-Dec-19

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

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Summary of Chemical Analysis

Soil Samples

Our Ref 19-24310
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1605059	1605060	1605061	1605062	1605063	1605064	1605065	1605066	1605067	1605068	1605069
				Sample ID	BH001	BH001	BH002	BH003	BH003	BH0012A	BH013	BH013	BH014	TP001	TP002
				Depth	1.65	5.50	1.20	1.20	1.70	2.70	1.50	8.00	0.70	0.80	1.50
				Other ID	1	25	3	5	15	8	5	20	6	5	8
				Sample Type	J	J	B	B	J	B	B	J	J	J	J
				Sampling Date	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19	27/11/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**												
Inorganics															
pH	DETSC 2008#		pH		9.4	8.9	10.3	9.3	10.2	8.3	8.4	8.4	9.5	8.0	9.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		430	22	340	210	160	62	120	31	42	16	40

Key: # - MCERTS (accreditation only applies if report carries the MCERTS logo); n/s - not supplied.

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Information in Support of the Analytical Results

Our Ref 19 24310
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1605059	BH001 1.65 SOIL	27/11/19	PT 1L		
1605060	BH001 3.50 SOIL	27/11/19	PT 1L		
1605061	BH002 1.20 SOIL	27/11/19	PT 500ml		
1605062	BH003 1.20 SOIL	27/11/19	PT 500ml		
1605063	BH003 4.70 SOIL	27/11/19	PT 500ml		
1605064	BH001A 1.70 SOIL	27/11/19	PT 500ml		
1605065	BH013 1.50 SOIL	27/11/19	PT 500ml		
1605066	BH013 3.00 SOIL	27/11/19	PT 500m		
1605067	BH014 0.70 SOIL	27/11/19	PT 500m		
1605068	TP001 0.80 SOIL	27/11/19	PT 500m		
1605069	TP002 1.50 SOIL	27/11/19	PT 500m		

Key: P-Plastic T-Tub
DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory QA in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where holding times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 2/5µm sieve, in accordance with BS 1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The moisture Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 25°C +/- 2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal:
Soils - 1 month. Liquids - 2 weeks, Asbestos (bulk sample) - 6 months.

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Certificate of Analysis

Certificate Number 19-25093 13-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-25093
Client Reference NW1588
Order No LA2256
Contract Title ID Manchester Preliminary Ground Investigation
Description 10 Soil samples.
Date Received 09-Dec-19
Date Started 09-Dec-19
Date Completed 13-Dec-19
Test Procedures Identified by prefix DETSn (details on request)

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2 Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

ID Manchester - Christine Cantrell, Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-25093
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1609600	1609601	1609602	1609603	1609604	1609605	1609607	1609608	1609609	1609610
				Sample ID	BH012A	BH001	BH004	BH007	BH011	BH013	BH004	BH007	BH005	BH006A
				Depth	10.00	8.00-8.30	9.50-11.00	7.50-8.10	7.50-8.50	10.50-12.00	0.00	4.50	0.50	0.50
				Other ID	30						18	18	3	3
				Sample Type	B	C	C	C	C	C	B	J	J	J
				Sampling Date	27/10/19	29/10/19	16/11/19	17/11/19	23/11/19	30/10/19	02/11/19	09/11/19	16/11/19	17/11/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**											
Inorganics														
pH	DETSC 2008#		pH		8.1	8.9	8.2	8.1	7.6	8.4	10.0	10.2	8.4	10.7
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		61	18	59	14	51	21	1100	630	89	710

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

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Information in Support of the Analytical Results

Our Ref 19-25093
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1609600	BH01A 10.00 SOI	27/10/19	PT 1L	pH + Conductivity (7 days)	
1609601	BH003 8.00-8.50 SOIL	29/10/19	PT 1L	pH + Conductivity (7 days)	
1609602	BH004 9.50-10.00 SOIL	16/11/19	PT 1L	pH + Conductivity (7 days)	
1609603	BH007 7.50-8.10 SOIL	17/11/19	PT 1L	pH + Conductivity (7 days)	
1609604	BH011 7.50-8.50 SOIL	23/11/19	PT 1L	pH + Conductivity (7 days)	
1609605	BH013 10.00-10.50 SOIL	19/11/19	PT 1L	pH + Conductivity (7 days)	
1609606	BH004 0.80 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1609607	BH004 5.00 SOIL	02/11/19	PT 500ml	pH + Conductivity (7 days)	
1609608	BH007 4.50 SOIL	16/11/19	PT 500ml	pH + Conductivity (7 days)	
1609609	BH005 0.50 SOIL	16/11/19	PT 500ml	pH + Conductivity (7 days)	
1609610	BH005A 0.50 SOIL	17/11/19	PT 500ml	pH + Conductivity (7 days)	

Key: P-Plastic T-Tub G-Glass J-Jar
DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. Therefore samples received may be deviating. Deviating Sample Criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. The results of the analysis (carried out where applicable) on results may be compromised due to sample deviations. If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the containers supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on air dried sample. Organics results are corrected for moisture and expressed on an oven dry weight basis.
The Loss on Drying, used to express inorganic analysis on an oven dried basis, is carried out at a temperature of 28°C (+/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal:-
Soils - Enviros, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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DETS

Certificate of Analysis

Certificate Number	19-24307
	03-Dec-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-24307
Client Reference	NW1588
Order No	LA2256
Contract Title	ID Manchester Preliminary Ground Investigation
Description	9 Soil samples.
Date Received	28-Nov-19
Date Started	28-Nov-19
Date Completed	03-Dec-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
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ID Manchester - Christine Carmichael - Plantwood ScriTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-24307
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1605045	1605046	1605047	1605048	1605049	1605050	1605051	1605052	1605053
			Sample ID	BH001	BH004	BH007	BH007	BH008	BH008	BH009	BH011	BH011
			Depth	12.50	0.80	1.20	7.20	2.10	5.50	0.80	1.20	5.50
			Other ID	28	5	6	22	8	18	3	5	29
			Sample Type	J	B	J	J	J	J	J	J	J
			Sampling Date	29/10/19	21/11/19	08/11/19	09/11/19	10/11/19	10/11/19	09/11/19	09/11/19	09/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**									
Inorganics												
pH	DETSC 2008#		pH	8.3	8.3	10.6	8.3	11.4	7.8	10.7	11.2	8.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	16	80	120	39	120	200	410	120	68

Key: # MCERTS accreditation only applies if report carries the MCERTS logo) n/s - not supplied.

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Information in Support of the Analytical Results

Our Ref 19-24307
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1605045	BH001 12.50 SOIL	29/10/19	PT 500ml	pH + Conductivity (7 days)	
1605046	BH004 0.80 SOIL	07/11/19	PT 500m		
1605047	BH007 1.20 SOIL	08/11/19	PT 500m	pH + Conductivity (7 days)	
1605048	BH007 7.20 SOIL	09/11/19	PT 500m	pH + Conductivity (7 days)	
1605049	BH008 2.10 SOIL	10/11/19	PT 500m	pH + Conductivity (7 days)	
1605050	BH008 5.50 SOIL	10/11/19	PT 500m	pH + Conductivity (7 days)	
1605051	BH009 0.80 SOIL	09/11/19	PT 500ml	pH + Conductivity (7 days)	
1605052	BH011 1.20 SOIL	09/11/19	PT 500ml	pH + Conductivity (7 days)	
1605053	BH011 5.50 SOIL	09/11/19	PT 500ml	pH + Conductivity (7 days)	

Key: P-Plastic T Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. Samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on air dried sample, crushing to pass a 2mm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an oven dried sample. Organic results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organic analysis on an oven dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this certificate, samples will be held for the following times prior to disposal:
Soils - 1 month, Liquids - 2 weeks, Asbestos (bulk portion) - 6 months

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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 497

DETS

Certificate of Analysis

Certificate Number 19-25586

19-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-25586
Client Reference NW1588
Order No LA2256
Contract Title ID Manchester Preliminary Ground Investigation
Description 5 Soil samples.
Date Received 12-Dec-19
Date Started 12-Dec-19
Date Completed 19 Dec-19
Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
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Derwentside Environmental Testing Services Limited
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ID Manchester - Christine Campbell, Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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DETS

Summary of Chemical Analysis
Soil Samples

Our Ref 19-25586
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1613155	1613156	1613157	1613158	1613159
			Sample ID	DS001	DS002	BH005	BH005	BH005
			Depth	0.70	1.20	3.50	11.00	19.00
			Other ID	6	5			
			Sample Type	B	U	C	C	C
			Sampling Date	30/11/19	01/12/19	24/11/19	25/11/19	30/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Inorganics								
pH	DETSC 2008#		pH	7.9	7.9	7.8	7.8	7.9
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1400	1800	65	64	68

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Information in Support of the Analytical Results

Our Ref 19 25586
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1613155	BH001 0.70 SOIL	20/11/19	PT 500ml	pH + Conductivity (7 days)	
1613156	BH002 1.20 SOIL	21/11/19	PT 500ml	pH + Conductivity (7 days)	
1613157	BH005 3.50 SOIL	24/11/19	PT 1L	pH + Conductivity (7 days)	
1613158	BH005 11.00 SOIL	25/11/19	PT 1L	pH + Conductivity (7 days)	
1613159	BH005 19.00 SOIL	30/11/19	PT 1L	pH + Conductivity (7 days)	

Key: P-Plastic, T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviation. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organic results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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LABORATORY TESTING ENCLOSURE 5

Determination of Dry Density/Moisture Content Relationship

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Six Business Park, Stella Road, Chester le Street, DH2 1SA. Telephone: 0191 387 4700 Fax: 0191 387 4710
Regional Office: Unit 30, Business Development Centre, Bassett Road, Blackburn, BB1 3BT. Tel: 01254 691441

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 Part 4 1990

Specimen Identification

Exploratory Hole No :- **BH004** Depth (m) :- **2.00** Sample Type & No :- **B8**

Test Method 2.5kg Compaction Single Sample

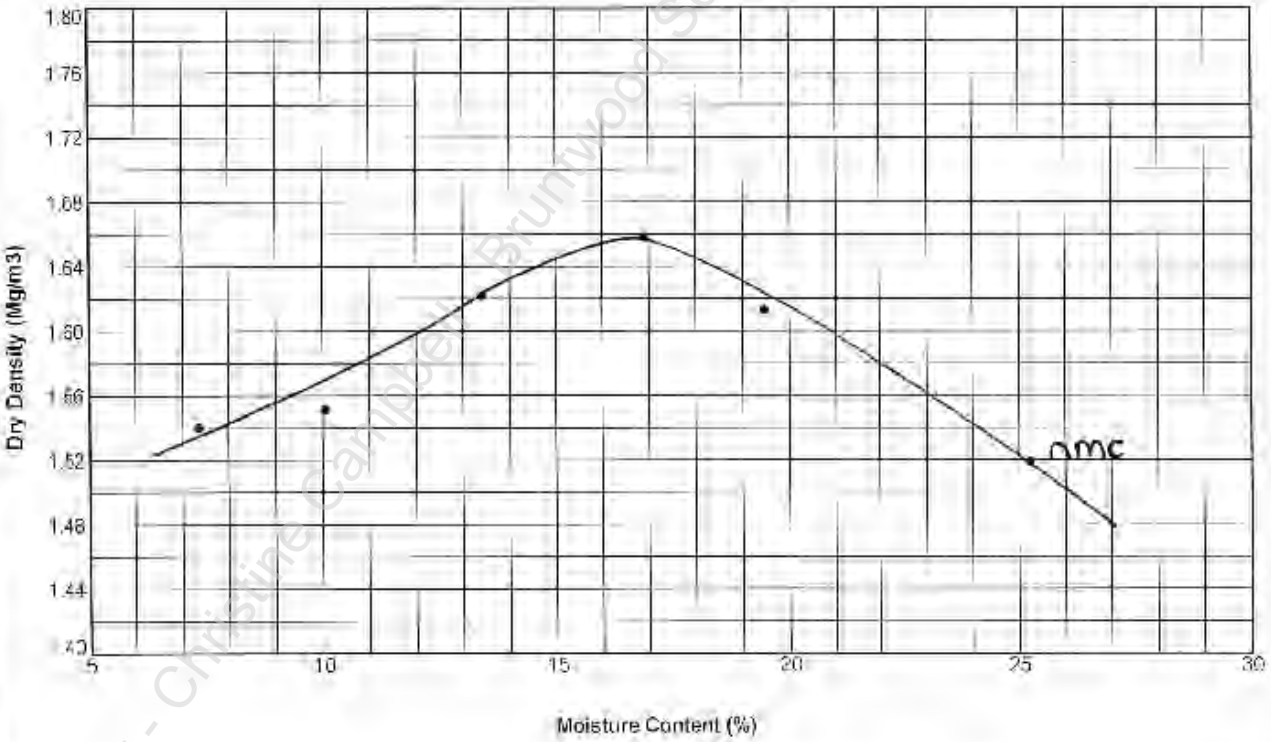
Test Results

Optimum Moisture Content (%) = **16.9** Particle Density (Measured) = **2.60**

Maximum Dry Density (Mg/m3) = **1.66** Retained on 20mm Sieve (%) = **17.3**

Date Tested = **09/12/2019** Retained on 37.5mm Sieve (%) = **9.3**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- Name :- Page 1 of 1

Date of Issue :- 20/01/2020 Certificate No :- COMP/NW1588/1 AGS Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Brunswood SciTech - 6430/2020 2:14:30 PM - 81.154.246.72

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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 502

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 12B Stirling Sth Industrial Estate, Raploch Rd, Cheese Bridge, Stirling, FK7 9RP Tel: 01786 471...
Regional Office: Unit 2, Business Development Centre, Crindau Road, Newport, NP20 5PG Tel: 01633 725 300 Fax: 01633 725 888

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

Specimen Identification

Exploratory Hole No :- **BH005** Depth (m) :- **1.50** Sample Type & No :- **B7**

Test Method 2.5kg Compaction Single Sample

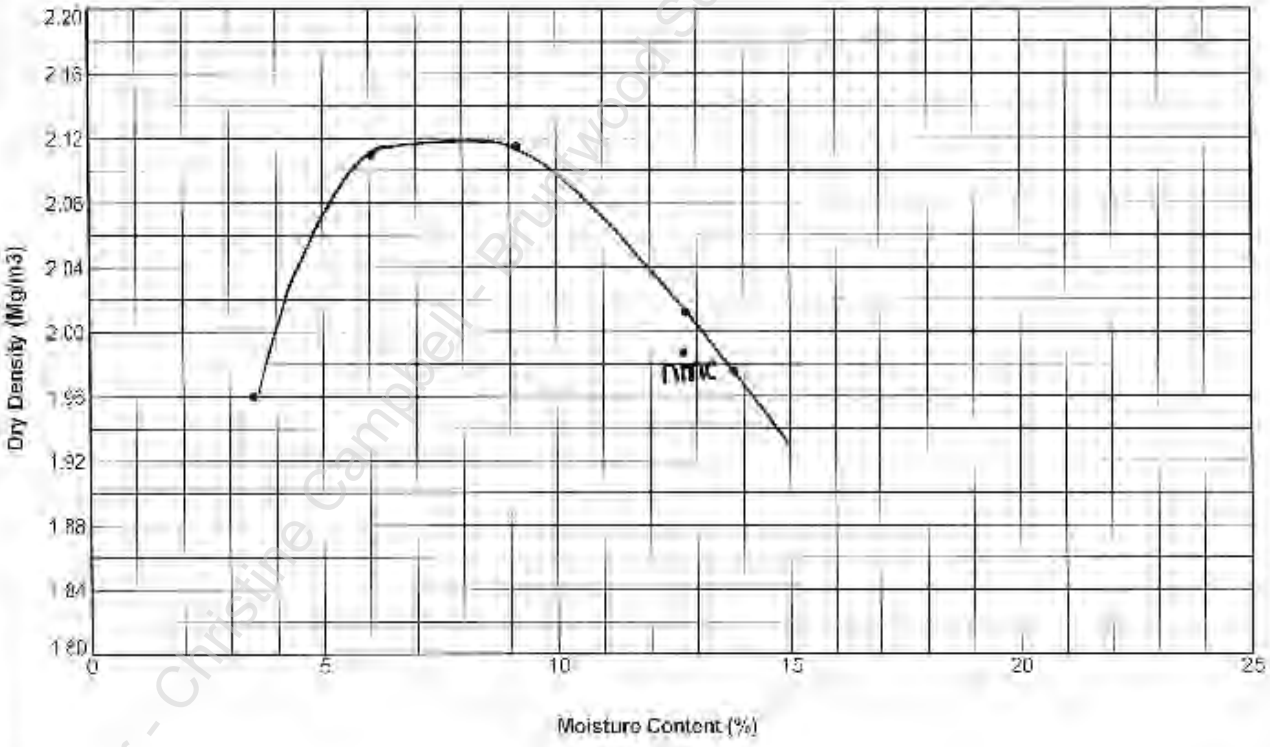
Test Results

Optimum Moisture Content (%) = **8.0** Particle Density (Assumed) = **2.75**

Maximum Dry Density (Mg/m3) = **2.12** Retained on 20mm Sieve (%) = **21.8**

Date Tested = **04/12/2019** Retained on 37.5mm Sieve (%) = **7.9**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- MSond

Name :-

Page 1 of 1

Date of Issue :- 22/01/2020

Certificate No :- GSW/PNW/5687

AEG Contract No :- NW1588

UKAS TESTING 1387

ID Manchester - Christine Campbell - Brynwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 22 Stoke On Industrial Estate, Dixon Rd, Lowestoft, Suffolk, NR32 3XQ. Tel: 01502 587470 Fax: 01502 587410
Regional Office: Unit 2A, Bluebell Investigation Centre, Sandy Walk, Bradford, BD6 2SE. Tel: 01274 395397 Fax: 01274 395399

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

Specimen Identification

Exploratory Hole No :- **BH011** Depth (m) :- **0.80** Sample Type & No :- **B3**

Test Method 2.5kg Compaction Single Sample

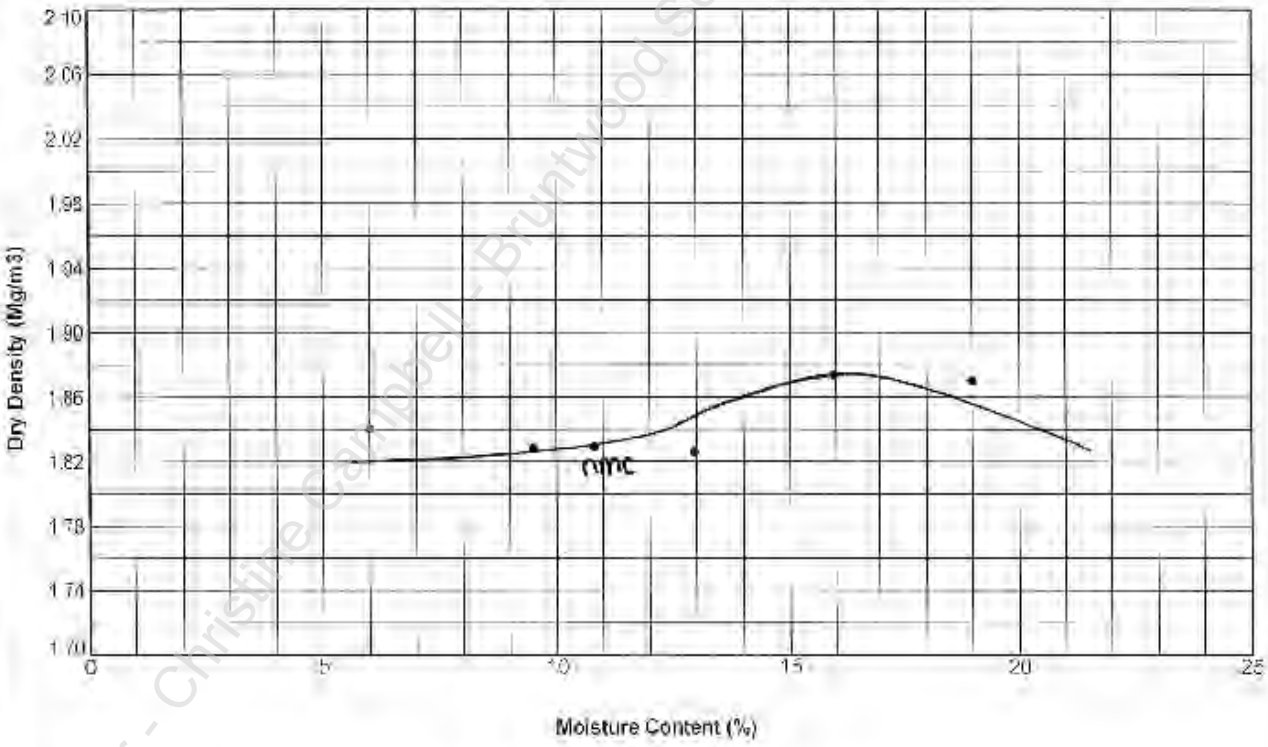
Test Results

Optimum Moisture Content (%) = **16.0** Particle Density (Assumed) = **2.75**

Maximum Dry Density (Mg/m3) = **1.87** Retained on 20mm Sieve (%) = **17.6**

Date Tested = **04/12/2019** Retained on 37.5mm Sieve (%) = **5.0**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- Name :- Page 1 of

Date of Issue :- 22/01/2020 Soil Trade No :- SUM-NW-588/1 AES Contract No. :- NW1588

1367

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 12A Bells Sol Industrial Estate Felton Hill, Chesterle Street, Co. Durham DH2 3RS Tel: 0191 492 4700 Fax: 0191 492 4701
Regional Office: Unit 3C, B.A.S.E. Swalwell Trading Centre, Derwent Street, Blaydon, NE21 5DJ Tel: 0191 738 3800 Fax: 0191 738 3801

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 Part 4 1990

Specimen Identification

Exploratory Hole No :- **TP001** Depth (m) :- **1.50** Sample Type & No :- **B7**

Test Method 2.5kg Compaction Single Sample

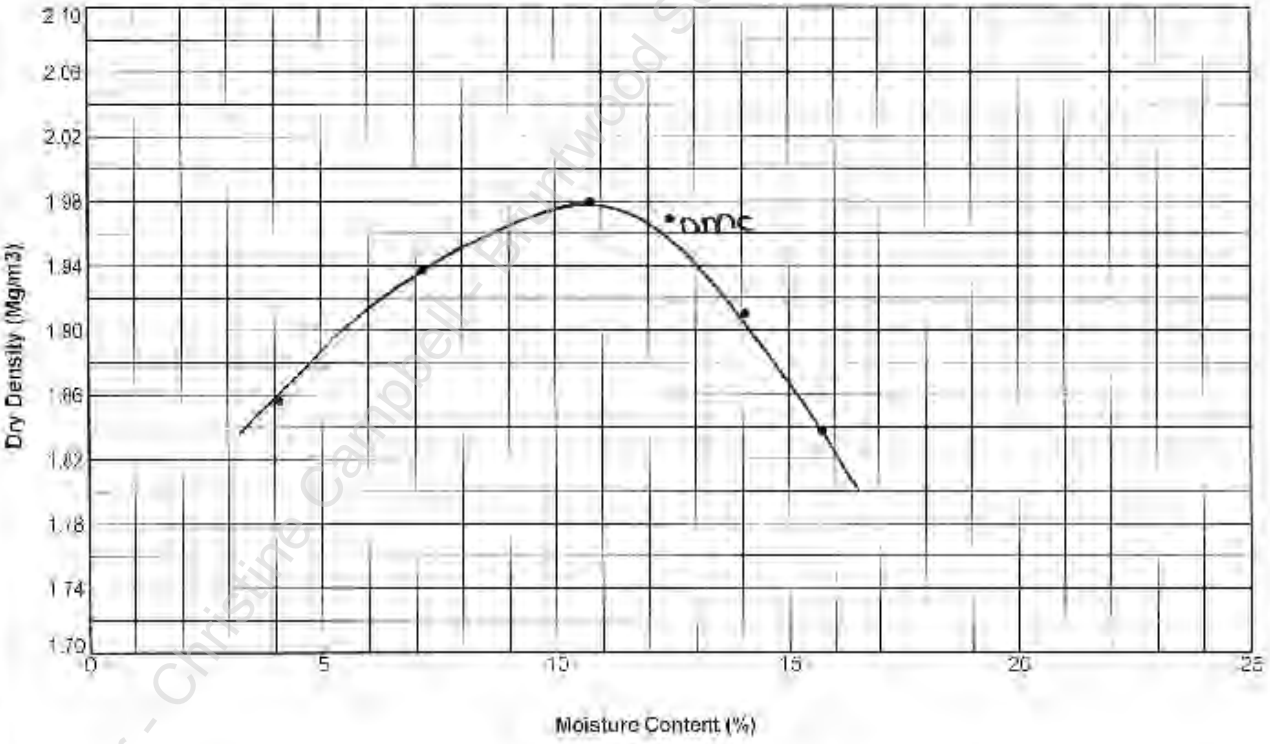
Test Results

Optimum Moisture Content (%) = **10.8** Particle Density (Assumed) = **2.67**

Maximum Dry Density (Mg/m3) = **1.98** Retained on 20mm Sieve (%) = **14.0**

Date Tested = **02/12/2019** Retained on 37.5mm Sieve (%) = **5.0**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- Name :- Page 1 of 1

Date of Issue :- 22/01/2020

Certificate No :- COMP/NW1588/1

AEG Contract No. :- NW1588

UKAS TESTING 1367

ID Manchester - Christine Campbell - Fairhurst SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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LABORATORY TESTING ENCLOSURE 6

Determination of One Dimensional Consolidation Properties

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

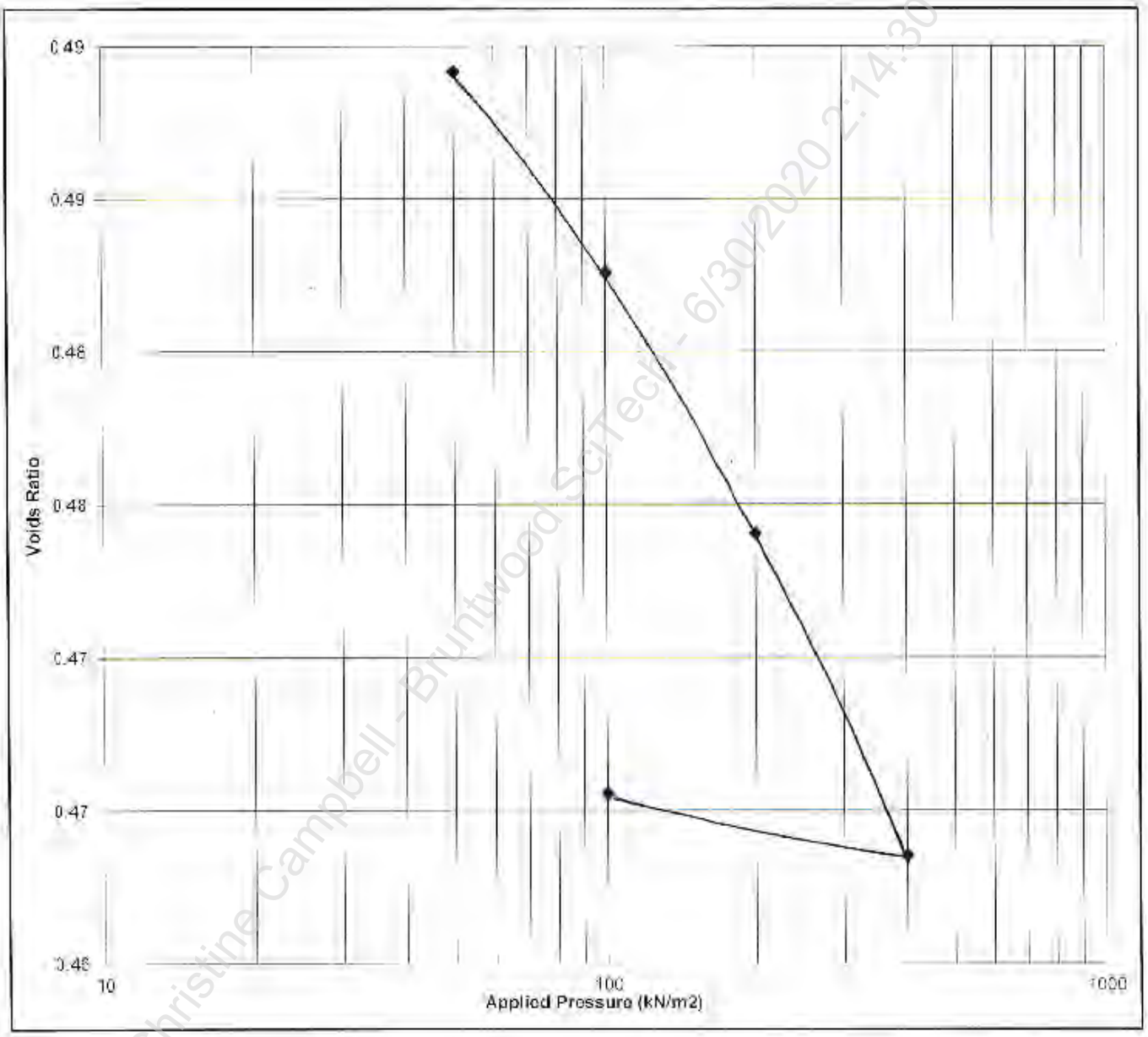
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ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH012A	Sample	U25	Depth	8.50m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth	8.81m



Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	University of Manchester

Signed:	Name:	Page 2 of 2
	M. SELKIRK	

Date of Issue:	Certificate No:	AEG Contract No:
26/11/2019	NW1588/A	NW1588

UKAS TESTING 1367

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES

BS 1377 : PART 5 : 1990 ; CLAUSE 3

Exploratory Hole No	**BH012A**	**Sample**	**U25**	**Depth**	**8.50m**
Specimen Type	**Undisturbed**	**Orientation**	**Vertical**	**Specific Depth**	**8.81m**

	INITIAL	FINAL			
Height	18.8	18.2	mm	Particle Density (Assumed)	2.70
Diameter	74.3	74.3	mm		
Moisture Content	17.6	17.4	%	Degree of Saturation (%)	92.9
Wet Density	2.10	2.15	Mg/m^3		
Dry Density	1.79	1.83	Mg/m^3	Test Duration (Days)	6
				Date Tested	18/11/2019

Square Root of Time Fitting Method

Pressure Range kN/m2	Mv m2/MN	Cv m2/yr	Temp C	Voids Ratio
Inital				0.512
0 - 50	0.296	.	22	0.489
50 - 100	0.089	18.38	22	0.483
100 - 200	0.057	18.76	21	0.474
200 - 400	0.036	17.96	22	0.464
400 - 100	0.005	Swelling	22	0.466

For sample description please refer to the Laboratory Sample Description Sheet

Contract Title:	Client:
ID Manchester Preliminary Ground Investigation	**University of Manchester**

Signed:	Name:		
	M. SELKIRK	Page 1 of 2	UKAS TESTING 1357
Date of Issue: 26/11/2019	Certificate No: NW1688/A	AEG Contract No: NW1688	

ID Manchester_Christina Campbell / Bruntwood SciTech 6/5/2020 2:14:30 PM 81.154.240.72

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LABORATORY TESTING ENCLOSURE 7

Consolidated Undrained Shear Strength in Triaxial Cell with Measurement of Pore Water Pressure

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate,
Pelton Fell, Chester le Street, DH2 2RG.

CONSOLIDATED UNDRAINED TRIAXIAL WITH MEASUREMENT OF PORE WATER PRESSURE

B.S. 1377 : Part 8 : 1990 : Clauses 3,4,5,6 and 7

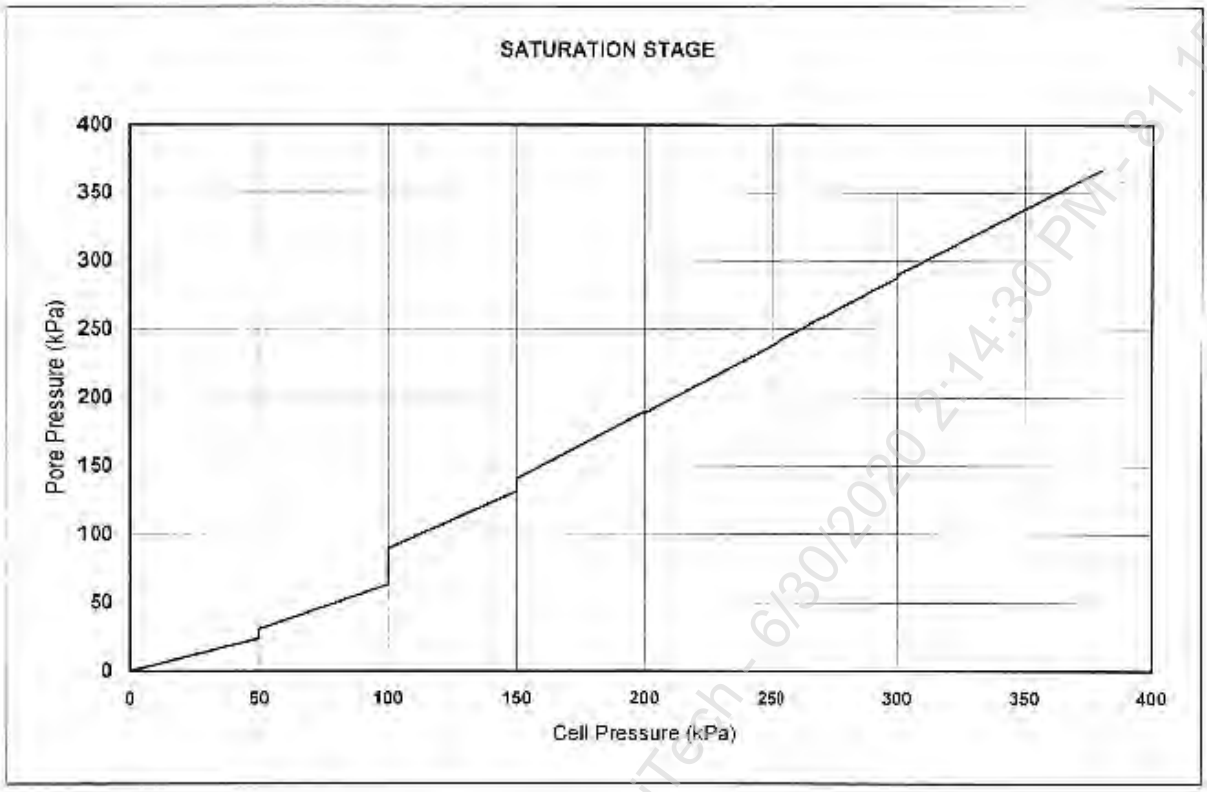
PROJECT No : NW1588 **CLIENT : University of Manchester**
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 **SAMPLE No : U10** **DEPTH (m) : 1.20**

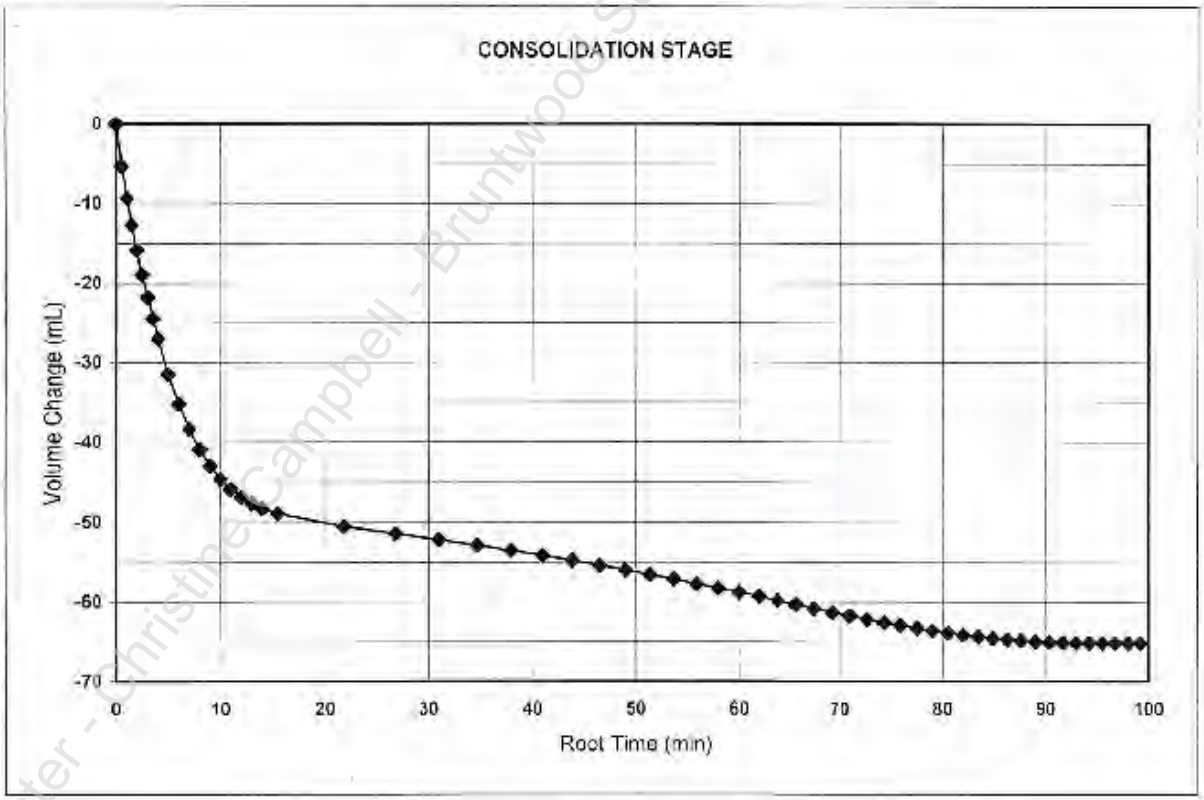
TEST SPECIMEN PREPARATION	Undisturbed	
Depth within original sample	: 1.40m	
Orientation within original sample	:Vertical	
Description	: Please refer to sample description sheet	
TEST SPECIMEN DETAILS	*Stage*	1
Length	*mm*	203.8
Diameter	*mm*	104.3
Moisture Content	*%*	23.8
Bulk Density	*Mg/m^3*	2.00
SATURATION STAGE		
Drainage Conditions	: Both ends and radial boundary	
Final Cell Pressure	*kPa*	380
Final Pore Pressure	*kPa*	300
Final Pore Pressure Parameter B		0.97
Duration	*day(s)*	2
CONSOLIDATION STAGE		
Cell Pressure	*kPa*	380
Back Pressure	*kPa*	300
Effective Pressure	*kPa*	80
Final Pore Pressure	*kPa*	298.9
Duration	*day(s)*	5
SHEARING STAGE		
Cell Pressure	*kPa*	380
Rate of Axial Displacement	*mm/min*	0.00699
Final Moisture Content	*%*	23.0
Final Bulk Density	*Mg/m^3*	1.99
CONDITIONS AT FAILURE	*Criterion*	Maximum stress ratio
Pore Pressure	*kPa*	332
Minor Effective Principal Stress	*kPa*	48
Deviator Stress	*kPa*	110
Major Effective Principal Stress	*kPa*	159
Effective Principal Stress Ratio		3.27
Pore Pressure Parameter A		0.30
Axial Strain	*%*	5.3
Correction applied to Principal Stress	*kPa*	4.4
Duration	*Days*	4

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PROJECT No : NW1588 **CLIENT : University of Manchester**
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 **SAMPLE No : U10** **DEPTH (m) : 1.20**



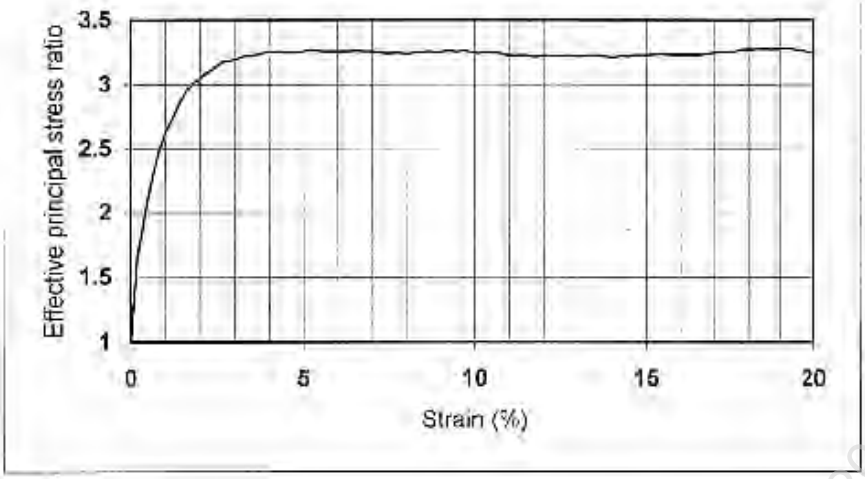


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PROJECT No : NW1588 **CLIENT : University of Manchester**
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 **SAMPLE No : U10** **DEPTH (m) : 1.20**

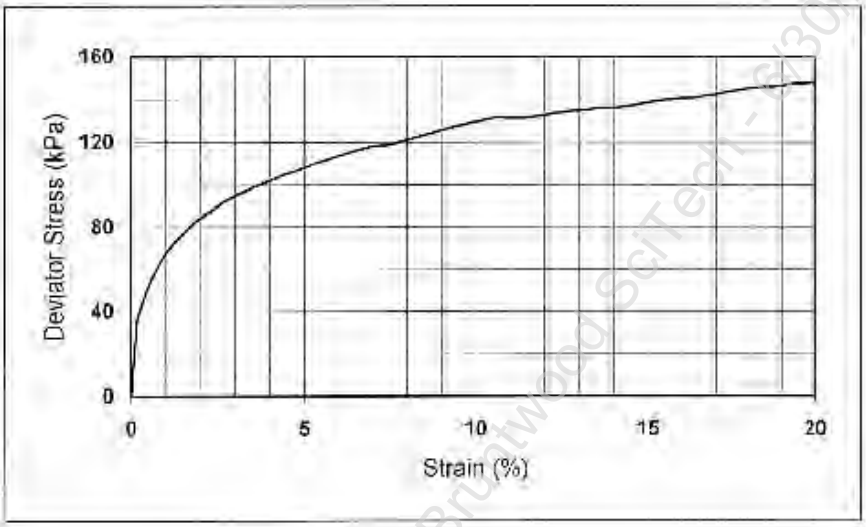


Failure Conditions

Specimen 1

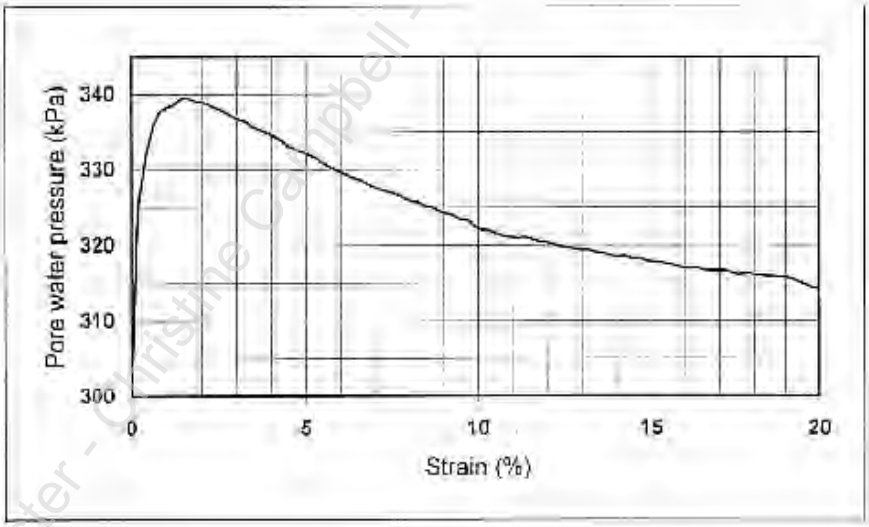
At maximum stress ratio

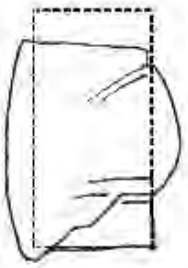
strain	5.33	%
deviator stress	110.2	*kPa*
stress ratio	3.27	



At maximum deviator stress

strain	19.85	%
deviator stress	148.0	*kPa*
stress ratio	3.25	





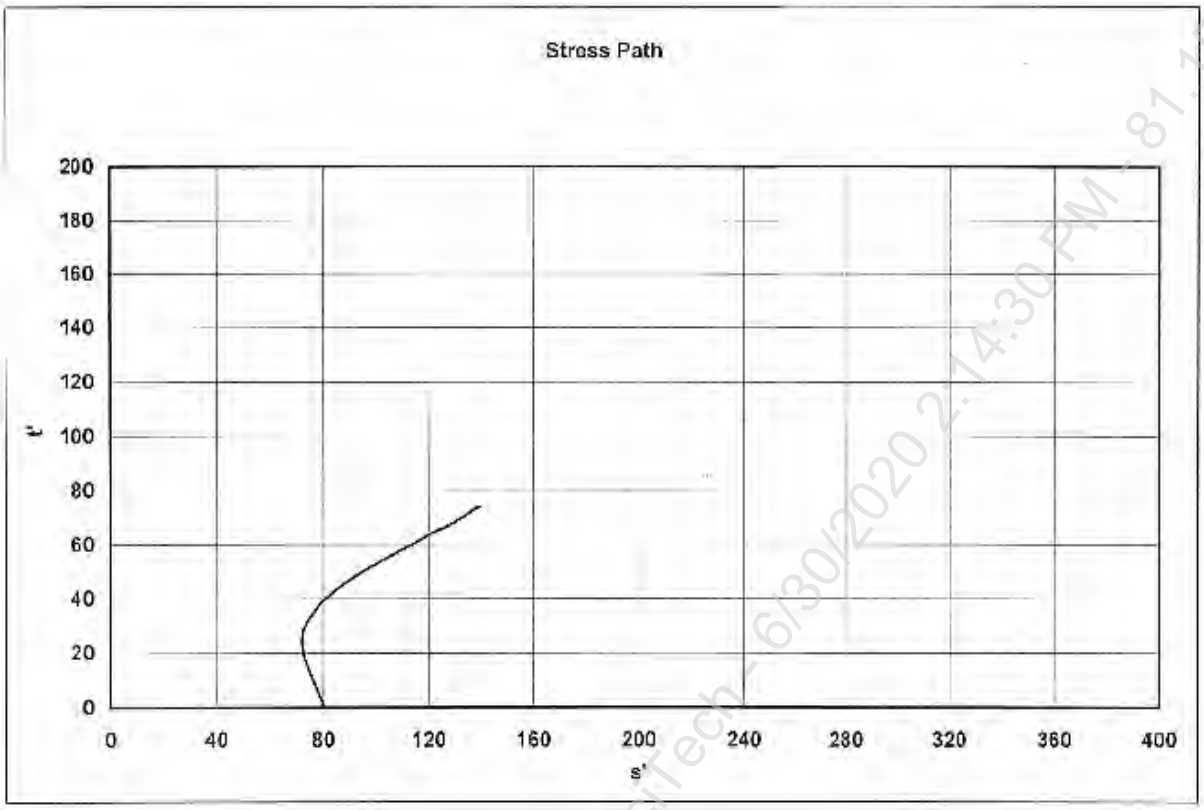
FAILURE MODE

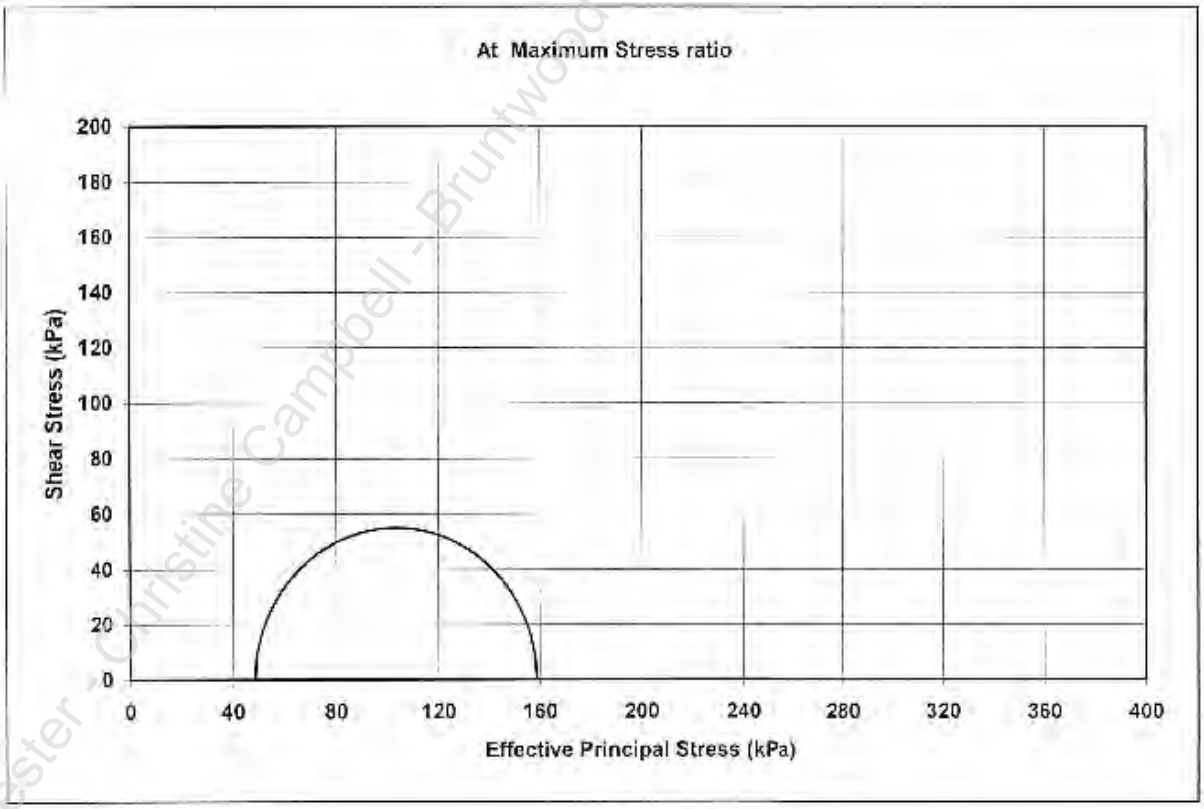
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PROJECT No : NW1588 CLIENT : University of Manchester
PROJECT : ID Manchester Preliminary Ground Investigation
HOLE : BH001 SAMPLE No : U10 DEPTH (m) : 1.20





Sheet 4 of 4

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LABORATORY TESTING ENCLOSURE 8

Moisture Content of Rock

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Head Office: Unit 25 Stella Building, Stella Close, Off Chester Road, Stretford, Manchester, M32 0RS. Tel: 0161 865 4700 Fax: 0161 865 4701
Regional Office: Unit 16, Burnhead Business Centre, Burnhead Road, Burnhead, Stonehouse, ML9 3QY. Tel: 01698 [illegible]

MOISTURE CONTENT CERTIFICATE

ISRM : 1981

Exploratory Hole No.	Sample Depth (m)	Sample ID	Moisture Content (%)	Date Tested	Remarks
BH001	9.20	C30	12.1	02/12/2019	
BH001	11.84	C32	13.7	02/12/2019	
BH001	14.70	C34	14.7	02/12/2019	
BH004	11.25	C30	15.3	03/12/2019	
BH004	13.20	C32	13.6	04/12/2019	
BH005	9.00	C23	16.0	09/12/2019	
BH005	17.00	C29	15.5	09/12/2019	
BH007	9.15	C27	17.9	03/12/2019	
BH011	8.45	C23	15.3	03/12/2019	
BH011	8.80	C24	15.3	03/12/2019	
BH011	10.00	C25	15.0	03/12/2019	
BH011	11.30	C26	13.4	03/12/2019	
BH011	12.30	C27	12.6	04/12/2019	
BH013	11.80	C26	16.1	02/12/2019	
HC001	0.00	C1	18.0	25/11/2019	
HC002	0.00	C1	17.9	25/11/2019	
HC003	0.00	C1	18.5	25/11/2019	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- ID Manchester Preliminary Ground Investigation

Client :- University of Manchester

Signed :- MSeal

Name :-

Page 1 of 1

Date of Issue :- 23/12/2019

Certificate No :- RMC/NW/15881

AEG Contract No. :- NW1588

UKAS TESTING 1367

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LABORATORY TESTING ENCLOSURE 9

Determination of Point Load Index

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ID Manchester - Christina Campbell - Brantwood GeoTech - 6/30/2020 2:14:39 PM - 84.254.246.72

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Head Office: [illegible] Registered Office: [illegible]

POINT LOAD STRENGTH INDEX

ISRM 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH001	3.20	Diametral	125.3	97.7	0.3	9546.3	0.026	1.352	0.035	Sandstone	02/12/2019
BH001	3.20	Axial	100.2	74.2	1.2	8466.3	0.128	1.349	0.173	Sandstone#	02/12/2019
BH001	3.70	Diametral	127.9	93.2	0.1	8686.2	0.007	1.323	0.009	Sandstone	03/12/2019
BH001	3.70	Axial	99.1	49.1	0.0	6195.3	0.004	1.227	0.004	Sandstone	03/12/2019
BH001	10.50	Diametral	126.3	99.3	0.1	9860.0	0.014	1.352	0.019	Sandstone	03/12/2019
BH001	10.50	Axial	100.1	36.0	0.0	4588.2	0.006	1.146	0.006	Sandstone	03/12/2019
BH001	10.70	Diametral	135.5	94.7	0.1	8980.1	0.012	1.330	0.016	Sandstone	03/12/2019
BH001	10.70	Axial	100.7	44.6	0.3	5775.2	0.055	1.207	0.066	Sandstone	03/12/2019
BH001	11.00	Diametral	98.1	92.6	0.1	8574.8	0.013	1.22	0.017	Sandstone	02/12/2019
BH001	11.50	Axial	99.5	78.9	0.9	9922.8	0.085	1.364	0.12	Sandstone#	02/12/2019
BH001	12.60	Irregular Lump	95.6	85.2	0.7	10370.7	0.067	1.377	0.092	Sandstone#	04/12/2019
BH001	12.70	Irregular Lump	101.8	61.3	0.2	7906.4	0.027	1.296	0.035	Sandstone	04/12/2019
BH001	12.90	Axial	100.3	68.9	0.3	8798.9	0.033	1.327	0.044	Sandstone#	04/12/2019
BH001	13.00	Axial	109.4	68.3	0.4	9597.2	0.038	1.353	0.051	Sandstone	04/12/2019

NOTES :- *Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) I-Too soft to register a reading

Date of Issue :- 22/01/2020	Certificate No :- PUNW1588/1	Signed :-	Name :-	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation		AEG Contract No :- NW1588	

UKAS TESTING 1367

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5 Bolton St / Lough of Leads, Ripley, Derbyshire, DH5 3RD. Tel: 01773 [illegible] Fax: 01773 [illegible]
Regional Office: Unit 7 Business Centre, [illegible] Road, Barnsley, S63 3JL. Tel: 01226 [illegible] Fax: 01226 [illegible]

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH001	13.60	Diametral	95.7	91.3	0.0	8335.7	0.003	1.311	0.003	Sandstone	04/12/2019
BH001	13.65	Axial	94.5	33.3	0.2	4006.7	0.054	1.112	0.06	Sandstone	04/12/2019
BH001	14.10	Axial	98.9	69.0	0.6	8751.7	0.064	1.325	0.085	Sandstone	02/12/2019
BH001	14.30	Axial	100.5	34.5	0.1	4414.6	0.026	1.138	0.03	Sandstone	02/12/2019
BH001	14.35	Axial	100.9	43.7	0.1	5614.1	0.023	1.12	0.026	Sandstone	02/12/2019
BH001	14.40	Axial	100.6	48.6	0.2	5840.8	0.034	1.21	0.041	Sandstone	02/12/2019
BH001	14.55	Axial	100.5	76.6	0.6	9673.6	0.061	1.356	0.083	Sandstone	02/12/2019
BH001	14.70	Axial	102.0	57.1	0.4	7416.6	0.053	1.277	0.068	Sandstone	02/12/2019
BH001	14.90	Axial	100.1	79.7	0.6	10157.9	0.052	1.371	0.071	Sandstone	02/12/2019
BH001	15.00	Diametral	150.2	94.3	0.1	8892.5	0.005	1.33	0.006	Sandstone	04/12/2019
BH001	15.00	Axial	93.8	57.8	0.6	7344.5	0.079	1.274	0.101	Sandstone	04/12/2019
BH001	15.30	Axial	104.7	86.9	0.4	11529.2	0.035	1.41	0.051	Sandstone	02/12/2019
BH001	15.40	Irregular Lump	100.4	67.7	0.1	8654.3	0.009	1.322	0.012	Sandstone#	04/12/2019
BH004	11.20	Axial	100.2	36.5	0.0	4533.6	0.003	1.143	0.003	Sandstone	03/12/2019

NOTES : +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PLNW/588/2	Signed :-	Name :-	Page 2 of 11
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

UKAS Testing 1367

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POINT LOAD STRENGTH INDEX

ISRM 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH004	11.25	Irregular Lump	99.4	62.5	0.2	7910.0	0.025	1.296	0.032	Sandstone#	03/12/2019
BH004	11.30	Diametral	127.8	83.4	0.0	6859.6	0.005	1.259	0.006	Sandstone	03/12/2019
BH004	11.30	Axial	100.4	33.9	0.0	4333.5	0.009	1.132	0.01	Sandstone	03/12/2019
BH004	11.45	Diametral	113.1	96.1	0.0	9235.2	0.002	1.342	0.002	Sandstone	03/12/2019
BH004	11.45	Axial	99.3	39.4	0.3	4981.4	0.067	1.168	0.078	Sandstone#	03/12/2019
BH004	11.60	Irregular Lump	112.8	80.2	0.7	11519.4	0.006	1.41	0.008	Sandstone#	03/12/2019
BH004	11.80	Axial	100.4	77.2	0.9	9668.7	0.092	1.362	0.125	Sandstone	03/12/2019
BH004	11.90	Diametral	128.7	91.3	0.1	8335.7	0.014	1.311	0.018	Sandstone	03/12/2019
BH004	11.90	Axial	99.4	50.2	0.2	6378.6	0.03	1.235	0.037	Sandstone#	03/12/2019
BH004	12.00	Axial	99.8	81.0	0.6	10292.6	0.058	1.375	0.08	Sandstone#	04/12/2019
BH004	12.10	Axial	100.2	44.7	0.5	5702.8	0.089	1.204	0.107	Sandstone	04/12/2019
BH004	12.15	Axial	100.4	73.5	1.2	9267.9	0.132	1.343	0.177	Sandstone#	04/12/2019
BH004	12.20	Axial	101.8	43.3	0.6	5690.1	0.102	1.203	0.123	Sandstone	04/12/2019
BH004	12.25	Diametral	100.3	98.8	0.2	9370.2	0.02	1.346	0.027	Sandstone	04/12/2019

NOTES :- Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) I-Too soft to register a reading

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Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588	1367

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ID Manchester - Christie Campbell - Brentwood - GeoTechnics 6/30/2020 2:14:39 PM - 84.134.246.72

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Rook Hill Industrial Estate, Wrotham Road, Meopham, Kent DA13 0AG. Tel: 01474 815810 Fax: 01474 815811
Regional Office: Unit 27 Pioneer Court, Kelvin Way, Bedford, MK41 7PW. Tel: 01234 [illegible] Fax: 01234 [illegible]

POINT LOAD STRENGTH INDEX

ISRM: 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH004	10.25	Axial	100.4	29.4	0.5	3758.3	0.133	1.096	0.146	Sandstone	04/12/2019
BH004	12.42	Axial	104.2	85.0	1.5	11277.1	0.114	1.403	0.16	Sandstone#	04/12/2019
BH004	15.20	Diametral	104.2	96.3	0.1	9273.7	0.005	1.343	0.006	Sandstone	04/12/2019
BH004	13.20	Axial	100.1	55.9	0.7	7124.5	0.102	1.266	0.129	Sandstone	04/12/2019
BH005	9.90	Axial	97.5	69.1	0.3	8575.3	0.04	1.32	0.048	Sandstone#	09/12/2019
BH005	14.10	Diametral	233.1	100.2	0.8	10030.0	0.08	1.37	0.114	Sandstone	09/12/2019
BH005	14.10	Axial	100.4	62.8	0.7	8024.4	0.09	1.3	0.12	Sandstone	09/12/2019
BH005	14.35	Axial	94.7	73.7	1.4	8880.7	0.16	1.33	0.21	Sandstone	09/12/2019
BH005	14.35	Axial	93.4	40.7	0.7	4773.3	0.14	1.16	0.165	Sandstone	09/12/2019
BH005	14.60	Axial	98.3	89.9	2.0	11367.2	0.17	1.41	0.242	Sandstone#	09/12/2019
BH005	14.80	Diametral		99.6	1.4		0.14	1.36	0.19	Sandstone	
BH005	15.00	Diametral	200.2	100.3	1.1	10052.1	0.11	1.37	0.144	Sandstone	09/12/2019
BH005	15.00	Axial	100.5	66.8	1.7	8798.2	0.19	1.33	0.255	Sandstone	09/12/2019
BH005	15.20	Axial	100.4	63.5	0.9	8112.9	0.11	1.3	0.143	Sandstone	09/12/2019

NOTES: Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of Issue: 22/01/2020

Certificate No :- PL/NW1586/4

Signed :-

Name :-

Page 1 of 1

Client :- University of Manchester

Contract Title :- ID Manchester Preliminary Ground Investigation

AEG Contract No :- NW1586

UKAS 1367

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POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH005	15.50	Diametral	150.8	100.1	0.6	10024.0	0.06	1.37	0.102	Sandstone	09/12/2019
BH005	15.80	Axial	100.3	64.4	1.4	5222.4	0.18	1.21	0.220	Sandstone	09/12/2019
BH005	17.02	Diametral	152.4	100.3	1.1	10308.0	0.1	1.37	0.143	Sandstone	09/12/2019
BH005	17.00	Axial	100.2	74.8	1.3	9540.7	0.14	1.35	0.184	Sandstone	09/12/2019
BH005	20.00	Diametral	176.5	100.2	0.8	10036.0	0.08	1.37	0.109	Sandstone	09/12/2019
BH005	20.00	Axial	100.9	86.2	1.5	11065.9	0.14	1.2	0.164	Sandstone	09/12/2019
BH005	20.20	Diametral	144.2	100.5	0.8	10102.3	0.08	1.37	0.104	Sandstone	09/12/2019
BH005	20.20	Axial	100.7	59.8	1.5	7673.2	0.19	1.29	0.25	Sandstone	09/12/2019
BH005	20.30	Diametral	230.9	99.6	0.9	9922.2	0.09	1.35	0.12	Sandstone	09/12/2019
BH005	20.30	Axial	100.3	60.3	0.8	7696.6	0.1	1.29	0.136	Sandstone	09/12/2019
BH005	20.50	Diametral		99.9	2.0		0.2	1.37	0.27	Sandstone	
BH005	21.00	Axial	101.3	49.8	0.7	6427.7	0.1	1.24	0.129	Sandstone	09/12/2019
BH005	21.12	Diametral	148.6	100.2	0.5	10042.0	0.05	1.37	0.068	Sandstone	09/12/2019
BH005	21.12	Axial	100.4	51.4	0.5	6569.4	0.08	1.24	0.098	Sandstone	09/12/2019

NOTES : +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #=Invalid Failure (Did not pass through end points) - Too soft to register a reading

Date of Issue :- 22/01/2020	Certificate No :- PLMW1588/3	Signed :-	Name :-	Page 5 of 11
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AES Contract No :- NW1588

UKAS TESTING 1367

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 27, Ring Six Industrial Estate, Tattenhall Road, Chester, CH3 9RD. Tel: 01829 772 [illegible] Fax: 01829 772 [illegible]
Regional Office: Unit 2, Dunlop Establishment, Dunlop Street, West Bromwich, B70 0BL. Tel: 0121 [illegible] Fax: 0121 [illegible]

POINT LOAD STRENGTH INDEX

ISRM: 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH005	21.35	Axial	100.2	68.5	0.3	8739.9	0.04	1.33	0.052	Sandstone	09/12/2019
BH007	6.10	Diametral	117.4	91.5	0.0	8372.3	2.508	1.313	0.035	Sandstone	03/12/2019
BH007	6.10	Axial	38.8	55.2	0.1	6943.9	0.021	1.258	0.026	Sandstone	03/12/2019
BH007	6.30	Axial	98.1	74.4	0.0	9292.9	0.004	1.344	0.005	Sandstone	03/12/2019
BH007	6.50	Axial	100.5	29.6	0.1	3774.8	0.035	1.097	0.038	Sandstone	03/12/2019
BH007	6.55	Axial	100.0	38.7	0.0	4927.4	0.004	1.165	0.004	Sandstone	03/12/2019
BH007	6.60	Diametral	116.3	92.8	0.0	8611.8	0.002	1.321	0.002	Sandstone	03/12/2019
BH007	6.90	Axial	100.5	31.8	0.0	4065.3	0.011	1.117	0.012	Sandstone	03/12/2019
BH007	6.80	Diametral	111.9	67.1	0.2	7566.4	0.023	1.284	0.03	Sandstone	03/12/2019
BH007	6.80	Axial	96.9	53.4	0.2	6717.5	0.028	1.249	0.035	Sandstone	03/12/2019
BH007	9.15	Axial	104.6	39.3	0.2	5234.0	0.029	1.181	0.034	Sandstone/Clay	03/12/2019
BH007	9.60	Axial	98.3	44.1	0.3	5619.5	0.05	1.195	0.06	Sandstone	03/12/2019
BH007	9.65	Diametral	105.2	92.6	0.0	8611.8	0.004	1.321	0.005	Sandstone	03/12/2019
BH007	9.65	Axial	100.1	39.6	0.2	5047.1	0.035	1.171	0.041	Sandstone	03/12/2019

NOTES - Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) ~Too soft to register a reading

Date of issue: 22/01/2020	Certificate No: - PL/NW1588/6	Signed: -	Name: -	Page 6 of 11
Client: - University of Manchester	Contract Title: - Manchester Preliminary Ground Investigation			AEG Contract No: - NW1588

UKAS Testing 1367

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Depot Road, Unit 7B, Pyle Industrial Estate, Pyle, Bridgend, South Wales, CF33 6RS. Tel: 01656 741268 E-mail: info@allied-eg.co.uk
Registered Office: 2 Acre Business Park, Hatton Heath, Chester, South West Cheshire, CH3 9AX. Tel: 01829 782000 Fax: 01829 782001

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH007	9.20	Axial	100.5	72.4	0.5	9273.6	0.049	1.343	0.066	Sandstone	03/12/2019
BH007	9.30	Diametral	104.6	91.2	0.1	5317.4	0.013	1.311	0.017	Sandstone	03/12/2019
BH007	9.90	Axial	99.3	43.0	0.2	5436.6	0.031	1.191	0.037	Sandstone	03/12/2019
BH007	11.05	Diametra	105.5	95.3	0.2	9082.1	0.021	1.337	0.028	Sandstone	03/12/2019
BH007	11.00	Axial	99.8	41.3	0.1	5248.0	0.015	1.182	0.018	Sandstone	03/12/2019
BH007	13.70	Diametra		99.8	2.1		0.21	1.36	0.29	Sandstone	
BH011	8.45	Axial	99.7	85.4	0.2	10967.8	0.02	1.395	0.028	Sandstone	03/12/2019
BH011	8.50	Axial	96.6	39.7	0.4	4662.9	0.084	1.163	0.098	Sandstone	03/12/2019
BH011	8.60	Axial	99.3	75.6	0.7	9596.2	0.072	1.353	0.097	Sandstone	03/12/2019
BH011	9.17	Diametral	120.5	97.4	0.3	9486.8	0.027	1.35	0.036	Sandstone	03/12/2019
BH011	9.17	Axial	100.0	53.5	1.0	6871.8	0.143	1.253	0.179	Sandstone	03/12/2019
BH011	9.95	Diametral	107.9	97.2	0.3	9447.8	0.036	1.349	0.049	Sandstone	03/12/2019
BH011	9.95	Axial	101.8	36.4	0.3	4718.0	0.07	1.154	0.081	Sandstone	03/12/2019
BH011	9.90	Diametral	103.8	97.2	0.1	9447.8	0.012	1.349	0.016	Sandstone	03/12/2019

NOTES: - Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) I-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW/15887	Signed :-	Name :-	Page 7 of 11
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW/1588

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POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH011	9.60	Axial	101.3	37.0	0.5	4772.2	0.105	1.157	0.176	Sandstone	03/12/2019
BH011	9.65	Diametral	112.7	96.4	0.6	9293.0	0.056	1.344	0.075	Sandstone	03/12/2019
BH011	9.65	Axial	101.5	43.5	0.6	5621.7	0.146	1.2	0.175	Sandstone	03/12/2019
BH011	10.00	Diametral	151.2	92.1	0.3	8482.4	0.033	1.316	0.043	Sandstone	03/12/2019
BH011	10.00	Axial	99.4	41.4	0.3	5239.8	0.059	1.161	0.07	Sandstone	03/12/2019
BH011	11.10	Diametral	104.-	95.4	0.4	9101.2	0.043	1.337	0.058	Sandstone	03/12/2019
BH011	11.10	Axial	100.7	32.9	0.7	4218.5	0.162	1.135	0.182	Sandstone	03/12/2019
BH011	11.30	Irregular Lump	98.5	75.1	1.3	9418.6	0.14	1.346	0.189	Sandstone#	03/12/2019
BH011	12.30	Axial	100.9	71.2	1.6	9147.1	0.179	1.339	0.24	Sandstone	04/12/2019
BH011	12.35	Axial	102.2	36.7	0.5	4775.8	0.095	1.157	0.11	Sandstone	04/12/2019
BH011	12.40	Diametral	106.6	98.7	0.5	9741.7	0.047	1.358	0.064	Sandstone	04/12/2019
BH011	12.40	Axial	101.1	39.3	0.9	5058.9	0.17	1.172	0.199	Sandstone	04/12/2019
BH011	12.50	Diametral	140.2	92.2	0.3	8500.9	0.033	1.317	0.043	Sandstone	04/12/2019
BH011	12.50	Axial	101.1	48.3	0.6	6217.4	0.127	1.228	0.156	Sandstone	04/12/2019

NOTES :- +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) - too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW1588/8	Signed :- mSeve	Name :	Page 1 of 1
Client :- University of Manchester	Contract Title :- ID Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Registered Office: Unit 20, Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RH - Tel: 0191 370 0500 Fax: 0191 388 8740
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POINT LOAD STRENGTH INDEX

ISRM 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH01	12.75	Diametral	102.6	91.3	0.9	8335.7	0.112	1.311	0.147	Sandstone	04/12/2019
BH01	12.75	Axial	100.7	48.7	0.4	6572.3	0.05	1.234	0.074	Sandstone	04/12/2019
BH 013	10.95	Diametral	103.0	88.7	0.2	8048.1	0.025	1.301	0.035	Sandstone	02/12/2019
BH013	10.95	Axial	98.7	35.7	1.3	4989.1	0.26	1.17	0.298	Sandstone	02/12/2019
BH013	11.00	Diametral	159.1	99.4	0.8	9680.4	0.082	1.352	0.112	Sandstone	02/12/2019
BH013	11.00	Axial	101.1	40.4	0.9	5200.5	0.176	1.179	0.208	Sandstone	02/12/2019
BH013	11.30	Axial	100.7	40.9	0.5	5244.9	0.095	1.181	0.112	Sandstone	02/12/2019
BH013	11.40	Diametral	103.6	99.8	0.6	8611.8	0.064	1.321	0.085	Sandstone	02/12/2019
BH013	11.40	Axial	106.9	43.0	0.5	5852.7	0.085	1.211	0.103	Sandstone	02/12/2019
BH013	11.65	Axial	105.7	63.9	0.9	8193.9	0.109	1.396	0.142	Sandstone	02/12/2019
BH013	11.70	Diametral	129.4	91.0	0.2	8281.0	0.02	1.309	0.026	Sandstone	02/12/2019
BH013	11.70	Axial	99.2	49.4	0.5	6239.5	0.078	1.228	0.096	Sandstone	02/12/2019
BH013	12.00	Diametral	137.4	93.9	0.2	8817.2	0.027	1.328	0.036	Sandstone	04/12/2019
BH013	12.00	Axial	99.2	98.7	0.7	6339.1	0.103	1.233	0.127	Sandstone	04/12/2019

NOTES :- +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation # Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW1588/3	Signed :- MSone	Name :-	Page 9 of 11
Client :- University of Manchester	Contract Title :- 3 Manchester Preliminary Ground Investigation			AEG Contract No :- NW1588

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Sherburn Court, Town of Sherburn, Durham Trading Estate, Sherburn Village, Durham, DH6 1PY. Tel: 0191 372 6700 Fax: 0191 372 6701
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POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No.	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH013	12.40	Diametral	132.6	93.1	0.1	8667.6	0.013	1.323	0.017	Sandstone	04/12/2019
BH013	12.40	Axial	100.6	48.0	0.9	6148.2	0.152	1.224	0.186	Sandstone	04/12/2019
BH013	12.60	Diametral	140.9	92.7	1.2	8593.3	0.138	1.32	0.182	Sandstone	04/12/2019
BH013	12.60	Axial	100.9	41.9	1.0	5382.9	0.191	1.188	0.227	Sandstone	04/12/2019
BH013	14.00	Diametral	103.3	94.2	0.8	8873.6	0.092	1.33	0.122	Sandstone	04/12/2019
BH013	14.00	Axial	97.5	41.8	0.4	5205.1	0.078	1.179	0.092	Sandstone	04/12/2019
BH013	15.40	Diametral	109.9	94.6	0.9	8987.0	0.103	1.304	0.137	Sandstone	04/12/2019
BH013	15.40	Axial	99.2	51.0	1.0	6441.6	0.162	1.237	0.2	Sandstone	04/12/2019
HS001	0.00	Irregular Lump	106.3	46.3	7.0	6266.5	1.117	1.23	1.375	Brick	25/11/2019
HS001	0.35	Irregular Lump	109.2	64.2	0.9	8190.5	0.11	1.306	0.145	Brick#	02/12/2019
HS001	0.70	Irregular Lump	118.4	56.1	1.7	8457.2	0.199	1.315	0.262	Brick	02/12/2019
HS001	0.85	Irregular Lump	156.9	42.9	4.8	10755.1	0.442	1.385	0.614	Brick	02/12/2019
HS001	1.35	Irregular Lump	103.1	29.7	2.0	3898.7	0.512	1.105	0.566	Brick	02/12/2019
HS002	0.00	Irregular Lump	140.1	35.2	1.9	9503.1	0.298	1.24	0.37	Brick#	25/11/2019

NOTES: +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 10 of 11
22/01/2020	PLI/NW1588/19	MSoup		

Client :-	Contract Title :-	AEG Contract No :-
University of Manchester	ID Manchester Preliminary Ground Investigation	NW1588

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

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POINT LOAD STRENGTH INDEX

ISRM - 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De² (mm²)	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
HC002	0.50	Irregular Lump	157.1	48.7	2.6	9741.3	0.25	1.358	0.353	Brick	02/12/2019
HC002	0.80	Irregular Lump	76.8	57.9	2.8	5224.6	0.54	1.18	0.639	Brick	02/12/2019
HC002	1.00	Irregular Lump	88.9	49.3	2.1	5580.3	0.361	1.198	0.432	Brick	02/12/2019
HC002	1.30	Irregular Lump	100.9	44.3	2.9	5691.2	0.511	1.203	0.615	Brick#	02/12/2019
HC003	0.00	Irregular Lump	128.6	58.7	8.8	6386.7	1.388	1.234	1.711	Brick	25/11/2019
HC003	0.50	Irregular Lump	108.6	21.9	2.2	3028.2	0.732	1.044	0.764	Brick	25/11/2019
HC003	0.80	Irregular Lump	119.9	29.6	5.2	4397.5	1.176	1.135	1.335	Brick	25/11/2019
HC003	0.00	Irregular Lump	87.3	39.3	2.4	4358.3	0.541	1.134	0.613	Brick	25/11/2019
HC003	0.30	Irregular Lump	80.2	32.9	3.5	3359.5	0.74	1.07	0.789	Brick#	25/11/2019
HC004	0.20	Diametral	128.8	67.2	11.1	45159	2.458	1.142	2.808	Concrete	25/11/2019
HC004	0.20	Diametral	89.8	67.6	10.0	4569.8	2.19	1.145	2.508	Concrete	25/11/2019
HC004	0.28	Axial	86.0	49.8	9.3	5510.1	1.696	1.195	2.026	Concrete	25/11/2019

NOTES :- +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) ~-Too soft to register a reading

Date of issue :- 22/01/2020	Certificate No :- PL/NW1586/11	Signed :-	Name :-	Page 11 of 11
Client :- University of Manchester	Contract Title :- The University of Manchester Preliminary Ground Investigation			AEG Contract No :- NW1586

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GSTL

Point Load Test

Int. J. Rock Mech. Sci. & Geomech. Abstr. Vol. 22. No. 2. pp. 51 - 60. 1985.

Contract Number	4.7033
Site Name	ID Manchester Preliminary Ground Investigation
Sample Type	Core
Date Tested	06/07/2020

*Please note that GSTL is not accredited for the water content of rock

Hole Reference	Depth (m)		Test Axis		Width	Platen Separation	Failure Load	Equivalent Diameter	Point Load	Size Factor	Point Load Index	Moisture Content	Description	Angle between Plane of Weakness & Core Axis	Type of Assembly (Broken or Complete)
			a-a (D/T)	b-b (D/L)											
BH01	14.00	-	a			99.0	1.97		0.14	1.00	0.15	14.5	SANDSTONE		
BH01	27.55	-	a			93.9	2.85		0.20	1.00	0.21	15.1	SANDSTONE		
BH01	13.00	-	a			93.8	2.10		0.21	1.00	0.24	13.7	SANDSTONE		

Key	Recorded As
Hole Reference	BH01
Depth (m)	14.00 - 14.00
Test Axis	a-a
Platen Separation	99.0mm
Failure Load	1.97 kN
Equivalent Diameter	99mm
Point Load	0.14 MPa
Size Factor	1.00
Point Load Index	0.15 MPa
Moisture Content	14.5 %
Description	SANDSTONE
Angle between Plane of Weakness & Core Axis	
Type of Assembly (Broken or Complete)	B

ID Manchester - Christine Campbell - Burntwood Site Team - 6/30/2020 2:[illegible]0 PM - 81.154.246.72

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LABORATORY TESTING ENCLOSURE 10

Determination of Unconfined Compressive Strength
(Tested Externally)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

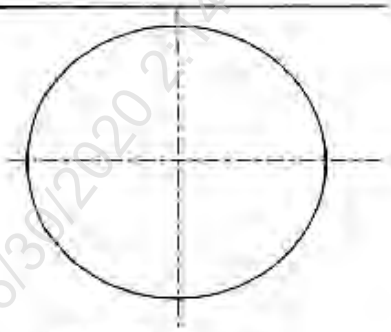
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Test Report: **Testing concrete in structures. Cored specimens. Taking, examining and testing in compression BS EN 12504-1:2009 & BS EN 12390-3: 2009**

Client:	AEG
Client Ref:	NW1588
Contract Number:	47038
Location	ID Manchester Preliminary Ground Investigation

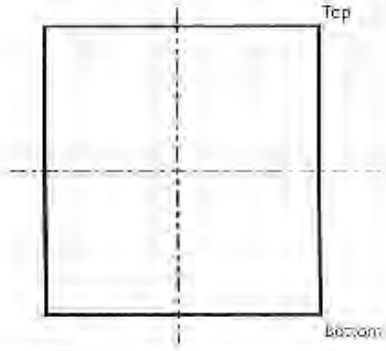
Core Description	Concrete Core
Sample Number	HC004
Maximum aggregate Size (mm)	29
Direction of coring	Unknown
Date cored	Unknown
Date of Test	06/01/2020
Method used for Preparation	Cutting
Condition On Test	Surface Dry
Core Density (kg/m^3)	2310
Density Condition	As received



Vertical re-bar	
From Centre (mm)	n/a
Horizontal Rebar	
From Top (mm)	n/a
From Centre (mm)	n/a
Re-bar Diameter (mm)	n/a

Measurement Dimensions: BS EN 12390-1: 2012

Size of sample Received in Lab (mm)	Diameter	86.1
	Length	238.0
Size of sample tested (mm)	Diameter	86.1
	Length	86.1
Length Diameter ratio of prepared specimen		1.00



Compression: BS EN 12390-3:2009

Compressive Strength N/mm2	25.9
Appearance of concrete and Type of Fracture	Satisfactory
Compaction of concrete, classification of void %	0.5
Any Deviations from the standard Method of Testing [1]	n/a

Remarks:

[1] All the testing was carried out in accordance with BS EN 12390-3: 2009 except as detailed

Technician Responsible (if Witnessed)

For and behalf of GEO Site & Testing Services Ltd

Checked By:
Wayne Honey Administrative/Quality Assistant

W. Honey

Date: 9/1/20

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2748

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APPENDIX I

Specialist Chemical Testing

(Tested Externally)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Certificate of Analysis

Certificate Number	20-01032
	27-Jan-20
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	20-01032
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	5 Water samples.
Date Received	20-Jan-20
Date Started	20-Jan-20
Date Completed	27-Jan-20
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

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Summary of Chemical Analysis

Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No				1625617	1625618	1625619	1625620	1625621
Sample ID				BH001	BH004	BH005	BH007	BH011
Depth				9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
Other ID				100	100	100	100	100
Sample Type				EW	EW	EW	EW	EW
Sampling Date				16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
Sampling Time				n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Metals								
Antimony, Dissolved	DETSC 2306	0.17	ug/l	0.25	0.18	0.23	0.18	0.28
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.82	4.7	0.54	15	0.57
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	0.2	< 0.1	0.5
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	0.26	< 0.03	0.38
Calcium, Dissolved	DETSC 2306	0.09	mg/l	43	140	11	83	130
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.63	< 0.25	< 0.25	0.32	1.1
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.0	< 0.4	1.0	< 0.4	0.5
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.21	0.12	0.26	0.31	3100
Manganese, Dissolved	DETSC 2306	0.22	ug/l	780	1900	170	2600	210
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	4.3	1.0	8.6	2.3	3.7
Selenium, Dissolved	DETSC 2306	0.25	ug/l	2.6	1.5	0.87	0.81	2.4
Tin, Dissolved	DETSC 2306*	0.4	ug/l	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	1.3	0.6	1.0	< 0.6	0.9
Zinc, Dissolved	DETSC 2306	1.3	ug/l	7.8	3.9	8.8	13	45
Inorganics								
pH	DETSC 2008		pH	6.7	6.7	6.9	6.8	4.8
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40	1000
Dissolved Organic Carbon	DETSC 2085	2	mg/l	< 2.0	2.3	< 2.0	< 2.0	< 2.0
Hardness	DETSC 2303	0.1	mg/l	170	420	39.6	246	349
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	< 0.015	0.53	0.027	< 0.015	0.31
Chloride	DETSC 2055	0.1	mg/l	26	32	30	24	180
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	2.7	2.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	3.9	< 0.1	< 0.1	7.9	9.7
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Summary of Chemical Analysis

Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No				1625617	1625618	1625619	1625620	1625621
Sample ID				BH001	BH004	BH005	BH007	BH011
Depth				9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
Other ID				100	100	100	100	100
Sample Type				EW	EW	EW	EW	EW
Sampling Date				16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
Sampling Time				n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PAHs								
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	4.9	< 0.05	0.42	0.12
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	0.09	< 0.01	0.02	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	0.37	< 0.01	0.36	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	0.01	0.27	< 0.01	0.15	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.01	0.56	< 0.01	0.42	0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	0.08	< 0.01	0.07	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.10	< 0.01	0.09	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.08	< 0.01	0.07	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	6.4	< 0.20	1.6	< 0.20
Phenols								
Phenols, Total	DETSC 3451*	2	ug/l	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

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Summary of Chemical Analysis
Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1625617	1625618	1625619	1625620	1625621
Sample ID	BH001	BH004	BH005	BH007	BH011
Depth	9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
Other ID	100	100	100	100	100
Sample Type	EW	EW	EW	EW	EW
Sampling Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
VOCs								
Dichlorodifluoromethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Chloromethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Bromomethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Chloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Cis-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	1	< 1
2,2-dichloropropane	DETSC 3432	2	ug/l	< 2	< 2	< 2	< 2	< 2
Bromochloromethane	DETSC 3432	4	ug/l	< 4	< 4	< 4	< 4	< 4
Chloroform	DETSC 3432	1	ug/l	< 1	< 1	1	< 1	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Benzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Trichloroethylene	DETSC 3432*	1	ug/l	< 1	< 1	< 1	1	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Dibromomethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Bromodichloromethane	DETSC 3432	4	ug/l	< 4	< 4	< 4	< 4	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Toluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Chlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
m+p-Xylene	DETSC 3432	2	ug/l	< 2	< 2	< 2	< 2	< 2
o-Xylene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Styrene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Bromoform	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Isopropylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1

Key: * -not accredited. n/s -not supplied.

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Summary of Chemical Analysis
Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1625617	1625618	1625619	1625620	1625621
			Sample ID	BH001	BH004	BH005	BH007	BH011
			Depth	9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
			Other ID	100	100	100	100	100
			Sample Type	EW	EW	EW	EW	EW
			Sampling Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Bromobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
n-propylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
2-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
4-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
sec-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l	< 2	< 2	< 2	< 2	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
n-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1	< 1	< 1	< 1
MTBE	DETSC 3432*	1	ug/l	< 1	< 1	< 1	< 1	< 1
SVOCs								
Phenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzyl Alcohol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-chloroisopropyl)ether	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
3&4-Methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-chloroethoxy)methane	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chloro-3-methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorocyclopentadiene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chloronaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
3-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

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Summary of Chemical Analysis
Water Samples

Our Ref 20-01032
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1625617	1625618	1625619	1625620	1625621
			Sample ID	BH001	BH004	BH005	BH007	BH011
			Depth	9.50-15.50	6.06-14.00	5.60-21.50	6.07-13.60	7.40-12.40
			Other ID	100	100	100	100	100
			Sample Type	EW	EW	EW	EW	EW
			Sampling Date	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
4-Nitrophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibenzofuran	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,3,4,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorophenylphenylether	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diphenylamine	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Bromophenylphenylether	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-ethylhexyl)ester	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Pentachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bis(2-ethylhexyl)phthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,3,5,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Azobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbazole	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ID Manchester - Christine Carnegie Bruntwood SciTech - 6/3/2020 2:44:49 PM - 81.154.246.72

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Information in Support of the Analytical Results

Our Ref 20-01032
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1625617	BH001 9.50-15.50 WATER	16/01/20	GB 1L x3, GV x4, PB 1L		
1625618	BH004 6.06-14.00 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		
1625619	BH005 5.60-21.50 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		
1625620	BH007 6.07-13.60 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		
1625621	BH011 7.40-12.40 WATER	17/01/20	GB 1L x3, GV x4, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

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Certificate of Analysis

Certificate Number 20-00912-1

14-Apr-20

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference	20-00912-1
Client Reference	1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	One Water sample.
Date Received	17-Jan-20
Date Started	17-Jan-20
Date Completed	14-Apr-20
Test Procedures	Identified by prefix DETSn (details on request).

Notes **This report supersedes 20-00912, amendments.**

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

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ID Manchester - Christine Comben - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Antimony, Dissolved	DETSC 2306	0.17	ug/l	0.53
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.78
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.04
Calcium, Dissolved	DETSC 2306	0.09	mg/l	140
Chromium, Dissolved	DETSC 2306	0.25	ug/l	9.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.33
Manganese, Dissolved	DETSC 2306	0.22	ug/l	52
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	22
Tin, Dissolved	DETSC 2306*	0.4	ug/l	0.6
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	0.8
Zinc, Dissolved	DETSC 2306	1.3	ug/l	10
Inorganics				
pH	DETSC 2008		pH	7.0
Cyanide, Total	DETSC 2130	40	ug/l	78
Dissolved Organic Carbon	DETSC 2085	2	mg/l	2.6
Hardness	DETSC 2303	0.1	mg/l	405
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.025
Chloride	DETSC 2055	0.1	mg/l	36

ID Manchester - Christine Carroll - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

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Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	3.4
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0
PAHs				
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01

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Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20

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Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Phenols				
Phenols, Total	DETSC 3451*	2	ug/l	< 2.0
VOCs				
Dichlorodifluoromethane	DETSC 3432	1	ug/l	< 1
Chloromethane	DETSC 3432	1	ug/l	< 1
Vinyl Chloride	DETSC 3432	1	ug/l	< 1
Bromomethane	DETSC 3432	1	ug/l	< 1
Chloroethane	DETSC 3432	1	ug/l	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l	< 1
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l	< 1
Cis-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1
2,2-dichloropropane	DETSC 3432	2	ug/l	< 2
Bromochloromethane	DETSC 3432	4	ug/l	< 4
Chloroform	DETSC 3432	1	ug/l	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l	< 1
Benzene	DETSC 3432	1	ug/l	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l	< 1
Trichloroethylene	DETSC 3432*	1	ug/l	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l	< 1
Dibromomethane	DETSC 3432	1	ug/l	< 1
Bromodichloromethane	DETSC 3432	4	ug/l	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1
Toluene	DETSC 3432	1	ug/l	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l	< 1
Dibromochloromethane	DETSC 3432	1	ug/l	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l	< 1
Chlorobenzene	DETSC 3432	1	ug/l	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1
Ethylbenzene	DETSC 3432	1	ug/l	< 1
m+p-Xylene	DETSC 3432	2	ug/l	< 2
o-Xylene	DETSC 3432	1	ug/l	< 1

Key: * -not accredited. n/s -not supplied.

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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 543

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
Styrene	DETSC 3432	1	ug/l	< 1
Bromoform	DETSC 3432	1	ug/l	< 1
Isopropylbenzene	DETSC 3432	1	ug/l	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1
Bromobenzene	DETSC 3432	1	ug/l	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l	< 1
n-propylbenzene	DETSC 3432	1	ug/l	< 1
2-chlorotoluene	DETSC 3432	1	ug/l	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l	< 1
4-chlorotoluene	DETSC 3432	1	ug/l	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l	< 1
sec-butylbenzene	DETSC 3432	1	ug/l	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l	< 1
n-butylbenzene	DETSC 3432	1	ug/l	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l	< 1
MTBE	DETSC 3432*	1	ug/l	< 1
SVOCs				
Phenol	DETSC 3434*	1	ug/l	< 1.0
Aniline	DETSC 3434*	1	ug/l	< 1.0
2-Chlorophenol	DETSC 3434*	1	ug/l	< 1.0
Benzyl Alcohol	DETSC 3434*	1	ug/l	< 1.0
2-Methylphenol	DETSC 3434*	1	ug/l	< 1.0
Bis(2-chloroisopropyl)ether	DETSC 3434*	1	ug/l	< 1.0
3&4-Methylphenol	DETSC 3434*	1	ug/l	< 1.0
Bis(2-chloroethoxy)methane	DETSC 3434*	1	ug/l	< 1.0
2,4-Dimethylphenol	DETSC 3434*	1	ug/l	< 1.0
2,4-Dichlorophenol	DETSC 3434*	1	ug/l	< 1.0
1,2,4-Trichlorobenzene	DETSC 3434*	1	ug/l	< 1.0
4-Chloro-3-methylphenol	DETSC 3434*	1	ug/l	< 1.0
2-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0
Hexachlorocyclopentadiene	DETSC 3434*	1	ug/l	< 1.0

Key: * -not accredited. n/s -not supplied.

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ID Planning Ltd - Christine Campbell - Brunswood GeoTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Summary of Chemical Analysis
Water Samples

Our Ref 20-00912-1
Client Ref 1588

ID Manchester Preliminary
Contract Title Ground Investigation

Lab No	1624853
Sample ID	BH013
Depth	5.30-16.50
Other ID	100
Sample Type	EW
Sampling Date	16/01/2020
Sampling Time	n/s

Test	Method	LOD	Units	
2,4,6-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0
2,4,5-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0
2-Chloronaphthalene	DETSC 3434*	1	ug/l	< 1.0
2-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0
2,4-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0
3-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0
4-Nitrophenol	DETSC 3434*	1	ug/l	< 1.0
Dibenzofuran	DETSC 3434*	1	ug/l	< 1.0
2,6-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0
2,3,4,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0
Diethylphthalate	DETSC 3434*	1	ug/l	< 1.0
4-Chlorophenylphenylether	DETSC 3434*	1	ug/l	< 1.0
4-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0
Diphenylamine	DETSC 3434*	1	ug/l	< 1.0
4-Bromophenylphenylether	DETSC 3434*	1	ug/l	< 1.0
Hexachlorobenzene	DETSC 3434*	1	ug/l	< 1.0
Bis(2-ethylhexyl)ester	DETSC 3434*	1	ug/l	< 1.0
Pentachlorophenol	DETSC 3434*	1	ug/l	< 1.0
Di-n-butylphthalate	DETSC 3434*	1	ug/l	< 1.0
Butylbenzylphthalate	DETSC 3434*	1	ug/l	< 1.0
Bis(2-ethylhexyl)phthalate	DETSC 3434*	1	ug/l	< 1.0
Di-n-octylphthalate	DETSC 3434*	1	ug/l	< 1.0
1,4-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0
Dimethylphthalate	DETSC 3434*	1	ug/l	< 1.0
1,3-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0
2,3,5,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0
Azobenzene	DETSC 3434*	1	ug/l	< 1.0
Carbazole	DETSC 3434*	1	ug/l	< 1.0
1-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0

ID Manchester - Christine Campbell - Brynwood - Sent To - 6/30/2020 2:14:30 PM - 81.154.246.72

Key: * -not accredited. n/s -not supplied.

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Information in Support of the Analytical Results

Our Ref 20-00912-1
Client Ref 1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1624853	BH013 5.30-16.50 WATER	16/01/20	GB 1L x3, GV x4, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

ID Manchester - Christine Campbell - Bruntwood SciTech - 31/08/2020 2:04:30 PM - 81.154.228.72

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Certificate of Analysis

Certificate Number 19-25005-1

17-Dec-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-25005-1

Client Reference NW1588

Order No CH1547

Contract Title ID Manchester Preliminary Ground Investiagtion

Description 2 Soil samples.

Date Received 06-Dec-19

Date Started 06-Dec-19

Date Completed 17-Dec-19

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 19-25005, amendments.**

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Approved By

Adam Fenwick
Contracts Manager

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Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
DS001	5	0.6	1608858	13/12/2019	Dark brown gravelly, clayey SAND
DS002	3	0.8	1608859	13/12/2019	Dark brown gravelly, clayey SAND (Possible made ground - brick)

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

			Lab No	1608858	1608859
			Sample ID	DS001	DS002
			Depth	0.60	0.80
			Other ID	5	3
			Sample Type	ES	ES
			Sampling Date	30/11/19	01/12/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Asbestos Quantification	DETSC 1102	0		Y	
Metals					
Antimony	DETSC 2301*	1	mg/kg	3.5	260
Arsenic	DETSC 2301#	0.2	mg/kg	32	56
Beryllium	DETSC 2301#	0.2	mg/kg	0.8	1.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	1.0
Cadmium	DETSC 2301#	0.1	mg/kg	1.2	1.2
Chromium	DETSC 2301#	0.15	mg/kg	27	33
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	80	160
Lead	DETSC 2301#	0.3	mg/kg	330	2400
Mercury	DETSC 2325#	0.05	mg/kg	0.37	1.1
Nickel	DETSC 2301#	1	mg/kg	17	26
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	53	330
Vanadium	DETSC 2301#	0.8	mg/kg	28	36
Zinc	DETSC 2301#	1	mg/kg	210	470
Inorganics					
pH	DETSC 2008#		pH	10.7	8.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.6	1.6
Total Organic Carbon	DETSC 2002	0.1	%	1.1	1.8
Petroleum Hydrocarbons					
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.16
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.03	0.25
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.30
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.22	2.7
Anthracene	DETSC 3303	0.03	mg/kg	0.04	0.56
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.39	3.4
Pyrene	DETSC 3303#	0.03	mg/kg	0.37	3.2
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.13	1.0
Chrysene	DETSC 3303	0.03	mg/kg	0.18	1.2
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	1.1
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.06	0.44
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.11	0.88
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.06	0.32

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Summary of Chemical Analysis

Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

			Lab No	1608858	1608859
			Sample ID	DS001	DS002
			Depth	0.60	0.80
			Other ID	5	3
			Sample Type	ES	ES
			Sampling Date	30/11/19	01/12/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.06	0.41
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.8	16
Phenols					
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0

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Summary of Asbestos Analysis

Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1608858	DS001 5 0.60	SOIL	Amosite	Bundle of Amosite	Michael Kay
1608859	DS002 3 0.80	SOIL	NAD	none	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

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Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 19-25005-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiagtion

Lab No	1608858
Sample ID	DS001
Depth	0.60
Other ID	5
Sample Type	SOIL
Sampling Date	30/11/19
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.001**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na
Breakdown of Gravimetric Analysis (a)			
Mass of Sample		g	564.66
ACMs present*		type	
Mass of ACM in sample		g	
% ACM by mass		%	
% asbestos in ACM		%	
% asbestos in sample		%	
Breakdown of Detailed Gravimetric Analysis (b)			
% Amphibole bundles in sample		Mass %	0.001
% Chrysotile bundles in sample		Mass %	na
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Chrysotile fibres in sample		Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)			
Amphibole fibres		Fibres/g	na
Chrysotile fibres		Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample

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Information in Support of the Analytical Results

Our Ref 19-25005-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investiagtion

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1608858	DS001 0.60 SOIL	30/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1608859	DS002 0.80 SOIL	01/12/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

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Certificate of Analysis

Certificate Number	19-23765
	02-Dec-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-23765
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	3 Soil samples.
Date Received	22-Nov-19
Date Started	22-Nov-19
Date Completed	02-Dec-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1601468	1601469	1601470
Sample ID	BH005	BH006A	BH006B
Depth	1.00	1.00	0.60
Other ID	5	5	4
Sample Type	ES	ES	ES
Sampling Date	16/11/19	17/11/19	17/11/19
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Antimony	DETSC 2301*	1	mg/kg	3.0	9.1	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	35	25	7.8
Beryllium	DETSC 2301#	0.2	mg/kg	1.1	0.8	0.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	1.2	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.8	0.8
Chromium	DETSC 2301#	0.15	mg/kg	25	17	8.2
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	130	76	22
Lead	DETSC 2301#	0.3	mg/kg	110	180	30
Mercury	DETSC 2325#	0.05	mg/kg	0.13	0.39	0.05
Nickel	DETSC 2301#	1	mg/kg	31	19	6.1
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.5
Tin	DETSC 2301	1	mg/kg	13	18	4.7
Vanadium	DETSC 2301#	0.8	mg/kg	35	27	11
Zinc	DETSC 2301#	1	mg/kg	96	130	35
Inorganics						
pH	DETSC 2008#		pH	8.4	9.0	11.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	11	0.5
Total Organic Carbon	DETSC 2002	0.1	%	1.7	1.4	0.4
Petroleum Hydrocarbons						
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
PAHs						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.21	0.05
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.13	0.04
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.11	1.0	0.54
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.33	0.10
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.12	1.5	0.81
Pyrene	DETSC 3303#	0.03	mg/kg	0.12	1.6	0.82
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.05	0.38	0.27
Chrysene	DETSC 3303	0.03	mg/kg	0.05	0.48	0.32
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	0.42	0.24
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.16	0.10
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.32	0.21
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.13	0.10
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.14	0.11
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.47	6.9	3.7

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1601468	1601469	1601470
Sample ID	BH005	BH006A	BH006B
Depth	1.00	1.00	0.60
Other ID	5	5	4
Sample Type	ES	ES	ES
Sampling Date	16/11/19	17/11/19	17/11/19
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Phenols						
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0
VOCs						
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
SVOCs						
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1601468	1601469	1601470
			Sample ID	BH005	BH006A	BH006B
			Depth	1.00	1.00	0.60
			Other ID	5	5	4
			Sample Type	ES	ES	ES
			Sampling Date	16/11/19	17/11/19	17/11/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	0.2	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	0.1	< 0.1

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Summary of Asbestos Analysis
Soil Samples

Our Ref 19-23765
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1601468	BH005 5 1.00	SOIL	NAD	none	Michael Kay
1601469	BH006A 5 1.00	SOIL	NAD	none	Michael Kay
1601470	BH006B 4 0.60	SOIL	NAD	none	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

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Information in Support of the Analytical Results

Our Ref 19-23765
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1601468	BH005 1.00 SOIL	16/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1601469	BH006A 1.00 SOIL	17/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1601470	BH006B 0.60 SOIL	17/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

ID Manchester - Christine Campbell - Brunswood SciTech 5/5/2020 2:04:30 PM - 81.154.218.72

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Certificate of Analysis

Certificate Number 19-23099-1

26-Nov-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference	19-23099-1
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	7 Soil samples.
Date Received	13-Nov-19
Date Started	14-Nov-19
Date Completed	26-Nov-19
Test Procedures	Identified by prefix DETSn (details on request).

Notes **This report supersedes 19-23099, amendments.**

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

UKAS TESTING
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ID Manchester - Christine Comben - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1597114	1597115	1597116	1597117	1597118	1597119
			Sample ID	BH007	BH007	BH008	BH008	BH009	BH011
			Depth	1.00	3.30	2.20	5.20	2.60	1.00
			Other ID	5	12	7	17	9	4
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	08/11/19	09/11/19	10/11/19	10/11/19	10/11/19	09/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification	DETSC 1102	0			Y				
Metals									
Antimony	DETSC 2301*	1	mg/kg	< 1.0	2.2	2.9	3.9	1.7	1.5
Arsenic	DETSC 2301#	0.2	mg/kg	7.7	18	22	28	18	12
Beryllium	DETSC 2301#	0.2	mg/kg	0.3	0.6	0.9	0.9	1.0	0.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	0.4	0.5	0.4	0.3	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.4	0.4	0.5	0.7	0.9
Chromium	DETSC 2301#	0.15	mg/kg	11	20	33	29	15	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24	56	65	87	30	32
Lead	DETSC 2301#	0.3	mg/kg	100	140	160	250	120	150
Mercury	DETSC 2325#	0.05	mg/kg	0.07	0.20	0.30	0.41	0.10	0.22
Nickel	DETSC 2301#	1	mg/kg	7.9	16	22	20	11	9.2
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.5	< 0.5	0.9
Tin	DETSC 2301	1	mg/kg	11	16	28	41	15	14
Vanadium	DETSC 2301#	0.8	mg/kg	14	17	29	25	16	15
Zinc	DETSC 2301#	1	mg/kg	36	86	100	130	170	60
Inorganics									
pH	DETSC 2008#		pH	7.9	11.6	9.6	9.2	8.6	11.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.4	0.3	0.3	0.4	0.5	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.6	0.9	2.4	2.1	0.5	0.3
Petroleum Hydrocarbons									
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	0.53	0.25	5.7	4.2	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	1.1	< 0.03	0.37	0.16	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.53	0.23	4.2	4.6	< 0.03	0.10
Fluorene	DETSC 3303	0.03	mg/kg	0.38	0.14	3.7	3.6	< 0.03	0.09
Phenanthrene	DETSC 3303#	0.03	mg/kg	5.6	1.4	24	24	0.09	1.6
Anthracene	DETSC 3303	0.03	mg/kg	1.4	0.37	5.7	6.3	< 0.03	0.34
Fluoranthene	DETSC 3303#	0.03	mg/kg	20	1.5	21	21	0.11	1.9
Pyrene	DETSC 3303#	0.03	mg/kg	21	1.4	21	20	0.09	1.8
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	11	0.56	9.6	8.6	0.07	0.78
Chrysene	DETSC 3303	0.03	mg/kg	9.3	0.43	7.3	6.9	0.05	0.73
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	12	0.46	6.4	6.7	0.04	0.69
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	6.9	0.20	3.0	2.8	< 0.03	0.29
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	12	0.43	6.7	6.3	< 0.03	0.59
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	5.0	0.12	1.7	2.0	< 0.03	0.21

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

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ID Manchester - Christine Campbell - Bluewood Services - 6/30/2020 2:15:30 PM - 81.154.246.72

Summary of Chemical Analysis

Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1597114	1597115	1597116	1597117	1597118	1597119
			Sample ID	BH007	BH007	BH008	BH008	BH009	BH011
			Depth	1.00	3.30	2.20	5.20	2.60	1.00
			Other ID	5	12	7	17	9	4
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	08/11/19	09/11/19	10/11/19	10/11/19	10/11/19	09/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	1.0	< 0.03	0.45	0.36	< 0.03	0.06
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	7.3	0.14	2.3	2.7	< 0.03	0.22
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	110	7.6	120	120	0.45	9.4
Phenols									
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1597120
Sample ID	BH011
Depth	3.60
Other ID	11
Sample Type	ES
Sampling Date	09/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
Asbestos Quantification	DETSC 1102	0		
Metals				
Antimony	DETSC 2301*	1	mg/kg	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	16
Beryllium	DETSC 2301#	0.2	mg/kg	1.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.4
Chromium	DETSC 2301#	0.15	mg/kg	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	440
Lead	DETSC 2301#	0.3	mg/kg	290
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05
Nickel	DETSC 2301#	1	mg/kg	17
Selenium	DETSC 2301#	0.5	mg/kg	1.1
Tin	DETSC 2301	1	mg/kg	4.5
Vanadium	DETSC 2301#	0.8	mg/kg	23
Zinc	DETSC 2301#	1	mg/kg	150
Inorganics				
pH	DETSC 2008#		pH	7.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.2
Petroleum Hydrocarbons				
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.04
Pyrene	DETSC 3303#	0.03	mg/kg	0.04
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1597120
Sample ID	BH011
Depth	3.60
Other ID	11
Sample Type	ES
Sampling Date	09/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.12
Phenols				
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

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Summary of Asbestos Analysis

Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1597114	BH007 5 1.00	SOIL	NAD	none	D Wilkinson
1597115	BH007 12 3.30	SOIL	Chrysotile	Chrysotile present as microscopic loose fibrous asbestos debris	D Wilkinson
1597116	BH008 7 2.20	SOIL	NAD	none	D Wilkinson
1597117	BH008 17 5.20	SOIL	NAD	none	D Wilkinson
1597118	BH009 9 2.60	SOIL	NAD	none	D Wilkinson
1597119	BH011 4 1.00	SOIL	NAD	none	D Wilkinson
1597120	BH011 11 3.60	SOIL	NAD	none	D Wilkinson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

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Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 19-23099-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	1597115
Sample ID	BH007
Depth	3.30
Other ID	12
Sample Type	SOIL
Sampling Date	09/11/19
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.192**
Gravimetric Quantification (a)	DETSC 1102	Mass %	0.192
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	na
Quantification by PCOM (c)	DETSC 1102	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na
Breakdown of Gravimetric Analysis (a)			
Mass of Sample		g	1024.85
ACMs present*		type	Insulation
Mass of ACM in sample		g	2.32
% ACM by mass		%	0.23
% asbestos in ACM		%	85.00
% asbestos in sample		%	0.19
Breakdown of Detailed Gravimetric Analysis (b)			
% Amphibole bundles in sample		Mass %	na
% Chrysotile bundles in sample		Mass %	na
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Chrysotile fibres in sample		Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)			
Amphibole fibres		Fibres/g	na
Chrysotile fibres		Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample

ID Manchester - Christine Campbell - Brunswood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Information in Support of the Analytical Results

Our Ref 19-23099-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1597114	BH007 1.00 SOIL	08/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597115	BH007 3.30 SOIL	09/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597116	BH008 2.20 SOIL	10/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597117	BH008 5.20 SOIL	10/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597118	BH009 2.60 SOIL	10/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597119	BH011 1.00 SOIL	09/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1597120	BH011 3.60 SOIL	09/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

ID Manchester - Christine Campbell - Bhuntwood Solutions - 6/30/2020 2:04:30 PM - 81.154.228.72

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Preliminary Ground Investigation Interpretive Report and Final Factual Report.pdf - Page 569

Certificate of Analysis

Certificate Number	19-22787-1
	26-Nov-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-22787-1
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	7 Soil samples.
Date Received	08-Nov-19
Date Started	08-Nov-19
Date Completed	26-Nov-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 19-22787, extra testing.** Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

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THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

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ID Manchester - Christine Campbell - Bruntwood SciTech - 6/30/2020 2:14:30 PM - 81.154.246.72

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Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH002	4	1	1595310	15/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH002	8	2.5	1595311	15/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH004	9	2.3	1595312	15/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH004	17	5.3	1595313	15/11/2019	Dark brown red clayey, very gravelly SAND (Made ground - brick)
BH003	4	1	1595314	15/11/2019	Dark brown gravelly, sandy CLAY
BH003	11	3.5	1595315	15/11/2019	Dark brown gravelly, sandy CLAY
BH006	4	1.2	1595316	15/11/2019	Dark brown gravelly, sandy CLAY

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1595310	1595311	1595312	1595313	1595314	1595315
				Sample ID	BH002	BH002	BH004	BH004	BH003	BH003
				Depth	1.00	2.50	2.30	5.30	1.00	3.50
				Other ID	4	8	9	17	4	11
				Sample Type	ES	ES	ES	ES	ES	ES
				Sampling Date	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification	DETSC 1102	0							Y	
Metals										
Antimony	DETSC 2301*	1	mg/kg	1.9	5.8	2.4	2.0	1.4	1.1
Arsenic	DETSC 2301#	0.2	mg/kg	7.7	21	9.4	13	10	8.2
Beryllium	DETSC 2301#	0.2	mg/kg	0.6	1.1	0.5	0.5	0.3	0.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.3	0.7	0.5	0.5	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.4	1.2	0.5	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	14	210	12	20	10	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24	77	120	46	180	110
Lead	DETSC 2301#	0.3	mg/kg	110	150	400	98	88	59
Mercury	DETSC 2325#	0.05	mg/kg	0.05	0.23	0.43	< 0.05	1.6	0.06
Nickel	DETSC 2301#	1	mg/kg	15	30	9.8	13	9.5	8.7
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.3	1.1	0.7	0.9	< 0.5
Tin	DETSC 2301	1	mg/kg	2.6	31	8.2	12	17	11
Vanadium	DETSC 2301#	0.8	mg/kg	21	32	23	18	16	18
Zinc	DETSC 2301#	1	mg/kg	43	100	310	91	74	31
Inorganics										
pH	DETSC 2008#		pH	10.8	8.1	10.8	10.7	11.5	9.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	1.0	0.4	9.0	0.2	0.3
Total Organic Carbon	DETSC 2002	0.1	%	0.4	2.1	0.8	0.5	1.0	0.4
Petroleum Hydrocarbons										
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	0.61	< 0.03	< 0.03	3.7
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.10	< 0.03	< 0.03	0.09
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.12	< 0.03	1.2	< 0.03	0.08	2.4
Fluorene	DETSC 3303	0.03	mg/kg	0.09	< 0.03	1.0	< 0.03	0.08	2.5
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.84	0.08	8.5	0.21	0.67	12
Anthracene	DETSC 3303	0.03	mg/kg	0.17	< 0.03	1.4	< 0.03	0.17	3.2
Fluoranthene	DETSC 3303#	0.03	mg/kg	1.5	0.09	9.8	0.30	1.9	9.5
Pyrene	DETSC 3303#	0.03	mg/kg	1.3	0.08	9.8	0.25	1.5	8.8
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.35	< 0.03	3.5	0.09	0.57	2.7
Chrysene	DETSC 3303	0.03	mg/kg	0.51	< 0.03	3.7	0.13	0.74	2.9
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.41	< 0.03	3.6	0.20	1.1	2.4
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	< 0.03	1.4	0.11	0.40	0.77
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.21	< 0.03	2.4	0.05	1.1	1.8
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.13	< 0.03	1.0	0.04	0.53	0.71
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.25	< 0.03	0.11	0.17
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.14	< 0.03	1.2	0.04	0.60	0.81

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1595310	1595311	1595312	1595313	1595314	1595315
			Sample ID	BH002	BH002	BH004	BH004	BH003	BH003
			Depth	1.00	2.50	2.30	5.30	1.00	3.50
			Other ID	4	8	9	17	4	11
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19	02/11/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	5.9	0.24	49	1.4	9.6	55
Phenols									
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1595316
Sample ID	BH006
Depth	1.20
Other ID	4
Sample Type	ES
Sampling Date	02/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
Asbestos Quantification	DETSC 1102	0		Y
Metals				
Antimony	DETSC 2301*	1	mg/kg	3.2
Arsenic	DETSC 2301#	0.2	mg/kg	20
Beryllium	DETSC 2301#	0.2	mg/kg	1.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.9
Cadmium	DETSC 2301#	0.1	mg/kg	0.7
Chromium	DETSC 2301#	0.15	mg/kg	21
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	100
Lead	DETSC 2301#	0.3	mg/kg	270
Mercury	DETSC 2325#	0.05	mg/kg	0.48
Nickel	DETSC 2301#	1	mg/kg	28
Selenium	DETSC 2301#	0.5	mg/kg	1.5
Tin	DETSC 2301	1	mg/kg	20
Vanadium	DETSC 2301#	0.8	mg/kg	39
Zinc	DETSC 2301#	1	mg/kg	180
Inorganics				
pH	DETSC 2008#		pH	8.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	1.0
Total Organic Carbon	DETSC 2002	0.1	%	3.5
Petroleum Hydrocarbons				
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.29
Anthracene	DETSC 3303	0.03	mg/kg	0.08
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.72
Pyrene	DETSC 3303#	0.03	mg/kg	0.74
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.24
Chrysene	DETSC 3303	0.03	mg/kg	0.30
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.50
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.29
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.18
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.12
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.13

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investiga

Lab No	1595316
Sample ID	BH006
Depth	1.20
Other ID	4
Sample Type	ES
Sampling Date	02/11/19
Sampling Time	n/s

Test	Method	LOD	Units	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	3.6
Phenols				
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0

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Summary of Asbestos Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1595310	BH002 4 1.00	SOIL	NAD	none	Michael Kay
1595311	BH002 8 2.50	SOIL	NAD	none	Michael Kay
1595312	BH004 9 2.30	SOIL	NAD	none	Michael Kay
1595313	BH004 17 5.30	SOIL	NAD	none	Michael Kay
1595314	BH003 4 1.00	SOIL	Amosite	Small bundle of Amosite	Michael Kay
1595315	BH003 11 3.50	SOIL	NAD	none	Michael Kay
1595316	BH006 4 1.20	SOIL	Amosite	Small bundle of Amosite	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

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Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 19-22787-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

		Lab No	1595314	1595316
		Sample ID	BH003	BH006
		Depth	1.00	1.20
		Other ID	4	4
		Sample Type	SOIL	SOIL
		Sampling Date	02/11/19	02/11/19
		Sampling Time		
Test	**Method**	**Units**		
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**< 0.001**	**< 0.001**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	<0.001	<0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na
Breakdown of Gravimetric Analysis (a)				
Mass of Sample		g	832.22	886.10
ACMs present*		type		
Mass of ACM in sample		g		
% ACM by mass		%		
% asbestos in ACM		%		
% asbestos in sample		%		
Breakdown of Detailed Gravimetric Analysis (b)				
% Amphibole bundles in sample		Mass %	<0.001	<0.001
% Chrysotile bundles in sample		Mass %	na	na
Breakdown of PCOM Analysis (c)				
% Amphibole fibres in sample		Mass %	na	na
% Chrysotile fibres in sample		Mass %	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)				
Amphibole fibres		Fibres/g	na	na
Chrysotile fibres		Fibres/g	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample

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Information in Support of the Analytical Results

Our Ref 19-22787-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1595310	BH002 1.00 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595311	BH002 2.50 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595312	BH004 2.30 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595313	BH004 5.30 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595314	BH003 1.00 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595315	BH003 3.50 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1595316	BH006 1.20 SOIL	02/11/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

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Certificate of Analysis

Certificate Number	19-22333-2
	10-Jan-20
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-22333-2
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	8 Soil samples.
Date Received	05-Nov-19
Date Started	05-Nov-19
Date Completed	10-Jan-20
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 19-22333-1, amendments.** Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

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Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-22333-2
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH013	4	1	1592554	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
BH013	11	3.5	1592555	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
BH014	5	0.7	1592556	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
BH014	15	4	1592557	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP001	6	0.8	1592558	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP002	6	1	1592559	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP002	12	2.5	1592560	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)
TP003	9	1	1592561	20/11/2019	Dark red and brown slightly clayey, very gravelly SAND (Possible made ground - brick)

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1592554	1592555	1592556	1592557
			Sample ID	BH013	BH013	BH014	BH014
			Depth	1.00	3.50	0.70	4.00
			Other ID	4	11	5	15
			Sample Type	ES	ES	ES	ES
			Sampling Date	28/10/19	28/10/19	28/10/19	28/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Antimony	DETSC 2301*	1	mg/kg	1.7	1.5	7.4	2.3
Arsenic	DETSC 2301#	0.2	mg/kg	19	7.4	32	13
Beryllium	DETSC 2301#	0.2	mg/kg	0.9	0.6	0.6	0.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	< 0.2	< 0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.5	0.9	0.3
Chromium	DETSC 2301#	0.15	mg/kg	18	11	24	25
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	36	46	430	79
Lead	DETSC 2301#	0.3	mg/kg	51	73	230	82
Mercury	DETSC 2325#	0.05	mg/kg	0.11	0.24	0.17	0.12
Nickel	DETSC 2301#	1	mg/kg	22	13	34	20
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	3.3	8.2	31	16
Vanadium	DETSC 2301#	0.8	mg/kg	29	21	24	27
Zinc	DETSC 2301#	1	mg/kg	75	84	560	110
Inorganics							
pH	DETSC 2008#		pH	8.1	10.8	8.4	8.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	3.5	0.3
Total Organic Carbon	DETSC 2002	0.1	%	0.8	0.9	1.2	0.3

ID Manchester - Christine Campbell_Brumwell_BriTest - 6/30/2020 - 1:30 PM - 81.154.246.72

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1592554	1592555	1592556	1592557
			Sample ID	BH013	BH013	BH014	BH014
			Depth	1.00	3.50	0.70	4.00
			Other ID	4	11	5	15
			Sample Type	ES	ES	ES	ES
			Sampling Date	28/10/19	28/10/19	28/10/19	28/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Petroleum Hydrocarbons							
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	0.20	0.12	0.42	0.04
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06	0.08	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.48	0.26	2.3	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	0.46	0.20	1.4	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	2.9	1.6	13	0.14
Anthracene	DETSC 3303	0.03	mg/kg	0.91	0.46	2.5	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	3.4	2.9	11	0.14
Pyrene	DETSC 3303#	0.03	mg/kg	2.8	2.6	9.9	0.14
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.86	0.84	3.2	0.06
Chrysene	DETSC 3303	0.03	mg/kg	0.78	0.81	3.0	0.06
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.74	0.71	2.8	0.05
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.27	0.25	0.95	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.54	0.54	2.1	0.04
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.20	0.18	0.70	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	0.20	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.24	0.22	0.86	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	15	12	54	0.66
Phenols							
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1592558	1592559	1592560	1592561
			Sample ID	TP001	TP002	TP002	TP003
			Depth	0.80	1.00	2.50	1.00
			Other ID	6	6	12	9
			Sample Type	ES	ES	ES	ES
			Sampling Date	28/10/19	29/10/19	29/10/19	28/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Antimony	DETSC 2301*	1	mg/kg	4.8	6.1	3.3	16
Arsenic	DETSC 2301#	0.2	mg/kg	87	44	20	22
Beryllium	DETSC 2301#	0.2	mg/kg	0.7	1.3	0.6	2.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.2	0.9	0.8	0.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3	0.8	0.2
Chromium	DETSC 2301#	0.15	mg/kg	20	22	15	19
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	110	230	100	380
Lead	DETSC 2301#	0.3	mg/kg	300	530	250	370
Mercury	DETSC 2325#	0.05	mg/kg	0.45	1.6	0.67	1.0
Nickel	DETSC 2301#	1	mg/kg	17	32	16	450
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.3	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	20	31	19	96
Vanadium	DETSC 2301#	0.8	mg/kg	31	37	18	61
Zinc	DETSC 2301#	1	mg/kg	140	620	220	92
Inorganics							
pH	DETSC 2008#		pH	8.4	7.7	9.0	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	2.9	1.8	0.3	0.4
Total Organic Carbon	DETSC 2002	0.1	%	1.1	3.6	1.5	4.4

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22333-2
Client Ref NW1588

Contract Title ID Manchester Preliminary Ground Investigation

				Lab No	1592558	1592559	1592560	1592561
				Sample ID	TP001	TP002	TP002	TP003
				Depth	0.80	1.00	2.50	1.00
				Other ID	6	6	12	9
				Sample Type	ES	ES	ES	ES
				Sampling Date	28/10/19	29/10/19	29/10/19	28/10/19
				Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Petroleum Hydrocarbons								
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
PAHs								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.05	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.11	0.36	0.06
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.07	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.03	0.19	0.55	0.09
Pyrene	DETSC 3303#	0.03	mg/kg	0.03	0.20	0.55	0.09
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.09	0.20	0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.10	0.21	0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.13	0.20	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	0.07	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.08	0.16	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.08	0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.09	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	1.0	2.6	0.33
Phenols								
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0

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Summary of Asbestos Analysis

Soil Samples

Our Ref 19-22333-2
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1592554	BH013 4 1.00	SOIL	NAD	none	Keith Wilson
1592555	BH013 11 3.50	SOIL	NAD	none	Keith Wilson
1592556	BH014 5 0.70	SOIL	NAD	none	Keith Wilson
1592557	BH014 15 4.00	SOIL	NAD	none	Keith Wilson
1592558	TP001 6 0.80	SOIL	NAD	none	Keith Wilson
1592559	TP002 6 1.00	SOIL	NAD	none	Keith Wilson
1592560	TP002 12 2.50	SOIL	NAD	none	Keith Wilson
1592561	TP003 9 1.00	SOIL	NAD	none	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

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Information in Support of the Analytical Results

Our Ref 19-22333-2
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1592554	BH013 1.00 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592555	BH013 3.50 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592556	BH014 0.70 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592557	BH014 4.00 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1592558	TP001 0.80 SOIL	28/10/19	GJ 250ml, GJ 60ml x2, PT 1L x2		
1592559	TP002 1.00 SOIL	29/10/19	GJ 250ml, GJ 60ml x2, PT 500ml x2		
1592560	TP002 2.50 SOIL	29/10/19	GJ 250ml, GJ 60ml x2, PT 500ml x2		
1592561	TP003 1.00 SOIL	28/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

ID Manchester - Jordaine Campbell - Brimwood SciTech - 6/30/2020 2:14:30 PM - 81.154.28.72

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

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Certificate of Analysis

Certificate Number 19-22225-1

15-Nov-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference	19-22225-1
Client Reference	NW1588
Order No	CH1547
Contract Title	ID Manchester Preliminary Ground Investigation
Description	4 Soil samples.
Date Received	30-Oct-19
Date Started	04-Nov-19
Date Completed	15-Nov-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	This test supersedes 19-22225, additional testing.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

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Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH001	8	1	1591955	11/11/2019	Dark brown gravelly, sandy CLAY
BH001	15	3	1591956	11/11/2019	Dark brown gravelly, sandy and CLAY (Possible made ground - brick)
BH012A	10	2.6	1591957	11/11/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
BH012A	23	7.5	1591958	11/11/2019	Dark brown gravelly, sandy CLAY

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1591955	1591956	1591957	1591958
			Sample ID	BH001	BH001	BH012A	BH012A
			Depth	1.00	3.00	2.60	7.50
			Other ID	8	15	10	23
			Sample Type	ES	ES	ES	ES
			Sampling Date	26/10/19	27/10/19	26/10/19	27/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Antimony	DETSC 2301*	1	mg/kg	1.5	1.4	< 1.0	1.2
Arsenic	DETSC 2301#	0.2	mg/kg	9.1	10	6.4	7.2
Beryllium	DETSC 2301#	0.2	mg/kg	0.9	0.7	0.5	0.7
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	1.0	0.7	0.8	1.1
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2	0.1	0.2
Chromium	DETSC 2301#	0.15	mg/kg	23	17	12	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	38	35	23	25
Lead	DETSC 2301#	0.3	mg/kg	39	200	34	42
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.16	0.06	0.09
Nickel	DETSC 2301#	1	mg/kg	30	18	13	18
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Tin	DETSC 2301	1	mg/kg	1.5	4.4	5.2	2.5
Vanadium	DETSC 2301#	0.8	mg/kg	29	25	17	25
Zinc	DETSC 2301#	1	mg/kg	60	43	37	48
Inorganics							
pH	DETSC 2008#		pH	8.1	8.4	8.5	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	0.1	< 0.1	0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.7	0.7	0.7	1.2
Petroleum Hydrocarbons							
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.05	0.04	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

			Lab No	1591955	1591956	1591957	1591958
			Sample ID	BH001	BH001	BH012A	BH012A
			Depth	1.00	3.00	2.60	7.50
			Other ID	8	15	10	23
			Sample Type	ES	ES	ES	ES
			Sampling Date	26/10/19	27/10/19	26/10/19	27/10/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10
Phenols							
Phenols, Total	DETSC 3451*	5	mg/kg	< 5.0	< 5.0	< 5.0	< 5.0

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Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

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Summary of Asbestos Analysis
Soil Samples

Our Ref 19-22225-1
Client Ref NW1588
Contract Title ID Manchester Preliminary Ground Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1591955	BH001 8 1.00	SOIL	NAD	none	Michael Kay
1591956	BH001 15 3.00	SOIL	NAD	none	Michael Kay
1591957	BH012A 10 2.60	SOIL	NAD	none	Michael Kay
1591958	BH012A 23 7.50	SOIL	NAD	none	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

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Information in Support of the Analytical Results

Our Ref 19-22225-1
Client Ref NW1588
Contract ID Manchester Preliminary Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1591955	BH001 1.00 SOIL	26/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1591956	BH001 3.00 SOIL	27/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1591957	BH012A 2.60 SOIL	26/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1591958	BH012A 7.50 SOIL	27/10/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

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Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

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Quality Control

Quality Systems.

Derwentside Environmental Testing Services employs numerous measures to ensure high levels of confidence in the results produced. Our laboratory has been accredited by the United Kingdom Accreditation Service (UKAS) since its inception and operates in full compliance with the internationally recognised standard ISO17025 and the Environment Agency's MCERTS (Monitoring & Certification Scheme) standard for soils and waters, which provides greater assurance to all parties of the reliability of data from chemical analysis.

To obtain a copy of our full UKAS schedule visit the UKAS website at www.ukas.org and search for our laboratory number 2139.

2139

Proficiency Testing Schemes.

DETS participates in seven external proficiency testing schemes in order to monitor and ensure the continuing quality of analysis. These schemes are:

Internal Quality Control.

DETS runs a strict internal quality control system. A minimum of 5% of all samples that undergo analysis in our laboratories are quality control samples. This way we can ensure a high level of confidence in all of the analytical data produced. In addition, MCERTS accredited tests must meet strict, ongoing limits for precision and bias in order to maintain their accreditation status.

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SAMPLE HOLDING TIME INFORMATION

Soil

Analyte	Container type	Minimum sample required	Reference	Maximum holding time from sampling	
				pre drying/extraction[1]	post drying/extraction[2]
Ammonium	Glass or plastic	20g	BS ISO18512:2007	1 week	
Anions	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
BTEX	60ml glass jar	Full container	EPA 8260	2 weeks	N/A
Conductivity	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Cyanide	Glass or plastic	20g	EPA 9010B/9012	2 weeks	
Heavy metals	Glass or plastic	10g	BS ISO18512:2007	6 months	30 years
Hexavalent chromium	Glass or plastic	20g	BS ISO18512:2007	1 month	
Loss on ignition	Glass or plastic	10g	BS ISO18512:2007	1 month	
OCP	Glass	20g	BS ISO18512:2007	1 month	
Oil & grease	Glass	20g	EPA 9070/1	1 month	
Organic matter/TOC	Glass or plastic	20g	BS ISO18512:2007	1 month	
PAH	Glass	20g	EPA 8100/8270	2 weeks	6 weeks
PCB	Glass	20g	BS ISO18512:2007	1 month	
pH	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Phenols	Glass	20g	EPA 8270	2 weeks	6 weeks
PRO	60ml glass jar	Full container	EPA 8015	2 weeks	N/A
Sulphide	Glass or plastic	20g	BRE SD1	3 weeks	1 month
SVOC	Glass	20g	EPA 8270	2 weeks	6 weeks
TEM/CEM	Glass	20g	EPA 418.1	2 weeks	6 weeks
Thiocyanate	Glass or plastic	20g	EPA 9251	No special requirement	
Total sulphur	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
TPH (C10-C40)	Glass	20g	EPA 418.1	2 weeks	6 weeks
VOC	60ml glass jar	Full container	EPA 8260	2 weeks	N/A

Sample storage environment 5°C

1. From sampling to extraction
2. Once extracted

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Waters

Analyte	Container type	Min sample required (ml)	Reference	Preservative required	Max holding time until extraction
Alkalinity	Glass or plastic	100	EPA 310.2	none	2 weeks
Ammonium	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	3 weeks
BOD	Glass or plastic	500	EPA 405.1 5120B	none	2 days
BTEX	Glass vial	Full container	Lab validation	none	2 weeks
Chloride	Glass or plastic	20	ISO 5667 3:2012	none	1 month
COD	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	1 month
Conductivity/TDS	Glass or plastic	100	EPA 160.1	none	1 week
Cyanide	Plastic	50	EPA 9012/335.3	Sodium hydroxide	2 weeks
Hexavalent chromium	Glass or plastic	20	ISO 5667 3:2012	none	4 days
Metals	Glass or plastic	20	ISO 5667 3:2012	Nitric acid	1 month
Nitrate	Glass or plastic	20	EPA 353.2	none	2 days
Nitrite	Glass or plastic	20	EPA 600/4 079-020	none	2 days
OCP	Glass	500	EPA 8081A/608	none	1 week
Oil & grease	Glass	500	ISO 5667 3:2012	Hydrochloric acid	1 month
PAH	Glass	500	ISO 5667 3:2012	none	1 week
pH	Glass or plastic	50	Lab validation	none	1 week
PCB	Glass	500	EPA 8082A	none	6 weeks
Phenols	Glass	500	ISO 5667 3:2012	Sulphuric acid	3 weeks
Phosphate	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	1 month
PRO	Glass vial	Full container	EPA 8015	none	2 weeks
Sulphate	Glass or plastic	20	ISO 5667 3:2012	none	1 month
Sulphide	Plastic	50	ISO 5667 3:2012	NaOH/Zinc acetate	1 week
Suspended solids	Glass or plastic	100	EPA 160.2 2540D	none	1 week
SVOC	Glass	500	EPA 8270/625	none	1 week
TOC	Glass or plastic	20	ISO 5667 3:2012	Sulphuric/Phosphoric acid	1 week
TON	Glass or plastic	20	EPA 353.2	none	1 month
TPH/EPH	Glass	500	Lab validation	none	1 weeks
VOC	Glass vial	Full container	Lab validation	none	1 week

Sample storage environment 3°C ± 2°C

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETS 036	**Leachate Preparation** **(NRA Method and BS EN 12457 Parts 1-3)**	Leachates are prepared as per the NRA (1994) method and as per BS EN 12457 Parts 1 - 3 one and two stage leachate preparation.	Leaching Test Method for the Assessment of Contaminated Land, Interim Guidance, NRA(1994) BS EN 12457 Part 1,2 & 3	n/a	Not Accredited
DETS 073	**Acid Neutralisation Capacity of Soils and Other Solids**	ANC is a measure of the buffering capacity of soils and other waste materials. The analysis measures the amount of acid required to bring the sample to a fixed pH. The initial pH of the sample extract must be measured before analysis begins. Analysis is performed by the addition of acid in conjunction with pH measurement by pH meter until the specified pH has been reached as indicated by the meter. The result is expressed in mol/kg (dry wt).	Annex B (Preliminary determination of the acid/base consumption) – CEN/TC 292 – WI 292046 – Characterization of waste – Leaching behaviour tests – Acid and Base neutralization capacity test	1.0 mol/kg	Not Accredited
DETS 074	**Low Level PAH by HPLC Fluorescence**	PAH is extracted from one litre of filtered water sample by solid phase extraction. PAH is eluted from the SPE column with DCM evaporated to dryness under nitrogen and redissolved in acetonitrile. Analysis of samples is carried out by HPLC fluorescence.	EPA Method 550 The Analyst 2001, 126:1336-1331 Phenomonex Strata X Application Note for PAH by SPE	0.01ug/L each 5.0 ug/L Total	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 1001	**Sample Pre-Treatment and Preparation of Solids**	Solid samples are classified and identified. Samples requiring analysis for unstable or volatile determinands are analysed as received. Samples requiring analysis for stable and non-volatile determinands are dried at <30◦C or 50◦C, depending on requirements, for a minimum of 16hrs (overnight). Dried samples are crushed in a jaw crusher, if necessary, and then ground using a mechanical mixer mill and sieved through a 250µm sieve to ensure they are homogenous.	BS1377:1990 – Soils for Civil Engineering Purposes The preparation and pre-treatment of potentially contaminated soils prior to chemical analysis – MEWAM – 2006 – Environment Agency (Updated procedure under preparation)	n/a	Not Accredited
DETSC 1002	**Description of Soil Sample Type**	This method outlines the procedure used to describe soil samples with respect to basic type, predominant colour and inclusions. The procedure is carried out during the sample preparation stage.	BS 5930:Section 6:1999	n/a	Not Accredited
DETSC 1003	**Stone and Glass / Metal / Plastic Content of Soil**	This method outlines the procedure used to determine the Stone and Glass/Metal/Plastic content of soil samples. The procedure is carried out during the sample preparation stage.	BS 3882:2007 BS 1377:1990	0.1%	Not Accredited
DETSC 1004	**Moisture Content/Loss on Drying of Soil**	Loss on drying is determined by loss of mass on drying in an oven set at 28ºC or 50ºC. Moisture content is determined by loss of mass on drying in an oven set at 105ºC. The procedure is carried out during the sample preparation stage.	Practical Environmental Analysis. Radojevic & Bashkin. RSC 1999 BS 1377: Part 2:1990 DETS drying time study	0.1%	Not Accredited
DETSC 1101	**Asbestos - Bulk Analysis**	Samples are examined visually for the presence of asbestos containing materials or asbestos fibres. Suspect fibres are removed from the sample and examined using polarised light microscopy to determine whether they are asbestos fibres. If no asbestos fibres are identified by the method after an adequate length of examination time, and after at least two small pinch samples have been examined, then the sample may be reported as 'NAD' (no asbestos detected).	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005 McCrone W.C., Asbestos Identification (Second Edition), The McCrone Research Institute, 1987 LAB 30, Application of ISO/IEC17025 for Asbestos Sampling and Testing, UKAS, Edition 2, April 2008	n/a	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 1102	**Quantification of asbestos in soils, loose aggregates and ballast**	The method of quantification is divided into three procedures: Gravimetric analysis, detailed gravimetric analysis and PCOM analysis. The analysis may be affected by the client's requirements as determined by contract review, and by the nature of the asbestos found in the sample, e.g. whether ACMs are present, and whether fibre bundles large enough to pick out using tweezers are have been found in the sample.	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005 HSG264 Asbestos: The survey guide. HSE Books, 2010. Davies, L. S.T., Wetherill, G. Z., McIntosh, C., McGonagle, C., Addison, J. 1996. Development and validation of an analytical method to determine the amount of asbestos in soils and loose aggregates. HSE Contract Research Report N0. 83/1996. HSE Books	Gravimetric Analysis: 0.01% for 1kg sample Detailed Gravimetric Analysis: 0.001% for 50g sample PCOM Analysis: 0.001%	UKAS
DETSC 1103	**Asbestos Water Absorption Test**	This test involves a sample of the asbestos product being dried and weighed before being immersed in water for a period of time. The sample is then removed from the water and re-weighed. If the amount of water absorbed is <30% by weight, then the sample should be reported as 'Not Licensed'. If ≥30% water is absorbed then the sample should be reported as being 'Licensed', i.e. an asbestos material for which a licence is required to work on.	Work with Materials Containing Asbestos: Approved Code of Practice and Guidance. HSE Books, 2006.	n/a	UKAS
DETSC 2002	**Organic matter content of soil**	The procedure is based upon Walkley and Black's method. Organic matter in soil is oxidised with potassium dichromate in the presence of concentrated sulphuric acid. The excess dichromate is titrated with ferrous sulphate using diphenylamine as an external indicator. The organic matter content is calculated from the amount of dichromate used during the oxidation process based on an empirical relationship.	BS1377 : Part 3 : 1990 Method 3 BS1377 : Part 1 : 1990 BS 3882:2007	0.1%	UKAS MCERTS(Soils)

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

DETSC 2003	**Loss On Ignition**	Soil is ignited at 440C and the amount of sample lost on ignition is determined gravimetrically. Other specified temperatures may be used but are not accredited.	BS1377 : Part 3 : 1990 Method 4 BS1377 : Part 1 : 1990	0.01%	UKAS MCERTS(Soils)
Method Number	**Title**	**Description**	**Reference**	**LOD**	**Accreditation Status**
DETSC 2004	**Sulphate Content of Soil and Water**	The sulphate in the soil is dissolved in dilute hydrochloric acid, or in an aqueous extract having a water:soil ratio of 2:1 and the insoluble residue is removed by filtration. Waters are also filtered prior to analysis. The sulphate in the filtrate is precipitated as barium sulphate which is then filtered, ignited and weighed.	BS1377 : Part 3 : 1990 Method 5 BS1377 : Part 1 : 1990 BRE SD1: 2005 Concrete in Aggressive Ground	**Acid Soluble:** 0.01% **Water Soluble** 100mg/l **Waters** 10mg/l	UKAS MCERTS(Soils)
DETSC 2005	**Carbonate content of soil by Rapid Titration**	The carbonate present in the soil reacts with a known excess of hydrochloric acid liberating carbon dioxide. The acid remaining after the reaction is determined by titration against sodium hydroxide. The result is calculated in terms of the equivalent proportion of carbon dioxide.	BS 1377: Part 1: 1990. BS 1377: Part 3: 1990: Method 5	1%	UKAS
DETSC 2006	**Water Soluble Chloride Content of Soil & Chloride Content of Water**	The chloride in the soil is dissolved in water and the insoluble material is removed by filtration. Waters are filtered before analysis. The chloride is analysed by Mohr's method. The chloride in a neutral solution is titrated against standard silver nitrate using potassium chromate as an indicator. The colour change is from yellow to brick red.	BS1377 : Part 3 : 1990 Method 7.2 BS1377: Part 1: 1990	**Soil:** 0.01% **Water:** 10mg/l	UKAS MCERTS(Soils)
DETSC 2007	**Acid Soluble Chloride Content of Soil and Concrete**	The chloride in the sample is dissolved in nitric acid and the insoluble material is removed by filtration. The dissolved chloride is analysed by Volhard's method. The chloride in solution is precipitated with a known excess of standard silver nitrate. The excess silver nitrate is titrated against standard ammonium thiocyanate using ferric alum as an indicator. The colour change is white to red.	BS1377 : Part 3 : 1990 Method 7.3 BS1377: Part 1: 1990 BS 1881-124:1988	0.01%	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2008	**pH Value of Soil and Water**	The pH value of a soil suspension in water or a groundwater sample is determined electrometrically using a glass electrode.	BS1377: Part 3: 1990 – Soils for Civil Engineering Purposes – Chemical and Electrochemical Methods	n/a	UKAS (Soils + Waters) MCERTS (Soils + Waters-Trade Effluent only)
DETSC 2009	**Electrical Conductivity of Soil & Water**	The electrical conductance of a soil suspension in water or of a water sample is determined by voltammetry using a conductivity meter. In some cases, the soil may need to be extracted with an aqueous solution of an inorganic salt e.g. the conductivity of topsoil is determined by preparing a suspension of the soil in saturated calcium sulphate.	Standard Methods for the Examination of water and Wastewater Part 2510B 21st Edition 2005 APHA, AWWA, WEF BS3882:2007 Specification for Topsoil	1uS/cm	UKAS
DETSC 2019	**Loose Packed Dry Soil Density**	Dried, ground soil is transferred to a dry, tared measuring cylinder and the volume recorded. The cylinder and its contents are then weighed and the density of the soil calculated.	BS3882:2007 Specification for Topsoil	n/a	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2024	**Sulphide in Soil and Water by Iodometry**	Hydrogen sulphide is liberated by acidification of the sample with hydrochloric acid in a steam distillation unit. The hydrogen sulphide produced is carried over with the steam and is absorbed in alkaline zinc acetate. The zinc sulphide produced reacts with iodine formed when iodate-iodide is acidified and the excess iodine titrated with standard thiosulphate.	In House Method based on: Environment Agency The determination of easily liberated sulphide in soils and similar matrices (2010) - Blue Book 228 Method D - The determination of easily liberated sulphide in as received or air-dried samples following acid steam distillation with iodometric titration. Environment Agency The determination of sulphide in waters and associated materials (2007) Draft Method D - The determination of easily liberated sulphide in as received or air-dried samples following phosphoric acid steam distillation with iodometric titration.	**Soils:** 10mg/kg . **Waters:** 250ug/l	**Soils:** UKAS MCERTS(Soils) **Waters:** Not Accredited
DETSC 2030	**Alkalinity in Water**	Alkalinity of a water sample is determined by indicator end point titration with a strong acid from sample pH to pH8.3 (where applicable) and then to pH4.5. From the titres obtained the total alkalinity and concentrations and types of alkalinity present can be calculated.	SCA Method ISBN 0 11 751601 5 The Determination of Alkalinity and Acidity in Water 1981 Instruction Manual for Skalar SP50 Robotic Analyser	20mg/l as CaCO3	UKAS MCERTS(Waters) Trade Effluent only
DETSC 2031	**5 Day Biochemical Oxygen Demand**	The sample, either diluted or undiluted, is placed in a BOD bottle and the initial dissolved oxygen content of the sample is measured using a dissolved oxygen meter. The bottle is placed in an incubator at 20ºC in the dark for 5 days. After this time the bottle is removed and the residual dissolved oxygen content of the sample is measured. The BOD of the sample is calculated from the reduction in the concentration of dissolved oxygen over 5 days.	SCA Method ISBN 0 117522120 5 Day Biochemical Oxygen Demand (BOD5) Second Edition 1988	1 mg/l	UKAS MCERTS(Waters)- Trade Effluent only

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2032	**Chemical Oxygen Demand**	Oxidisable substances react with sulphuric acid – potassium dichromate solution in the presence of silver sulphate as a catalyst. Chloride is masked by mercury sulphate. The reduction in the yellow colouration of Cr6+ is evaluated using a spectrophotometer for the low range tubes (LCK 314) whilst the green colouration of Cr3+ is evaluated for the medium and high range tubes (LCK 014 and LCK 114).	Environment Agency The determination of chemical oxygen demand in waters and effluents (2007) Methods for the Examination of Waters and Associated Materials	10 mg/l	UKAS MCERTS(Waters)-Trade Effluent only
DETSC 2033	**Total and Dissolved Organic Carbon in Water**	The term TOC (Total Organic Carbon) is used to describe the total content of organically bound carbon in dissolved and undissolved compounds. The TOC content is expressed in mg/l. If DOC (Dissolved Organic Carbon) is required, samples are filtered through a 0.45µm filter paper prior to analysis. Inorganic carbon is expelled by acidification of the sample. TOC is then determined by digestion of the sample with sulphuric acid and peroxodisulphate. Carbon containing compounds are transformed into carbon dioxide. The carbon dioxide evolves and reacts with an indicator solution. The colour change is measured using a spectrophotometer.	Hach-Lange Technical Instructions: LCK 385, LCK 386, LCK 387	2 mg/l	UKAS
DETSC 2034	**Suspended and Settleable Solids in Water**	Suspended matter is removed from a measured volume of sample by filtration under reduced pressure through a pre-treated, pre-weighed glass fibre filter paper. The paper is washed with deionised water to remove dissolved salts and the total suspended matter is determined gravimetrically after drying at 105 ±5°C Settleable solids are determined by subtracting the solids left in suspension after settlement for 1 hour (or other agreed time) from the total suspended matter in the sample.	SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980	5 mg/l	**Suspended Solids:** UKAS MCERTS(Waters)-Trade Effluent only **Settleable Solids:** Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2035	**Total Dissolved Solids in Water**	Water samples are pre-filtered to remove any suspended solids and evaporated in an oven at 180°C. The amount of residual dissolved solids is determined gravimetrically. An estimate of the total dissolved solids can be obtained by measuring the conductivity of the sample. This method is not accredited.	SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980 BS1377: Part 3 : 1990 Section 8	5 mg/l	UKAS
DETSC 2047	**Formaldehyde in Water**	Formaldehyde in soil is extracted in water, with a water to soil ratio of 10:1. The insoluble residue is removed by filtration prior to analysis. Waters are filtered prior to analysis to remove any particulates in suspension. Formaldehyde in the extract or water sample reacts with chromatropic acid-sulphuric acid solution to form a purple coloured complex. The absorbance of the coloured solution is read at 580nm using a suitable visible spectrophotometer.	Formaldehyde by visible absorption spectrophotometry – Method 3500, Issue 2 – NIOSH Manual of Analytical Methods, Fourth edition, August 1994	**Soil:** 0.2mg/kg **Water:** 20µg/l	Not Accredited
DETSC 2048	**Dissolved Oxygen Content of Water**	The dissolved oxygen content of the sample is measured using a dissolved oxygen meter either electrochemically or by fluorescence, or by the titrimetric method developed by Winkler.	SCA Method ISBN 0.11 751442X Dissolved Oxygen in Natural and Waste Waters 1979	0.1 mg/l	Not Accredited
DETSC 2055	**Anions in Water and Aqueous Soil Extracts by Ion Chromatography**	Liquid samples and aqueous soil extracts are filtered through a 0.22µm syringe filter prior to analysis. The filtered samples are injected into an Ion Chromatograph. The anions of interest are separated on the basis of their affinity for the active sites of the column packing material. The separated anions are converted into their highly conductive acid forms and measured by conductivity. The anions are identified on the basis of retention time as compared to standards and quantisation is by measurement of peak area.	Standard Methods for the Examination of Water and Wastewater Section 4110 21st Edition 2005 APHA, AWWA, WEF	**Soil:** 1.0 mg/kg **Water:** 0.1 mg/L	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2076	**Sulphate and Magnesium Content of 2:1 Aqueous Extract of Soil by ICP-OES**	The sulphate and magnesium in the soil are extracted in an aqueous extract having water: soil ratio of 2:1 and the insoluble material is removed by filtration. The concentrations of sulphate and magnesium in the filtrate are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelengths used for identification and quantification are 181.972nm for sulphate and 285.213nm for magnesium.	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1: 1990 TRL 447 Sulphate Specification for Structural Backfills 2005 BRE SD1:2005 Concrete in Aggressive Ground 2005	10mg/L	**Sulphate:** UKAS MCERTS(Soils) **Magnesium:** Not Accredited
DETSC 2084	**Total Organic Carbon by PrimacATC Analyser**	Soil samples are treated with phosphoric acid to expel any inorganic carbonates. The samples are then heated at high temperature in a continuous flow of air so that any organic carbon is oxidised to carbon dioxide. The gas is then allowed to cool and analysed by an infra-red detector.	PrimacsATC Analyser – User Manual, Skalar	0.47%	MCERTS(Soils)
DETSC 2085	**Total and Dissolved Organic Carbon in Water**	**Direct TOC Analysis** The sample is acidified, stirred and purged to remove the IC before the sample is injected and handled as in the TC Analysis. The sample is filtered before acidification for DOC. **TC Analysis** The sample is injected by an automated septum less rotary port into a high temperature reactor. In the reactor, at a temperature of 750 - 950°C all organic and inorganic carbon is oxidized to the gaseous carbon dioxide (CO2). The catalyst that is present in the reactor catalysis the oxidation to completion. A flow of air transports these oxidation products to the detectors. The oxygen required for reaction is taken from the airflow. The products are led into the non-dispersive infrared detector where the carbon dioxide is determined. The carbon dioxide is measured at a wavelength of 4.2 µm by NDIR detection.	Standard Methods for the Examination of Water and Wastewater Section 5310 B 21st Edition 2005 APHA, AWWA, WEF HMSO Methods for the Examination of Waters and Associated Materials – The Instrumental Determination of Total Organic Carbon and Related Determinands 1995	lmg/l as C	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2119	**Exchangeable Ammonia in Soil**	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	MAFF/ADAS Reference Book 427 – the Analysis of Agricultural Materials – Method 53, Ammonium, Nitrate and Nitrite-Nitrogen, Potassium Chloride Extractable	0.5mg/kg	UKAS MCERTS(Soils)
DETSC 2120	**Ammonia in Water by Spectrophotometry**	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	Environment Agency Ammonia in Waters 1981 ISBN 0117516139 Methods for the Examination of Waters and Associated Materials	20µg/l	UKAS
DETSC 2121	**Total Kjeldahl Nitrogen Content of Soils and Waters**	The sample is digested with sulphuric acid and a mixture of catalysts to convert organic nitrogen to ammonia. The sample is then distilled under alkaline conditions, and the distilled ammonia is absorbed in sulphuric acid. The ammonia content of the distillate is then determined colorimetrically either using the UV/vis spectrophotometer or the Konelab 60i. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm	The Analysis of Agricultural Materials – MAFF/ADAS Reference Book 427 – HMSO BS 3882: 2007 Specification for topsoil Standard Methods for the Examination of Water and Wastewater Part 4500-N. 21st Edition 2005 APHA, WWA, WEF	**Soil:** 0.01% **Water:** 2mg/l	Not Accredited
DETSC 2123	**Water Soluble Boron in Soil & Boron in Water**	Boron in soil is extracted in boiling saline water. Waters are filtered prior to analysis to remove any particulates in suspension. The water soluble boron in the extract or filtrate reacts with azomethine–H to produce a yellow coloured complex. The resulting colour absorbance is measured at 420nm using a suitable visible spectrophotometer.	SecondSite Property (now National Grid Property Holdings) - Guidance for assessing and managing potential contamination on former gasworks and associated sites (Part I) (Version 3) Method 17.12 The analysis of Agricultural materials MAFF/ADAS – reference book 427	**Soil:** 0.2mg/kg **Water:** 100ug/L	UKAS MCERTS(Soils)

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

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Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2130	**Cyanides & Monohydric Phenols by Skalar**	Water samples are filtered through a 0.45µm syringe filter and solid samples are extracted with 1M caustic soda prior to analysis on the automated flow analyser. The method determines total cyanide, easily liberated cyanide, complex cyanide, thiocyanate and monohydric phenols	Skalar methods: I295-001 w/r+P7 I295-002 w/r+P7 293-902 w/r+P7 497-001	**Soils mg/kg:** Total & Free CN=0.1, Thio=0.6, Phenol=0.3 **Waters ug/L:** Total CN=40, Free CN=20, Thio=20, Phenol=100	UKAS MCERTS(Soils)
DETSC 2140	**Sugar in Mixing Water for Cement**	Waters are filtered prior to analysis to remove any particulates in suspension. The sugar in the filtrate reacts with phenol and sulphuric acid to produce a yellow-orange coloured complex. The resulting colour absorbance is measured at 490nm using a suitable visible spectrophotometer.	Colorimetric Method for Determination of Sugars and Related Substances MICHEL DUBOIS, K. A. GILLES, J. K. HAMILTON, P. A. REBERS, and FRED SMITH - Division of Biochemistry, University of Minnesota, St. Paul, Minnesota.	10mg/l	Not Accredited
DETSC 2201	**Nitrite in Waters and Leachates by Konelab 60i**	Nitrite is determined colorimetrically using the Konelab60i autoanalyser. The nitrite colour reaction occurs at pH 2.0 to 2.5 by coupling diazotized Sulphanilamide with N-1-naphthyl-ethylenediamine. The absorbance of this compound is measured spectrophotometrically at 520nm.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B – 21st Edition 2005 APHA, AWWA, WEF Aquakem Method Nitrite in Waters Iss No 2 Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981.	0.04mg/l (as N)	UKAS

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			EPA Method 354.1 Nitrite, spectrophotometric (Approved at 40 CFR Part 136, not approved at Part 141)		

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2202	**Total Oxidised Nitrogen in Waters and Leachates by Konelab 60i**	Nitrate is reduced to nitrite by hydrazine under alkaline conditions. The total nitrite ions are then reacted with sulphanilamide and N-1-naphthylethylenediamine dihydrochloride under acidic conditions to form a reddish purple azo-dye. The absorbance of this compound is measured spectrophotometrically at 540 nm using the Konelab 60i autoanalyser.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B and Part 4500-NO3 H – 21st Edition 2005 APHA, AWWA, WEF Aquakem Method Total Oxidised Nitrogen. Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981. EPA Method 353.1 Nitrate, Nitrite Colorimetric Automated Hydrazine Reduction (Approved at 40 CFR Part 136, Not approved at Part 141)	0.7mg/l (as N)	UKAS
DETSC 2203	**Hexavalent Chromium in Waters and Leachates by Konelab 60i**	Hexavalent Chromium is determined colorimetrically using the Konelab 60i autoanalyser. Hexavalent chromium reacts with diphenylcarbizide in acid solution and produces a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm.	Standard Methods for the Examination of Water and Wastewater Part 3500-Cr – 21st Edition 2005 APHA, AWWA, WEF USEPA 7196-A Aquakem Method. Hexavalent Chromium	10µg/l	UKAS
DETSC 2204	**Hexavalent Chromium in Soil by Konelab 60i**	Hexavalent Chromium is determined colorimetrically using the Konelab 60i autoanalyser. Hexavalent chromium reacts with diphenylcarbizide in acid solution and produces a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm.	Aquakem Method. Hexavalent Chromium	1mg/kg	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2205	**Reactive & Total Phosphorus in Waters and Leachates by Konelab 60i**	Phosphate is determined colorimetrically using the Konelab60i autoanalyser. The orthophosphate ion reacts with ammonium molybdate and antimony potassium tartrate under acidic conditions to form a 12-molybdophosphoric acid complex. The complex is then reduced with ascorbic acid to form a blue heteropoly compound. The absorbance of this compound is measured spectrophotometrically at wavelength 880nm.	Standard Methods for the Examination of Water and Wastewater Part 4500-P E– 21st Edition 2005 APHA, AWWA, WEF Aquakem Method. Phosphate in Waters Issue 2	0.01mg/l	**Reactive Phosphorus:** UKAS MCERTS (Waters-Trade Effluent only) **Total Phosphorus:** Not Accredited
DETSC 2206	**High Level Ammonia in Waters and Leachates by Konelab 60i**	Ammonia is determined colorimetrically using the Konelab60i autoanalyser. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm.	Methods for the Examination of Waters and Associated Materials Ammonia in Waters 1981 ISBN 0117516139. Aquakem Method. Ammonia in Waters Issue 2	0.8mg/l	UKAS
DETSC 2207	**Low Level Ammonia in Waters and Leachates by Konelab 60i**	Ammonia is determined colorimetrically using the Konelab60i autoanalyser. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm.	Methods for the Examination of Waters and Associated Materials Ammonia in Waters 1981 ISBN 0117516139. Aquakem Method. Ammonia in Waters Issue 2	0.015mg/l	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2208	**Sulphide in Waters and Leachates by Konelab 60i**	Sulphide is determined colorimetrically using the Konelab60i autoanalyser. Potassium Dichromate converts N-N-Diethyl-p-phenylenediamine to the free radical which reacts rapidly with sulphide to produce the coloured 'DPD Blue' or 'Ethylene Blue'. The absorbance can then be measured at wavelength 660nm.	The determination of sulphide in waters and associated materials (2007) - SCA - Draft (March 2007) Aquakem Method. Sulphide SP001 Issue 2 Standard Methods for the Examination of Water and Wastewater, 21st Edition 2005, Part 4500. ISBN0-87553-223-3	10µg/l	UKAS
DETSC 2210	**Ferrous Iron in Waters and Leachates by Konelab 60i**	Three molecules of phenanthroline chelate with each atom of ferrous iron to form an orange/red complex. The intensity of the coloured solution is stable between pH3 to pH9. Rapid colour development occurs between pH2.9 and pH3.5 in the presence of excess phenanthroline. The resulting colour absorbance is measured at 510nm	Aquakem Method Ferrous Iron FIR001 Issue 2	0.1mg/l	Not Accredited
DETSC 2211	**Silicate in Waters and Leachates by Konelab 60i**	Reactive forms of silicon in acid solution, below pH2, react with ammonium molybdate ions to form a yellow silicomolybdate. Ascorbic acid reduces the yellow silicomolybdate to produce a blue silicomolybdate complex. Oxalic acid is added to destroy any molybdophosphoric acid formed.	ASTM D7126 - 10 Standard Test Method for On-Line Colorimetric Measurement of Silica Aquakem Method Silica SIL Issue 2	0.1mg/l	Not Accredited
DETSC 2301	**Metals in Soil by ICP-OES** As, Ba, Be, Cd, Cr, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, V, Zn	Metals in soil are extracted using aqua regia and their concentrations are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Any metals not listed can be determined but are not accredited under UKAS or MCERTS for soils.	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005, AWWA, WEF	**mg/kg:** As, Be Cu, Ni =0.2, Ba=1.5, Cd=0.1, Cr=0.15, Co=0.7, Mn=20, Mo=0.4, Pb=0.3, Fe=1200, Se=0.5, V=0.8, Zn=1.0	UKAS (all listed) MCERTS (All soils listed except Fe)

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2302	**Metals in Waters by ICP-OES** Al, As, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Zn	Concentrations of metals in water are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Any metals not listed can be determined but are not accredited under UKAS or MCERTS for waters	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005 APHA, AWWA, WEF	**µg/l:** Al=6.5, As= 7.1, Ca=100, Cd=0.3, Cr=0.75, Cu=0.75, Fe=70, K=20, Mg=5, Na=12, Ni=2.7, Pb=4, Se=11.3, Zn=3.8	**Dissolved:** UKAS (all listed) MCERTS(Waters)-Trade Effluent only (Al, Cd, Cr, Cu, Ni, Pb, Zn) **Total:** Not Accredited
DETSC 2303	**Total Hardness (By Calculation)**	The concentrations of calcium and magnesium are determined using the appropriate methodologies. The hardness is a measure of the sum of the calcium and magnesium concentration expressed as calcium carbonate.	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005 APHA, AWWA, WEF	n/a	UKAS
DETSC 2304	**Zinc Equivalent in Soil (By Calculation)**	The concentrations of copper, nickel and zinc concentrations are determined using the appropriate methodologies. The zinc equivalent is a measure of the combined toxicity of the three metals, relative to the toxicity of zinc.	n/a	n/a	Not Accredited
DETSC 2306	**Metals in Waters by ICP-MS** Ag, Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Sn, V, Zn	Concentrations of metals in water are determined by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Any metals not listed can be determined but are not accredited under UKAS.	Standard Methods for the Examination of Water and Wastewater Part 3125 B – 21st Edition 2005 APHA, AWWA, WEF	**µg/l:** Ag=0.13, Al=10.0, As=0.16, Ba=0.26, Ca=90, Cd=0.03, Co=0.16, Cr=0.25, Cu=0.40, Fe=5.50, Hg=0.01, K=80, Mg=20, Mn=0.22, Mo=1.1, Na=70, Ni=0.50, P=18.0, Pb=0.09, Sb=0.17, Se=0.25, Sn=0.40, V=0.60, Zn=1.3	**Dissolved:** UKAS (all listed) **Total:** Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2320	**Total Sulphur in Soil by ICP**	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia.	TRL 447 Sulphate Specification for Structural Backfills 2005 BRE SD1 Concrete in Aggressive Ground 2005	0.01%	UKAS
DETSC 2321	**Total Sulphate content of Soil by ICP-OES**	The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1 : 1990	0.01%	UKAS MCERTS(Soils)
DETSC 2322	**Total Potential Sulfate and Total Oxidisable Sulphur (By Calculation)**	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The wavelength used for identification and quantification of sulphate is 181.972nm. The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelength used for identification and quantification of sulphate is 181.972nm. The two results obtained from the above tests may then be combined to calculate the Total Potential Sulphate and Total Oxidisable Sulphur content	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1 : 1990	0.01%	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2324	**Mercury in Waters by Atomic Fluorescence Spectroscopy**	Waters and aqueous samples are preserved by fixing with concentrated nitric acid. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry.	Standard Methods for the Examination of Water and Wastewater Part 3112 B – 21st Edition 2005 APHA, AWWA, WEF PSA Method – Millennium Merlin Method for Total Mercury in Drinking, Surface, Ground, Industrial and Domestic Wastewaters and Saline Waters	0.05µg/l	UKAS
DETSC 2325	**Mercury in Soil Atomic Fluorescence Spectroscopy**	The mercury is extracted from soil in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments	0.05 mg/kg	UKAS MCERTS(Soils)
DETSC 2332	**Inorganic and Methyl Mercury Speciation**	Soils are air-dried and crushed before being subjected to a two-stage microwave extraction procedure for Inorganic (Hg(II)) and Methyl (MeHg) mercury. Waters and aqueous samples are filtered to remove particulates. An aliquot is separated via HPLC before treatment with bromate-bromide and tin (II) chloride to generate mercury and the mercury is determined by atomic fluorescence spectroscopy.	USEPA Method 3200 – Mercury Species Fractionation and Quantification by Microwave Assisted Extraction. PSA Application Note 053 – Mercury Speciation Using The Millenium Merlin Speciation System	**Soil:** 100µg/kg **Water:** 1µg/l	Not Accredited
DETSC 2333	**Elemental Mercury Speciation**	Soils, waters and aqueous samples are tested on an as-received bases. A known quantity of sample is extracted using argon and the released elemental mercury is trapped. The trapped mercury is released upon heating in a scarifier module and determined by atomic fluorescence spectroscopy.		**Soil:** 0.6µg/kg **Water:** 1µg/l	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2400	**Unified Barge Bioaccessible Metals in Soils**	The Unified BARGE Method (UBM) is a an in vitro method for simulating the human digestive system. Synthetic digestive fluids are used to simulate the fluids present in the body. Both inorganic solutions (Containing inorganic salts such as KCl, NaCletc), and organic solutions (Containing organic compounds such as Urea, Glucose etc) are mixed with enzymes to produce 4 Synthetic digestive fluids saliva (S), Gastric fluid (G), duodenal fluid (D) and bile (B). These solutions are then used to mimic the effect of a sample passing through a human gastro intestinal tract by shaking portions of the sample at 37^0C, human body temperature (17.4).	EPA 9200.2-86 April 2012- Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead in Soil BGS Chemical& Biological Hazards Programme Open Report OR/07/027 - Inter-laboratory Trial of a Unified Bioaccessibility Procedure	V = 1.0mg/kg Cr = 5.0mg/kg Co = 1.0mg/kg Ni = 5.0mg/kg As = 0.5mg/kg Se = 0.5mg/kg Cd = 0.5mg/kg Pb = 1.0mg/kg	Not Accredited
DETSC 3001	**Solvent Extractable Matter in Soil**	Soil samples are extracted with a water-immiscible solvent and filtered to remove the water. The solvent is evaporated and the amount of extractable matter in the sample is determined gravimetrically.	In-house method based on:- Problems Arising from the Redevelopment of Gas Works and Similar Sites - AERE Harwell Laboratory 1981. Environmental Agency The Determination of Material Extractable by Carbon Tetrachloride and of Certain Hydrocarbon Oil and Grease Components in sewage Sludge – 1978	40mg/kg	**Toluene & Cyclohexane:** UKAS **Other Solvents:** Not Accredited
DETSC 3002	**Oil & Grease/Solvent Extractable Matter in Waters**	A known volume of sample is acidified to pH<2 and extracted three times with an organic solvent, such as n-Hexane, in a separating funnel. The solvent is removed by evaporation and the amount of extractable matter in the sample is determined gravimetrically.	APHA 21st Edition, 2005 – Method 5520 B. Oil & Grease - Partition Gravimetric Method USEPA Method 1664, Revision A: n-Hexane Extractable Material (HEM: Oil & Grease) and Silica Treated N-Hexane Extractable Material (SGT-HEM; Non Polar Material) by Extraction and Gravimetry.	1mg/l for 500ml sample	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3049	**Elemental Sulphur in Soils and Waters by HPLC**	Soils are extracted in dichloromethane (DCM) by sonication. The elemental sulphur concentration is determined by high performance liquid chromatography (HPLC) with UV detection using a C_{18} (e.g. 250mm x 4.6mm) column and a mobile phase composed of 95% methanol and 5% water. Waters and aqueous extracts of soils are extracted using DCM in a separating funnel, filtered, and the concentration determined using HPLC.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Elemental Sulphur.	**Soil:** 0.75mg/kg **Waters:** 90ug/l	**Soil:** UKAS MCERTS(Soils) **Water:** UKAS
DETSC 3072	**Aliphatic / Aromatic TPH by GC-FID**	Aliphatic and aromatic petroleum hydrocarbons (C_{10}-C_{35}) are extracted from soil and water using n-Hexane. The fractions are separated by solid phase extraction using silica columns, whereby the aliphatic fraction is eluted first with n-Hexane and the aromatic portion is eluted second with dichloromethane. The total, aliphatic, and aromatic concentrations are determined by gas chromatography flame ionisation detection (GC-FID) using a capillary column and hydrogen as the carrier gas. The chromatographic data is further characterized by subdivision into approximate boiling point/carbon number ranges with respect to n-alkane retention time markers.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Draft TNRCC Method 1006	**Soil mg/kg:** AL10-12 =1.5 AL12-16 =1.2 AL16-21 =1.5 AL21-35 =3.4 AR10-12 =0.9 AR12-16 =0.5 AR16-21 =0.6 AR21-35 =1.4 **Water:** 1ug/l	**Soil:** UKAS MCERTS(Soils) (C10-C35 only) **Water:** Not Accredited
DETSC 3301	**PAH in Soil by GC-FID**	Soils and associated materials are extracted in dichloromethane (DCM) using sonication. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m; 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.5 mg/kg each 1.6 mg/kg Total PAH	UKAS (16 PAH's only)
DETSC 3302	**Hexane / Acetone Extracted PAH in Soil by GC-FID**	Soils are extracted into hexane: acetone by shaking. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m; 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.1 mg/kg each 1.6 mg/kg Total PAH	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3303	**Polyaromatic Hydrocarbons in Soils by GC-MS**	The PAHs in the soil sample are extracted into hexane: acetone by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision C, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	0.03 mg/kg each 0.10 mg/kg Total PAH	UKAS (All 16 PAH's) MCERTS (not Fluorene, Anthracene, Chrysene or Total)
DETSC 3304	**Polyaromatic Hydrocarbons in Waters by GC-MS**	The PAHs in the water sample are extracted into dichloromethane by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the Instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS) In-house method based on EPA Method 3510C- EPA Method 3510C, Revision 3, Separatory Funnel Liquid-Liquid Extraction	10 ng/l each	UKAS (16 PAH's only)
DETSC 3311	**Extractable Petroleum Hydrocarbons (EPH) in Soil, Ballast and Water**	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid and aqueous matrices. This method uses a dichloromethane (DCM) extraction followed by quantification using gas chromatography/flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10-C24), and "mineral oil range" (C24-C40).	USEPA Method 3550C – Ultrasonic Extraction USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	**Soil:** 10 mg/kg **Ballast:** 10mg/kg **Water:** 10µg/l	**Soil:** UKAS MCERTS(Soils) **Water:** UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3312	**Hexane Extractable Petroleum Hydrocarbons (HPH)**	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid matrices. This method uses a hexane: acetone (9.4) extraction followed by quantification using gas chromatography/flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10- C24) and "mineral oil range" (C24-C40).	USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	**Soil:** 5 mg/kg	Not Accredited
DETSC 3321	**BTEX, MTBE & PRO in Soils by Headspace GC-FID**	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	0.01 mg/kg	UKAS MCERTS(Soils) Not accredited for PRO range (C5-10)
DETSC 3322	**BTEX, MTBE & PRO in Waters & Leachates by Headspace GC-FID**	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	1 µg/l	UKAS
DETSC 3401	**PCBs in Soils by GC-MS**	An as-received soil sample is extracted in Hexane:Acetone (1:2) using sonication methodology. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the instrument software.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	**µg/kg** PCB 28=1.25 PCB 52=1.12 PCB 101=1.32 PCB 118=1.43 PCB 153=2.08 PCB 138=1.35 PCB 180=1.42	UKAS MCERTS(Soils)

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3402	**Polychlorinated Biphenols in Waters by GC/MS**	The water sample is extracted in DCM on a reciprocal shaker. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the GC-MS software using an internal standard.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	**ng/l** PCB 28=208 PCB 52=161 PCB 101=211 PCB 118+123=513 PCB 153=163 PCB 138=107 PCB 180=132 PCB 105=133 PCB 114=253 PCB 126=399 PCB 156=253 PCB 157=119 PCB 167=248 PCB 169=181 PCB 189=271 PCB 77=202 PCB 81=186	UKAS
DETSC 3432	**Volatile Organic Compounds in Waters by Headspace GC-MS**	The method covers the range of volatile organic compounds with boiling points up to 220°C. Water samples are heated and agitated in a crimp cap vial. This drives the volatile components in to the headspace. An aliquot of the headspace is taken and injected in to a gas chromatograph with mass selective detection (GC-MS).The detector operates in full scan mode and is calibrated with standards containing known concentrations of the compounds of interest.	USEPA Method 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996	1 ug/l except: DCM (27), 2,2-Dichloropropane (2), Bromochloromethane (4), Bromodichloromethane (4), m+p-Xylene (2), 1,3-Dichlorobenzene (2)	UKAS except: Trichlorofluoromethane, Methylene Chloride, 1,1,1-Trichloroethane,

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3433	**Semi-Volatile Organic Compounds in Soils by GCMS**	The SVOCs in the soil sample are extracted into DCM: Acetone by shaking. The SVOCs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each SVOC is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semi volatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	Individual SVOCs 0.1 mg/kg	UKAS
DETSC 5001	**Ash Content of Coal**	The ash content of the sample is determined gravimetrically. A known weight of the sample is placed in a prepared ash crucible and placed in a furnace. The furnace is heated to 750ºC ±10ºC where the temperature is maintained. Following combustion the crucible and sample are removed, cooled and reweighed.	ASTM D3174-11 BS 1016-104.4 1998 ISO 1171: 2010	0.1%	UKAS
DETSC 5002	**Ash & LOI Content of Solid Biomass & Solid Recovered Fuels**	The ash and LOI content of the sample is determined gravimetrically. A known weight of the sample is placed in a prepared ash crucible and placed in a furnace. The furnace is heated to 550ºC ±10ºC where the temperature is maintained. Following combustion the crucible and sample are removed, cooled and reweighed.	BS EN 14775:2009 BS EN 15403:2011	0.1%	UKAS
DETSC 5003	**Volatile Matter Content of Solid Biomass, Solid Recovered Fuels and Coal**	A known weight of the sample produced for volatile matter determination is placed in a suitable crucible fitted with a lid. The crucible and sample is weighed and heated in a furnace with a limited air through put at a temperature of 900ºC ±10ºC for 7 minutes. The sample and crucible are re-weighed and the volatile matter content determined by difference.	BSEN15148:2009 – Solid Biofuels Determination of the Content of Volatile Matter BS EN 15402:2011 - Solid Recovered Fuels - Determination of the Content of Volatile Matter	0.1%	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5004	**Total Moisture / Dry Solids Content of Solid Biomass & Solid Recovered Fuels & Coal**	The sample produced for general analysis is placed into a suitable prepared and weighed tray and reweighed. The sample is dried at 105ºC to constant weight and the total moisture / dry solids content is calculated from the reduction in weight.	BSEN 14774 Parts 1 & 2 2009 DD CEN/TS 15414 Parts 1 & 2: 2010	0.1%	UKAS
DETSC 5005	**Analysis Moisture Content of Solid Biomass, Solid Recovered Fuels & Coal**	The sample produced for total moisture determination in accordance with DETSC 5009 or DETSC 5010 is placed in a suitable pre-weighed tray and reweighed. The sample is then dried at 105°C ±2°C to constant weight and then weighed again. The analysis moisture content is calculated from the reduction in weight.	BS EN 14774-3 2009 BS EN 15414-3 2011 BS 1016-104.1 -1999 ISO 11722 – 1999	n/a	UKAS
DETSC 5007	**Calorific Value of Solid Biomass, Solid Recovered Fuels & Coal**	Calorific value of a material is determined in an Isoperbol calorimeter by burning it in pure oxygen in a combustion bomb. A known amount of sample is placed in a combustion bomb which is then pressurised to 30bar with oxygen. A calorimeter bucket is filled with a known amount of deionised water which is placed in the calorimeter and the bomb placed in the bucket. The system is allowed to equilibrate and the bomb fired by electrical connection. The difference in temperature of the water in the calorimeter bucket caused by the ignition of the material in the bomb is measured and the calorific value calculated	BS EN 14918: Solid biofuels – Determination of calorific value BS EN 15400: Solid recovered fuels - Determination of calorific value	1MJ/kg	UKAS
DETSC 5008	**Calorific Value of Soil**	A known amount of sample material is burnt in a combustion bomb that is immersed in water in a calorimeter and the difference in the water temperature before and after ignition measured. The calorific value of the sample material is calculated making any necessary corrections for heat generation not associated with the combusting sample. A gelatine capsule will be required to assist combustion which is also corrected for in the final calculations.	BS 1016-105 1992 ISO 19208 ASTM 5865	1MJ/kg	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5009	**Sample Preparation of Solid Biomass & Solid Recovered Fuels**	If analysis is required on the original material (i.e. Bulk Density) a sub-sample will be taken after initial mixing after which the sample is then reduced by cutting/chopping oversized pieces of material. The material is then mixed and subdivided by manual means during which process representative samples are taken for analysis i.e. total moisture. The remainder of the sample is dried and then reduced to <1mm and again mixed and subdivided to produce the sample for laboratory analysis.	BS EN 14780:2011 BS EN 15413:2011	n/a	Not Accredited
DETSC 5010	**Sample Preparation of Coal**	If required the sample received is first mixed and a sample taken for bulk density or bulk density is carried out on the whole initial sample. The remaining sample or the whole sample used for bulk density is then reduced to <10mm preferably by jaw crushing. The material is then mixed and subdivided by mechanical or manual means during which process representative samples are taken for any analysis required at this stage i.e. total moisture, The remainder of the sample is again mixed and subdivided to produce the sample for laboratory analysis which may require drying prior to crushing to <212 microns. If there is excessive water content a pre- drying stage of the whole sample may have to be carried out before sample blending and subdivision commences.	BS ISO 13909-4: 2001	n/a	Not Accredited
DETSC 5011	**Calculation of Fixed Carbon Content of Coal, SRF and Solid Biomass Fuels**	The total moisture, analysis moisture, ash and volatile matter content are determined by approved methods. The values obtained are deducted from 100 and this gives the fixed carbon value of the fuel.	DD CENT/S 15296:2006 BS 1016.100:1994 BS ISO 17246:2005	0.1%	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5012	**Determination of Biomass Content of SRF**	Approximately 5g of the sample is dissolved in 150ml of 78% Sulphuric Acid for 16 hours ±2 hours after which 35ml of 30% Hydrogen Peroxide is added and the sample left for an additional 5 hours ±1 hour. At the end of this period 300ml of deionised water is added to the sample and the residue remaining filtered off using a glass fibre filter paper, washing the residue with an additional 300ml of deionised water. The filter paper and residue are placed in a pre-weighed crucible and dried at 1500C until completely dry. The filter paper is reweighed after drying and the non biomass residue determined. Corrections for carbonates content is made by determining the ash content of the original sample and the non biomass residue remaining. The result can also be expressed by percentage calorific value by performing a calorific valve on the solid captured on the filter paper.	BS EN 15440 Solid recovered fuels - Methods for the determination of biomass content	n/a	UKAS
DETSC 5013	**Determination Of Carbon, Hydrogen, Nitrogen & Oxygen In Solid Biomass, Solid Recovered Fuels & Coal**	A known mass of fuel is weighed into tin capsules which are dropped sequentially into the combustion reactor prior to the arrival of oxygen. The sample and tin capsule react with oxygen and combust at temperatures of 1700-1800 °C and the sample is broken down into its elemental components N2, CO2, and H2O. High performance copper wires absorb the excess oxygen not used for sample combustion. The gases flow through the gas chromatographic (GC) separation column which is kept at a constant temperature. As they pass through the GC column, the gases are separated and are detected sequentially by the thermal conductivity detector (TCD). The TCD generates a signal, which is proportional to the amount of element in the sample. The instrument software compares the elemental peak to a known standard material (after calibration) and generates a report for each element on a weight basis. The oxygen is calculated by deducting these quantities from 100 along with the moisture, ash, sulphur & chlorine contents determined by other methods.	BS EN 15104:2011 Solid biofuels - Determination of total content of carbon, hydrogen and nitrogen - Instrumental methods BS EN 15407:2011 Solid recovered fuels - Methods for the determination of carbon (C), hydrogen (H) and nitrogen(N) content BS EN 15296:2011 Solid biofuels - Conversion of analytical results from one basis to another	Carbon 0.10% Nitrogen 0.30% Hydrogen 0.30% Oxygen 3.55%	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5014	**Metals in Coal, SRF and Biomass by ICP**	Metals in coal, solid recovered fuel (SRF) and biomass samples are extracted by microwave using Hydrogen Peroxide (to oxidise and break down organic matter) and Aqua Regia (to dissolve the matrix and hold the metals in solution). Their concentrations are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS EN 15410 - Solid recovered fuels - Methods for the determination of the content of major elements (Al, Ca, Fe, K, Mg, Na, P, Si, Ti) BS EN 15411 - Solid recovered fuels - Methods for the determination of the content of trace elements (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Tl, V and Zn) BS EN 15290 - Solid biofuels - Determination of major elements - Al, Ca, Fe, Mg, P, K, Si, Na and Ti BS EN 15297 - Solid biofuels - Determination of minor elements - As, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, V and Zn	**0.1 mg/kg:** As, Be, Cd, Co, Mn, Ni, P, Pb, Sb, Se, Sn, Ti, V, Zn **0.2mg/kg:** Cr, Cu, Tl **0.5mg/kg:** Mo **1mg/kg:** Al, Fe, K, Mg **5mg/kg:** Ca **10mg/kg:** Ag, Ba, Rh, Sr, Te	UKAS: Al, As (SRF only), Ca, Cd, Co, Cr, Cu, K, Mg, Mn, Na (SRF only), Ni, P, Pb, Se, Sn, Tl, V, Zn All other metals not accredited
DETSC 5015	**Mercury in Coal, SRF and Biomass by Atomic Fluorescence Spectroscopy**	The mercury is extracted from coal, SRF and biomass in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment of the resulting solution with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is then quantitatively detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments.	0.055mg/kg	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5016	**Total Sulphur Content Of Coal, SRF And Biomass**	Sulphur compounds in SRF and biomass are extracted using aqua regia / hydrogen peroxide and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The use of hydrogen peroxide enhances the oxidation properties of nitric acid especially in the digestion of organics. Sulphur compounds in coal are determined by ICP-OES from the aqueous washings of the combustion products after firing in a bomb calorimeter.	TRL Report TRL447 (Updated) - Sulphate specification for structural backfills 2005	0.001mg/kg	UKAS
DETSC 5017	**Sulphur, Chlorine, Fluorine & Bromine Content of Solid Biomass, Solid Recovered Fuels and Coal by IC**	A known weight of fuel is burnt in a pressurised bomb in pure oxygen. After firing of the bomb, it is stood for a minimum of five minutes to allow the combustion products to settle then the oxygen is slowly released over a period of at least three minutes. The bomb is then taken apart and the bomb electrodes rinsed with deionised water into the inside of the bomb. These washings are then decanted into a 50ml volumetric flask. The inside of the bomb is rinsed with deionised water and the washings added to those in the volumetric flask. The contents of the volumetric flask are made up to volume with deionised water and stored for the analysis of sulphur, chloride, fluoride and bromide by ion chromatography.	Operating Instruction Manual No. 442M 6200 Parr Oxygen Bomb Calorimeter Operating Instruction Manual No. 205M 1108 Oxygen Combustion Bomb Operating Instruction Manual No. 454M 6510 Water Handling System	0.01% Chlorine 0.01% Fluorine 0.01% Bromine 0.04% Sulphur (Coal only)	UKAS

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5018	**XRF Analysis of Coal, Biomass, SRF and Cement**	When X-rays are targeted at a material they will cause electrons to be ejected from the component atoms (Ionisation). The ejection of electrons will cause the electronic structure of the component atoms to become unstable resulting in electrons from the higher energy outer orbitals "falling" into the inner orbitals to compensate. This causes a release of energy in the form of a photon equal to the energy difference between the two orbitals involved. Thus the material emits radiation which has energy characteristics of the atoms present. In energy dispersive X-ray fluorescence the fluorescent X-rays emitted are directed to a detector from which the data is processed by a multichannel analyser, producing a digital spectrum which is processed to obtain analytical data. The instrument analytical parameters are set up for the matrix type. A sample cell is prepared by placing a piece of prolene film over the outer cell and then inserting the inner cell. This gives a complete cell with a clear prolene base. A portion of the sample is placed into the cell and then analysed.	Rigaku NEX CG EDXRF instruction manual	**Cement:** 0.01% BaO, Cr_2O_3, CuO, PbO, Rb_2O, SrO, ZnO 0.02% Cl, V_2O_5 0.05% TiO_2 0.1% Mn_2O_3, P_2O_5, SO_3 0.5% K_2O 1% Al_2O_3, CaO, CdO, Co_2O_3, Fe_2O_3, MgO, Na_2O, NiO, SiO_2, Y_2O_3 **Fuel:** 0.01% Co, Cr, Cu, I, Li, Mn, Ni, P, Pb, Sn, Ti, V, Zn 0.02% Al, Ba, S, Si 0.1% Mg 0.2% Ca 0.5% As, Cd, Hg, Mo, Na, Sb, Se, Th, Tl 1% Ag	UKAS Al, As, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Sb, Si, Sn, Tl, Ti, V, Zn Al2O3, BaO, CaO, Cl, Cr2O3, CuO, Fe2O3, K2O, MgO, Mn2O3, Na2O, P2O5, PbO, Rb2O, SiO2, SO3, SrO, TiO2, V2O5, ZnO All other testing not accredited
DETSC 5019	**Determination of Biodegradable Municipal Waste Content (Compositional Analysis)**	The method is based on handpicking the BMW fraction from the municipal waste sample, and then weighing the amount of BMW sorted and expressing this as a percentage on a wet weight basis of the weight of the whole municipal waste sample.	ENVIRONMENT AGENCY: Guidance on monitoring of MBT and other treatment processes for the landfill allowances schemes (LATS and LAS) for England and Wales	n/a	Not Accredited
DETSC 5020	**Determination of Bulk Density in Solid Biomass and Solid Recovered Fuels**	The test portion is filled into a standard container of a given size and shape and weighed afterwards. Bulk density is calculated from the net weight per standard volume and reported for the moisture content.	BS EN 15103:2009 Solid Biofuels- Determination of bulk density BS EN 15401:2010 Solid Recovered Fuels- Determination of bulk density	0.5kg/m^3	Not Accredited

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DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5021	**Auto Ignition Temperature**	A quantity of the sample is placed into a metal tray or crucible and placed into an oven or furnace. The temperature of the oven / furnace is increased in predefined increments and the temperature in which the sample ignites is noted.	None	25°C	Not Accredited

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Appendix 9 – BS5837:2012 Tree Quality Survey

Tree Number	Common Species Name	Height (m)	Trunk Diameter (mm)	Stem Count	Crown Spread (m)				Height of Crown Clearance (m)	Age Class	Physiological Condition	Structural Condition	BS5837 Category	Comments/Preliminary Management Recommendations	RPA Radius (m)	Root Protection Area (m2)
					N	E	S	W								
T1	Sambucus nigra (Elder)	5m	130,120, 100	3	2.00	2.00	3.00	3.20	1.00	Semi Mature	Fair	Fair	C2	Low quality and value. Kerb close to stem base. Tree located within hard surface area. Decay present on stem. Cavity on stem. Dieback in crown.	2.4	19
G2.A	Fraxinus excelsior (Ash)	17m	470.00	1	8.50	4.00	4.50	8.50	3.00	Early Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure. Root exposure and induced impacts to tarmac footpath spanning RPA to north. surface root wounds occluded. No obvious A Dieback Symptoms- appears relatively healthy despite species.	5.6	100
G2.B	Fraxinus excelsior (Ash)	17m	580.00	1	9.00	6.50	5.00	5.00	3.00	Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure. Tarmac footpath through RPA to the north. No obvious Ash Dieback Symptoms - appears relatively healthy despite species.	7.0	152
G2.C	Fraxinus excelsior (Ash)	17m	530.00	1	3.50	3.00	8.50	9.00	3.00	Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure. No obvious Ash Dieback Symptoms - appears relatively healthy despite species. Co dominant stem at 2.7m, not an included union.	6.4	127
T3	Acer pseudoplatanus (Sycamore)	15m	750.00	1	9.00	8.00	10.00	9.00	2.50	Mature	Good	Good	B2	Moderate quality and value. Roadside tree: of value in the streetscene. Tree located within raised bed. Scattered deadwood. Co dominant stem at approx 2.5m with wide-mouth union. Minor scattered deadwood throughout canopy especially within internal branch structure.	9.0	255
T4	Acer platanoides (Norway Maple)	15m	620.00	1	7.00	5.00	9.50	8.00	2.50	Mature	Fair	Good	B2	Moderate quality and value. Scattered deadwood. Crown distorted due to group pressure.	7.4	174
T5	Acer platanoides (Norway Maple)	16m	610.00	1	8.50	6.50	5.00	7.00	2.50	Mature	Fair	Good	B2	Declining in health and condition. Moderate quality and value. Located on bank. Exudation on stem. Scattered deadwood. Crown distorted due to group pressure. Crown touching car parking stairwell facade to the east. Rooted on mound with root exposure and potential girdling around buttress. Some canopy suppression in lower scaffold branches and decline likely induced from light availability.	7.3	168

Tree Number	Common Species Name	Height (m)	Trunk Diameter (mm)	Stem Count	Crown Spread (m)				Height of Crown Clearance (m)	Age Class	Physiological Condition	Structural Condition	BS5837 Category	Comments/Preliminary Management Recommendations	RPA Radius (m)	Root Protection Area (m2)
					N	E	S	W								
T6	Acer platanoides (Norway Maple)	14m	560.00	1	3.00	8.30	9.50	3.50	3.00	Mature	Fair	Fair	C2	Declining in health and condition. Low quality and value. Located on bank. Scattered deadwood. Sparse foliage. Dieback in crown. Crown distorted due to group pressure. Crown touching car park building to east. Lower canopy and internal structures significantly suppressed and in decline with reduced overall vigour and reduced foliage density likely due to light availability and or root issues (girdled buttress roots and root exposure above soil surface).	6.7	142
G7	Fraxinus excelsior (Ash)	4m	150.00	1	1.20	1.50	2.00	1.50	0.00	Semi Mature	Fair	Fair	C2	Low quality and value. Self set poor location.	1.8	10

T1 - C2
Elder

G7 - C2
Ash

G2.A - B2
Ash

G2.B - B2
Ash

G2.C - B2
Ash

T3 - B2
Sycamore

T4 - B2
Norway Maple

T5 - B2
Norway Maple

T6 - C2
Norway Maple

RAILWAY BRIDGE

NO ACCESS

TARMAC

GRASS

CONCRETE

PAVING

CHARLES STREET

PRINCESS STREET

0 10m

North

Survey Boundary

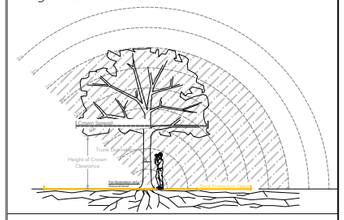
Category B - Trees of Moderate Quality and Value

Category C - Trees of Low Quality and Value

Root Protection Areas

Tree Shading Constraints

*Denotes trees and groups not identified on topographical survey. Locations approximated using measurements taken on site.



Rev	Description	Date
-	-	-

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Project title
MSCP, Manchester

Drawing title
Tree Constraints Plan

Scale 1:200 @ A3
Date 17.07.2024
Drawn BV
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Drawing number
14667_P12

Revision
-

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Appendix 10 – TVIA Draft Viewpoints – Main works

SISTER - PLOT H: MAIN WORKS

Manchester, UK

Townscape & Visual Impact Assessment

Draft Viewpoints

15th September 2025

451-LYR-XX-ZZ-RPT-L-0001-09

Revision: 02

Layer.studio

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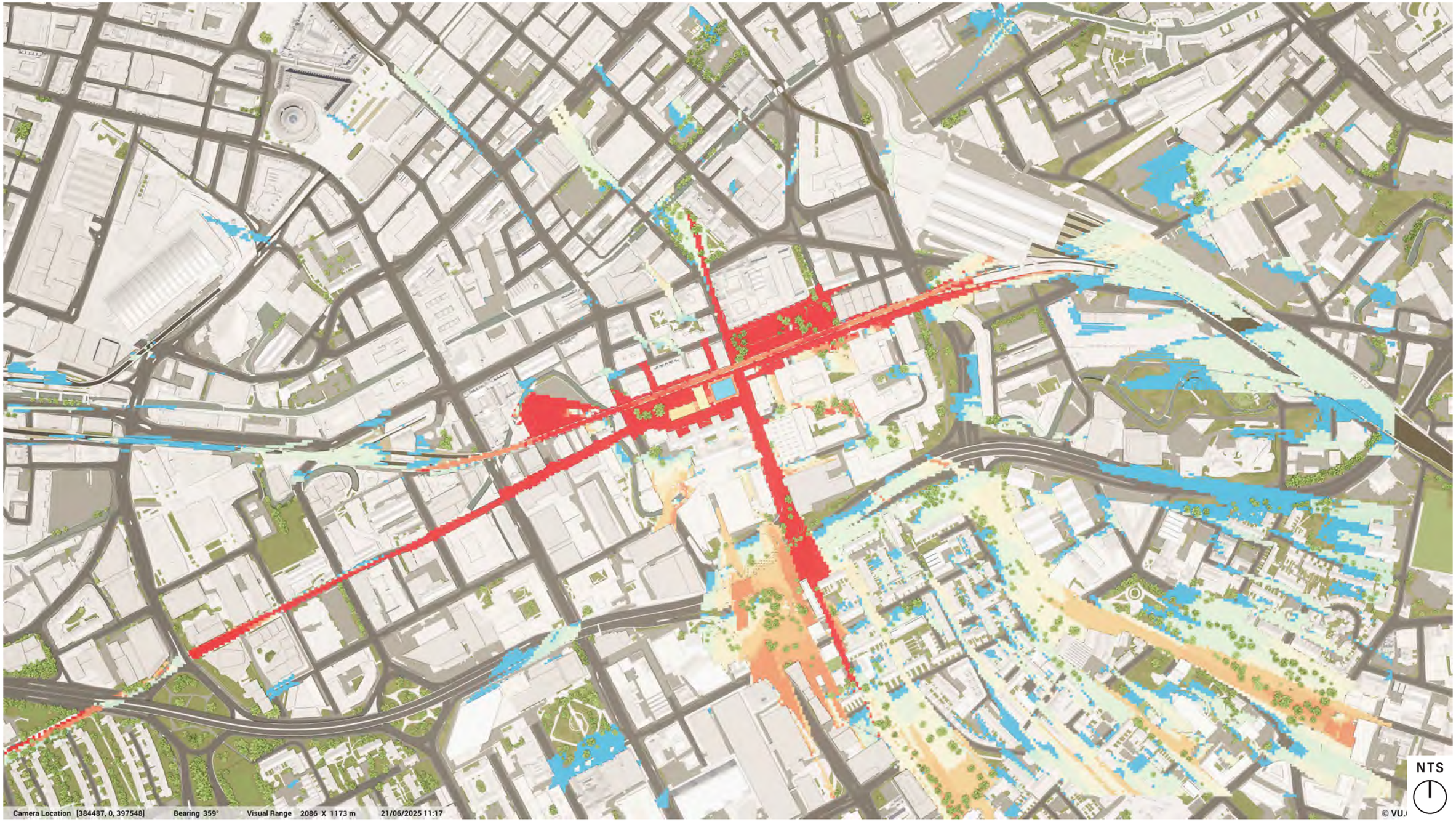
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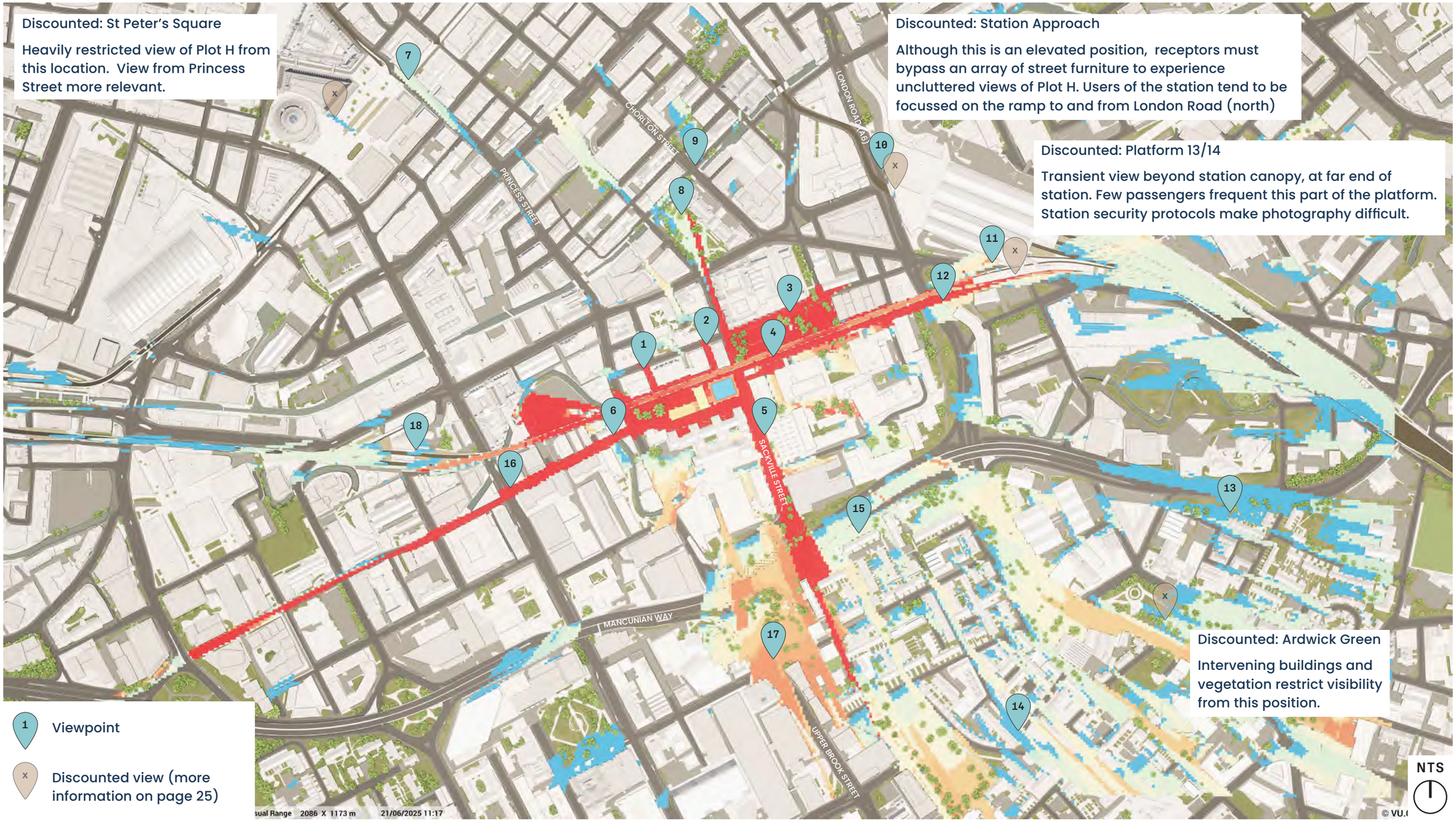
01 Supporting Figures

Figure 2.0: Zone of Theoretical Visibility (ZTV)



01 Supporting Figures

Figure 2.1: Viewpoint Location Plan



02 Draft Viewpoints

SISTER - PLOT H: MAIN WORKS

02 Draft Viewpoints

Viewpoint 1: Granby Row at Orient House



Render

Townscape view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 2: Granby Row at Granby House



Render

Townscape & Heritage view



Existing "Streetview"

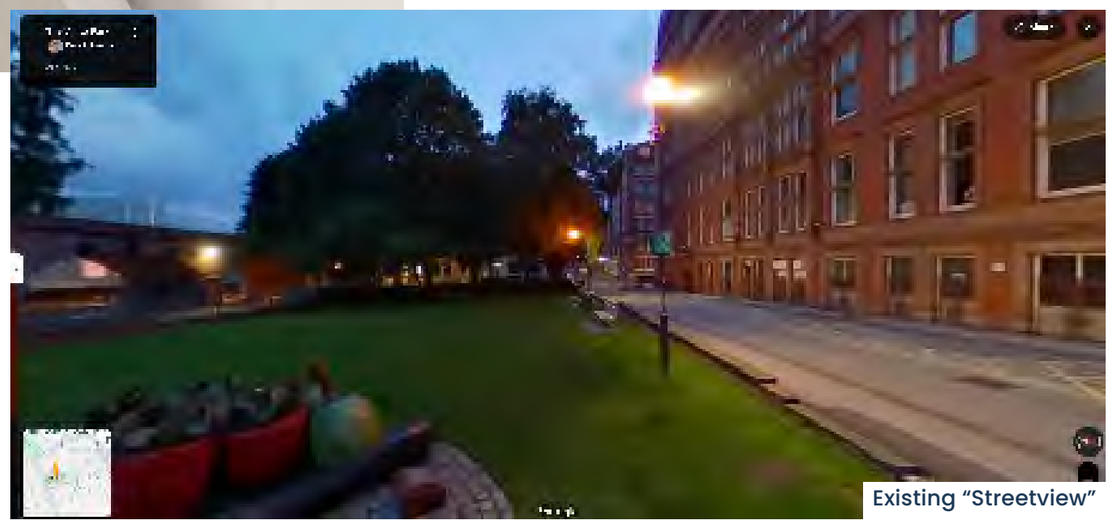
02 Draft Viewpoints

Viewpoint 3: Vimto Park (SRF View B)



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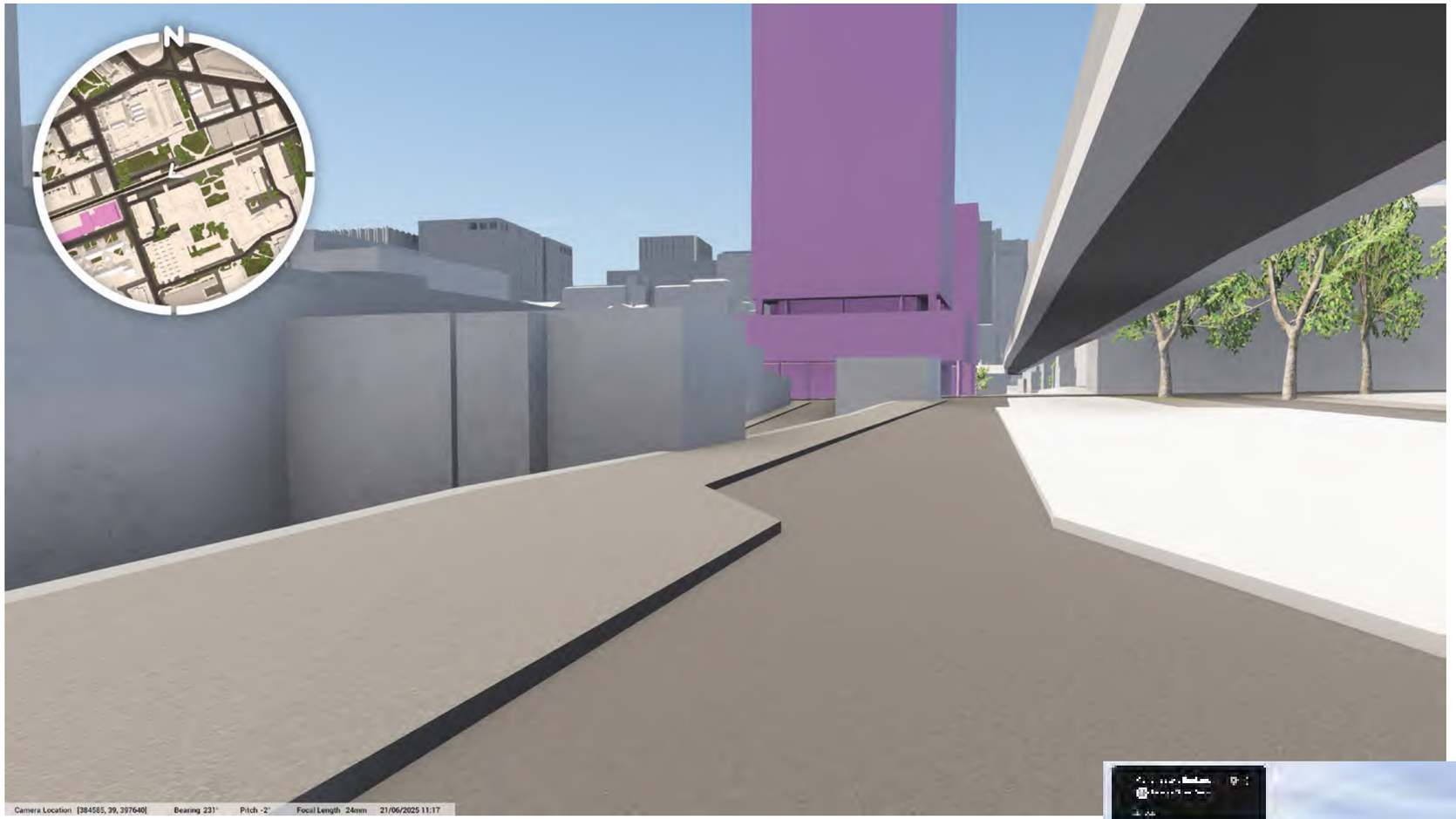
Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 4: Altrincham Street



Render

Townscape & Heritage view



Existing "Streetview"

02 Draft Viewpoints

Viewpoint 5: Sackville Street



Render

Townscape & Heriatge view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 6: Charles Street at Lass O' Gowrie pub



Render

Townscape & Heritage view

Night time view



Existing "Streetview"

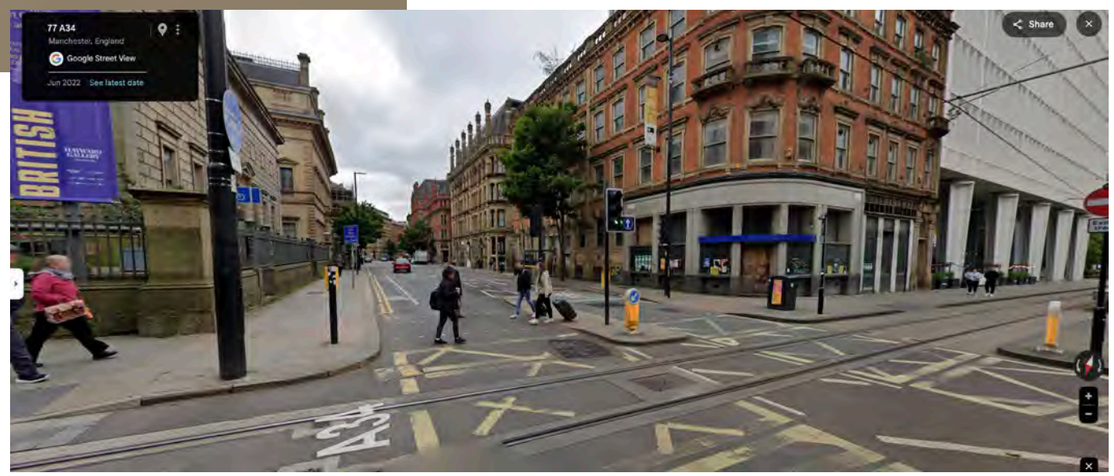
02 Draft Viewpoints

Viewpoint 7: Princess Street



Wireline

Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

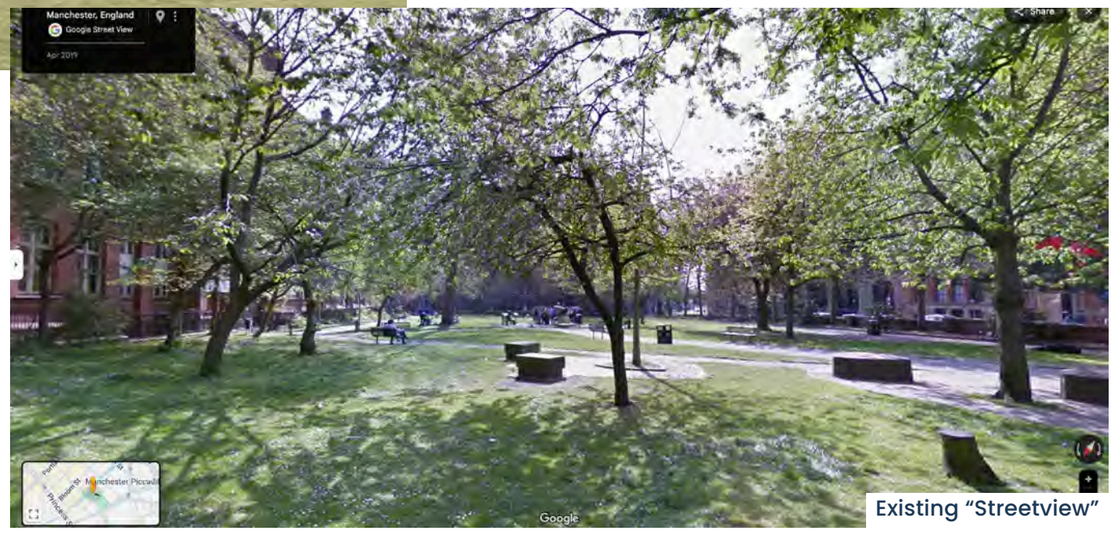
Viewpoint 8: Sackville Gardens (SRF view 5)



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Townscape & Heritage view

Night time view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 9: Chorlton Street (SRF view 2)



Wireline

Townscape & Heritage view



Existing “Streetview”

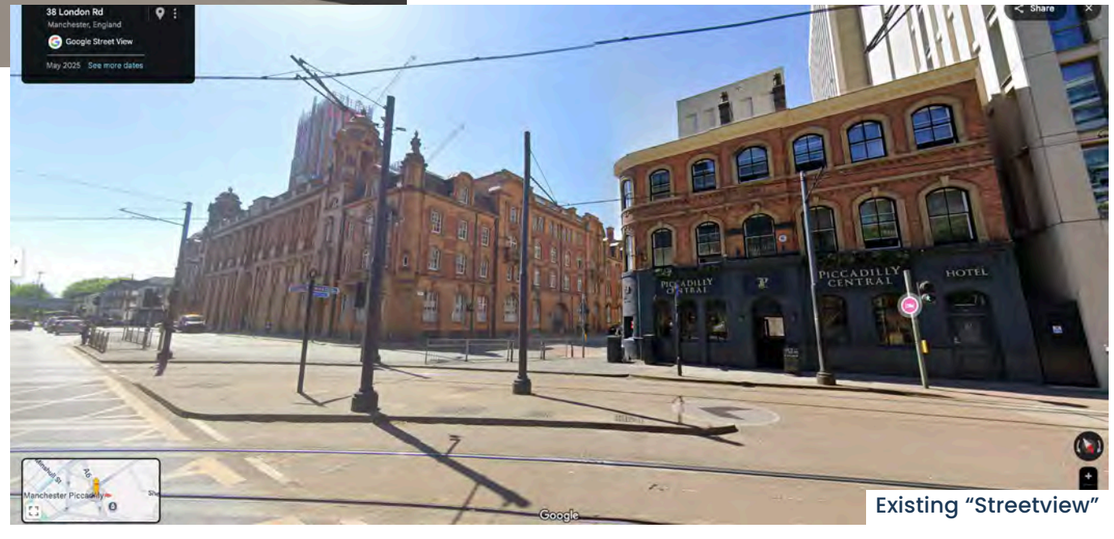
02 Draft Viewpoints

Viewpoint 10: London Road (SRF view 3)



Wireline

Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 11: Fairfield Street (SRF view 4)



Wireline

Townscape & Heritage view



Existing “Streetview”

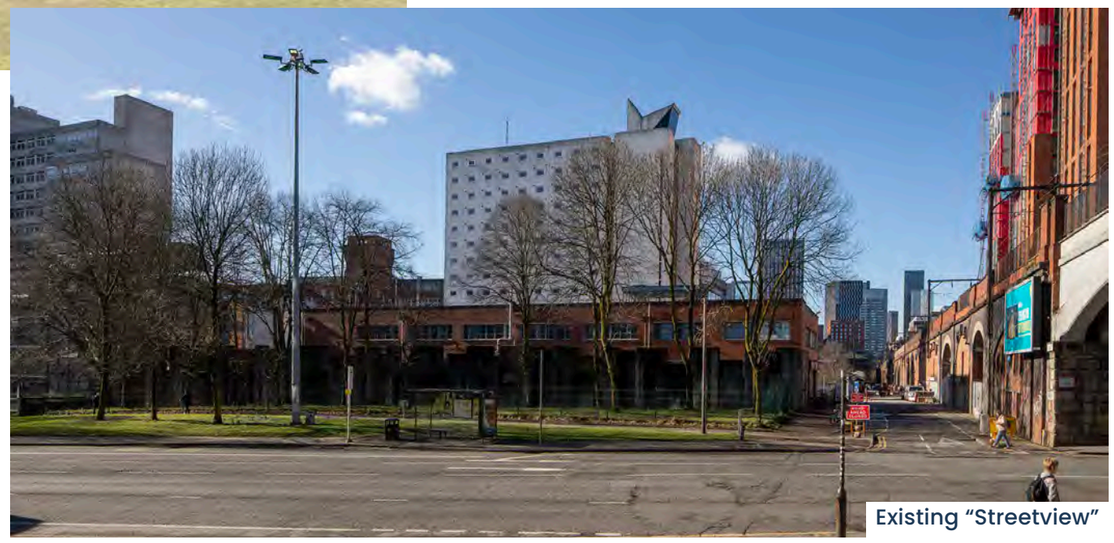
02 Draft Viewpoints

Viewpoint 12: Altrincham Street



Render

Townscape & Heritage view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 13: Mancunian Way



Wireline

Townscape view



Existing “Streetview”

02 Draft Viewpoints

Viewpoint 14: Skerry Close



Wireline

Townscape view



Existing “Streetview”

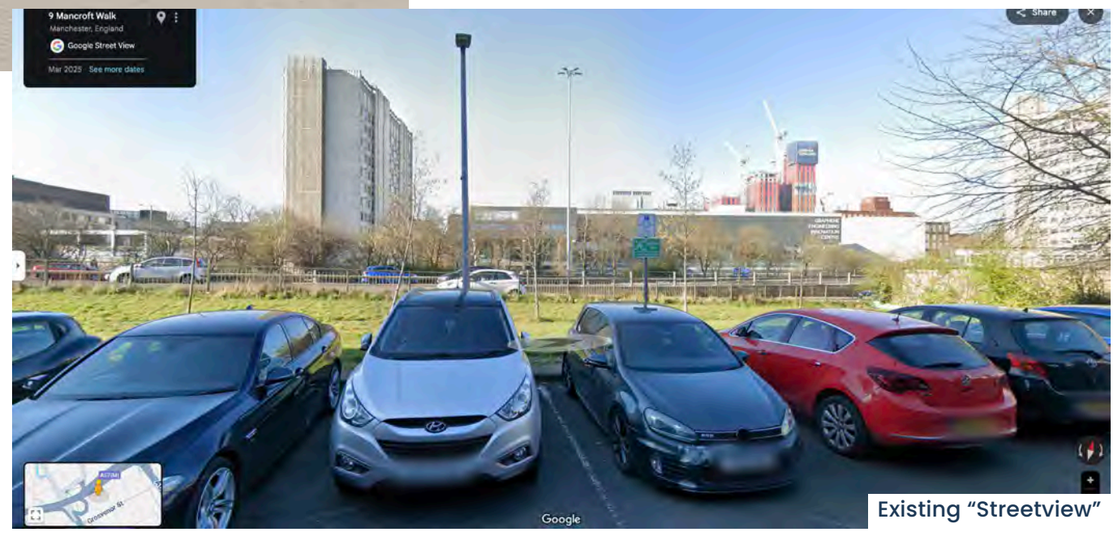
02 Draft Viewpoints

Viewpoint 15: Mancroft Walk



Render

Townscape view



Existing “Streetview”

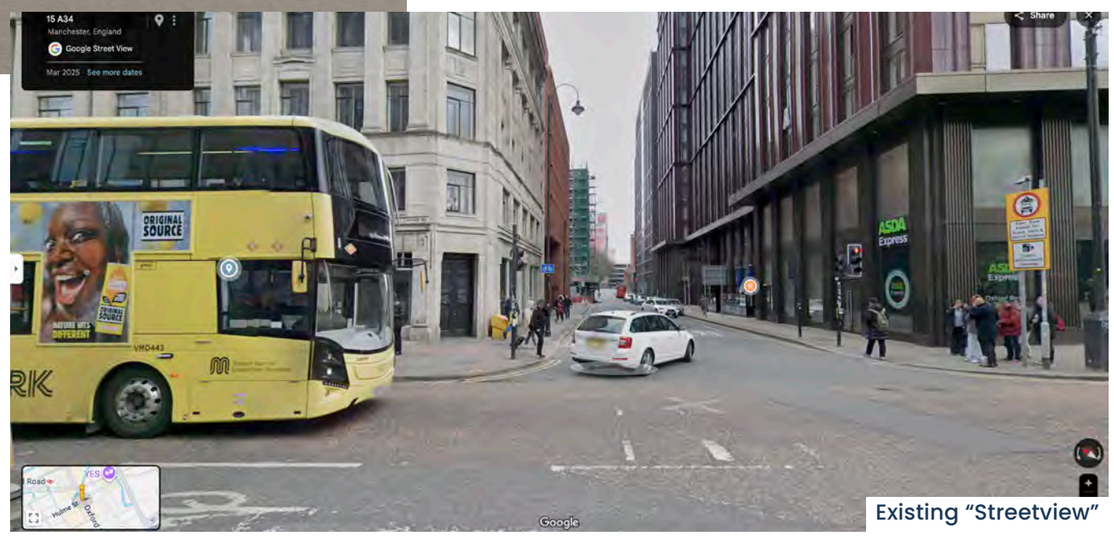
02 Draft Viewpoints

Viewpoint 16: Oxford Road



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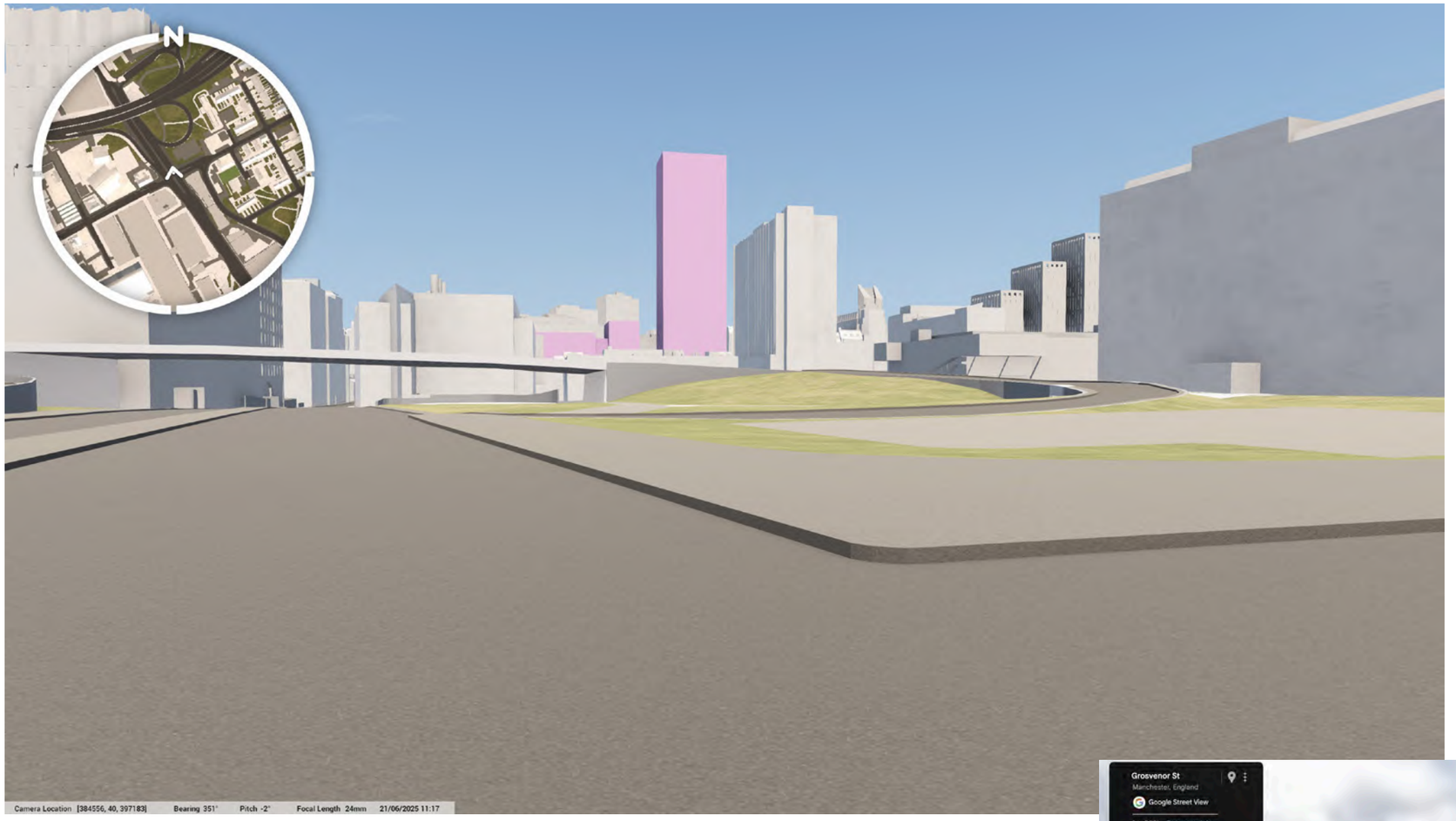
Townscape view



Existing “Streetview”

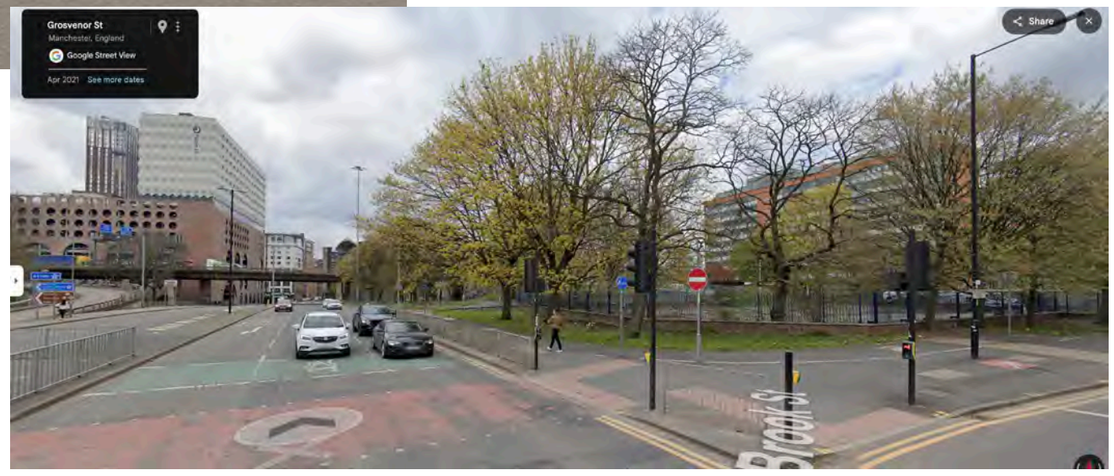
02 Draft Viewpoints

Viewpoint 17: Upper Brook Street



Wireline

Townscape view



Existing “Streetview”

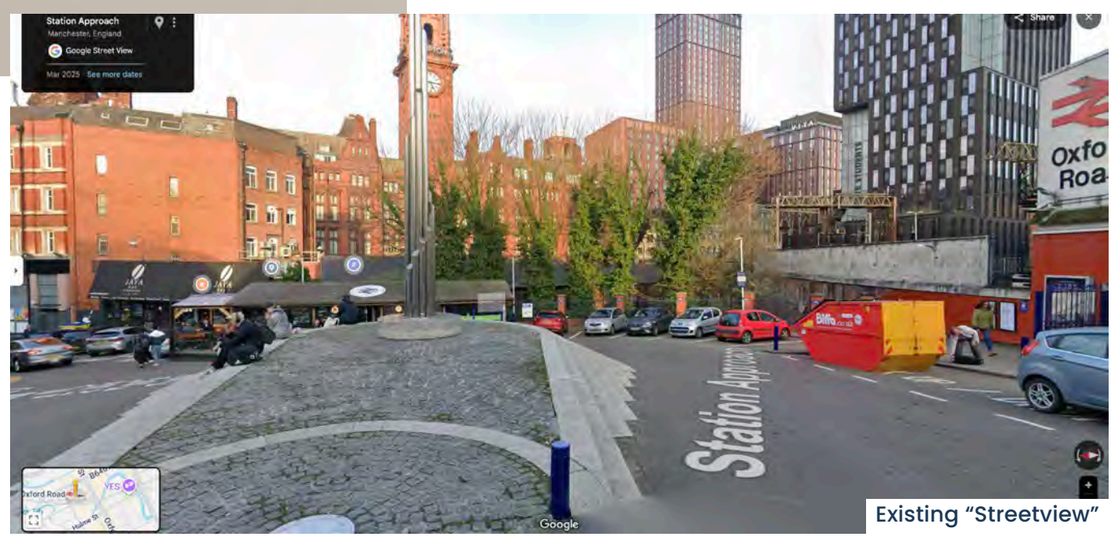
02 Draft Viewpoints

Viewpoint 18: Oxford Road Station



Wireline

Townscape & Heritage view



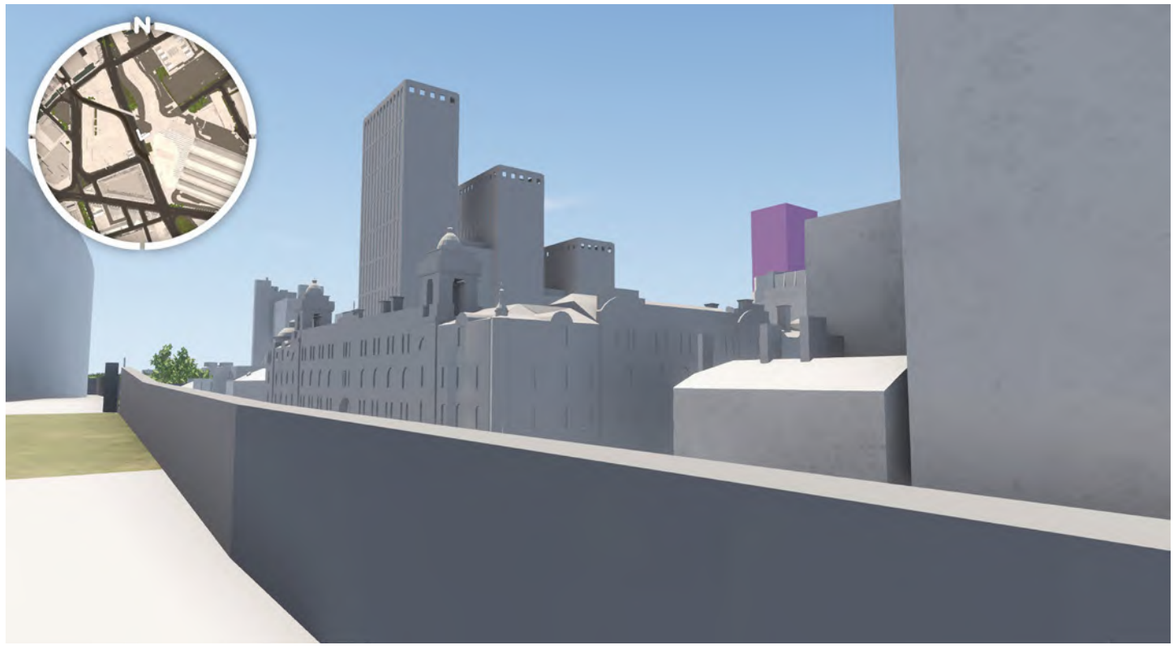
Existing "Streetview"

02 Draft Viewpoints

Discounted views (locations on page 05)



St Peter's Square



Station Approach



Ardwick Green



Station Platform 13/14

MANCHESTER

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Appendix 11 – Our Studio Methodology

DATE
02 · 07 · 2024

CLIENT
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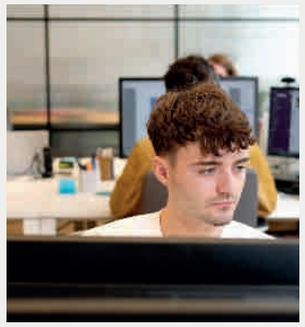
ID MANCHESTER, PLOT C AVRS X 22 VIEWPOINTS OUR STUDIO

OUR STUDIO
PROFILE

We understand our clients and the industry we work in and believe in the importance of building long term relationships and adding real value to our clients' team.

5plus architects
AlliedLondon
Balfour Beatty
bruntwood
CALLISONRTKL
CAPITAL&CENTRIC
CARTWRIGHT PICKARD
Deloitte.
Forge New Homes
GENERAL PROJECTS
greatplaces HOUSING GROUP
Hawkins\Brown
HBD
Jon Matthews Architects
LWC/ LISA WESTERMAN CONSULTANCY
mabanee
MORGAN SINDALL GROUP
MUSE
NORTHSTONE
NOCHINTZ
Peel L&P REALISING POSSIBILITY
PRP
PURCELL
Renaker
SALBOY
Select Property Group
SevenCapital
SHP
Shomoul
SHEPPARD ROBSON
stephenson STUDIO
VITA GROUP

Our Studio is a dedicated team of artists, designers, illustrators and producers. Together, we're proud to collaborate with architects and property developers around the world, bringing their ideas to life in 3D.







As a collective committed solely to visualising buildings and spaces, we're true industry specialists - we understand the technical nuances, project processes and journey touchpoints required to transform an architect's vision into something commercially viable.

Since switching on our PCs in 2009, we've become an essential part of each client's design process. We've helped to gain planning permission, earn funding, win tenders and market developments. Success that's meant as much to us as them.

Because, while we love creating stunning designs in the digital realm, we love seeing them in the real world even more.



Our Studio can produce a wide variety of 3D and interactive assets to target all areas of the market.

Image



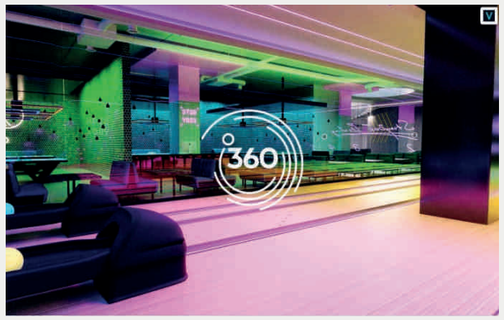
- Interior & Exterior Marketing CGI
- AVR & Planning CGI
- Axonometric 3D Plans
- Rendered 3D Sections
- Rendered Masterplans

Film & Animation



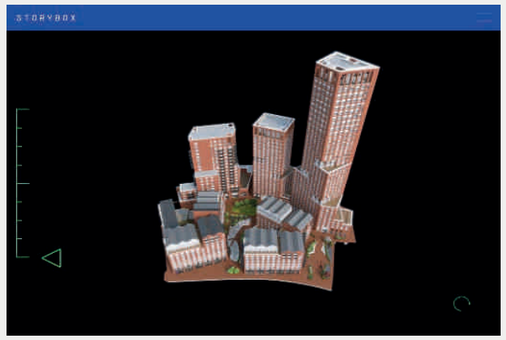
- Interior & Exterior Marketing Animations
- Corporate Launches
- Masterplan Animations
- Concepts
- Sun Path Study
- Social Media animation
- Animated stills / cinemagraphs
- Live location shoots and corporate films / interviews
- Storyboarding
- Greenscreen shoots
- Drone footage with tracking and compositing

VR



- Virtual Reality Tours for online and mobile
- Virtual Reality Tours for marketing suites
- 360 Degree Stereo Panoramas
- 360 Degree Panoramic Video
- Interactive VR
- Multi Platform Solutions
- UNREAL

Apps & Interactive



- Marketing Launch Apps
- Standalone VR Apps
- Multi Platform Solutions
- Web-progressive apps
- iOS apps

Your project

Your OS project will have a dedicated Account Manager and Production Director overseeing your project through all our key stages of production to ensure your project is delivered to a high standard, on time and on budget.

Your project will also include the following key people:

+ Creative Director for internal sign-off of drafts at each key stage
+ Lead 3D Artist
+ Supporting 3D Artist

Our Studio involves our clients at every stage of the process, only progressing to the next stage on sign-off of precedent stages. We think the process of image and animation creation should be an enjoyable one for both client and 3D Artist.

Our Studio's Processes are based on over 15 years working in the industry and are a tested method for the successful, efficient delivery of our projects.

Key stages of Production

01 Define
Scope of works and associated costs / schedule.

02 Pre-production
Organising design information, talking to architects and interior designers, cleaning drawings and preparing supplied 3D Models.

03 Concepts
Preparing moodboards for interiors, sourcing 3D assets, storyboard concepts, view composition, inspiration for lighting.

04 Production
Stills and animation - 3D modelling and texturing interior spaces, building modelling and landscape. Includes 3 key stages when drafts will be issued for client feedback:

+ White card view options for view selection prior to developing the 3D Model
+ First textured draft for feedback on lighting, furniture, textures.
+ Second textured draft with people placed in scene - final, minimal comments that do not require design or model changes.

05 Editing, Animating & Motion
For animation includes animatic creation, motion design and animation. Sourcing sound, music and/or v/o.

06 Rendering & Post Production
For stills, animation and VR

07 Delivery
Once the project is complete we ensure the client is happy with what has been delivered. Delivery is usually made via electronic file transfer in the usable file sizes for marketing and planning purposes specified at the start of the project.

Our Studio USPs

- Expertise
- Highly-skilled, Creative & Technical Team
- Collaboration
- Innovation
- Refined Processes
- Relationships
- Quality

01 Expertise

Each Director brings with them over 18 years experience in their key sector which is in turn shared on projects:

\+ Sam Crothers, Managing Director - Marketing & Branding

\+ Nick Harrison, Creative Director - Planning & Verified Views

02 Highly Skilled Artists

Our artists are experienced in key and complimentary skills across 3D modelling, exterior and interior cgi, interior design, animation and photography.

03 Team of 12

We are a relatively large team for a visualisation studio which means we can keep everything in-house having better control over quality and delivery. We can take on large projects and resource quick turnaround projects more easily than smaller studios / freelancers.

04 15 years in business

Our Studio is in its 15th year of business and takes pride in the relationships it has built with clients, architects, suppliers and collaborators. This makes for a smoother process from start to finish on a project.

05 Refined and proven processes

Our years working in Architectural Visualisation, we have honed in on our processes, understood how and what are more efficient and enjoyable ways of working balancing both technical and creative output. We have also built up an extensive 3D asset library over our 15 years of production. We are always open to improvement and welcome feedback from clients.

06 Collaboration & Innovation

These are two values that are important to us as a studio and enable us to always look at innovative solutions to our client's challenges. Whether it's using a VR Headset, a web progressive app or testing UNREAL technology, we always strive to find the right solution to add value and ROI.

OUR STUDIO
ACCURATE VISUAL REPRESENTATION (AVR) METHODOLOGY
2024

INTRODUCTION

This document outlines Our Studio's process for verified imagery. It describes the process from commission through to completion of wireline, massing and fully rendered views.

In drafting this methodology, guidance has been taken from relevant sections of the Landscape Institute Technical Guidance Note 06/19 - Visual Representation of Development Proposals. Where appropriate we have also taken guidance from the London Plan 2011 Implementation Framework (March 2012) London View Management Framework Supplementary planning Guidance: Appendix C: Accurate Visual Representations.

Prior to commencement, the series of views are chosen by the project team. This would usually be completed with the assistance of a townscape planning specialist - Our Studio would recommend that this is undertaken, especially if the views are intended to form part of an Environment Impact Assessment Report.

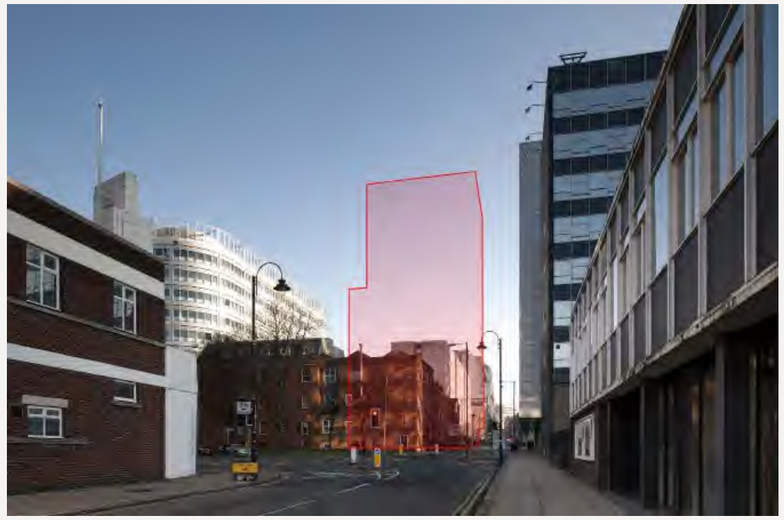
The disciplines employed are of the highest possible levels of accuracy and photo-realism which are achievable with today's standards of architectural photography and computer-generated models.

The process is divided into a number of stages, once the viewpoints have been chosen. These are summarised as follows:

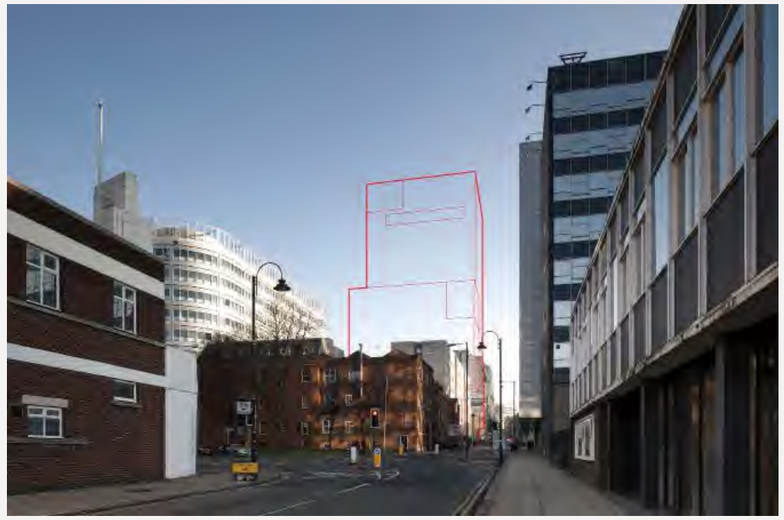
Stage 1 - Commissioning of photography
Stage 2 - Commissioning of Survey
Stage 3 - 3D Modelling of scheme
Stage 4 - Integration of photography and survey data to form the alignment
Stage 5 - Adding scheme and rendering
Stage 6 - Completion of final image



AVR LEVELS RELATING TO TYPE 4 VISUALISATION



LEVEL 0 - Location and size of proposal



LEVEL 1 - Location, size and degree of visibility of proposal



LEVEL 2 - As level 1 + description of architectural form



LEVEL 3 - As level 2 + use of materials

STAGE 1
PHOTOGRAPHY

After consultation with the Local Authorities, the chosen views are typically scoped out in the form of draft photographs and marked on an Ordanance Survey (OS) map. Our Studio will then brief the professional photographer on each viewpoint.

At each of the chosen viewpoints, a photograph of the actual view is taken recording its position on the ground (by photography as well as inserting a survey pin into the ground). This assists the survey team with identifying the camera position and measuring co-ordinates.

The Photography is taken using a full frame digital camera placed vertically above the chosen point at a standard height of 1.6m. This is typically achieved using a plumbline vertically beneath the centre of the lens.

Our photographer uses a lens with a known field-of-view (FOV) and sets the camera on a levelled tripod. High quality lenses are used to ensure minimum distortion. Within each study or series of images, the photographer will aim to use a consistent lens. This is typically a 24mm perspective control lens for a local view which equates to 73.7 degrees angle of view. However, for mid-distant views a 50mm lens may typically be used.

The Photographer notes the time and date of each shot (which is always captured in the EXIF metadata) - this enables any lighting conditions to be replicated later on in the process.

Our photographers use a range of full frame architectural cameras with the following high-resolution, digital lenses:
24mm, 28mm, 35mm, 50mm

Using perspective control shift may be required in Townscape views.
The digital chip dimensions are 36mm x 24mm.



Camera location map



Camera position



Final photo

STAGE 2
SURVEY

For each agreed photo viewpoint location an instructional document is released to the survey subcontractor. The surveyor is instructed (by means of a marked up photograph) to record a range of reference points that would enable a very high degree of accuracy.

These points should be centred on the location of the candidate scheme, and be varied throughout the depth of the view - ie near, mid-distant and far points. The points can then be measured by the survey team and will be recorded in terms of their Easting, Northing and height in relation to Ordanance Survey (OS datum)

The survey team also replicate the position of the camera in order to survey points on the horizon of the photograph. These can be used later in the process to remove any rotational errors in the photo.

Survey Equipment Required
• Global Positioning System (GPS)
• Total Station (with good reflectorless EDM range)

Field Survey Methodology
• Camera Locations - To establish the position of a viewpoint, the surveyor sets up a GPS on it and records enough points to ensure a high level of accuracy.
• Reference points - The surveyor sets up two temporary stations (TBMs) within view of each reference point and establishes their location using the GPS. Once these co-ordinates have been established, the surveyor sets up a Total Station on the TBMs and takes 3 reflectorless survey shots to the reference point in question.
Note: Where GPS positioning is not possible near to the required survey point - due to poor signal, for instance - the surveyor set up his TBMs at the nearest position possible and traversed traditionally to a position where he could survey the point.

Data Processing & Delivery
GPS data is processed through to acquire the surveyed points in the form of a delimited text file containing OSGB36 co-ordinates. Plus a 3D point cloud and camera position that can be imported into our 3D software.



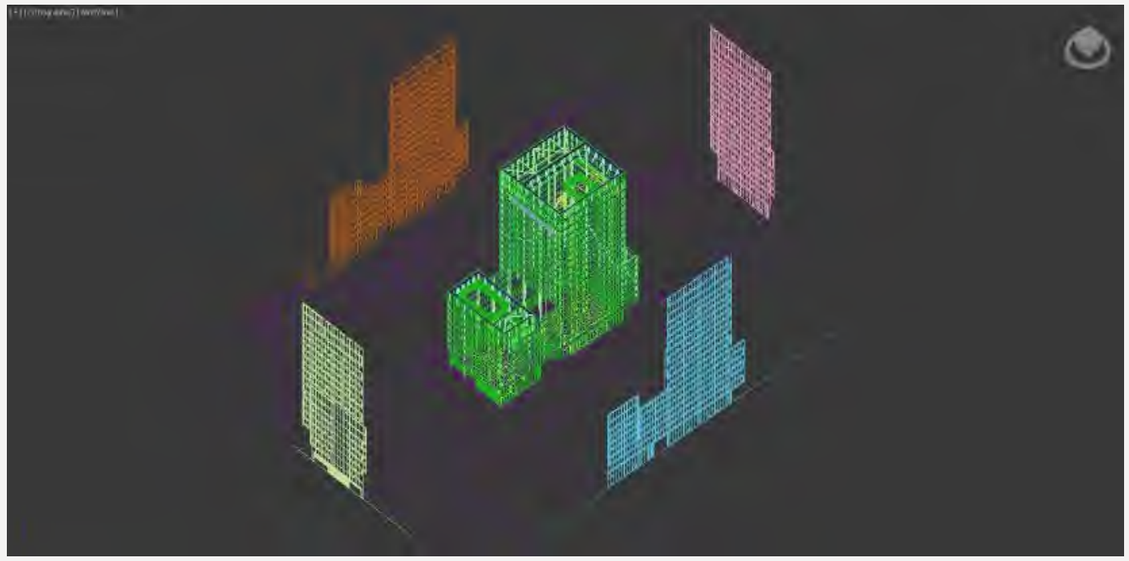
Survey points

STAGE 3
MODELLING OF THE SCHEME

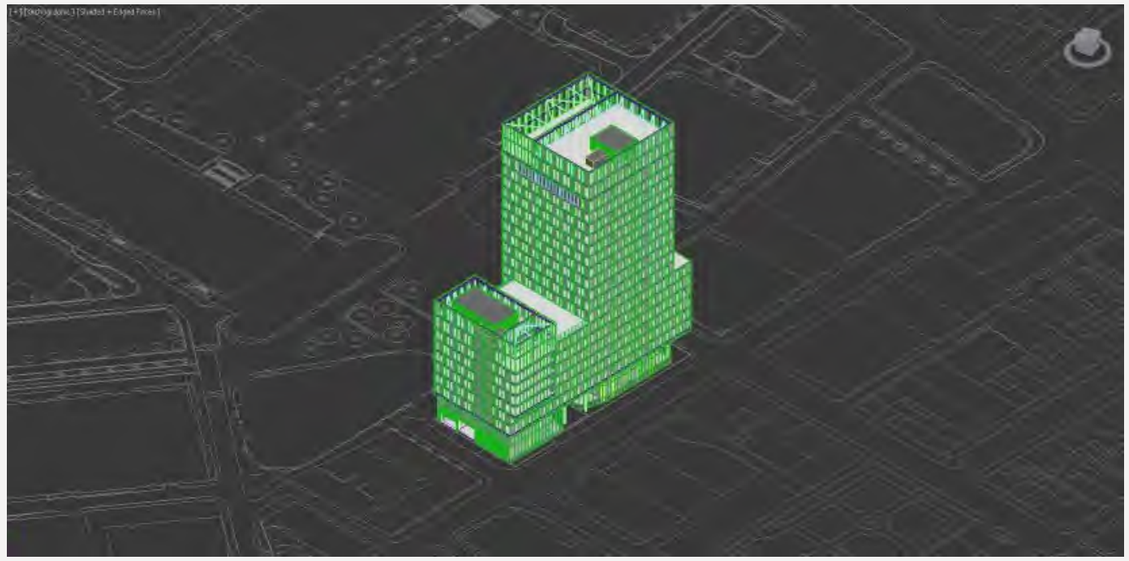
Within 3DSMax software, the scheme is either modelled from drawings supplied as dwgs by the architects or a detailed model will be supplied by the architect usually in the form of a Revit model. The model can be constructed in a number of ways dependent on the type of image being produced. The requirement is often for initial views, to study the form of the scheme and its impact on the surrounding environment - here, a block model is usually appropriate to allow all parties to assess the scheme.

From here a detailed model is often commissioned to progress to fully rendered certified imagery.

The model is setup in the 3D Virtual environment in relation to OS plan so that it can be integrated with the survey information.



DWG elevations and plans are imported to enable accurate modelling.



Orthographic view of detailed model

STAGE 4
INTEGRATION OF PHOTOGRAPHY, AND SURVEY DATA TO FORM THE ALIGNMENT

The first three stages are now brought together to create the alignment, within the 3D software.

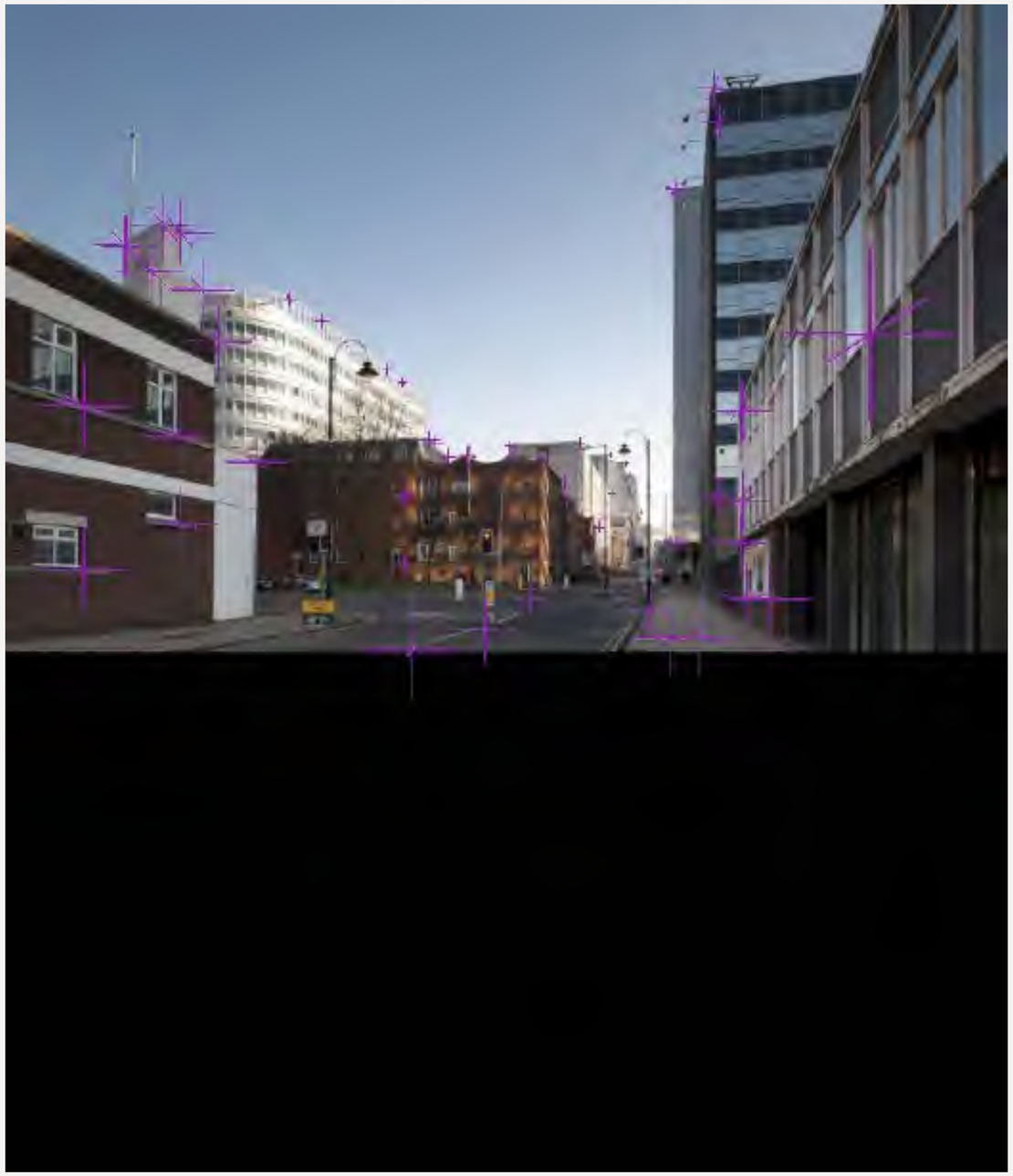
Firstly, the photography is brought into the 3D software, in the form of a background so that the surveyed information can be aligned to it ie camera-matching. A couple of stages are completed to accomplish this.

1. The photo is brought into ' Adobe Photoshop' editing software. Any rotational inaccuracies from the photo are removed. This is completed by using the surveyed horizon information and rotating the image accordingly.

2. Any 'shift' applied by the photographer using the perspective control lens needs to be addressed. Vertical shift is applied to allow the photographer to photograph tall buildings whilst keeping the camera level, and hence the verticals of the image vertical. It has the effect of 'shifting' the horizon off the centre of the image. To use the photography within the 3D software, the horizon has to be returned to the centre of the image - this is done by adding a blank area to the top or bottom.

Secondly, the survey data is brought into the 3D software. Returned to Our Studio as a database document, the Easting, Northing and height co-ordinates that can be imported so that they form points in 3-dimensional space. The virtual camera is also located, using the OS data reference returned to Our Studio.

Lastly, the camera is adjusted so that the surveyed points line up with the background photography. The field-of-view (FOV) is entered according to the lens the photographer used and the location of the camera's 'target' is adjusted in the X and Y plane (ie not vertically) so that the points align with the features surveyed.



3D software viewport showing background photography aligned with survey data points.

STAGE 5
ADDING SCHEME AND RENDERING

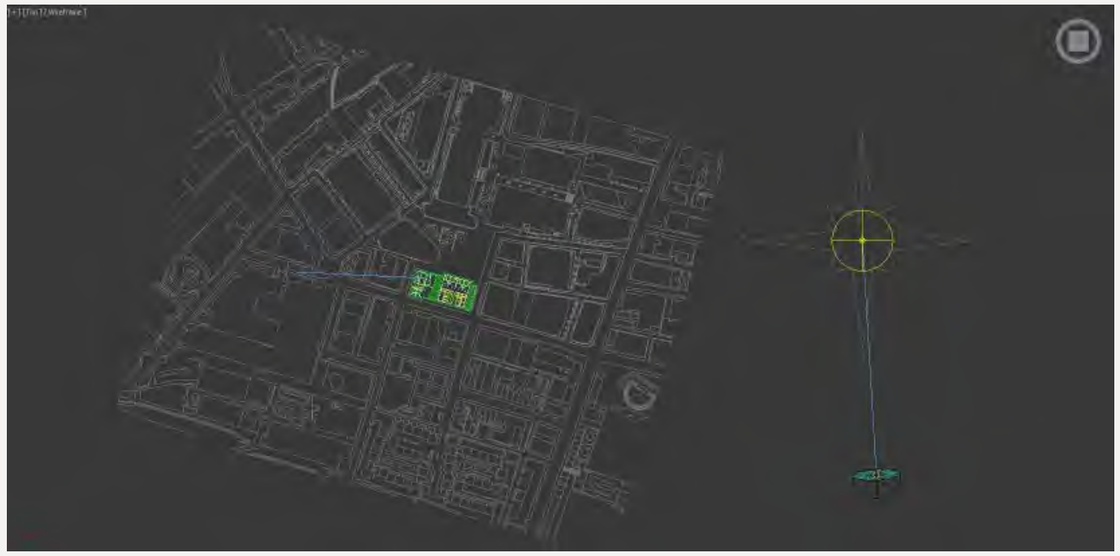
Upon completion of the camera alignment the 3D model (as described in stage 3) is brought into the 3D virtual environment in relation to OS datum.

Lighting is then setup in the 3D virtual environment to match the sunlight conditions at the time the source photograph was taken.

In order to assist a more qualitative assessment of the proposals, the output image needs to be a photo-realistic reflection of what the proposed scheme would look like once constructed. The process of transforming the wireframe 3D scheme model into one that can be used to create a photo-realistic image is called texturing.

Prior to rendering, Our Studio requires details from the architect regarding the proposed materials (e.g. type of glass, steel, aluminium etc.) to be utilised. This information is used to produce the appearance and qualities in the image that most closely relates to the real materials to be used.

The 3D model is then rendered in the 3D software at the same resolution as the photograph.



3d software showing top view of model aligned with OS plan including camera location and sun-light setup.



3d software showing view from camera with photo background and model in position.

CLIENT
TRILOGY PROPERTY

ARCHITECT
SIMPSON HAUGH & PARTNERS

GREAT NORTHERN



CLIENT
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ARCHITECT
SIMPSON HAUGH & PARTNERS

ONE PORT STREET.



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EASTERN GREEN LTD

ARCHITECT
FEILDEN CLEGG BRADLEY

67 PICCADILLY

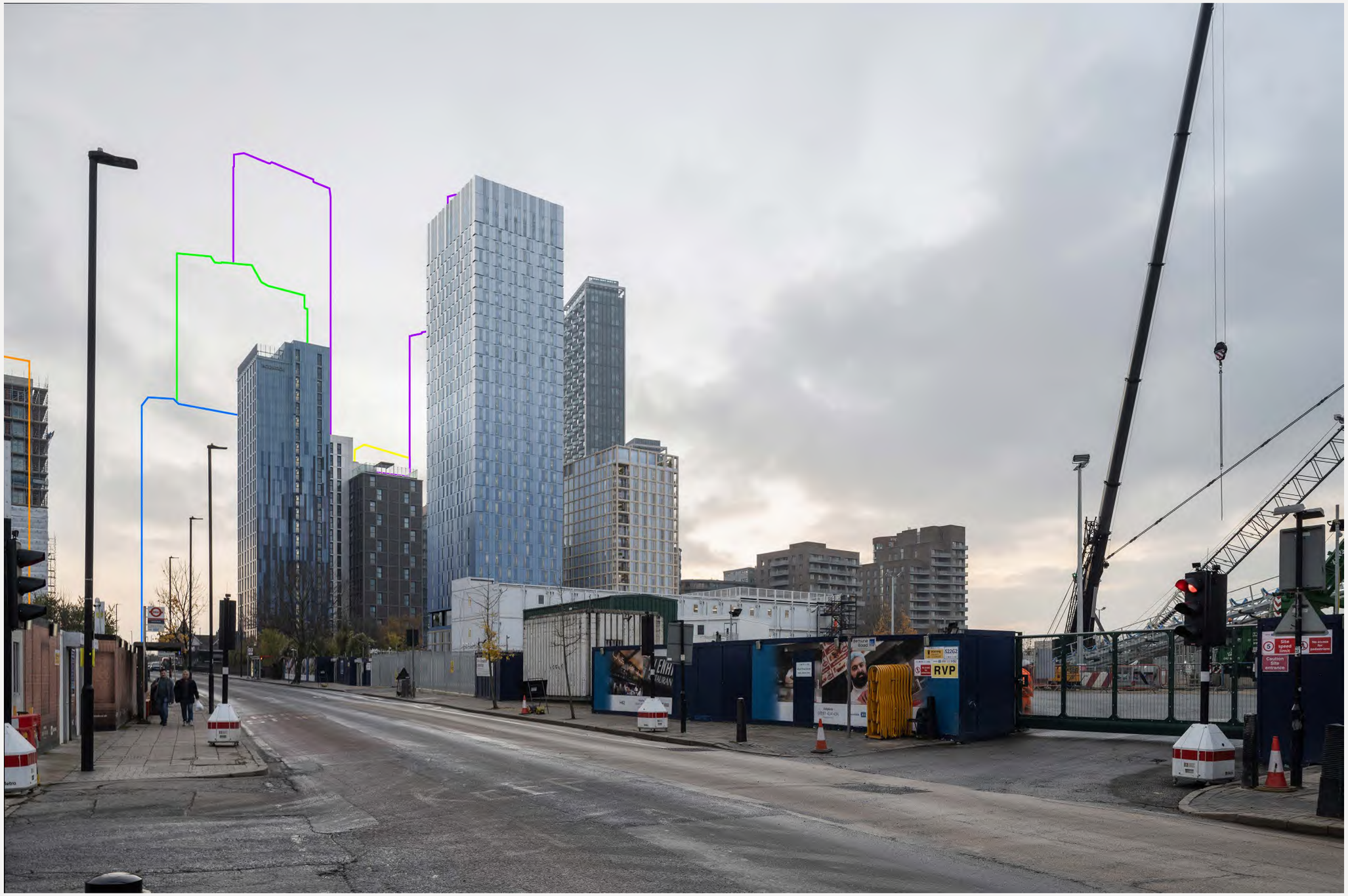


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DOWNING PROPERTY GROUP

ARCHITECT
SIMPSON HAUGH & PARTNERS

HOLIDAY INN, NORTH ACTON



CLIENT
DOMINVS GROUP AND WHITBREAD

ARCHITECT
JON MATTHEWS ARCHITECTS

MEDLOCK STREET



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TOWER EIGHT

ARCHITECT
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CHARLES STREET



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HENRY BOOT
DEVELOPMENTS (HBD)

ARCHITECT
CARTWRIGHT PICKARD

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Appendix 12 – Built Heritage – EIA Scoping Figures

Project: ID Manchester – Plot H

Title: Built Heritage – EIA Scoping Figures

Date Issued: September 2025

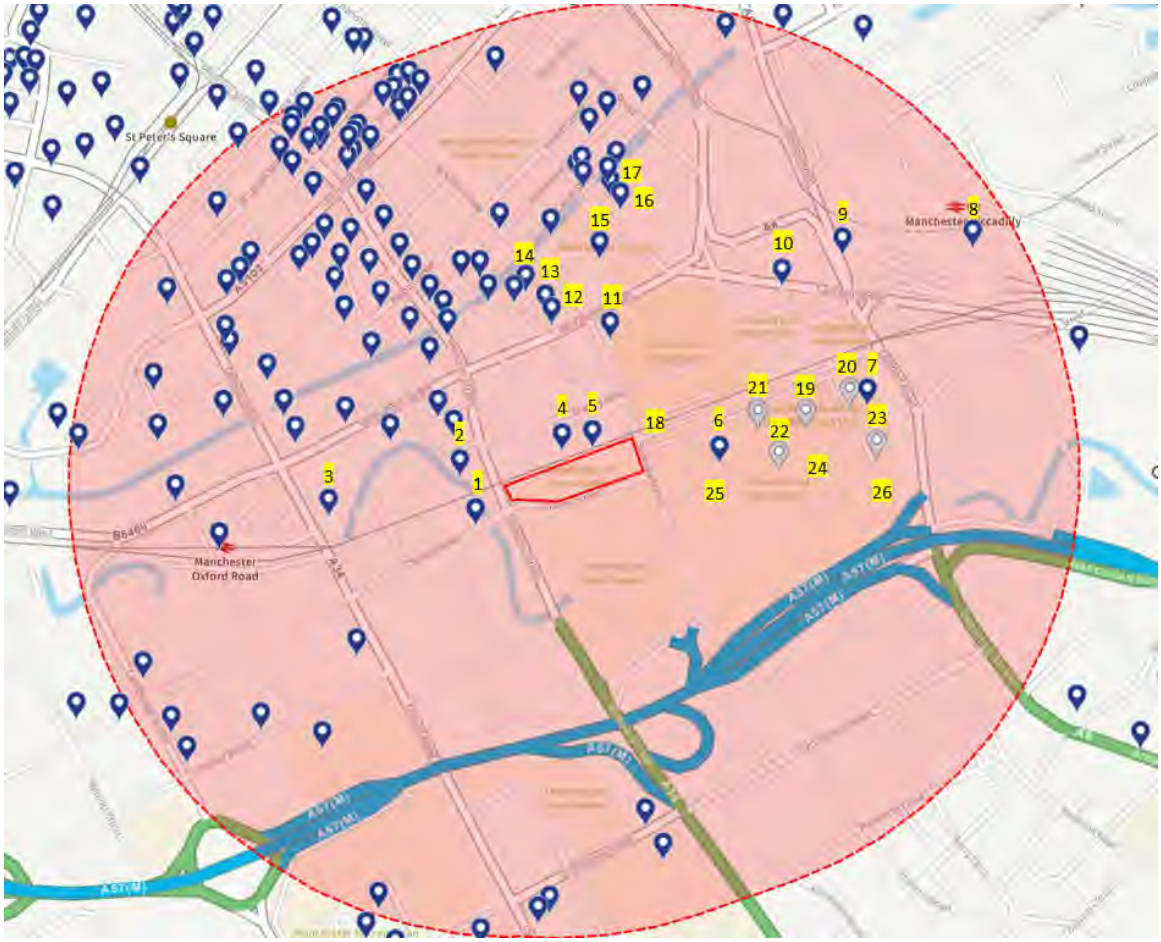


Figure 1: Location of listed buildings (blue markers) within 500m study area (red shading). Indicative Site boundary indicated in red. Identified receptors for inclusion within the scoping assessment numbered 1-18. Source: Historic England, National Heritage List for England.



Figure 2: Location of Whitworth Street Conservation Area (red line) in relation to the Site (Plot H boundary indicatively shown in area shaded green). Location of conservation areas in relation to the Site.

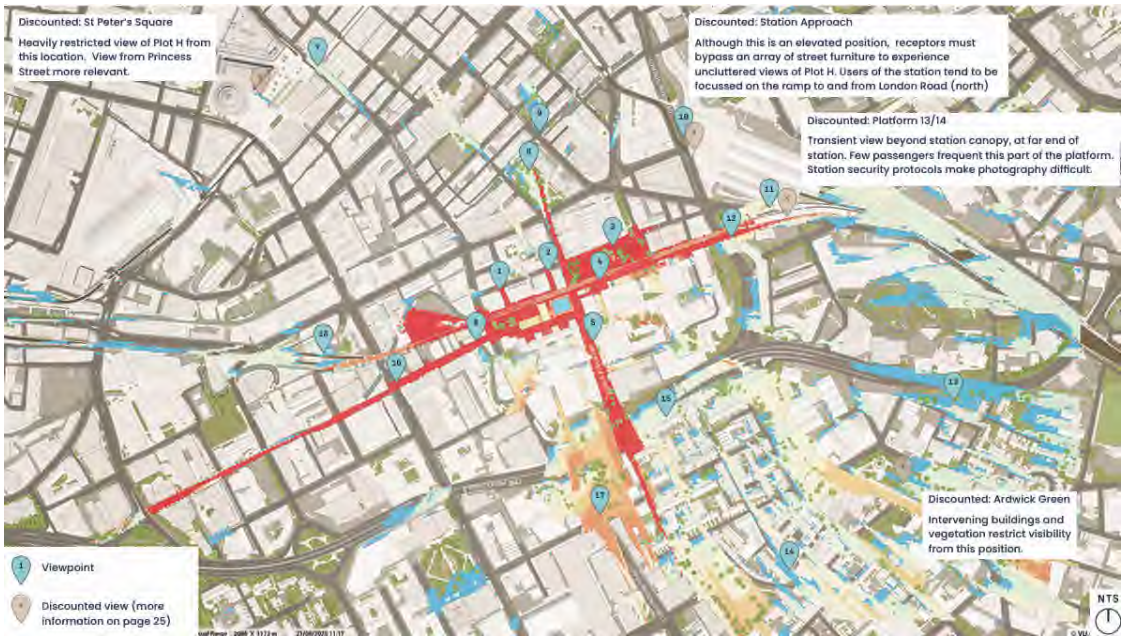


Figure 3: Zone of Theoretical Visibility (ZTV) of Tower 3 (148m) prepared by Layer Studio. The area shaded red is indicative of high visibility. The ZTV has informed initial viewpoint location discussion.

Draft viewpoint locations with potential effects on heritage as identified within the TVIA issued on 15 September 2025 are:

- 2 – Granby Row at Granby House
- 3 – Vimto Park (SRF view B)
- 4 – Altrincham Street
- 5 – Sackville Street
- 6 – Charles Street at Lass O' Gowrie pub
- 7 – Princess Street
- 8 – Sackville Gardens (SRF view 5)
- 9 – Chorlton Street (SRF view 2)
- 10 – London Road (SRF view 3)
- 11 – Fairfield Street (SRF view 4)
- 12 – Altrincham Street
- 18 – Oxford Street Station

Appendix 13 – Environmental Noise Survey Report

Ref: 2151.Rep.ENS

17 July 2025

blackbird acoustics
E: Alex.Wyatt@Blackbird-Acoustics.co.uk
M: 07958 439 142
W: www.blackbird-acoustics.co.uk/
A: Forest Hill, London SE23

Chris Lambourn
RG Group
Chris.Lambourn@rg-group.org.uk

Dear Chris

RGRE, PBSA, Plot H, Charles Street, Manchester M1 7AR
Environmental Noise Survey Report

Planning permission is being sought for the re-development of the current multi-storey car park on Charles Street in Manchester to build student accommodation (PBSA) on behalf of RGRE with ancillary communal amenity spaces, commercial uses, and landscaping. Blackbird Acoustics Limited (BAL) have been appointed by RGRE to supply acoustic input to the project at the planning application stage, through design and build stages, up to commissioning and handover. Blackbird Acoustics have undertaken baseline environmental noise surveying at the site to establish the prevailing noise levels. This report details the findings of the noise surveying, on which future assessments will be based; including detailed assessment of the glazing performance requirements, Part O and noise risks associated with overheating, mechanical services limits and criteria, etc.

Noise Surveying

Blackbird Acoustics attended site to undertake environmental noise surveying of the prevailing noise levels at site. Noise monitoring was conducted over a full weekend period (due to its central city location) between 15:15 hours on Friday 4th to 13:20 hours on Tuesday 8th July 2025.

The survey was undertaken in general accordance with BS 7445 and the ANC's Environmental Noise Measurement Guide. Weather conditions throughout the survey were conducive with obtaining representative noise measurements, being generally dry with light winds with periods of light rainfall occasionally. The measurements were made using Type 1 sound level meters, Norsonic 140s, which were calibrated both prior to and on completion of the surveying, with no significant calibration drifts observed. Calibration details available upon request.

Measurements were undertaken over 5-minute sample periods at the following positions, with microphones attached to booms at least 1.5m from the façade line, in the free-field.

Position 1 – North – Rail:	Rear of Site overlooking elevated railway tracks, 9.3m above ground level, circa 3rd floor, ~0.5m above tracks with direct line-of-sight [///august.museum.rank]
Position 2 – South-East – Sackville St:	Corner of site overlooking Sackville and Charles Streets, 5.6m above ground, circa 2nd floor [///chef.same.lease]
Position 3 – South-West – Charles St:	Corner of Site overlooking Charles St towards Princess St, opposite Echoes Day Nursery, 7.8m above ground, circa 2nd floor [///issue.prop.vibrates]

Figure 1 – Site Plan indicating Measurement Positions

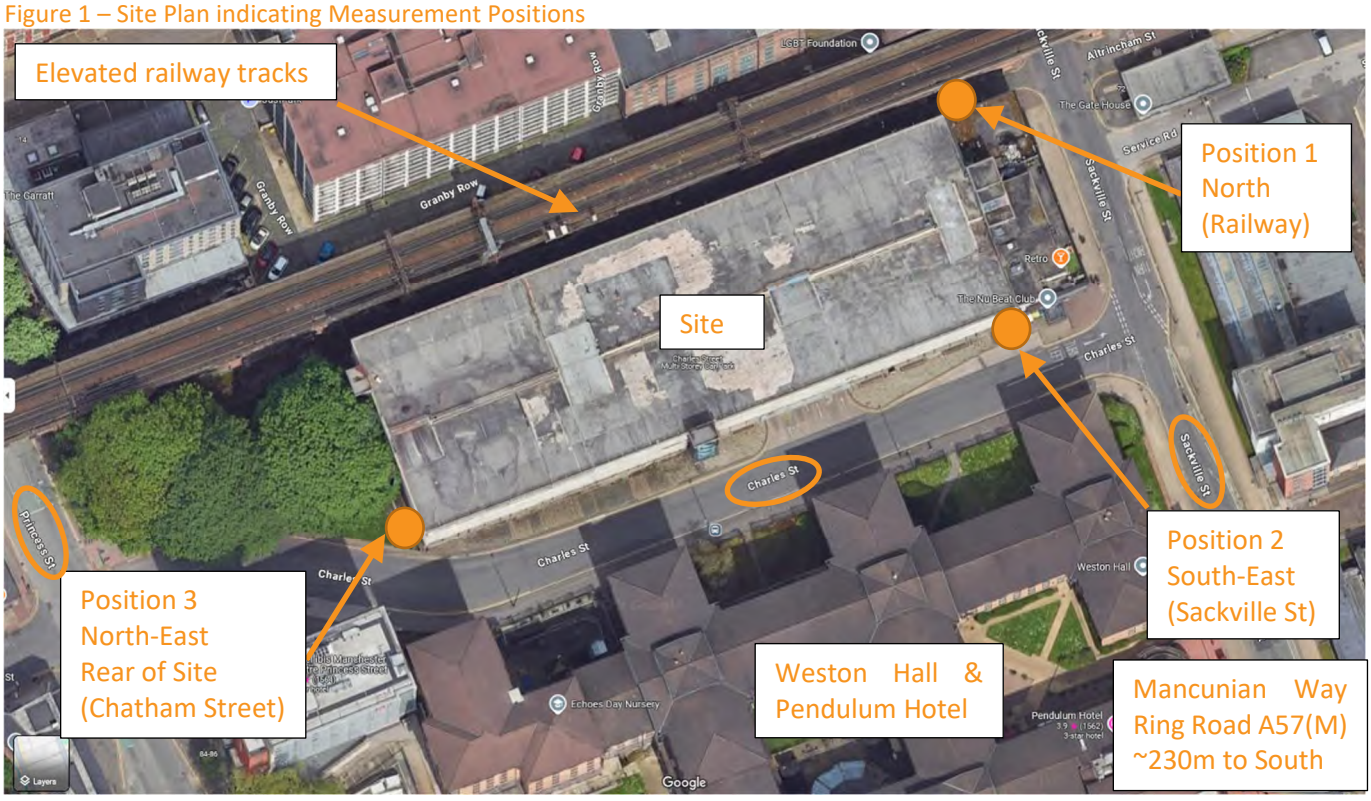


Image courtesy of Google Maps

The measured levels are summarised below;

Table 1 – Summary of Measured Noise Levels

Measurement Period	Pos 1 – North (Railway)			Pos 2 – South-East (Sackville St)			Pos 3 – South-West (Charles St)		
	Typical Lowest L_{A90} (dB)	Period-Averaged L_{Aeq} (dB)	Typical Night L_{Afmax} (dB)	Typical Lowest L_{A90} (dB)	Period-Averaged L_{Aeq} (dB)	Typical Night L_{Afmax} (dB)	Typical Lowest L_{A90} (dB)	Period-Averaged L_{Aeq} (dB)	Typical Night L_{Afmax} (dB)
Daytime (07:00 – 23:00 hours)	46	65	-	47	61	-	48	61	-
Night-time (23:00 – 07:00 hours)	41	62	82	43	58	75	43	58	78

The typical night-time $L_{Amax,f}$ values are calculated from the 90th percentile of the 5-minute samples.

It should be noted that noise levels at all Measurement Positions were dominated by local road traffic movements along the immediately adjacent Sackville (east) and Charles (south) Streets, and the other local roads, including Princess Street (west) and the Mancunian Way Ring Road A58(M), which is approximately 230m to the south of the site. Traffic is fairly consistent and prevalent in the vicinity, although quieter periods occur during the daytime with congestion during rush hour periods. Road traffic movements along the elevated A58(M) contribute to the prevailing background levels. Road sweeping machines were present around the site, on and off throughout the day. Vehicles of all types were present, i.e. cars, motorbikes, vans, buses, lorries, etc.

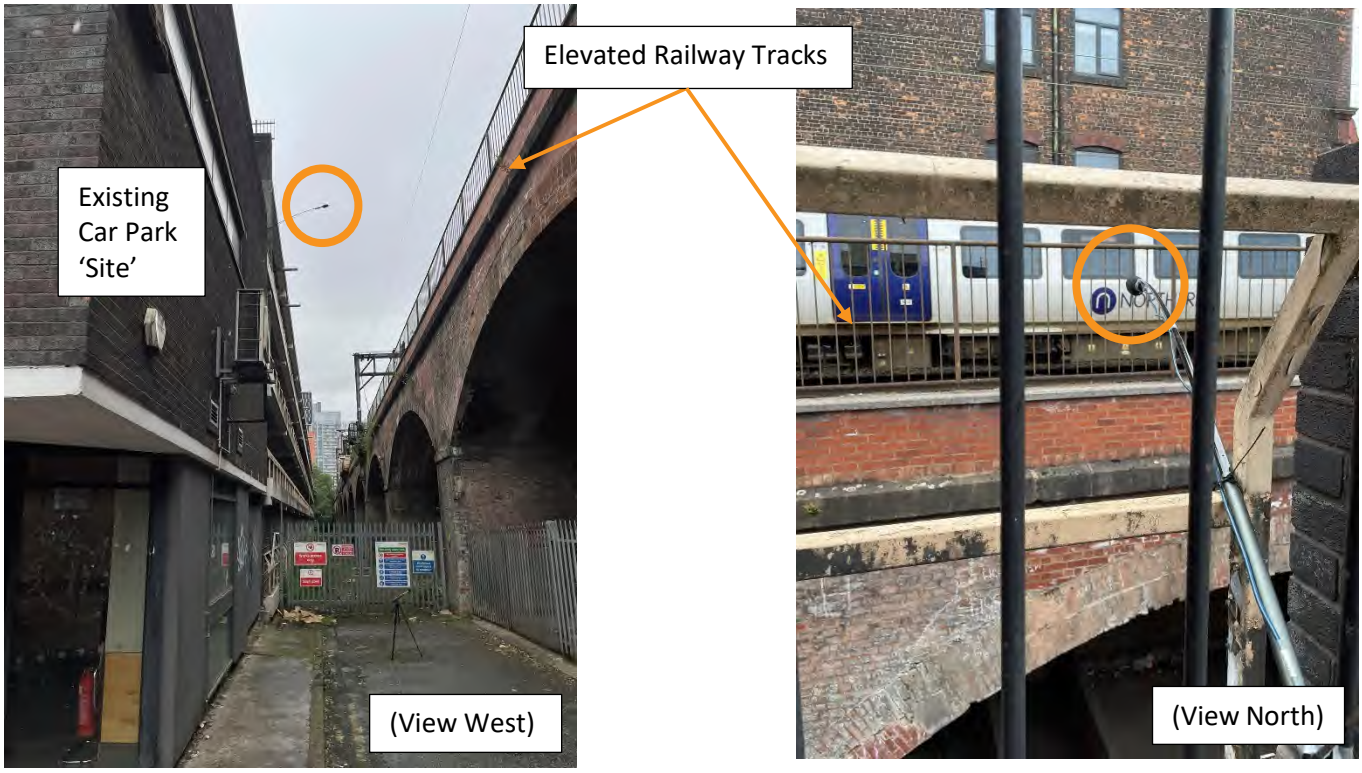
Rail traffic movements along the elevated railway tracks running the length of the northern boundary also heavily influenced the noise environs. Both passenger and freight trains use the tracks with movements generally quite slow, as the trains travel between stations, with Manchester Oxford Road station to the west of site and Manchester Piccadilly station to the east. Low frequency rumble ('boomy') noise was present on site due to re-radiated noise off the arches supporting the elevated tracks, particularly for faster moving trains.

The measured noise levels from the surveying are graphically represented in the attached Graphs;

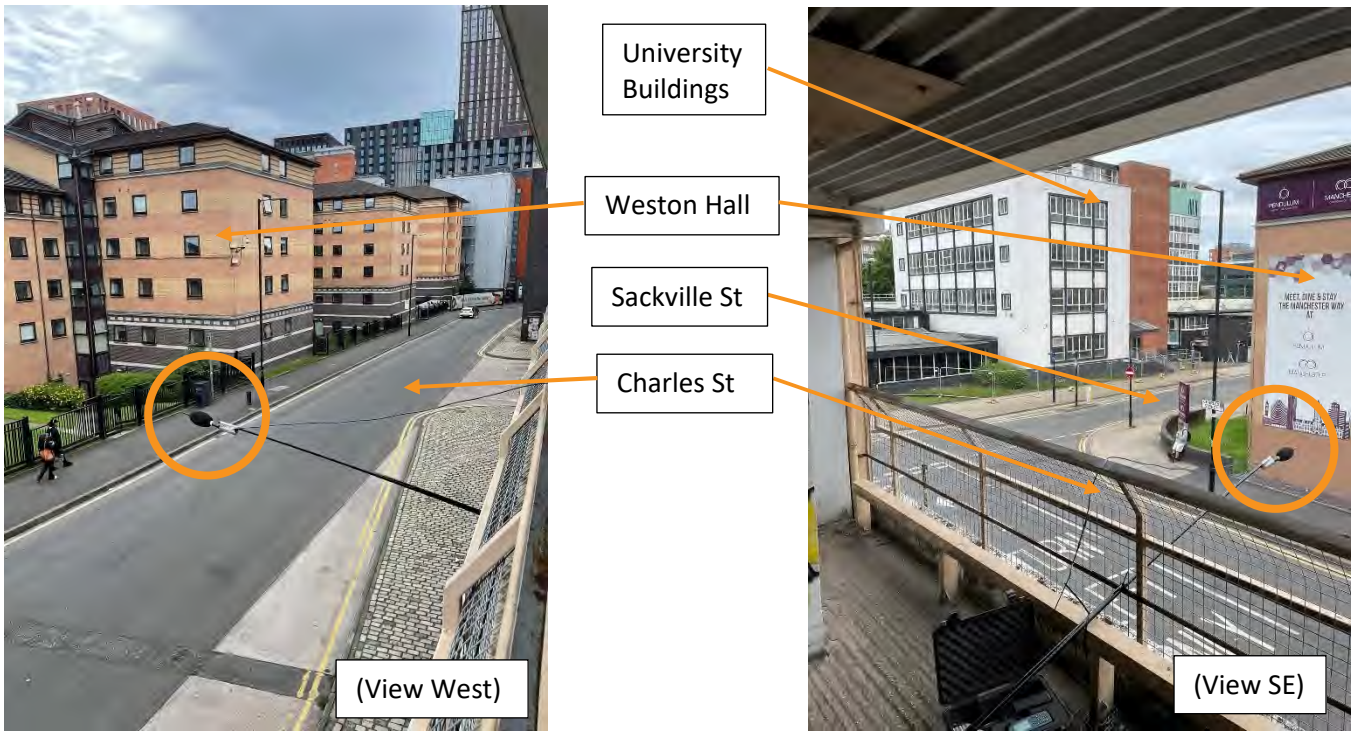
- Graphs 1 - 6 indicate the L_{eq} and L_{max} & L_{90} overall dBA value time-histories measured at each position.
- Graphs 7 - 9 indicate the spectral noise levels, which will be used in the assessment of the glazing specs.
- Graphs 10 - 12 indicate the L_{90} histograms used to derive the "typical lowest" values & thus plant noise criteria.
- Graphs 13 - 15 indicate the $L_{Amax,f,5mins}$ histograms for the night-time only, used to derive the "typical L_{max}" values.

Photos of the measurement positions are as follows;

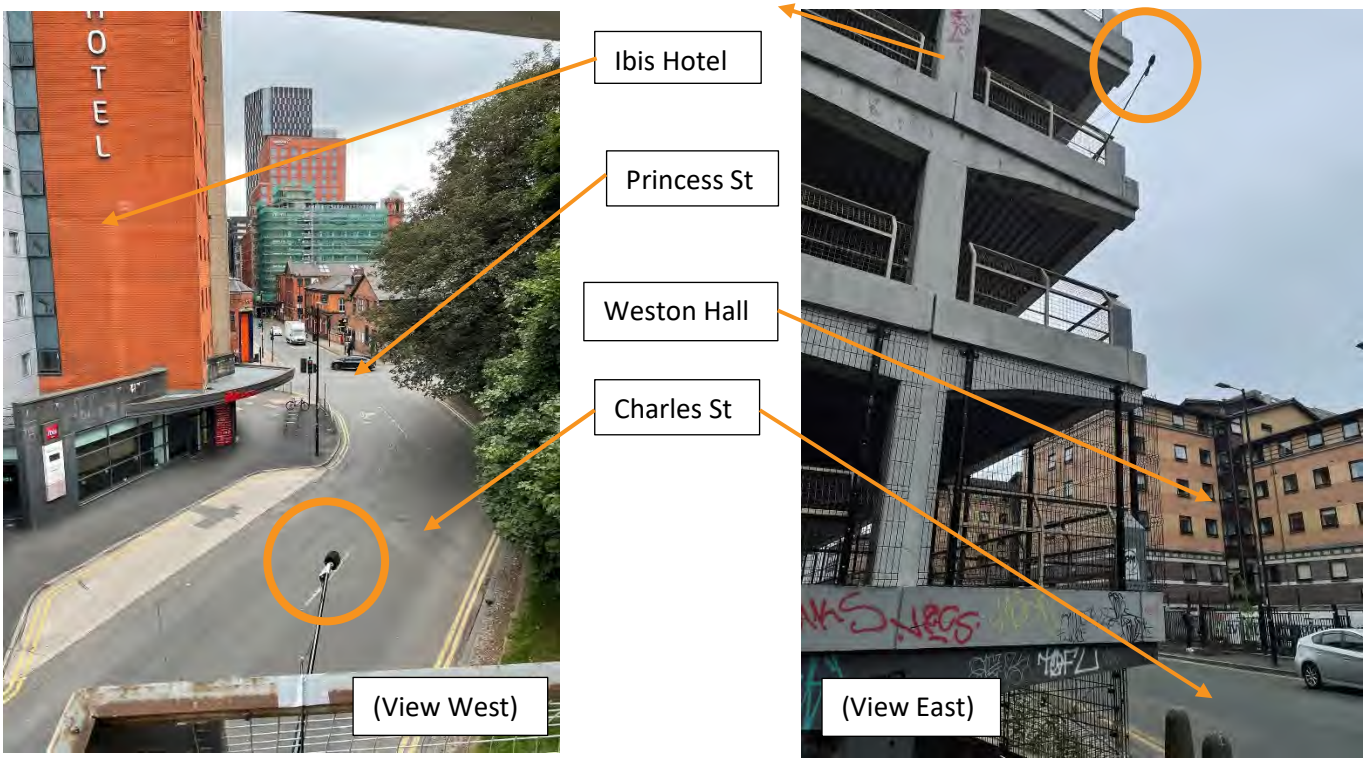
Position 1 – North – Railway Tracks



Position 2 – South-East – Sackville Street



Position 3 – South-West – Charles Street



"Typical-Lowest" Background Levels

When considering the existing background levels at a site, BS 4142:2014 "*Methods for Rating and Assessing Industrial and Commercial Sound*" recommends assessing to the "typical" measured $L_{A90,\ 15mins}$ background levels, BS 4142:2014 goes on to state:

> *In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.*

BS 4142:2014 suggests that statistical analysis is a suitable method to determine the "typical" background level. This can be carried out by calculating the level of the most-commonly occurring $L_{A90,\ 15mins}$ period during the proposed operating hours of equipment.

We generally consider that designing to the most-commonly occurring $L_{A90,\ 15mins}$ period is not sufficient during those slightly quieter periods. In our opinion, a more representative value would be the "typical-lowest" level, which can be determined statistically as the lowest rounded $L_{A90,\ 15mins}$ level which occurs for at least 10% of the assessment period.

The "typical-lowest" background noise levels ($L_{A90,\ 5mins}$) at the measurement positions are therefore summarised in the Table 1 above, based upon the L_{A90} histograms attached in Graphs 10 - 12. This data can be used to set plant noise emission criteria for use in the assessment of noise emissions from any proposed plant at the development.

Plant Noise Emissions Criteria

Local Authority Requirements

Manchester City Council's standard requirements in relation to fixed plant installations are outlined within Manchester City Council's Noise and Planning Guidance, which states that the noise assessment should be based on BS 4142:2014. It also states that:

> *"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) noise level at the nearest noise sensitive location."*

To this end, in setting plant noise emissions criteria to a level -5dB below the otherwise prevailing typical-lowest background noise level, the following criteria would therefore be formulated.

Table 2 – Proposed Plant Noise Emission Criteria at Existing Receptors

Time Period	Plant Noise Emission Criterion (dBA) at Nearest *Existing* Noise Sensitive Receptor (Relevant Location)		
	Pos 1 – North (Railway)	Pos 2 – South-East (Sackville St)	Pos 3 – South-West (Charles St)
Daytime (07:00 – 23:00 hours)	41	42	43
Night-time (23:00 – 07:00 hours)	36	38	37

In line with BS 4142:2014+A1:2019, should the proposed plant be identified as having intermittent or tonal characteristics, a further penalty should be subtracted from any of the above proposed noise emission limits.

Own Development Noise Sensitive Receptors

Where the nearest noise sensitive receptors to the plant locations or ventilation ductwork grilles/louvres are the bedroom windows of our own development, we have developed more relevant criteria based on guidance from applicable industry standards.

We propose maximum emission limits that would result in acceptable internal noise levels in the bedrooms and studios in the event of partially open windows. BS 8233 provides guidance on suitable internal noise levels (see below). A level of -5dBA below the internal noise criterion is targeted, in line with MCC's general intent.

Based on the sound reduction given by a partially open window as outlined in BS 8233:2014, internal noise levels are anticipated to be approximately 15dB lower than external noise levels. We therefore propose that cumulative noise emissions from mechanical services plant to the own development receptors should be below the levels detailed in Table 3 below.

Table 3 – Proposed Plant Noise Emission Criteria at Own Development Receptors

Time Period	Plant Noise Emission Criterion (dBA) at Nearest *Own Development* Noise Sensitive Receptor
Daytime (07:00 – 23:00 hours)	45
Night-time (23:00 – 07:00 hours)	40

Should the proposed plant be identified as having intermittent or tonal characteristics, a further applicable penalty should be subtracted from any of the above proposed noise emission limits.

Emergency Plant

As emergency plant will be operating only in emergencies and during periodic testing, it is common to accept a relaxed noise limit for such noise. It is common to target a level of 10dB above the existing background level for such a limit. This is in line with other City Councils' standard requirements. Given that testing will only occur during daytime hours, this therefore sets worst-case noise limits of 56 and 60 dB L_{Aeq} for emergency plant affecting Receptors, Existing & Own-Development respectively.

Summary of Assessment Criteria

Therefore, all future design advice will be based upon achievement of the plant noise limits stated in both Tables 2 & 3 above, as summarised below in Table 4.

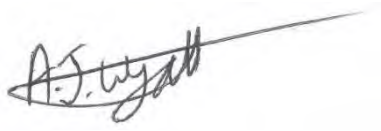
Table 4 – Summary of Proposed Plant Noise Emission Criteria

Time Period	Plant Noise Emission Criterion (dBA) at Nearest Noise Sensitive Receptor (Relevant Location)				
	Existing Receptor			*Own Dev Receptor*	Emergency Plant at Receptors – *Exist/OwnDev*
	Pos 1 – North (Railway)	Pos 2 – SE (Sackville St)	Pos 3 – SW (Charles St)	All façades	
Daytime (07:00 – 23:00 hours)	41	42	43	45	56 / 60
Night-time (23:00 – 07:00 hours)	36	38	37	40	–

The findings in this report will be used as the basis for future assessments; including detailed assessment of the glazing performance requirements, Part O and noise risks associated with overheating, mechanical services limits and mitigation measures, and construction/demolition noise & vibration assessments, etc.

We trust the above is clear and of assistance, but should you have any queries, please do not hesitate to contact the undersigned.

Yours sincerely,
For Blackbird Acoustics Limited



Alex J Wyatt
Director

Att.

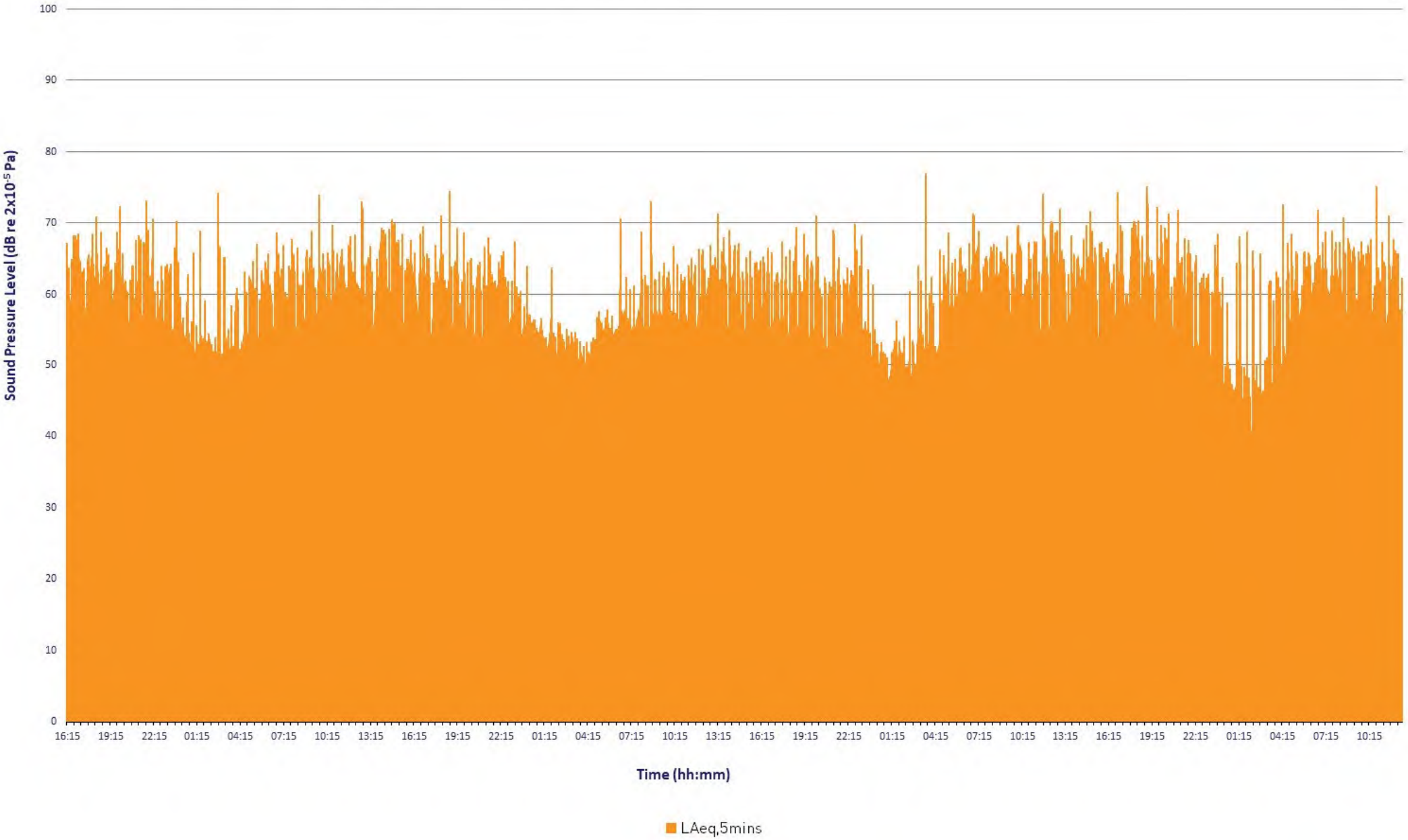
RGRE, PBSA, Plot H, Charles Street, Manchester

L_{Aeq} Time History (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 1



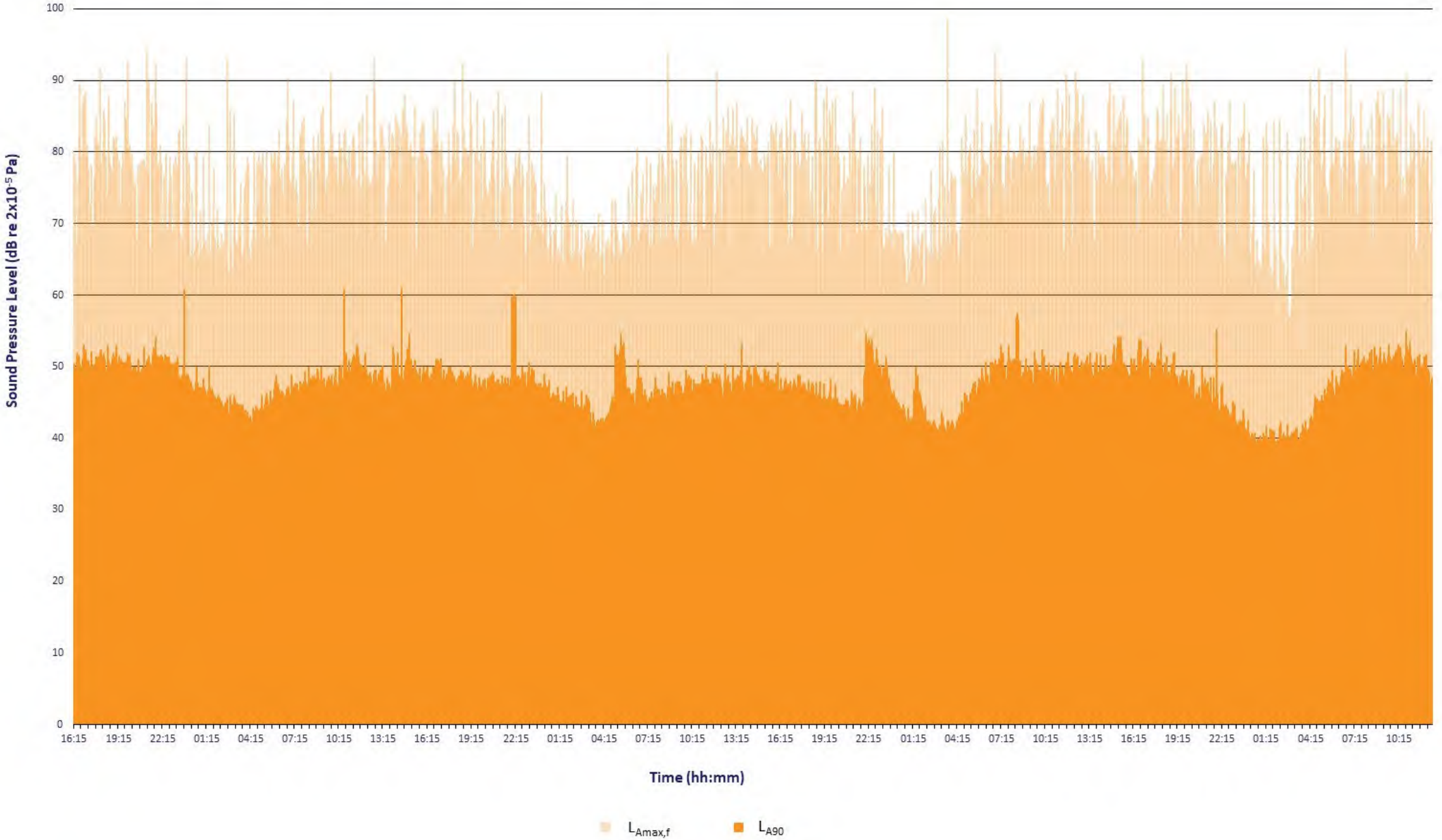
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 2



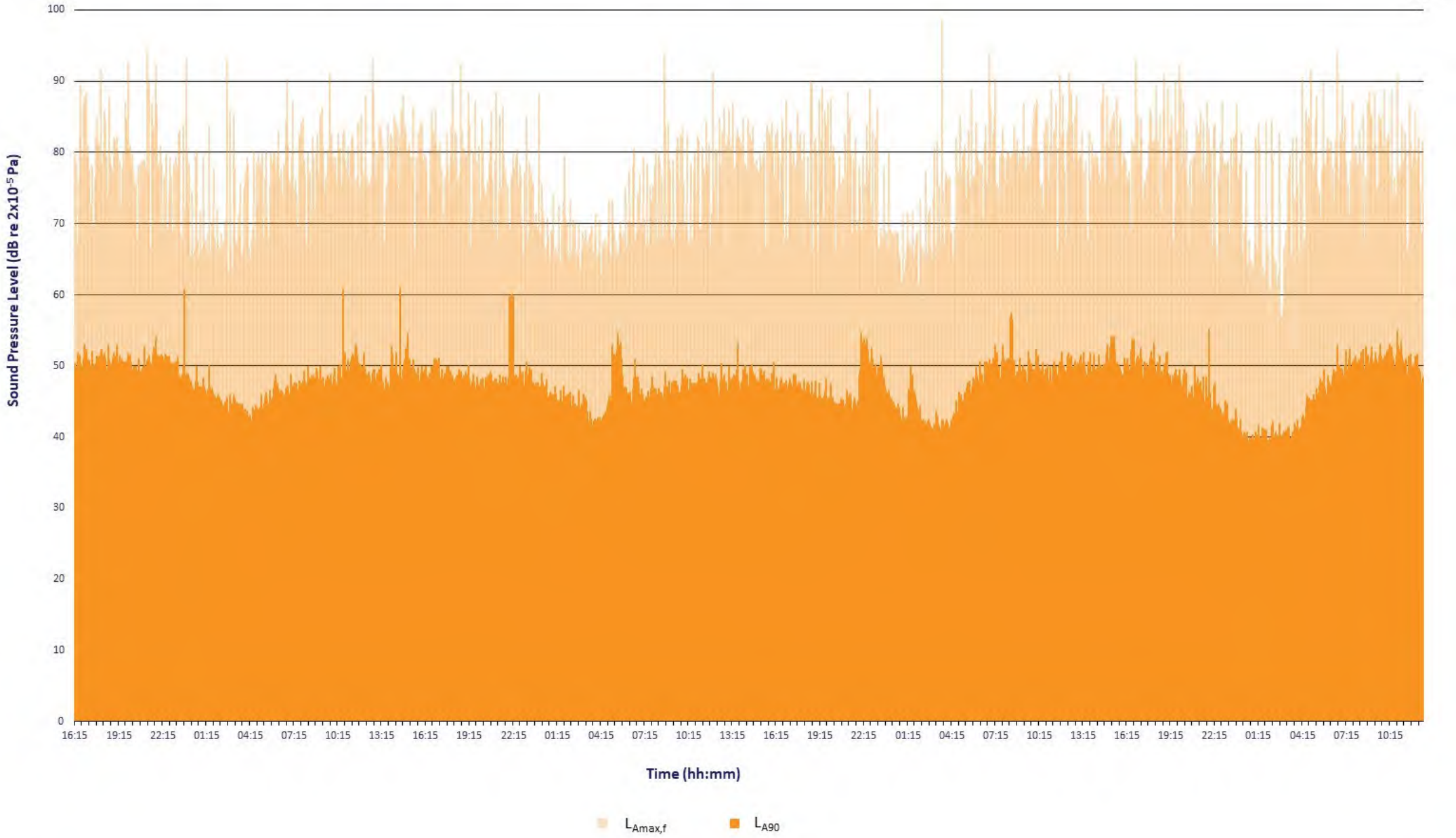
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 2



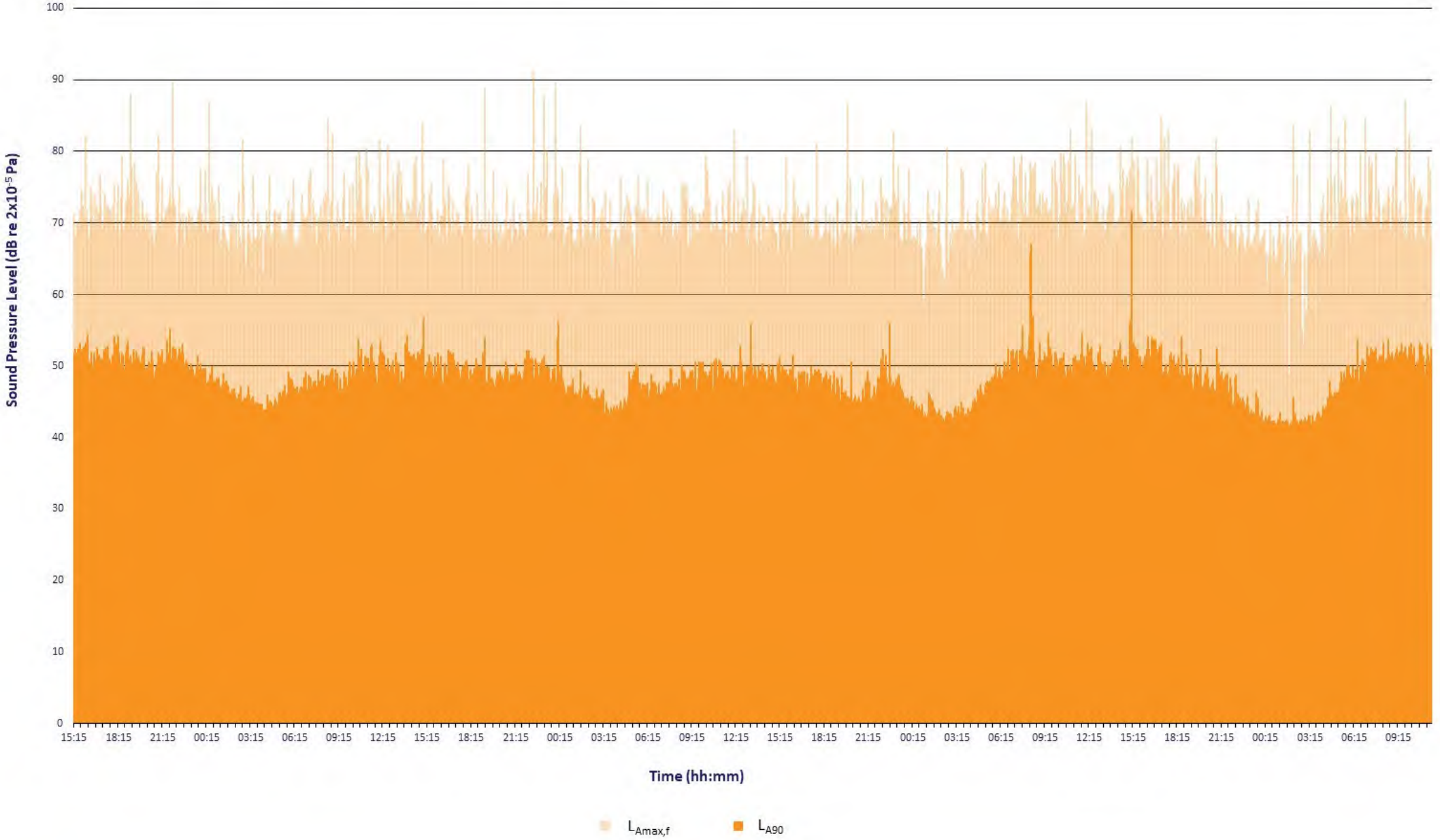
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 4



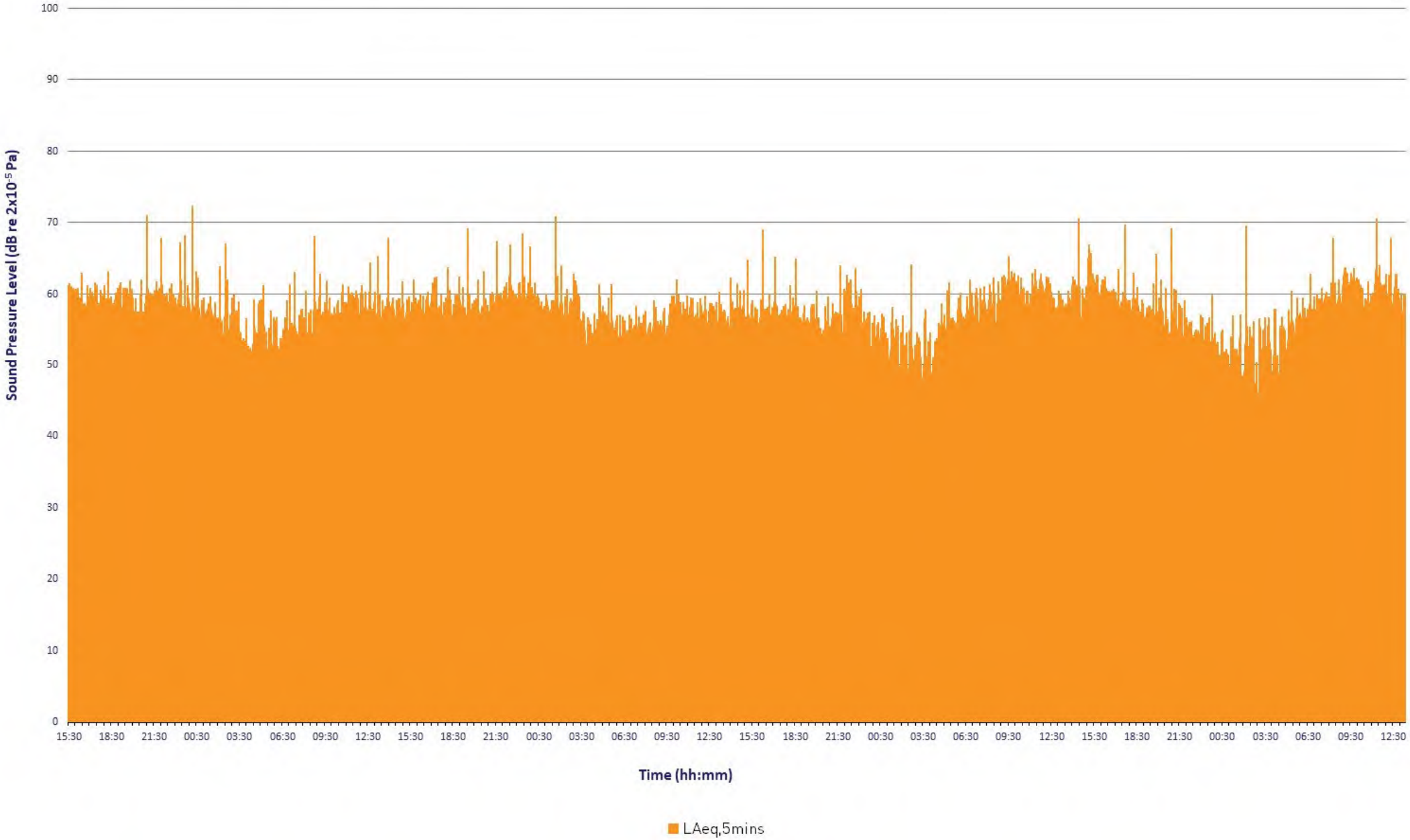
RGRE, PBSA, Plot H, Charles Street, Manchester

L_{Aeq} Time History (5-mins)

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 5



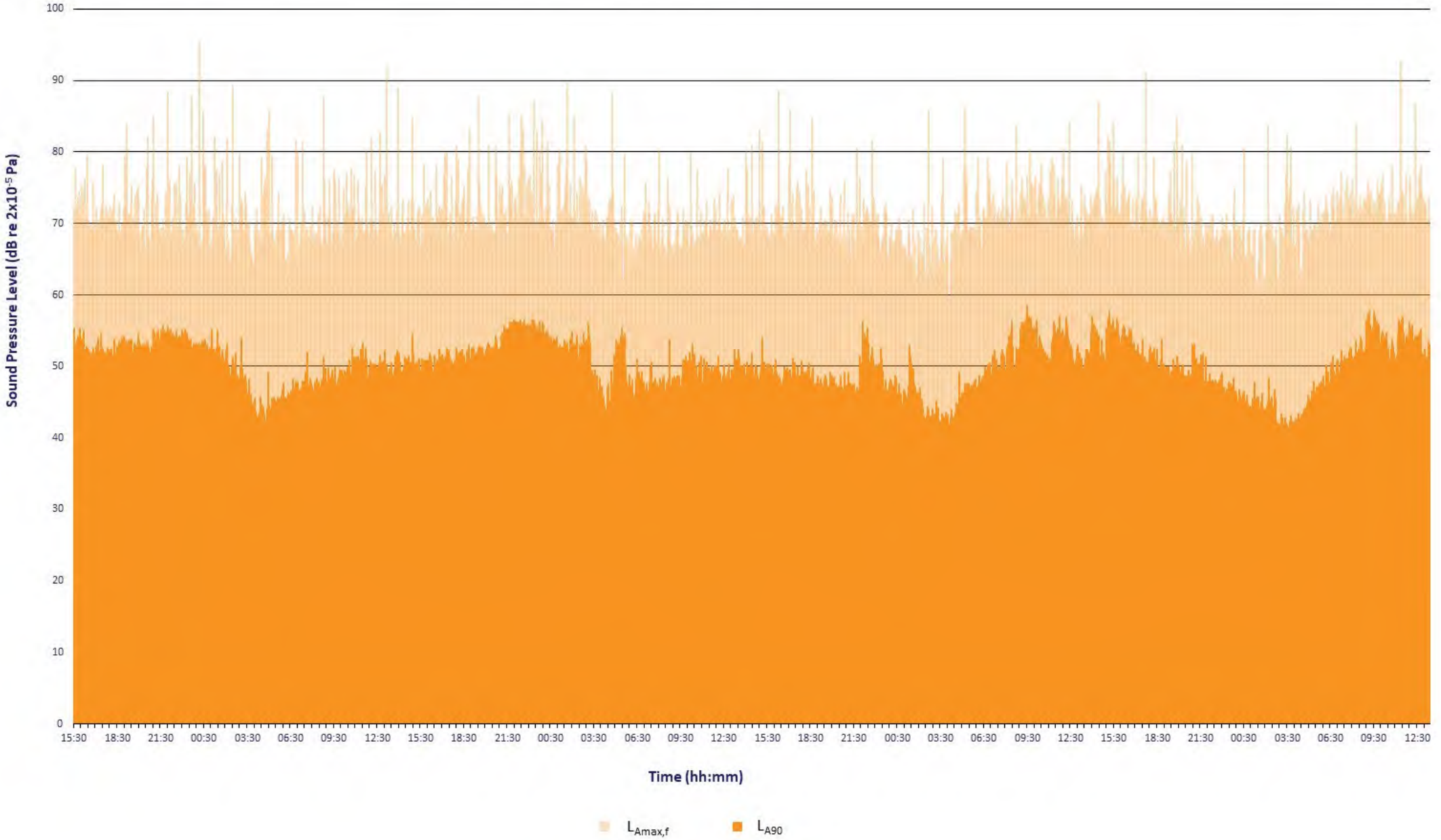
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ and L_{A90} Time History (5-mins)

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 6



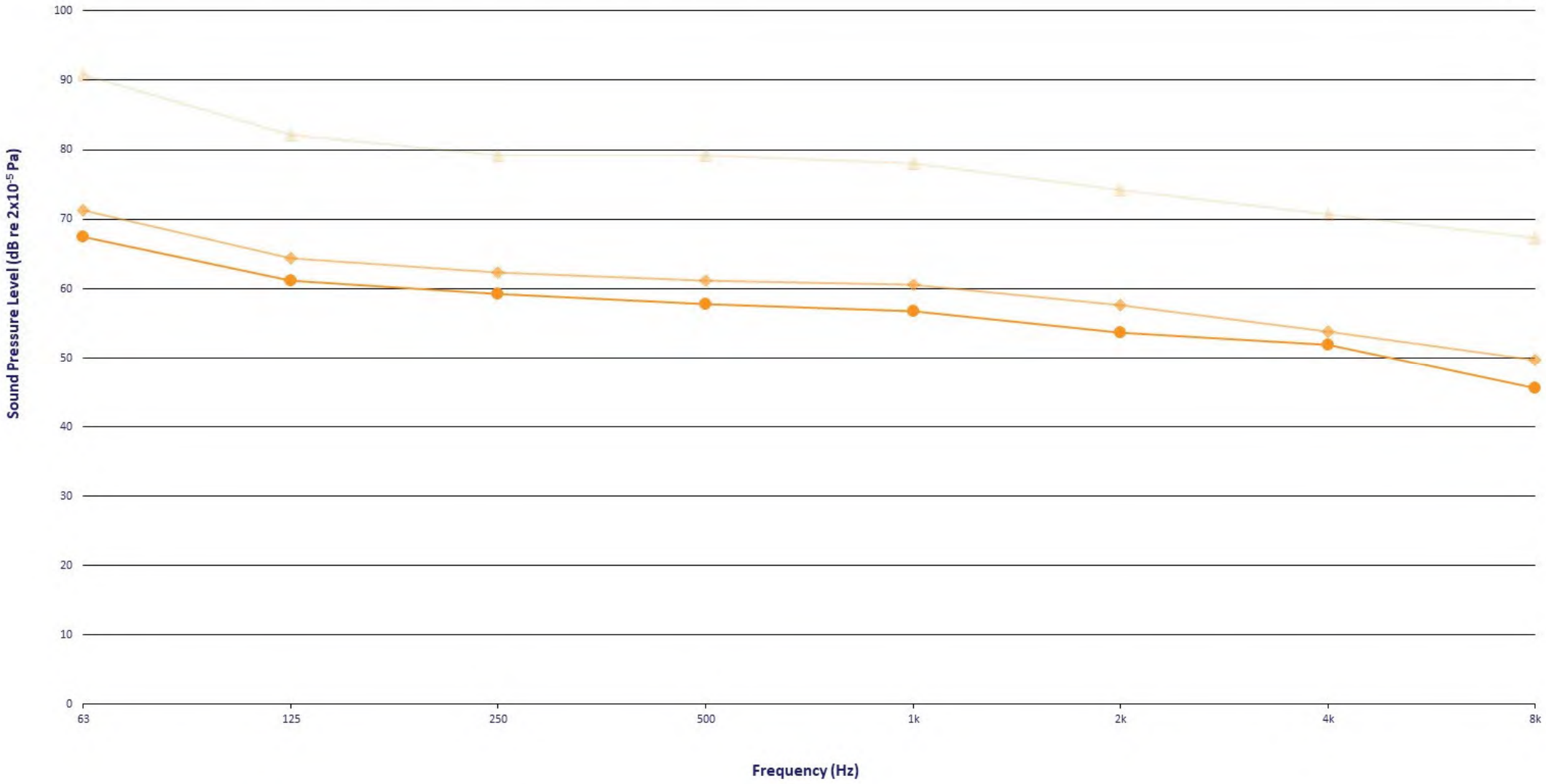
RGRE, PBSA, Plot H, Charles Street, Manchester

Spectral Noise Levels

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 7



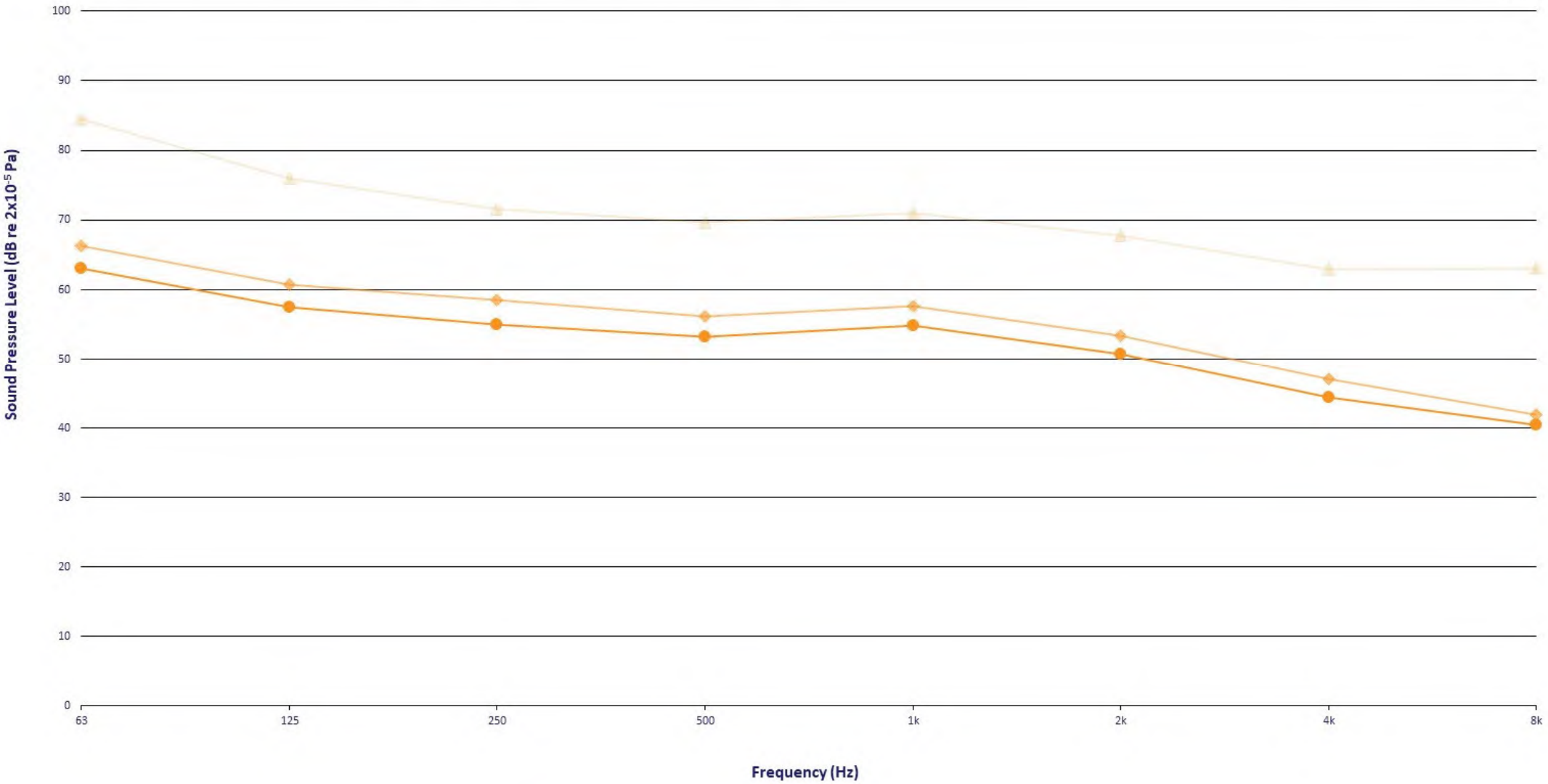
RGRE, PBSA, Plot H, Charles Street, Manchester

Spectral Noise Levels

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 8



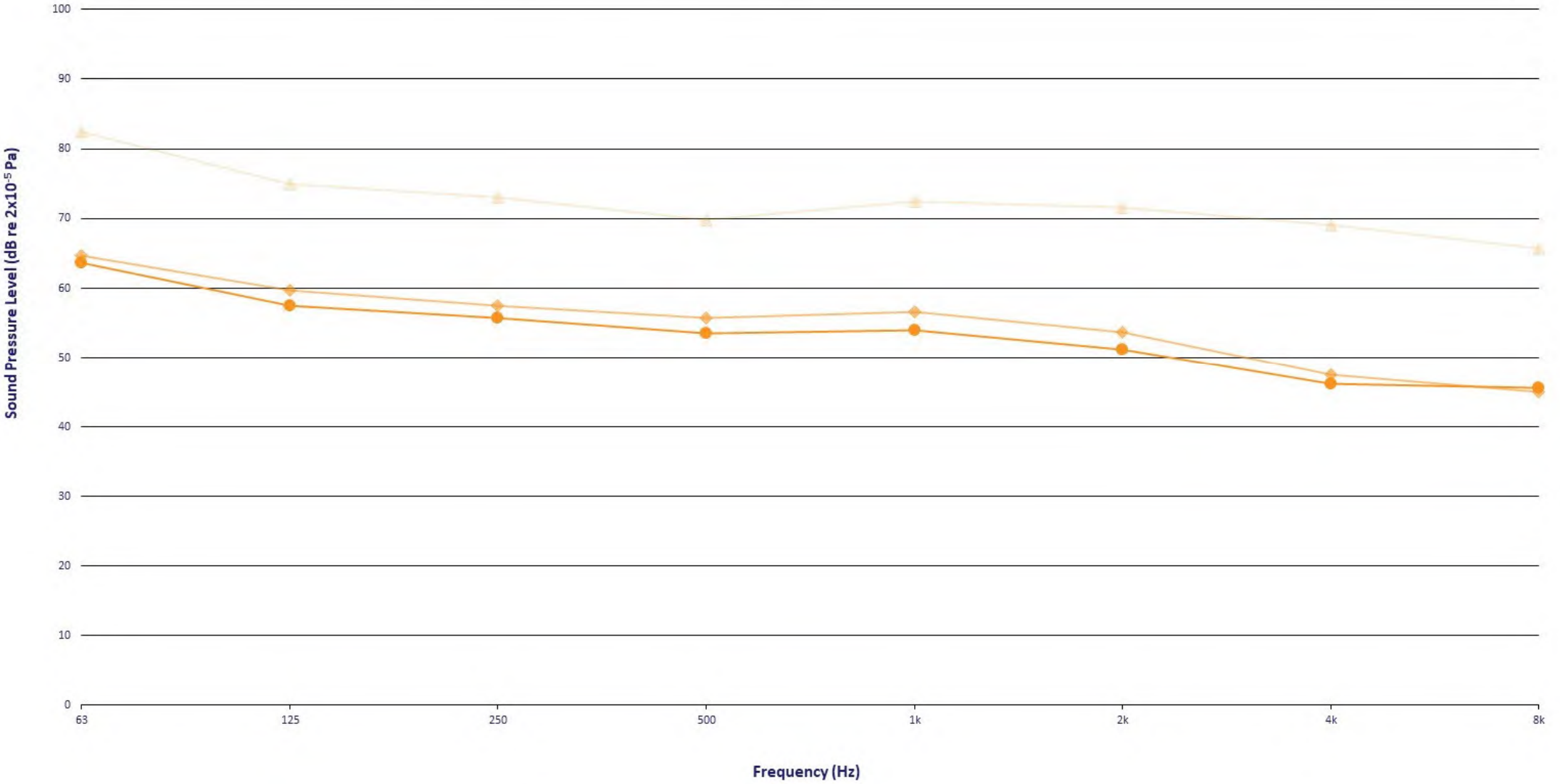
RGRE, PBSA, Plot H, Charles Street, Manchester

Spectral Noise Levels

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 9



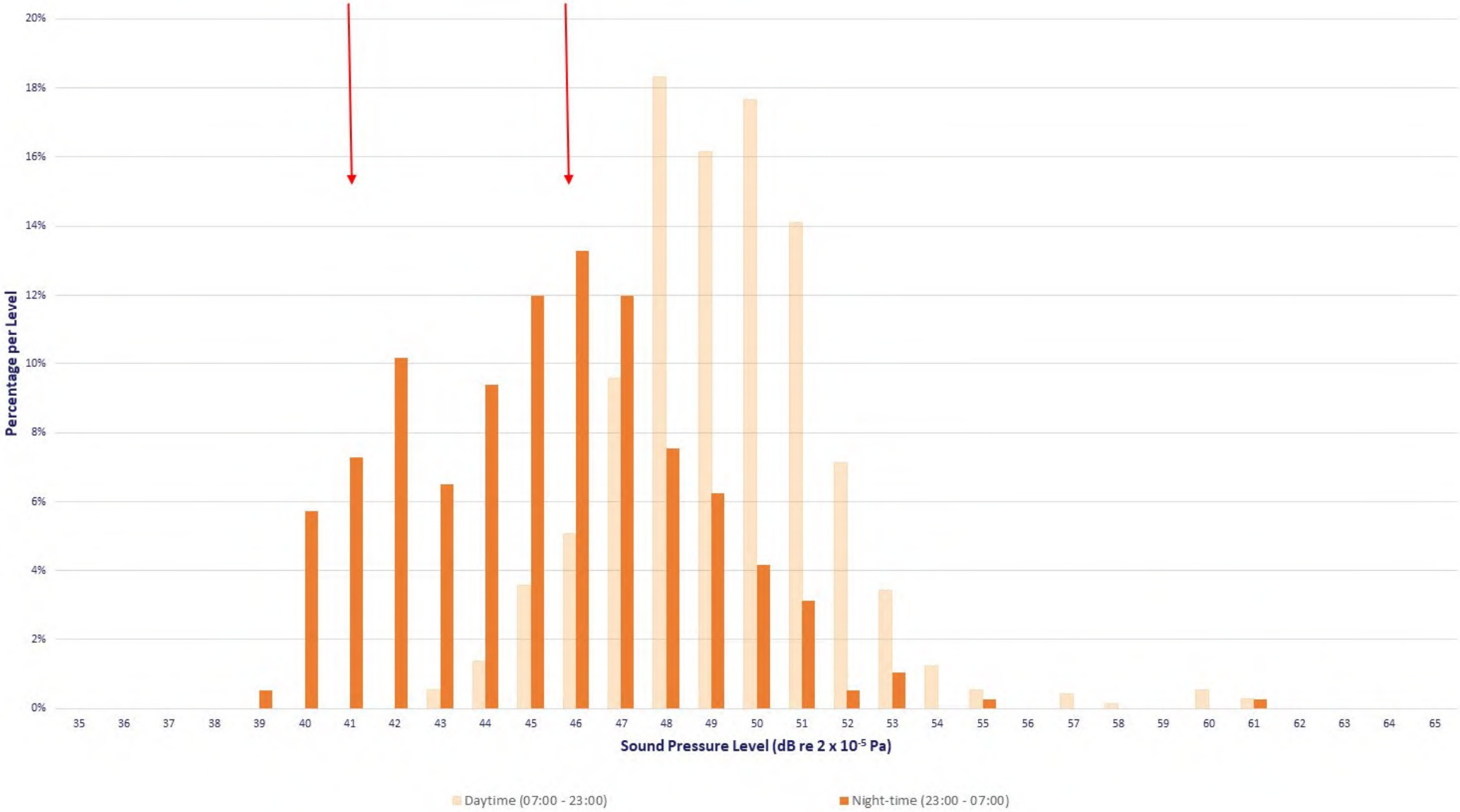
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{A90,5\ minutes}$ Histogram

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 10



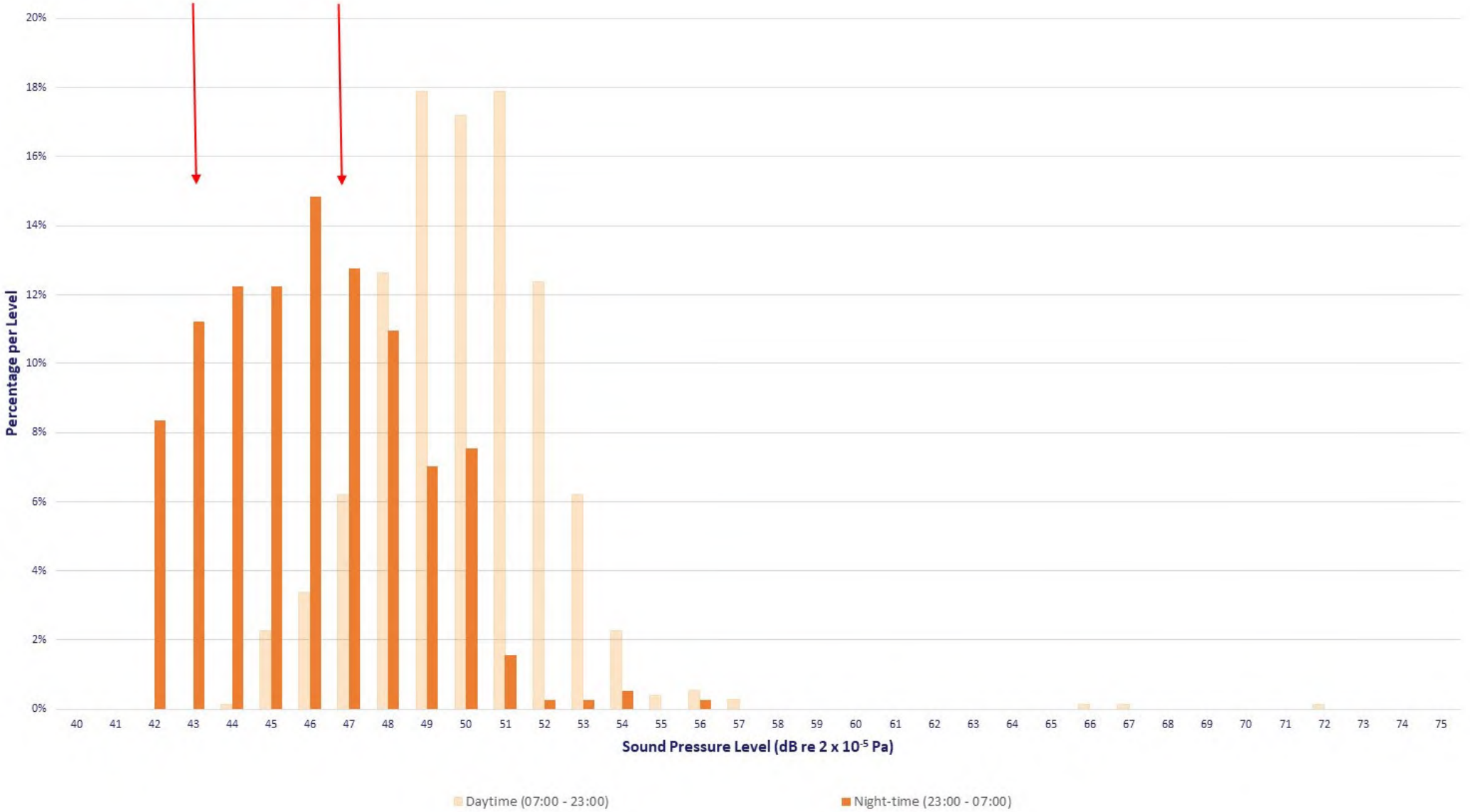
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{A90,5\ minutes}$ Histogram

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 11



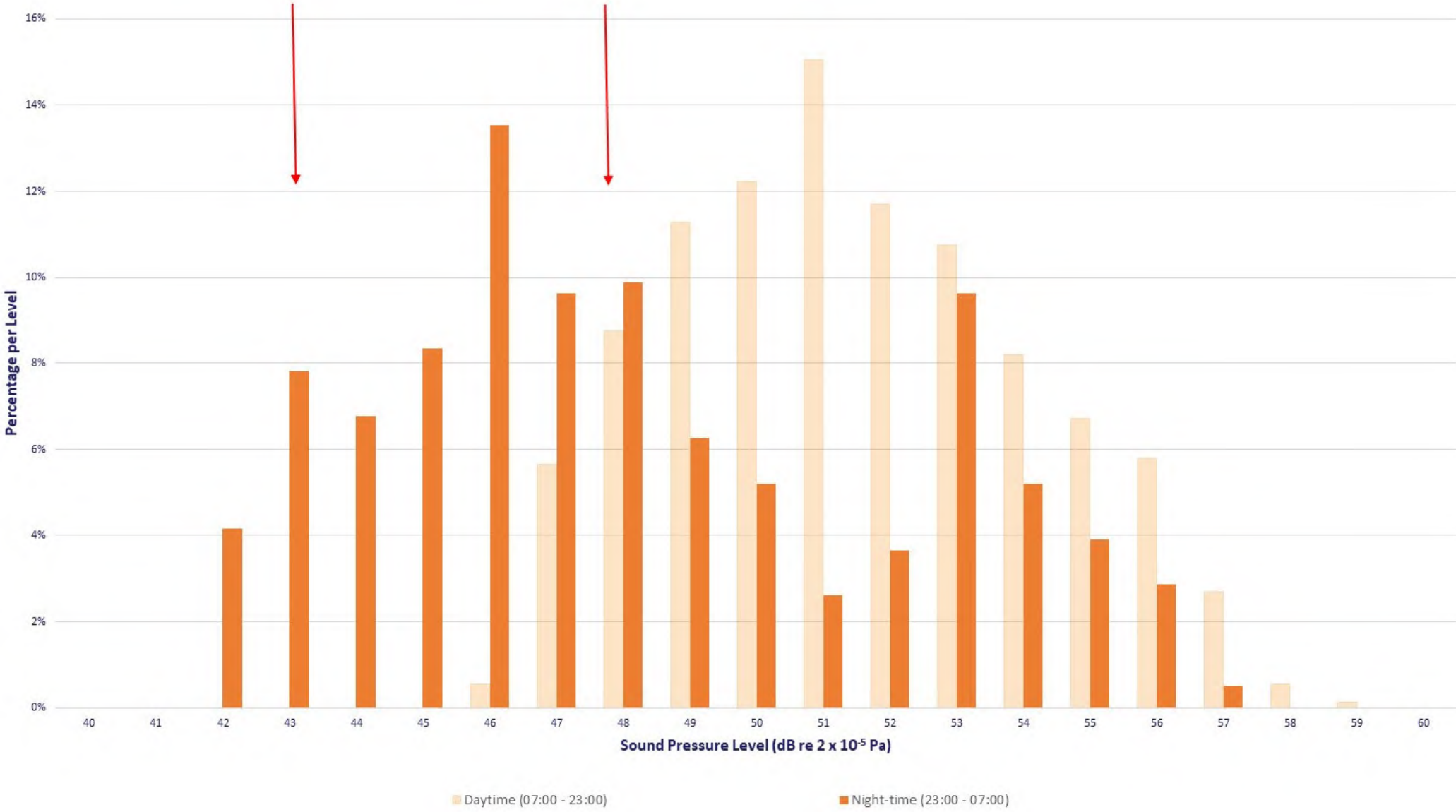
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{A90,5\ minutes}$ Histogram

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 12



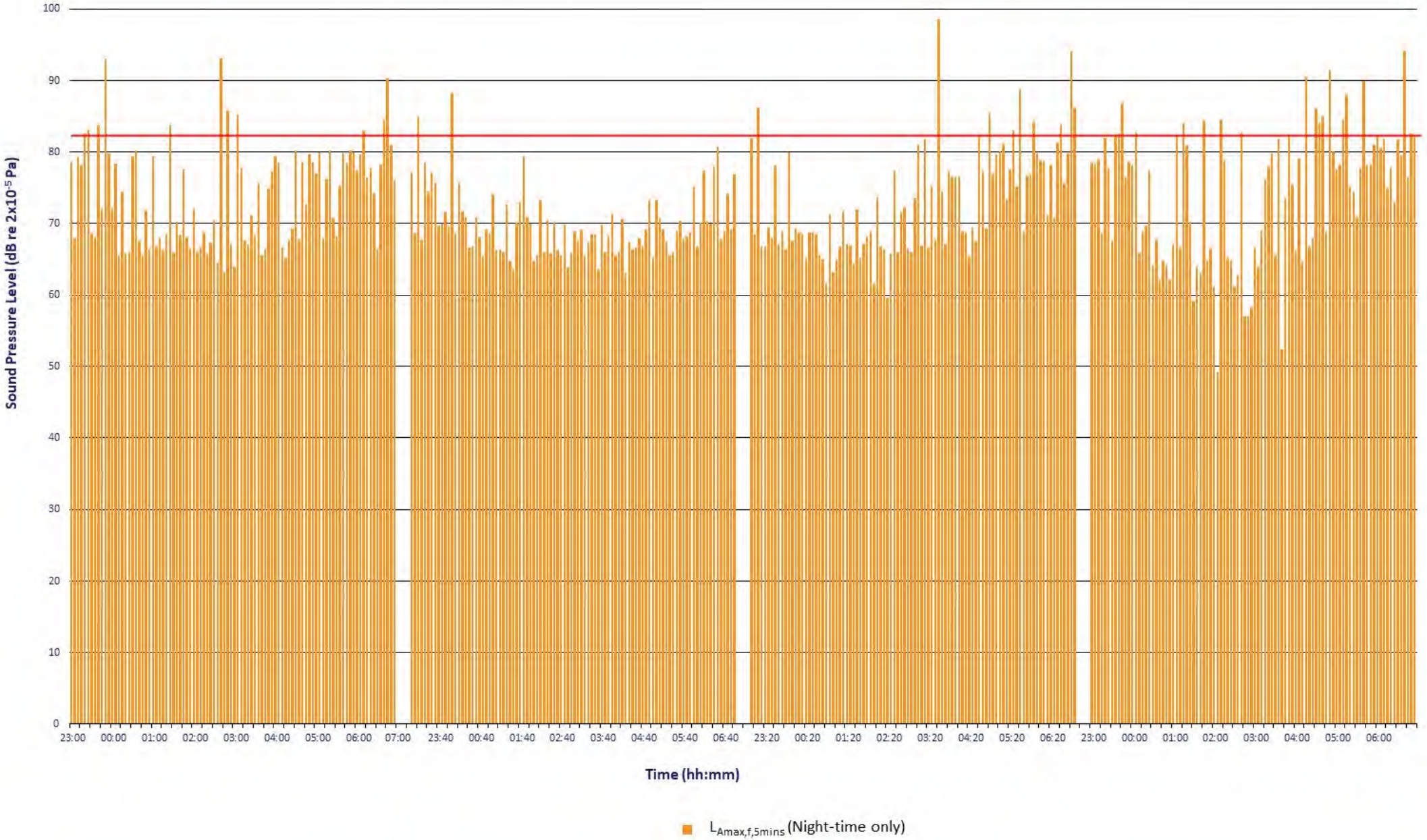
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ Time History - Night-Time Only (5-mins)

Measurement Position 1 (North - Railway), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 13



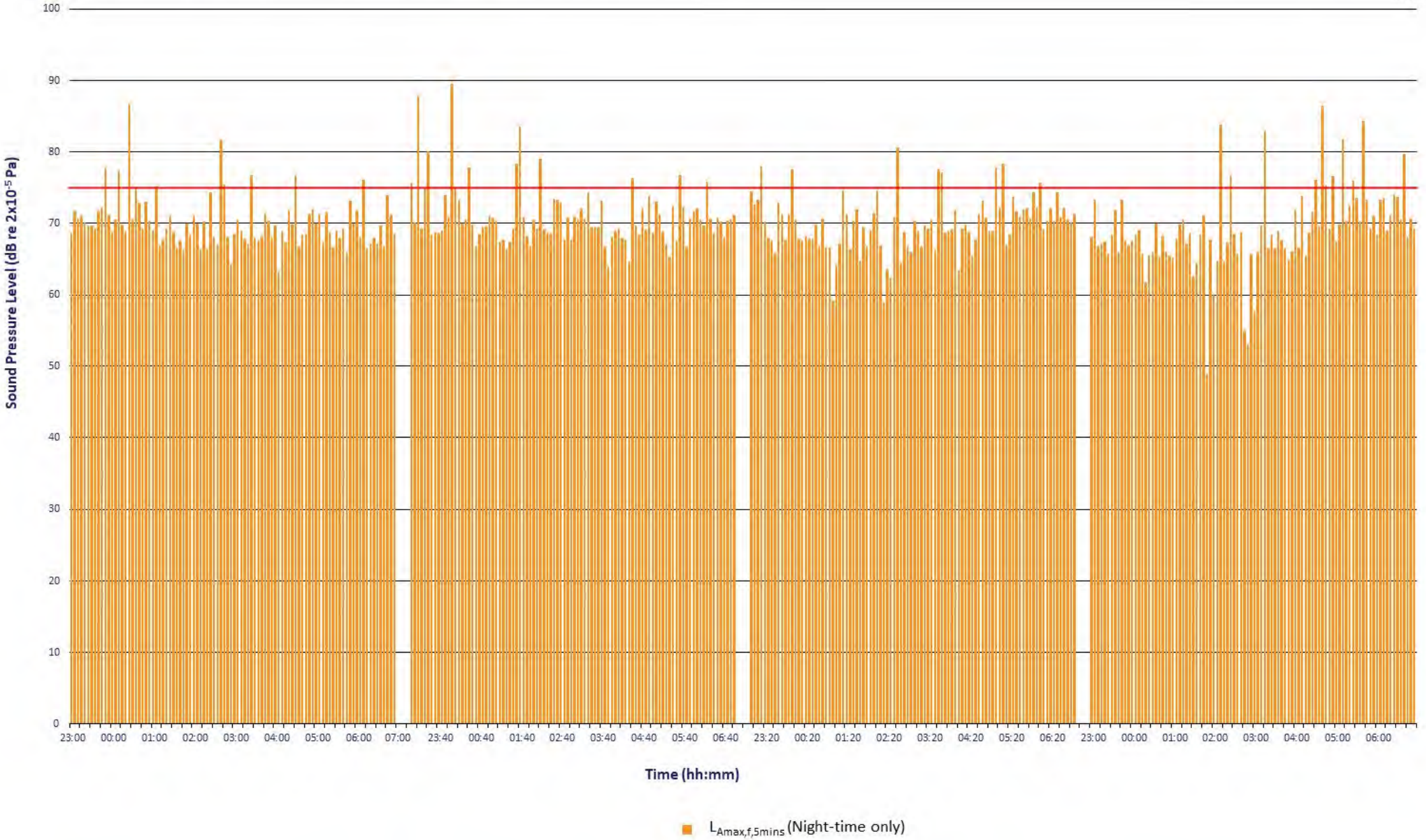
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ Time History - Night-Time Only (5-mins)

Measurement Position 2 (South-East - Sackville St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 14



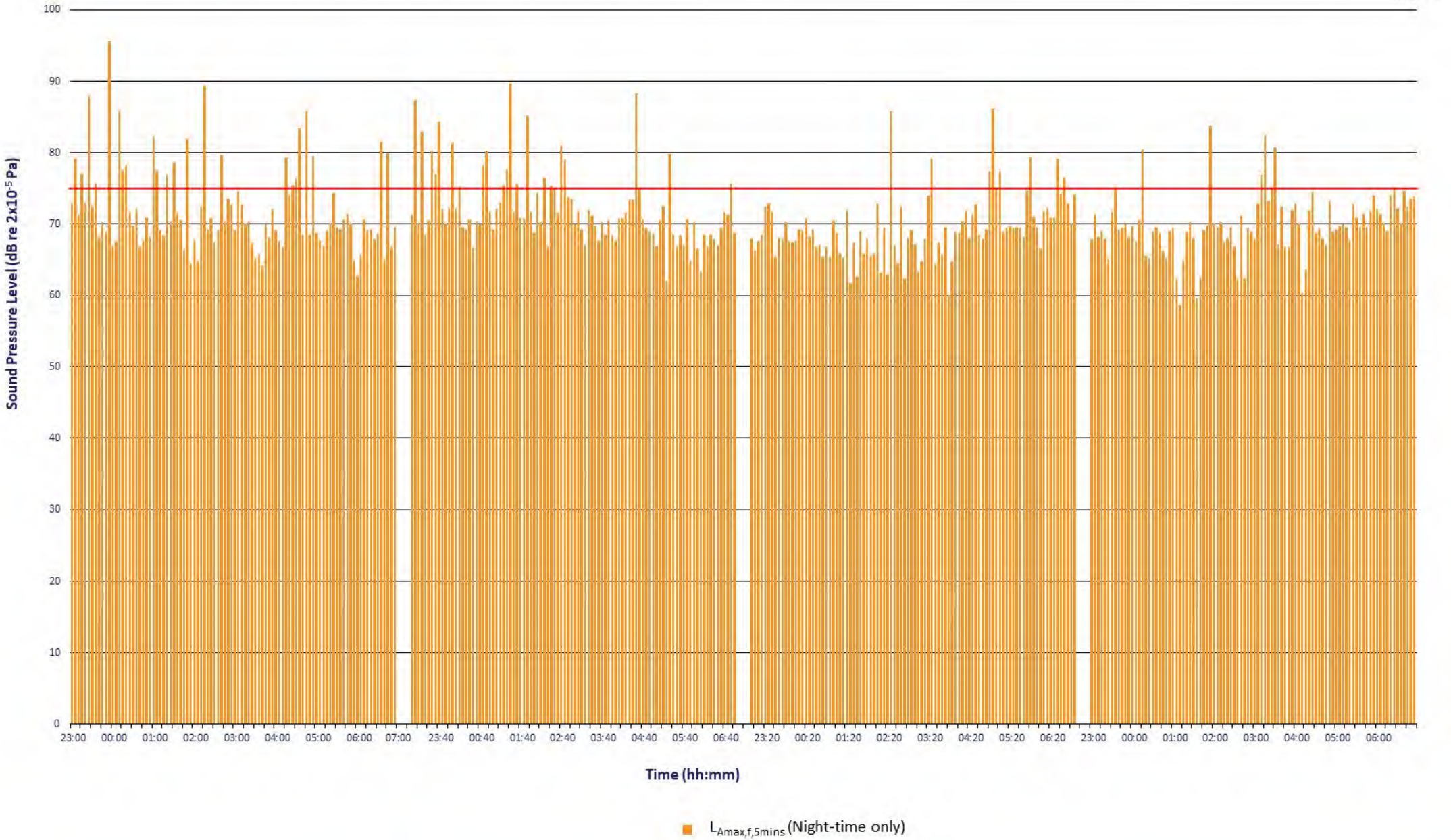
RGRE, PBSA, Plot H, Charles Street, Manchester

$L_{Amax,f}$ Time History - Night-Time Only (5-mins)

Measurement Position 3 (South-West - Charles St), Friday 4th to Tuesday 8th July 2025

Project: 2151

Graph 15



Appendix 14 – Wind Assessment Methodology Tables

(i) Methodologies for Determining Impact Magnitude

Magnitude of Impact	Criteria for assessing impact of Impact
Major	Wind conditions which are three categories windier/calmer than the target conditions (unless consistent with the baseline conditions)
Moderate	Wind conditions which are two categories windier/calmer than the target conditions (unless consistent with the baseline conditions)
Minor	Wind conditions which are one categories windier/calmer than the target conditions (unless consistent with the baseline conditions)

The sensitivity of a receptor is based on relative importance of the receptor using the scale in the table below:

Sensitivity	Examples of receptor
High	Any amenity spaces, public realm, footpaths or entrances to buildings
Moderate	Any general thoroughfares through or around the Proposed Development Site.
Low	Locations which are not accessible to pedestrians

Methodology for Determining Sensitivity

The significance of an environmental impact 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 the table below.

(ii) Standard Impact Signifiance Matrix

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

(iii) Lawson Comfort Criteria (LDDC variant)

Key	Comfort Category	Mean Wind Speed (5% exceedance)	Description
	Sitting	4 m/s	Acceptable for outdoor sitting use (e.g. cafes, benches, balconies)
	Standing	6 m/s	Acceptable for main building entrances, pick-up / drop-off points and bus stops
	Walking (leisure)	8 m/s	Acceptable for strolling
	Walking (business)	10 m/s	Acceptable for external pavements, walking purposefully without lingering
	Uncomfortable	>10 m/s	Not comfortable for regular pedestrian access

(iv) Lawson Safety Criteria

Key	Safety Category	Mean Wind Speed (0.025% exceedance)	Description
	No Safety Exceedance	<15 m/s	
	S15 (Distress)	>15 m/s	Unsafe for frail individuals, or cyclists
	S20 (Safety)	>20 m/s	Wind conditions considered unsafe for all users

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