

HERITAGE

Faithful+Gould Limited

Postal Street
Manchester

Archaeological Desk-Based Assessment

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Archaeological Desk-Based Assessment

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EXECUTIVE SUMMARY

BWB Consulting (BWB) was instructed by Faithful & Gould Limited to undertake an Archaeological Desk-Based Assessment on a site at Postal Street, Manchester ('the Site'). The assessment considers the significance of any recorded archaeological assets within a 250m radius of the Site boundary, together with an assessment of any potential impacts, in line with the requirements of National Planning Policy Framework (NPPF).

The potential for pre-18th century archaeological remains to exist within the Site is considered to be low due to the lack of evidence within the study area. The pre Post-medieval archaeological horizon has been removed by later development and subsequent demolition, including grubbing out.

There is low potential for sub-surface remains relating to former buildings from the late 18th century onwards to exist within the Site, including a cotton mill, a plate manufactory and a row of terraced houses.

Phase 2 Ground Investigations (GI) conducted by Curtins in 2022 revealed made ground in all boreholes, ranging from 2.1m to 3.5m. The made ground contained modern inclusions such as brick and plastic. Given the presence of modern inclusions, it is unlikely that any 19th-century archaeological remains survive within the areas of the borehole investigations. The depth of made ground has been interpreted as the grubbing out of previous foundations of earlier buildings and seems to be extensive.

The Proposed Development would cover the entire Site and would involve piled foundations.

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1. INTRODUCTION

- 1.1 BWB Consulting (BWB) was instructed by Faithful+Gould Limited to undertake an Archaeological Desk-Based Assessment on a site at Postal Street, Manchester ('the Site') in respect of a planning application for a residential block containing 85-100 units.
- 1.2 The purpose of the report is to assess the significance of any recorded heritage assets within a 250 m study area of the Site boundary and assess the potential for archaeological remains to be present within the Site. The assessment also considers any potential impacts on heritage assets and the potential archaeological resource, in line with the requirements of National Planning Policy Framework (NPPF).¹
- 1.3 Impacts on the settings of built heritage assets, including listed buildings, have not been assessed in this report, as these have been subject to detailed consideration in a separate Heritage Statement.

Site Location and Topography

- 1.4 The Site which formally comprised a row of commercial units and a hard standing carpark on an area of c. 0.2 ha, are now vacant and were demolished in 2024. The Site is on a rectangular plot, bounded to the north-east by Postal Street, to the south-east by Dean Street, to the south-west by Faraday Street and to the north-west by Newton Street (A62). The Site is centred approximately on National Grid Reference SJ 8472 9844. The proposed site boundary is shown on **Figure 1**.
- 1.5 The Site is situated on level ground at a height of approximately 54m Above Ordnance Datum (AOD).²

¹ Ministry of Housing, Communities & Local Government, 2012 (as amended 2024), *National Planning Policy Framework*, Chapter 16, paragraph 202.

² Free Map Tools, *Elevation Finder*, <https://www.freemaptools.com/elevation-finder.htm>.



Figure 1: Site Location

Geology and Soils

- 1.6 Bedrock geology across the Site comprises Chester Formation – Sandstone. Superficial deposits comprise Till, Devensian – Diamicton.³
- 1.7 These soils comprise Slowly permeable seasonally wet acid loamy and clayey soils.⁴

Proposed Development

- 1.8 The Proposed Development comprises a residential block approximately 8 storeys high and containing 126 units.
- 1.9 The depth of any basement levels and depth and type of foundations are currently not known.

³ British Geological Survey, *Geology of Britain Viewer*, <https://mapapps.bgs.ac.uk/geologyofbritain/home.html>.

⁴ LandIS, *Soilscapes Viewer*, <http://www.landis.org.uk/soilscapes/>.

2. PLANNING BACKGROUND

National Planning Policy Framework (NPPF)⁵

- 2.1 Chapter 16 of the NPPF Paragraph 202 states, 'Heritage assets range from sites and buildings of local historic value to those of the highest significance, such as World Heritage Sites which are internationally recognised to be of Outstanding Universal Value. These assets are an irreplaceable resource and 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.'
- 2.2 Chapter 16, 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:
- d) the desirability of sustaining and enhancing the significance of heritage assets, and putting them to viable uses consistent with their conservation;
 - e) the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;
 - f) the desirability of new development making a positive contribution to local character and distinctiveness; and
 - g) opportunities to draw on the contribution made by the historic environment to the character of a place.'
- 2.3 Paragraph 205 of the NPPF states that 'Local planning authorities should maintain or have access to a historic environment record. This should contain up-to-date evidence about the historic environment in their area and be used to:
- h) assess the significance of heritage assets and the contribution they make to their environment; and
 - i) predict the likelihood that currently unidentified heritage assets, particularly sites of historic and archaeological interest, will be discovered in the future'.
- 2.4 Paragraph 206 states that 'Local planning authorities should make information about the historic environment, gathered as part of policy-making or development management, publicly accessible'.
- 2.5 Chapter 16, paragraph 207, of the NPPF states that 'In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, 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

⁵ National Planning Policy Framework, Chapter 16.

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'.

- 2.6 Paragraph 208 states that *'Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this into account when considering the impact of a proposal on a heritage asset, to avoid or minimise any conflict between the heritage asset's conservation and any aspect of the proposal'.*
- 2.7 Paragraph 210 states that *'in determining applications, local planning authorities should take account of:*
- a) the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;*
 - b) the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and*
 - c) the desirability of new development making a positive contribution to local character and distinctiveness'.*
- 2.8 Paragraph 212 states that *'When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance'.*
- 2.9 Paragraph 213 states that *'any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of:*
- a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional;*
 - b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional'.*
- 2.10 Paragraph 214 states that *'Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:*
- a) the nature of the heritage asset prevents all reasonable uses of the site; and*

- b) *no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and*
 - c) *conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and*
 - d) *the harm or loss is outweighed by the benefit of bringing the site back into use'.*
- 2.11 Paragraph 215 states that *'Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use'.*
- 2.12 Paragraph 216 states that *'the effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset'.*
- 2.13 Paragraph 217 states that *'Local planning authorities should not permit the loss of the whole or part of a heritage asset without taking all reasonable steps to ensure the new development will proceed after the loss has occurred'.*
- 2.14 Paragraph 218 states that *'Local planning authorities should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted'.*
- 2.15 Paragraph 219 states that *'Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to the asset (or which better reveal its significance) should be treated favourably'.*
- 2.16 Paragraph 220 states that *'not all elements of a Conservation Area or World Heritage Site will necessarily contribute to its significance. Loss of a building (or other element) which makes a positive contribution to the significance of the Conservation Area or World Heritage Site should be treated either as substantial harm under paragraph 207 or less than substantial harm under paragraph 208, as appropriate, taking into account the relative significance of the element affected and its contribution to the significance of the Conservation Area or World Heritage Site as a whole'.*
- 2.17 Paragraph 221 states that *'Local planning authorities should assess whether the benefits of a proposal for enabling development, which would otherwise conflict with planning policies but which would secure the future conservation of a heritage asset, outweigh the disbenefits of departing from those policies.'*

Local Policy

Places for Everyone Joint Development Plan for Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford, and Wigan 2022 to 2039⁶

Policy JP-P2: Heritage

- 2.18 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.
- 2.19 Development proposals affecting designated and non-designated heritage assets and/or their settings will be considered having regard to national planning policy.
- 2.20 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.
- 2.21 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.

⁶ Places for Everyone Joint Development Plan: (Greater Manchester Combined Authority, September 2024)

3. INFORMATION SOURCES

- 3.1 The following sources of information have been consulted in order to meet the requirements of the assessment and are in line with guidelines laid down by the Chartered Institute for Archaeologists.⁷
- 3.2 Historic England's National Heritage List for England Database was consulted for information on all designated scheduled monuments, listed buildings, registered parks and gardens, registered battlefields, conservation areas and World Heritage Sites within the study area.⁸
- 3.3 Information on previous archaeological finds and investigations within the study area was obtained from a search of the Greater Manchester HER and Historic England's National Monuments Record (NMR) on the 18th of December 2024.
- 3.4 A review of relevant and available online historic mapping was undertaken using the National Library of Scotland (NLS) Online Map Images.⁹ Other internet sources, including the Historic England Aerial Photo Explorer,¹⁰ Historic England Aerial Archaeology Mapping Explorer¹¹ and Google Earth Pro¹² were also consulted.

⁷ Chartered Institute for Archaeologists, 2020, *Standard and Guidance for Historic Environment Desk-based Assessment*.

⁸ Historic England, *The National Heritage List for England*, <https://historicengland.org.uk/listing/the-list>.

⁹ National Library of Scotland Map Finder (last accessed 24 March 2025).

¹⁰ Historic England. Aerial Photo Explorer (last accessed 24 March 2025).

¹¹ Historic England Aerial Archaeology Mapping Explorer (Last accessed 24 March 2025).

¹² Google Earth Pro (last accessed 24 March 2025).

4. ASSESSMENT METHODOLOGY

- 4.1 An assessment of the importance of heritage assets within a 250m study area of the Site has been undertaken. Scheduled Monuments, Grade I and II* Listed Buildings, Registered Parks and Gardens, Registered Battlefields and World Heritage Sites are assessed to be of *high importance*.
- 4.2 The basis for assessing impacts on the historic environment is an understanding of the heritage assets that might be affected by a proposal. Planning policy and guidance emphasise the need to understand the cultural significance of heritage assets, including their setting, reflecting that the primary purpose is to preserve significance rather than no change. The process of gaining this understanding can be broken down into three distinct stages:
- **Description:** Research leading to a preliminary factual statement that establishes the location, nature and setting of the asset;
 - **Cultural significance:** Analysis of what we value about the asset and the contribution made by its setting, leading to a statement of cultural significance. Cultural significance is not scaled but can be expressed in terms of four key 'heritage values' (see **Table 4.1**), as outlined in Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment¹³; and

Table 4.1: Heritage Values

Value	Description
Evidential	The potential of a place to yield evidence about past human activity. Sites of evidential value will include those which have archaeological interest.
Historical	The ways in which past people, events and aspects of life can be connected through a place to the present. Heritage assets can either illustrate, or be associated with, past people and events
Aesthetic	The ways in which people draw sensory and intellectual stimulation from a place. Aesthetic value can arise from conscious design or fortuitously from the way the heritage asset has evolved.
Communal	The meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory

- **Importance:** A conclusion regarding the level of protection or consideration that the asset merits in planning policy and cultural heritage legislation. A judgement on importance is scaled and can therefore be expressed in terms of the criteria set out within **Table 4.2**.

¹³ English Heritage, 2008, *Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment*.

Table 4.2: Importance of Heritage Assets Criteria

Importance	Examples
Very High	World Heritage Sites; and Places of international importance due to their 'outstanding universal value'.
High	Scheduled Monuments; Grade I or II* Listed Buildings or Registered Parks and Gardens; Battlefields; Places or structures of national importance; and Non-designated heritage assets of equivalent national importance or potential to contribute significantly to national research objectives.
Medium	Grade II Listed Buildings or Registered Parks and Gardens Conservation Areas; and Non-designated assets of regional or high local importance with potential to contribute significantly to regional and local research objectives. This includes assets which have particular regional associations or may have important associations at a local level (e.g. they have significance to local population or embody something of the special identity of a locality).
Low	Locally Listed Buildings; and Non-designated assets which are relatively poorly preserved or have limited importance at a local level and low potential to add to local and regional research objectives.
Negligible	Assets that have very limited no archaeological, historical or cultural importance.
Uncertain	Sites where there is evidence that a heritage asset may exist, but where there is insufficient information to determine its nature, extent and degree of survival given current knowledge.

4.3 Having understood cultural significance, the next step is to understand the proposed change(s) and the impact they would have on cultural significance. The process of evaluating the consequences of change can be usefully broken down into three distinct analytical stages:

- **Change:** A factual statement of how a proposal would change an asset or its setting including physical, visual appearance, scale, nature and duration;
- **Impact:** An assessment of the degree to which any changes would increase or decrease the cultural significance of an asset. Impact is scaled and the magnitude of impact is a reflection of the extent to which the cultural significance of an asset is changed by a proposal. A judgement of magnitude of impact can be made based criteria set out within **Table 4.3**; and
- **Effect:** A conclusion regarding whether an impact matters or not, reflecting the importance of the affected heritage asset. The effect is the measure that brings together the magnitude of the impact and the heritage asset's importance. This a critical stage of the assessment process as this determines the weight that should be given to the matter in either influencing the design of the proposal or ultimately in the test as to whether the proposal will be acceptable and permitted. The effect can be articulated through the use of a matrix which brings together the importance of an asset and the magnitude of impact on the asset's significance (see **Table 4.4**). Where there are two options for a level of effect, it is a matter of professional

judgement which should be articulated in the text description as to the level of effect appropriate.

Table 4.3: Magnitude of Impact

Impact	Criteria
Major Negative	Causes total destruction or change to most key elements of the asset that results in substantial loss of integrity and cultural significance. Comprehensive change to the setting of the asset which is a critical aspect of the asset's cultural significance. Any such change would not normally be reversible.
Moderate Negative	Causes change to, or loss of many key elements which results in a moderate loss of integrity and cultural significance of the asset. Moderate changes to the setting of the asset where this makes an important contribution to the cultural significance of the asset.
Minor Negative	Change to some elements which lead to a limited loss of integrity and cultural significance of the asset. Change to the setting of the asset where this makes a limited contribution to the cultural significance of the asset.
Negligible / No change	No appreciable change to the cultural significance of the asset or its setting.
Minor Positive	Change to some elements which leads to limited improvement in integrity and cultural significance of the asset, or arrests decline. Change to the setting of the asset where this makes a limited contribution to the cultural significance of the asset.
Moderate Positive	Causes change to many key elements which result in a moderate enhancement to integrity and cultural significance of the asset or reverses decline. Moderate changes to the setting of the asset where this makes an important contribution to the cultural significance of the asset.
Major Positive	Causes significant change to most key elements of the asset that results in substantial enhancement of cultural significance. Comprehensive change to the setting of the asset which is a critical aspect of the asset's cultural significance.

Table 4.4: Effect Matrix

Importance of Asset	Magnitude of Impact			
	Major	Moderate	Minor	Negligible / No Change
Very High	Very Large	Very Large/Large	Large/Moderate	Slight/Neutral
High	Very Large/Large	Large/Moderate	Moderate/Slight	Slight/Neutral
Medium	Large/Moderate	Moderate	Slight	Neutral
Low	Moderate/Slight	Slight	Slight/Neutral	Neutral

5. BASELINE ASSESSMENT

- 5.1 The following outlines the archaeological and historical background of the study area and is compiled from a review of the relevant HER data, as well as available secondary sources that can aid in interpreting the development of the Site and inform the archaeological potential.
- 5.2 The assessment considers in detail the archaeological baseline within a 250m study area. Tabulated gazetteers summarising pertinent information for individual assets are presented in **Appendix 2 (Tables 1 and 2)**. Within **Appendix 3, Figure 2** depicts the locations of designated heritage assets, **Figure 3** depicts the location of non-designated heritage assets, and **Figure 4** depicts previous archaeological events. **Appendix 4** contains the historic maps used during the map regression (**Figures 5 to 8**). **Appendix 5** contains photographs taken during the site visit presented as plates.
- 5.3 Where heritage assets and events are mentioned in the text, the relevant National Historic List for England (NHLE) or Greater Manchester HER list entry number is given,

Designated Sites or Areas

- 5.4 The study area contains no designated assets related to archaeology. Built heritage is assessed in a separate report.
- 5.5 The study area contains no scheduled monuments, World Heritage Sites, registered battlefields or registered historic parks or gardens.

Non Designated Assets

- 5.6 No archaeological sites and/or historical finds or features have been recorded within, or partially within, the Site on the Greater Manchester HER.
- 5.7 Within the 250m study area 92 monuments and 67 archaeological events and have been recorded (**Appendix 2**). These assets date from the 16th century and include archaeological features, buildings and structures.

Historic Landscape Characterisation

- 5.8 The Site lies within the 'Around Port Street and Brewery Street, Manchester' Historic Landscape Characterisation (HLC) area (**HGM11274**), which is predominantly commercial in character, comprising 18th to early 20th century buildings. Some early townhouses/workshop dwellings survive in this area, although there have been significant additions and land clearance.¹⁴

¹⁴ Redhead, N., 2012, *Greater Manchester Urban Historic Landscape Characterisation Project* [data-set], Archaeology Data Service, https://archaeologydataservice.ac.uk/archives/view/gmanchester_hlc_2012/downloads.cfm, viewed April 2022.

Archaeological and Historical Background

- 5.9 The following outlines the historical background of the study area supported by detail on the known archaeological record. Unless stated otherwise, the non-designated archaeological and heritage assets described here have low importance.

Prehistoric

- 5.10 As expected, there are very few traces of prehistoric activity remain in the urban areas of Central Manchester, but evidence from artefacts and antiquarian accounts reveals that prehistoric people were active in the area from Mesolithic times onwards.
- 5.11 Some of the earliest finds, in the form of a number of microlithic flints dating to the Mesolithic period (10,000 – 4500BC), have been discovered in Heywood, and in the Cheesden Valley and Knowl Moor areas between Bury and Rochdale. All of these were found near to water and more than likely represent the remains of temporary hunting camps.
- 5.12 There are currently no known surviving Neolithic monuments in the Greater Manchester area, but the discovery of a number of flints, including daggers, arrowheads, stone axes and hammers, indicates that people were almost certainly living in the region at that period. In the last couple of centuries flint artefacts have been found close to Manchester Cathedral, on Cheetham Hill just to the north of the city centre, in Gorton to the south-east, Withington, Chorlton-cum-Hardy and Fallowfield to the south and at Baguley Hall in Timperley.
- 5.13 Evidence for Bronze Age activity comes from a number of round barrows and cairns, although very few remain apart from in the upland areas, such as those at Brown Low and Ludworth Intakes near Mellor in the east of the county.
- 5.14 There are no known records for the Prehistoric period within the study area.

Roman Period

- 5.15 Manchester derives its names from the Roman fort of *Mamucium*, which was established by 78 AD on the confluence of the River Medlock and River Irwell. Originally a timber fort with earthen ramparts, it housed a cohort of infantry of around 500 men. It was established to protect strategically important roads to the larger forts at Chester, York and Ribchester. A vicus, or civilian settlement comprising the families of soldiers and traders, built up around the fort and archaeological evaluations have revealed evidence of buildings, including an inn, temples, shops and a bathhouse.
- 5.16 There are no known records Romano-British period within the study area.

Early Medieval and Medieval Period

- 5.17 At the time of the Domesday Book in 1086 a village called Mamecester existed. The medieval town grew up around a bluff at the confluence of the rivers Irwell and Irk. In the 11th century, Manchester was a small village, but this changed in the 12th century.

The population of England grew, as did trade and commerce, and many new towns were founded. The village of Manchester was made into a town in the early 13th century. This was the site of the manor house of the Grelley family by the 13th century, and probably also their castle, recorded in 1184.

- 5.18 In the year 1222, Manchester was granted the right to hold an annual fair (market) which would attract buyers and sellers from all over Lancashire.
- 5.19 There are no known records relating to the early medieval and medieval periods within the study area.

Post-medieval and Modern Period

- 5.20 Barlow Cross, which was mentioned in 1554, stood at the intersection of Oldham Street with Swan Street and Great Ancoats Street approximately 220m to the northwest of the Site (**MGM1918**). A new cross was erected here in the late 18th century and removed in 1819. This was probably a boundary cross.
- 5.21 To the immediate south-west of the Site lies the Stevenson Conservation Area, which encompasses the Stevenson Square Residential District (**MGM11092**). The area that is now Piccadilly Gardens, to the south-west of the Stevenson Square Conservation Area, was once the site of the so-called 'daub holes', where mud for the construction of wattle and daub walls was extracted from the ground.
- 5.22 In the mid-18th century, the land lying between Ancoats Lane and the 'old daub holes' was owned by Sir Ashton Lever. Conceding to the pressure of property developers, Lever eventually sold the land to William Stevenson. In the 1780s, Stevenson laid out a grid of streets on the land which formerly comprised a series of fields. He then sold the land on, piecemeal, to entrepreneurs, many of whose names are commemorated in the local street names. The original intention was that it should become a residential area which would rival the serenity of St Ann's Square. Instead, the area became largely commercially oriented.¹⁵
- 5.23 Numerous buildings dating to the period of mass industrial expansion of Manchester are located within the study area and close to the Site. For example, to the immediate south is Marlsbro House (**MGM17438**), a factory building of 1823 that was sited in the centre of the world's first industrial city, outside the clusters of mills in the suburbs of Ancoats and Chorlton-on-Medlock.
- 5.24 From the late 18th century, Newton Street Mills lay to the northeast of the Site beyond Postal Street. This cotton mills, owned by Thomas Houldsworth and Co., employed 622 people by 1815. The mill had been converted for use as a machine works by the mid-19th century.¹⁶
- 5.25 The vast majority of HER records within the study area relate to built heritage and the industrial and commercial history of this part of Manchester. They are discussed in a

¹⁵ Manchester City Council, *Stevenson Square Conservation Area*, https://www.manchester.gov.uk/info/511/conervation_areas/1208/stevenson_square_conservation_area, viewed April 2022; Miller, I. [Oxford Archaeology North], 2008, *Newton Street, Manchester – Archaeological Desk-based Assessment*.

¹⁶ Nevell, M., 2008, 'Manchester – The Hidden History', *The History Press*.

separate Heritage Statement, although listed in the gazetteer in **Appendix 2, Table 2** and their locations shown in **Appendix 3, Figure 3** for completeness.

- 5.26 Several assets related industrial archaeological are located within the study area which demonstrate the rapid expansion of Manchester as a commercial and industrial powerhouse during the 18th and 19th centuries.
- 5.27 The Rochdale Canal (**MGM1921, MGM18542, MGM18543**) runs c.160m to the south-east of the Site on a north-east to south-west alignment. This stretch of the urban canal section is c. 1.25 miles long and is connected with the Ashton-under-Lyne Canal at the now infilled Dale Street Basin (**MGM1920**). It comprises nine broad locks down to the Bridgewater Canal at Castlefield which gave it the name 'Rochdale Nines'. A third junction is formed with the Manchester & Salford Canal in the Great Bridgewater Street area. As part of the Cheshire Ring of canal navigations, it gained Parliamentary approval in 1799 and 1800. Its construction was completed 1804 and used for the transportation of industrial goods and supplies. It is now mainly used for pleasure craft.
- 5.28 Situated close to the southern boundary of the study area, just north of Dale Street Lock on the canal, is the site of the former Dale Warehouse Underground Waterwheel (**MGM9589**). Dating to the early 19th century, the wheel provided motive power for hoists in adjacent and nearby canal side warehouses via gearing and line shafts. The machinery, which is 95% intact, represents the only known subterranean waterwheel in the Manchester area of early TC Hewes design.

Previous Archaeological Investigations

- 5.29 A total of 67 events are recorded within the study area (**Appendix 2, Table 3**). A These are appraised to add historical context and to help assess the archaeological potential of the Site.
- 5.30 There are no events within the Site. Thirteen events relate to building surveys/recording (**EGM456, EGM3195, EGM3353, EGM3366, EGM3841, EGM3844, EGM3852, EGM3884, EGM4350, EGM4355, EGM454, EGM4839, EGM5652**).
- 5.31 In 2008, a Desk-based Assessment was produced for land to the immediate south of the Site (**EGM3856**).¹⁷ This concluded there was potential for buried remains of archaeological significance of the early 19th century steam-power plant associated with the original cotton mill situated here. Such remains were considered to be of local archaeological importance and a mitigation strategy was recommended to assess the significance of any buried remains. Another assessment (**EGM4377**) came to the same conclusion and a programme of evaluation trenching was recommended.¹⁸
- 5.32 Excavation approximately 40m to the south of the Site in 2009 (**EGM4110**) revealed good survival of archaeologically significant remains at a very shallow depth. These included the early 19th century remains of workers housing, a public house and a small factory

¹⁷ Miller, I. [Oxford Archaeology North], 2008, *Newton Street, Manchester – Archaeological Desk-based Assessment*.

¹⁸ Miller, I. [University of Salford Manchester], 2018, *Malsbro House, 52, Newton Street, Manchester – Archaeological Desk-based Assessment*.

boiler room. A range of workers houses dating to the late 18th century was also revealed.¹⁹

- 5.33 In 2016, excavation which took place c. 70m to the Site's north-east (**EGM4723**) revealed likely 19th century building remains, including those of basement rooms, a small courtyard and a former public house. Archaeological remains interpreted as being of 20th century date were also recorded. The remains of possibly residential and commercial properties of 19th century or earlier date were considered to have archaeological significance related to the early 19th century industrial expansion within the area. It was considered that these remains warranted further investigation.²⁰
- 5.34 A scheme of trial trenching followed by Strip Map and Record (**EGM5531**, **EGM5597**) was undertaken approximately 40m east of the Site. These archaeological investigations uncovered a former arm of the Rochdale Canal, as well as a wharf and associated warehouses.
- 5.35 Excavations elsewhere in the study area have revealed remains of late 18th century, or later, buildings including houses, public houses, shops, warehouses and factories.

Cartographic Analysis

- 5.36 The following section is an analysis of historic mapping of the area, used to show how the Site and its immediate surroundings have changed over time. This supports the assessment of the Site's archaeological potential in **Section 6**. The maps referred to can be found in **Appendix 4**.
- 5.37 The 1750 Plan of the Towns of Manchester & Salford (**Appendix 4, Plate 1**), and the attached 1650 plan, show the land to the east of the centre of Manchester comprising fields. Although the Site itself is not shown, it is likely that this too lay within fields at this time.
- 5.38 Green & Thornton's 1794 Plan of Manchester and Salford (**Appendix 4, Plate 2**) shows the rectangular layout of the Site. What is now Postal Street to the Site's north-east was *Warwick Street* at this time, and Faraday Street to the south-west was *Friday Street*. The Site contained several buildings, including a row of terraced houses with outhouses to the rear on Dean Street. Two larger buildings are depicted in the northern and western corners of the Site, although these are not labelled. The Site lay near the eastern extent of the urban core of Manchester at this time, with apparently empty plots situated to its east beyond Port Street.
- 5.39 The 1810 German city map of Manchester and Salford (**Appendix 4, Plate 3**) depicts the Site in broadly the same layout although in less detail.
- 5.40 The 1851 1:10,560 Ordnance Survey (OS) plan (**Appendix 4, Plate 4**) is more detailed and shows the Site now includes industrial buildings, including a *Cotton Mill* and *Tin Plate Manufactory*. A rectangular reservoir is also labelled in the centre of the Site. Terraced housing still lined the south-eastern side of the Site off Dean Street. Other industrial

¹⁹ Mottershead, G. [The University of Manchester], 2009, *Tariff Street, Manchester – An Archaeological Evaluation and Excavation*.

²⁰ Goode, A. [Pre-Construct Archaeology], 2016, 74-88 *Great Ancoats Street, Ancoats, Manchester – Summary Report of an Archaeological Evaluation*.

buildings surrounded the Site, including *Newton Street Iron Works* to the south and *Newton Street Mills* to the north. Several other metal foundries and machine factories are also labelled within the vicinity. Terraced housing was situated to the north, east and south of the Site. The footprint of some of the buildings depicted on the 1794 Plan in the north and west can be seen, which suggest expansion rather than demolition and rebuilding.

- 5.41 Goad's Insurance Plan of the City of Manchester of 1888 (**Appendix 4, Plate 5**) depicts the Site in detail. On the north-western side, fronting onto Newton Street lay *Iron & Tin Plate Warehouses*, a *Paper Warehouse*, *Fancy Box Factory*, *W. D. Thompson Printer & Co.*, *Grey Cloth Warehouse*, *Hat & Bonnet Warehouse and Factory* and *L. Clarke & Co. Linen Warehouse*. Warehouses lay along the north-eastern side of the Site fronting onto Warwick Street. A *Tin Plate Factory* was located in the southern part of the Site off Dean Street. A row of terraced houses fronted onto Dean Street. Three shops are depicted within the Site, two in the southern corner and one on the north-western boundary. Two sheds are also labelled in the yard area in the centre of the Site.
- 5.42 The Site layout remains the same on the 1893 25-inch OS plan (**Appendix 4, Plate 6**), although none of the buildings are labelled.
- 5.43 Aside from the demolition of several small outbuildings in the central yard area of the Site, no change is shown within the Site on the 1922 25-inch OS plan (**Appendix 4, Plate 7**). The industrial buildings to the north-west outside of the Site on Newton Street had been demolished and replaced with a post office. Warwick Street has become Postal Street.
- 5.44 No change within the Site is shown on the 1934 25-inch OS plan (**Appendix 4, Plate 8**). A tramway had been constructed by this time, which ran along Newton Street to the north-west of the Site.
- 5.45 Though less detailed, the c. 1947 6-inch OS plan (**Appendix 4, Plate 9**) shows that the buildings on Site remained standing.
- 5.46 Demolition of residential properties on the south-eastern boundary of the Site had taken place by 1969. By 1985, all buildings on the southern and eastern boundary had been demolished, leaving two large buildings remaining on the western boundary. One of these was labelled an 'Arabesque House'. By 2000, the south-eastern half of the Site was in use as a car park. The commercial units have now been demolished as of 2024.

Aerial Images

- 5.47 Historic England hold an aerial image from 1953, raf_58_1158_f21_0049, which shows the Site prior to demolition. An image from 1969 shows the Site has been cleared with all the buildings demolished (raf_543_4782_v2_0004). The earliest image consulted is dated to 1946 (raf_3g_tud_uk_185_vp2_5167) and depicts the detail seen on late 19th and early 20th century maps.

6. ARCHAEOLOGICAL POTENTIAL

Potential Sub-surface Remains

- 6.1 An analysis of historic mapping and aerial photographs shows that buildings lay within the Site from at least the late 18th century, although it is likely that Site lay within a field system prior to this. William Stevenson purchased land in this area in the 1780s and laid out a grid of streets. He then sold parcels of land on to entrepreneurs. Residential dwellings and two larger unlabelled buildings are shown within the Site on the 1794 map of Manchester and Salford, and a cotton mill and plate manufactory are shown on the 1851 OS plan. The 1888 insurance plan shows the Site in the most detail, with *Iron & Tin Plate Warehouses*, a *Paper Warehouse*, *Fancy Box Factory*, *W. D. Thompson Printer & Co.*, *Grey Cloth Warehouse*, *Hat & Bonnet Warehouse and Factory*, *L. Clarke & Co. Linen Warehouse*, *Tin Plate Factories* and several other warehouses and sheds depicted within the Site. A row of terraced houses also lined the south-eastern part of the Site along Dean Street and three shops are depicted within the Site.
- 6.2 These buildings remained on the Site until the latter half of the 20th century. All the buildings on the Site were demolished at some point before 1969. By 2000, the south-eastern half of the Site was in use as a car park and commercial units covered the north-western half.
- 6.3 Photographic evidence from the late 1960s shows the buildings which were formerly within the Site. A photograph taken from Newton Street in 1967 (**Appendix 5, Plate 1**) shows four and three storey buildings and a café in the north-western corner of the Site. The building in the northern corner of the Site appears to have been partially demolished and suggests demolition of this part of the can be dated between 1967 and 1969. A photograph taken from the junction of Dean Street and Port Street in 1966 (**Appendix 5, Plate 2**) shows two smaller buildings in the south-eastern part of the Site and Newton Street Mills can be seen beyond them to the north of the Site. The terraced housing on the Site's south-eastern boundary had been demolished by this time.
- 6.4 Given that the early cartographic evidence shows industrial activity on the Site from at least the late 18th century, the archaeological potential of the Site would be related to any sub-surface remnants of former buildings with potential for evidence associated with their industrial and domestic function.
- 6.5 However, this potential is dependent on the completeness of any 'grubbing out' that may have taken place during the demolition process. Approximately half the Site was also redeveloped for a commercial unit which would have required foundations and service infrastructure, which also could have potentially impacted any remains that may have survived earlier demolition. The Sites use as a car park would have required the preparation of a suitable substrate although probably at a shallower depth.
- 6.1 Phase 2 Ground Investigations (GI) conducted by Curtins in 2022²¹ revealed made ground in all boreholes, ranging from 2.1m in WS03 to 3.5m in WS02 below ground level (BGL). The made ground contained modern inclusions such as brick and plastic. Beneath the made ground was brown, gravelly clay. Boreholes closest to the existing

²¹ Curtins 2022, Postal Street, Manchester: Phase 2 Ground Investigation (report no 080401-CUR-00-XX-RP-GE-002)

building on the site (WS02, BH01, WS04) showed a slightly deeper made ground level, with a maximum depth of 3.5m, likely corresponding to the foundational depth during the construction of the existing building. Given the presence of modern inclusions, it is unlikely that any 19th-century archaeological remains survive within the areas of the borehole investigations (**Appendix 6**).

- 6.2 The GI logs suggest the Site has been grubbed out to a depth of between 2.1 and 3.5m BGL. Although no GI interventions are possible within the footprint of the existing building, it can be assumed the made ground can be extrapolated across the Site and it assumed this was as a result of site clearance in the late 1960s.
- 6.3 There is a dearth of pre-industrial archaeological evidence within the study area, with the former 16th century Barlow Cross being the only pre-18th century asset recorded on the HER. The potential for archaeological remains from earlier periods is very low. Any remains that may have present would have been heavily truncated or removed during the construction of buildings from the late 18th century onwards and subsequent demolition and site reuse. The pre-industrial archaeological horizon has been removed.
- 6.4 The made ground, which includes modern detritus, has been interpreted as the demolition material of the former buildings on Site. Any surviving remains would be below the level of made ground. Made ground can infill earlier features such as cellars or basements, although given the extrapolated GI results, this interpretation seems less likely.

7. IMPACT ASSESSMENT

- 7.1 This section considers the impacts of the Proposed Development on the archaeological resource within the 250m study area. It addresses potential physical impacts on recorded heritage assets and the potential impact on previously unrecorded sub-surface remains.

Direct Impacts on Recorded Heritage Assets

- 7.2 The proposed development will not directly impact any currently known, designated or non-designated heritage asset recorded on the Greater Manchester Historic Environment Record.
- 7.3 Made ground has been demonstrated to be present across the Site between 2m and 3.5m in depth. There will no impact on archaeological remains where made ground is present. The made ground, which includes modern detritus, has been interpreted as the demolition material of the former buildings on Site. Any surviving remains would probably be below the level of made ground and would be the vestigial remnants of the industrial era building. The impact of piling can be localised to the toe of the pile, with additional impacts potentially arising from other factors such as vibration. The effects of piling can be cumulative where they occur. However, given the reduced archaeological potential, the impact of piling would be negligible.

8. CONCLUSION

- 8.1 The report provides an assessment of the baseline archaeological constraints for residential development of a Site at Postal Street, Manchester. The potential for pre-18th century archaeological remains to exist within the Site is considered to be very low due to the lack of evidence within the study area and the fact that the archaeological horizon has been truncated by Post-medieval development, subsequent truncation by demolition and extensive grubbing out.
- 8.2 There is low potential for sub-surface remains relating to buildings dating to the late 18th century onwards to exist within the Site, including a cotton mill, a plate manufactory and a row of terraced houses.
- 8.3 Phase 2 Ground Investigations (GI) conducted by Curtins in 2022 revealed made ground in all boreholes, ranging from 2.1m in WS03 to 3.5m in WS02. The made ground contained modern inclusions such as brick and plastic. Beneath the made ground was brown, gravelly clay. Boreholes closest to the existing building on the site (WS02, BH01, WS04) showed a slightly deeper made ground level, with a maximum depth of 3.5m, possibly as a result of foundational depth during the construction of the existing building on Site. Given the presence of modern inclusions, it is unlikely that any 19th-century archaeological remains survive within the areas of the borehole investigations (Appendix 6). The depth of the made ground across Site suggests that earlier buildings have been grubbed out resulting in the low archaeological potential.
- 8.4 Impacts on the settings of built heritage assets, including Listed Buildings, have not been assessed in this report and are within a separate Heritage Statement.

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APPENDICES

APPENDIX 1: Gazetteer of Heritage Assets and Archaeological Events

APPENDIX 1

Catalogue entries for heritage assets and archaeological events recorded on the Greater Manchester Historic Environment Records (HER), and those identified as part of this assessment, are provided below. Each entry includes a National Grid Reference (NGR) and the relevant HER reference numbers.

Table 2: Gazetteer of Non-designated Assets

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 1384.1.0	Barlow Cross/New Cross (site of)	SJ 8466 9868	Low	Mentioned in 1554, the cross stood at the intersection of Oldham Street with Swan Street and Great Ancoats Street. A new cross was erected in the last quarter of the 18th century and the name was changed to New Cross. This is shown as a pyramidal obelisk on a map of 1793. It was removed in 1819. Probably a boundary cross but no further information. Inferred siting confirmed.
HER 1386.1.0	Dale Street Basin – Rochdale Canal (site of)	SJ 8474 9822	Low	Built c.1804 in Dale Street, the canal linked with the Ashton terminus. The basin has been filled in and is now used as a car park.
HER 1386.2.0	Rochdale Canal	SJ 8437 9782	Low	Urban canal section c.1.25 miles long, connected with the Ashton-under-Lyne Canal at Dale Street. Nine broad locks down to the Bridgewater Canal at Castlefield which gave it the name 'Rochdale Nines'. A third junction is formed with the Manchester & Salford Canal in Great Bridgewater Street area. Infilled canal arms. Part of the Cheshire Ring of canal navigations. Parliamentary approval of 1799, and 1800. Completed 1804. Now mainly used for pleasure craft.
HER 2042.1.1	Royal Mill	SJ 8497 9852	Low	Marked on map as a cotton mill. Old Mill was completely demolished in 1911–13 and replaced by a new mill. Electrically powered for mule-spinning.
HER 2042.1.2	Paragon Mill	SJ 8496 9859	Low	Marked on map as a cotton mill. Erected between 1911 and 1913. Red brick with white limestone dressings.
HER 2085.1.0	Buildings at 47 Tib Street	SJ 8455 9863	Low	47 Tib Street (formerly indexed as 47–53 Tib Street) form a terrace of 4 brick-built houses dating from the late C18. Each consists of 2 storeys, basement and attic.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 2111.1.0	Rochdale Canal Company Office	SJ 8469 9817	Low	Built c.1820. Offices of the Rochdale Canal Company. The centre of operations for the wharves and warehousing of the company.
HER 2112.1.0	69–71 Dale Street (former)	SJ 8468 9818	Low	Terraced row of brick-built housing, with attached storage shed infill to rear, originally comprised of four dwellings with cellar, ground, and first floor. Evidence of alterations including bricked-up doorways, windows and possible cellar entrance, steps up to ground floor, and doorway above cellar. Built c.1815, possibly for the Rochdale Canal Company.
HER 2119.1.0	Brownsfield Mill	SJ 8489 9840	Low	Marked on 1831 map as "Gerrard's Mill", as a cotton mill on 1849 map and no details on 1910 map. The spinning mill dates back to the late 1820s and has 2 wings.
HER 6401.1.0	6 Oldham Road (site of)	SJ 8469 9871	Low	Shop/former offices. 4 storeys, 2x4 bays. Brick with stone embellishment. Possibly late-C19 original shop window. Late-C19 offices above brick embellishment. This building was recently demolished as it had become unsafe and a hazard to the public (1993).
HER 6402.1.0	8–18 Oldham Road (site of)	SJ 8470 9872	Low	Shops. Brick built. 3 storeys, 10 bays in phases. Possibly mid-C19. These buildings have recently been demolished (1993) as they had become unsafe and a hazard to the public.
HER 6424.1.0	Virginia House	SJ 8469 9869	Low	Early C20 terracotta, renovated brick office block. 4 storeys, 4x4 bays. Highly embellished. Very good terracotta. Doubleglazed windows are possibly original. Lion "trade mark" statue on top.
HER 6426.1.0	Derros Building (29 Great Ancoats Street)	SJ 8474 9863	Low	Early C20. Brick with tile inlay. 4-storeys and cellar. 1x7 bays. Mock Rustic – almost Tudor.
HER 6427.1.0	The Hudson Buildings	SJ 8476 9863	Low	Built in 1924. 4-storey brick building with tiled front and 4x3 large bays. Ornate tiled columns to the front.
HER 6428.1.0	39 Great Ancoats Street	SJ 8476 9861	Low	Late C19 or early C20 red-brick house. 3 storeys and attic. 3 or possibly more bays. Interesting windows, including an octagonal bay "oriel" window. Also some good embellished brickwork.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 6429.1.0	Electricity Sub Station (site of)	SJ 8479 9860	Low	Built 1927. Brick-built with red brick gable front. Demolished in c. 2017. The former electricity substation was established by the Manchester Corporation Electrical Department to address the increasing need for electrical energy required, during the first quarter of the C20, as a consequence of the electrification of the expanding tram network, conversion of cotton mills from steam to electric power, and increasing demand for electric lighting in both domestic and commercial contexts.
HER 6430.1.0	53–55 Great Ancoats Street (site of)	SJ 8479 9858	Low	Mid-late C19 brick-built warehouse/shop. 3 storeys, cellar.
HER 6431.1.0	55–57 Great Ancoats Street (site of)	SJ 8481 9857	Low	Mid-C20 building. 3 storeys, 4x3 bays to Great Ancoats Street.
HER 6432.1.0	69–85 Great Ancoats Street (site of)	SJ 8483 9855	Low	Vacant site. 19 th century.
HER 6433.1.0	5 Jersey Street (Now part of 1 Jersey Street)	SJ 8488 9855	Low	Brick-built warehouse with slate roof. 4 storeys and semi-basement, 5x2 small bays.
HER 6434.1.0	Electricity Sub Station	SJ 8490 9858	Low	Early C20 electricity sub station of one storey with 5x1 bays. Red brick with light moulded brick embellishment. Early distinctive example. Called "McConnel's" sub station.
HER 6435.1.0	17 & 19 Jersey Street	SJ 8491 9859	Low	Late 1920s to 1930s houses with 2 storeys, 2x2 bays. Brick-built with slate roofs.
HER 6436.1.0	Gun Street Building (site of)	SJ 8484 9857	Low	Late C19 brick-built building with 3 storeys and 4x3 bays with paired windows. The windows of the lower 2 storeys are blocked. A small-scale building, typical for the area.
HER 6437.1.0	16 Blossom Street	SJ 8484 9860	Low	Late-C19/ early-C20 brick-built warehouse/ sweatshop. It has 4 storeys with a semi-basement and 3x7 bays.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 6438.1.0	11–13 Blossom Street (site of)	SJ 8483 9862	Low	Mid-late C19/ early C20. Brick and red brick. Mainly 1 and 2 storeys with a various number of bays.
HER 6439.1.0	23–25 Gun Street (site of)	SJ 8478 9864	Low	Warehouse. Built c.1896, possibly earlier. Brick. 4 storeys – had a cellar?
HER 6440.1.0	24–28 George Leigh Street	SJ 8480 9868	Low	Two attached late C19 or early C20 and mid-C20 buildings. 2 and 3 storeys, 3x3 bays and 8x3 bays.
HER 6441.1.0	The Edinburgh Castle public house and 17a Blossom Street	SJ 8484 9864	Low	Pub and hotel. Built c.1900. Brick with slate roof. 3 storeys and cellar. 3x5 bays.
HER 6442.1.0	19 Blossom Street (site of)	SJ 8485 9864	Low	Industrial or warehousing? 2 storeys with 5x2 bays on Cotton Street.
HER 6443.1.0	The Cornerstones public house (30 George Leigh Street) (site of)	SJ 8482 9869	Low	Pub and hotel. 2½ storeys and 5 bays. Brick/stucco building materials. Three prominent dormer windows. Very distinctive appearance.
HER 6449.1.0	2–4 Loom Street	SJ 8485 9867	Low	Early C19 building. 2 storeys, 4x2 bays.
HER 6450.1.0	Building at junction of Cotton Street/Blossom Street	SJ 8486 9866	Low	A late C19 or early C20 building with 2 storeys and 6x2 bays.
HER 6451.1.0	Warehouse on Blossom Street (former)	SJ 8487 9867	Low	Late-C19 warehouse with 4 storeys and 14x4 bays. Currently in use as clothing workshops.
HER 6451.1.1	Chimney (site of), Blossom Street	SJ 8488 9867	Low	Chimney – square section. Brick. Part of site 52 [HER 6451.1.0]. Possibly associated with warehouse?

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 6454.1.0	87 & site of 89–93 Great Ancoats Street	SJ 8487 9851	Low	Four mid-C19 houses. One is a restaurant (The Dancing Weasel), formerly The King's Arms. Another is a Medicinal Wholesalers shop and another is an Electrical Fittings shop.
HER 6455.1.0	The Cotton Tree public house (site of)	SJ 8491 9849	Low	Late-C19 public house. 3 storeys and 3x2 bays. Brick-built with tile front.
HER 6456.1.0	Rochdale Canal Road Bridge (Great Ancoats Street)	SJ 8494 9843	Low	Canal road bridge. Early C19 to mid-late C20. Brick and iron. Several phases. Includes locks immediately to east; restored. "Radfords & Co. 1838. Manchester" on east side. The remains of a swing bridge stone plinth are still visible.
HER 6457.1.0	Rochdale Canal Lock No.82	SJ 8495 9845	Low	Early C19 canal lock and iron footbridge. The footbridge is still in use. Conserved recently. It is a very distinctive high-arched footbridge which includes a urinal on Redhill Street.
HER 6458.1.0	The Coates School	SJ 8488 9852	Low	Coates School 1821 (stone plaque). Brick with felt roof/slate and 4 bays. Now Minster Mill.
HER 6459.1.0	The Green Dragon public house (8 Jersey Street) (site of)	SJ 8490 9855	Low	Public house, c.1790, altered. Brown brick in Flemish bond, slate roof.
HER 8294.1.0	4, 6 & 8 Bradley Street	SJ 8466 9857	Low	6 cottages, disused at time of spot-listing (1984). Circa 1790. Orange-red brick in English Garden Wall bond. Single-pitch graduated stone slate roofs.
HER 8369.1.0	24 & 26 Dale Street (formerly Nicklebys; formerly Haunch of Venison Public House); also 28 Dale Street	SJ 8456 9833	Low	Late C18 or early C19 with later alterations. Red brick, 3 storeys.
HER 8370.1.0	Dale Warehouse, formerly Warehouse of the Rochdale Canal Company	SJ 8469 9819	Low	1806. 4 storeys, attic and basement, coursed freestone, fairly low pitched slate roof.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 8370.1.1	Dale Warehouse Underground Waterwheel	SJ 8471 9818	Low	The wheel provided motive power for hoists in adjacent and nearby canalside warehouses via gearing and lineshafts. The machinery, which is 95% intact, represents the only known subterranean waterwheel in the Manchester area of early TC Hewes design. Early 19 th century.
HER 8371.1.0	49 and 51 Dale Street	SJ 8470 9827	Low	Some various trade warehouses, c.1900. Iron frame, cladding of red brick, red terracotta and sandstone dressings.
HER 8410.1.0	Daily Express Building	SJ 8473 9868	Low	1939. Architect: Sir Owen Williams. With its counterpart in Fleet Street, London, a good example of the "functional" style of the period & the early use of glazed curtain walling.
HER 8426.1.0	Newton Buildings (formerly 50 Newton Street)	SJ 8466 9836	Low	Hat manufacturers' premises. c.1900, altered. Red brick; buff terracotta. Slate mansard to parapet. 3 storeys, attic, mansard.
HER 8458.1.0	69–77 Lever Street	SJ 8466 9857	Low	Row of 5 town houses, now partly shops and workshops. Late C18 or early C19, altered. Brown brick in Flemish bond, slate roof.
HER 8490.1.0	Crown & Kettle public house	SJ 8467 9869	Low	Late C19. Gothic style. Buff brick, stone dressings. Two storeys.
HER 8506.1.0	The City public house	SJ 8461 9866	Low	Circa 1870, core probably late C18. Originally known as the Prince of Orange. Stucco; 3 storeys.
HER 8507.1.0	Castle Hotel public house	SJ 8457 9857	Low	Early C19 with c.1900 alterations. Stucco and faience. Roof not visible. 3 storeys; 3-bay façade with c.1900 brown glazed faience to pilastered ground floor with words "Castle Hotel" in fascia of faience.
HER 8540.1.0	Hall's Buildings	SJ 8457 9824	Low	Warehouses and offices, now cafes, offices etc. c.1870–80, altered.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 8541.1.0	77–83 Piccadilly	SJ 8458 9822	Low	Restaurant, shops and warehousing. Dated 1877 to gable. Architects: Clegg & Knowles. Sandstone ashlar and stucco (probably on iron frame).
HER 8556.1.0	50–62 Port Street	SJ 8470 9837	Low	Dwellings with ground floor shops. Early C19 or earlier. Red brick, low pitched slate roof to eaves. 3 storeys.
HER 8636.1.0	Jacksons Warehouse (formerly Rochdale Canal Warehouse)	SJ 8480 9833	Low	Built 1836. Red brick. 5 storeys. Ranges of small semi-circular-headed windows with modern windows inserted to ground and 1st storeys.
HER 9888.1.0	Stevenson Square Residential District	SJ 8457 9845	Low	Sir Ashton Lever sold land between Ancoats Lane and Daub Holes (Piccadilly) to a businessman, William Stevenson. He went about advertising the building leases and sold off parcels of land piecemeal to entrepreneurs. Swindells studied the deed relating to this sale and found most of the streets were named after the people who bought the leases, with the square commemorating William Stevenson.
HER 11308.1.0	35 Back Piccadilly (site of)	SJ 8455 9832	Low	Built c.1852–1858 as a commercial cotton warehouse. Was adapted to operate as two warehouses by 1888.
HER 11401.1.0	47 Piccadilly	SJ 8448 9830	Low	Townhouse, now shop. Probably late C18; altered. White-painted stucco on brick, slate roof.
HER 11402.1.0	49 Piccadilly	SJ 8449 9829	Low	Clothiers' warehouse, now shop. 1892, by W.G.Higginbottom; altered. Red brick with sandstone dressings, slate roof.
HER 11403.1.0	Gardens Hotel and Shops	SJ 8451 9829	Low	Shops, offices and warehousing, now shops and offices. Dated 1904 in upstand of parapet, by W.G. Higginbottom; altered. Portland stone façade, slate roof.
HER 11404.1.0	Clayton House	SJ 8453 9828	Low	Restaurant, warehousing and offices. Dated 1907 at top floor; by W.G.Higginbottom. Portland stone façade with brown terracotta ground floor, slate roof.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 11405.1.0	St Margaret's Chambers	SJ 8454 9827	Low	Shops with numerous offices over (in 1905 mostly manufacturers' agents). c.1890; altered. Pink brick in Flemish bond, with sandstone dressings and some terracotta matching this (probably cladding iron frame), 4-span slate roof.
HER 11637.1.0	45, 47 and 47a Hilton Street	SJ 8470 9835	Low	Pair of small townhouses, now shop and café. Late C18, altered and reduced. Brown brick in Flemish bond, with some sandstone dressings, slate roof.
HER 11649.1.0	69–75 Back Piccadilly (site of)	SJ 8462 9820	Low	Row of garret-workshop cottages, now part workshop and part unoccupied. Later C18 and early C19; altered.
HER 11685.1.0	3 Dale Street	SJ 8448 9843	Low	Formerly known as: No.23 SPEAR STREET. Millinery warehouse, now clothing shops. 1900-1910. Cast-iron columns and concrete floors, clad in red brick and ochre terracotta, with plinths of polished pink granite; roof concealed.
HER 11686.1.0	25 and 27 Dale Street (site of)	SJ 8455 9838	Low	Large home trade textile warehouse and workshop, now fashion warehouse and manufacturing furriers' premises. c.1860–70, altered. Red brick with sandstone ashlar plinth and dressings (roof concealed). Completely destroyed by fire 30 April 2007.
HER 11687.1.0	56 Dale Street	SJ 8462 9825	Low	Shipping warehouse, now garment wholesalers' premises. c.1870, altered. Plinth and ground floor of sandstone ashlar with some polished pink granite, upper floors of red brick in Flemish bond with some blue brick ornament, roof concealed.
HER 11688.1.0	Langley Buildings	SJ 8469 9825	Low	Home trade and mail-order warehouse and newspaper printing office, now mail-order warehouses. 1908, for J.D.Williams & Co. Steel columns and girders, concrete floors, with cladding of brown and red faience and red brick, slate roof with skylights.
HER 11689.1.0	29 and 31 Dale Street	SJ 8459 9836	Low	Home trade warehouse, workshops and offices; now fashion wholesalers' premises. c.1900–5. Iron frame with cladding of bright red brick in English garden wall bond with limestone dressings, and slate roof.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 11690.1.0	35 Dale Street	SJ 8464 9831	Low	Cotton manufacturer's warehouse, now wholesalers' premises. c.1900, probably for Richard Howarth & Co, cotton spinners and manufacturers. Steel columns and girders (cased), with cladding of polished grey granite, red brick and pink terracotta; roof concealed.
HER 11691.1.0	68 Dale Street	SJ 8465 9820	Low	Small manufacturers' warehouse, now yarn merchant's. Probably mid-C19. Red brick (possibly handmade) in English garden wall bond, with sandstone plinth, roof concealed by parapet.
HER 11692.1.0	Industry House	SJ 8468 9822	Low	Various warehouses and mantle factory, now mail-order warehouse and clothing factory. 1913. Iron columns and girders, concrete floors, with cladding of red brick, the front faced with buff faience; flat concrete roof with felt cladding and skylights.
HER 11693.1.0	Eleska House	SJ 8463 9824	Low	Clothing warehouse, now wholesalers' premises and offices. Probably early C20. Red brick in English garden wall bond with sandstone plinth and dressings (roof concealed).
HER 11694.1.0	45 Dale Street	SJ 8464 9827	Low	Merchants' warehouse (with No.47 to right, q.v.), now clothing wholesalers' premises. Mid- to later C19. Red brick in Flemish bond (now painted white at ground floor) with some sandstone dressings, slate roof.
HER 11701.1.0	Sevendale House	SJ 8453 9843	Low	Large general warehouse; now mostly wholesalers' premises. Dated 1903 on doorway; for I.J.& C.Cooper Ltd, general warehousemen. Steel frame with concrete floors, in cladding of polished red granite, red sandstone (now grime-blackened) and blood-red brick and terracotta; green slate roof.
HER 11702.1.0	22 Dale Street	SJ 8453 9835	Low	Textiles warehouse, now garment showrooms etc. c.1900. Cast-iron frame, cladding of blood-red brick in Flemish bond with dressings of red sandstone and some polished grey granite (side and rear of glazed white brick), roof concealed.
HER 11703.1.0	47 Dale Street	SJ 8464 9827	Low	Merchants' warehouse (with No.45 to left, q.v.); now textiles wholesalers' premises. Later C19; altered. Red brick in stretcher bond (painted white at ground floor) with some sandstone dressings, slate roof.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 11704.1.0	64 & 66 Dale Street	SJ 8464 9821	Low	Shipping warehouse, now clothing wholesalers' premises. Mid- to later C19, altered. Red brick in Flemish bond with sandstone dressings and slate roof.
HER 11727.1.0	18 Oldham Street (including Dale Street Chambers)	SJ 8448 9844	Low	Includes: No.1, Dale Street Chambers DALE STREET. Shops and offices. Probably 1860s; altered. Scored stucco with sandstone dressings (now all painted white), slate roof.
HER 11735.1.0	49 Newton Street	SJ 8462 9839	Low	Includes: No.10 STEVENSON SQUARE. Includes: No.18 HILTON STREET. Cotton goods warehouse, now garment wholesalers' premises. Mid- to later C19, altered. Red brick in Flemish bond, with gritstone ashlar plinth and dressings (roof not visible).
HER 11736.1.0	14 and 16 Newton Street	SJ 8460 9829	Low	Manufacturers' warehouses and agents' offices, now shops, etc. Late C19, altered. Red brick in Flemish bond (part painted white), with sandstone ashlar plinth and dressings, slate roof.
HER 11737.1.0	17 to 25 (odd) Newton Street	SJ 8457 9832	Low	Includes: Nos.32 AND 34 DALE STREET. Shops and clothing warehouses with offices over. Late C19; altered. Red brick with sandstone dressings, mansard slate roof with skylights.
HER 11768.1.0	5 & 7 Dorsey Street (formerly Green Street) (site of)	SJ 8451 9859	Low	Late C18 with later alterations. Brick; 3 storeys, No.7 with basement; 4 sash windows plus one blocked and one 3-light window, all with single glazing bars only and with flat brick arches and stone sills.
HER 12064.1.0	10 Lever Street	SJ 8450 9833	Low	Town house, now shop. Early C19, altered and part rebuilt. Brown brick in Flemish bond, stuccoed at ground floor (but the top floor rebuilt in C20 common brick) ; slate roof.
HER 12066.1.0	24 Lever Street (Watts Brothers)	SJ 8457 9840	Low	Hardware and furniture warehouse, now offices. Dated 1898 at 3rd floor; altered. Red brick in Flemish bond, with red sandstone dressings, slate roof.
HER 12063.1.0	8 Lever Street	SJ 8449 9833	Low	Town house, now shops. Early C19, altered. Brown brick in Flemish bond (stuccoed at ground floor), slate roof. Doubled depth double-fronted plan.
HER 12065.1.0	12 & 14 Lever Street	SJ 8451 9834	Low	Pair of town houses, now shop. Early C19, altered. Stucco on brick, slate roof. Double-depth plan, each house singlefronted.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 12080.1.0	8, 10 and 12 Newton Street	SJ 8458 9828	Low	Warehouses, workshops and offices, now shops and offices. c.1860–70; altered. Brown brick with some polychromy, sandstone dressings (roof not visible).
HER 12082.1.0	Kingsley House	SJ 8456 9830	Low	Garment warehouses and workshops. Late C19. Red brick in Flemish bond, with sandstone ashlar plinth and dressings, slate roof with skylights.
HER 12084.1.0	45 and 47 Newton Street	SJ 8461 9837	Low	Textile warehouse, now fashion wholesalers' premises. Mid- to later C19, altered. Red brick in Flemish bond with gritstone plinth and dressings (roof not visible).
HER 12086.1.0	Greater Manchester Police Museum (former Newton Street Police Station)	SJ 8466 9844	Low	Police station, now police museum. Mid- to later C19. Red brick in Flemish bond with sandstone dressings and slate roof.
HER 12087.1.0	72 to 76 Newton Street	SJ 8475 9849	Low	Merchants' and manufacturers' warehouses, now offices. c.1860–80, altered. Red brick in Flemish bond, with sandstone dressings, hipped slate roof.
HER 12089.1.0	Rochdale Canal Lock No.83, East of Tariff Street	SJ 8487 9835	Low	Canal lock. c.1800, for Rochdale Canal Company; now disused. Coursed squared sandstone, wooden gates.
HER 12090.1.0	Towpath footbridge and associated ramps opposite Brownsfield Mill	SJ 8491 9839	Low	Towpath footbridge over former branch of canal, with approach ramps at east and west ends. Probably c.1804. Brick ramps with cobbled surfaces and stone slab outer walls with rounded tops; wooden bridge rebuilt.
HER 12093.1.0	105 Oldham Street	SJ 8456 9859	Low	Small townhouse, now shop. Probably late C18; altered. Painted brick, slate roof.
HER 12095.1.0	13 and 15 Paton Street (and attached railings)	SJ 8463 9819	Low	Pair of town houses, now shop, offices and tailor's shop. c.1800; altered. Brown brick, slate roof.
HER 12096.1.0	19 Paton Street	SJ 8464 9820	Low	Town house, now workshop? Probably early to mid-C19. Brown brick (now painted white at ground floor), slate roof.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 12142.1.0	49 to 53 Tib Street	SJ 8455 9864	Low	Row of 3 garret-workshop houses, now shops. Late 18th or early 19th century; altered. Brick, painted white above ground floor; slate roof.
HER 12168.1.0	16–18 Tariff Street (Fourways House)	SJ 8473 9831	Low	Packing warehouse, now offices. 1906, with minor late C20 alterations. By James William Beaumont, architect, of Manchester. Red brick on a low stone plinth with ashlar sandstone dressings and moulded brick detailing.
HER 12404.1.0	Piccadilly Basin Development Phase II, Rochdale Canal	SJ 8486 9832	Low	A watching brief was conducted along the central Manchester sector of the Rochdale Canal, its associated basin and industrial buildings for a major area redevelopment and for the construction of a new multi-storey car parking facility as part of the Piccadilly Basin Improvement Scheme. The results provided some below-ground evidence for the industrial structures that once stood on the site of the car park. No physical evidence or artefacts were found to indicate that these structures were any earlier than the 19th century. The groundworks also uncovered a canal arm that lay opposite Brownsfield Mill, built in the 1820s. During the first phase of the watching brief, when work was being carried out on the basin opposite Brownsfield Mill (UMAU 2000), there was no indication that the canal arm was still present. However, it is possible that the arm had been closed off and natural silting had rendered the brickwork indistinguishable.
HER 15564.1.0	33 Dale Street (Bradley House)	SJ 8462 9834	Low	Shipping warehouse, now various workshops and offices. Later C19, probably for Kessler & Co., merchants. Blackened sandstone ashlar and brown brick in Flemish bond, roof not visible.
HER 15743.1.0	Housing, George Leigh Street (site of)	SJ 84826 98698	Low	A range of double-depth houses, with outshuts to rear, which are plotted on Green's 1787–94 map. These houses fronted George Leigh Street and three of these properties, positioned close to the corner of George Leigh and Cotton streets, were provisioned with three separate yards. A large proportion, if not all, of these buildings appear to have been demolished by 1831, as they are not depicted on Bancks & Co's map of Manchester and Salford.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 15744.1.0	House, Cotton Street (site of)	SJ 84833 98682	Low	A single small double-depth house and yard and outshut to the rear, which is plotted on Green's 1787-94 map. This property fronted Cotton Street and was separated from the rear of the properties fronting George Leigh Street by a narrow passageway. This building appears to have been demolished during the early 19th century and was replaced by a block of housing located at the corner of Cotton and Loom streets.
HER 15814.1.0	St Michael's Clergy House (former)	SJ 84831 98700	Low	A clergy house fronting George Leigh Street, which abuts St Michael's Roman Catholic School [HER 6444.1.0]. The clergy house was designed by the architect O.C. Hill and was constructed in 1887. The building is still extant and presently functions as a hostel.
HER 15815.1.0	St Chad's Church School (site of)	SJ 84833 98697	Low	A large rectangular building which is denoted on the 1848 OS map as 'St Chad's Church School (R. Catholic, Day and Sunday)'. This school is also plotted on Bancks & Co's 1831 map and it is possible that it forms one of the buildings plotted on the 1808, 1818-19 and 1824 maps of this area of Manchester. This school had been demolished by at least 1887 and was replaced by a clergy house [HER 15814.1.0], though it is possible that it was actually demolished in 1879 during the construction of St Michael's School [HER 6444.1.0].
HER 15816.1.0	St Mary's Square (site of)	SJ 84848 98692	Low	A rectangular block of housing sandwiched between George Leigh and Loom streets. Although these houses were probably constructed during the early years of the 19th century, particularly as buildings are plotted across this area on the 1808 map of Manchester, their form can be seen most clearly on the large-scale 1848 OS map.
HER 15817.1.0	Housing on Loom Street/ Cotton Street (site of)	SJ 84837 98680	Low	An L-shaped block of housing situated at the corner of Cotton and Loom streets. The cartographic evidence suggests that these houses had possibly been constructed by 1808.
HER 15818.1.0	Housing on Spear Street and Bradley Street (site of)	SJ 84615 98544	Low	A block of late 18th century housing plotted on Green's 1787-94 map. This housing consisted of two ranges of double-depth houses with outshuts and yard areas to the rear, and two sets of blind-back houses separated by a covered passageway leading to a narrow back alley.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 15819.1.0	The Crown & Mitre, Spear Street (site of)	SJ 84590 98525	Low	Green's 1787–94 map plots a building which is documented in a trade directory of 1825 as the 'Crown & Mitre' public house, with John Senior listed as the licensee.
HER 15820.1.0	Commercial property on Bradley Street (site of)	SJ 84597 98518	Low	A late 18th century building, positioned at the corner of Bradley and Friday streets, which is plotted on Green's 1787–94 map.
HER 15821.1.0	Buildings on Warwick Street and Lever Street (site of)	SJ 84639 98541	Low	A block of properties with a small yard to the rear which are plotted on Green's 1787–94 map of Manchester.
HER 15822.1.0	The Crown & Lion public house (also known as the Crown & Anchor) (site of)	SJ 84630 98532	Low	Green's 1778–94 map plots a large square building fronting Lever Street with a yard and privies to the rear. By 1831 a rearward extension had been added to the building with two yard areas either side.
HER 15823.1.0	Commercial concerns on Lever/Bradley Street (site of)	SJ 84623 98522	Low	The early cartographic sources indicate that at some point between 1808 & 1818–19 a number of buildings had been constructed on a previously vacant plot of land fronting Lever Street, directly adjacent to the public house [HER 15822.1.0]. These buildings are plotted on the large-scale 1849 OS map and a flight of stairs is visible on the south-western wall of one of these properties.
HER 15824.1.0	Commercial concerns on Lever Street (site of)	SJ 84613 98506	Low	The early cartographic sources indicate that between 1808 & 1818–19 buildings had been constructed at the corner of Faraday and Lever streets. The large-scale 1849 OS map plots two adjacent buildings in this area, which have a square ground plan and are provisioned with cellars.
HER 15825.1.0	Buildings on Faraday Street (site of)	SJ 84606 98513	Low	The early cartographic sources indicate that between 1808 & 1818–19 a building had been constructed at the corner of Faraday and Bradley streets. The large-scale 1849 OS map depicts this as an L-shaped building, denoted as 'Machine Manufactory', which had a flight of stairs at its north-eastern corner.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 15826.1.0	Ellesmere Club (site of)	SJ 84619 98554	Low	By the time of the 1888 OS survey a large building, which functioned as the Ellesmere Club, had been constructed. Goad's Insurance plan of 1927 indicates that this building was two-storeyed and was provisioned with a basement. The building was still extant during the 1960s but has since been demolished.
HER 15827.1.0	Printing Works, Spear Street (site of)	SJ 84600 98531	Low	By 1905 a large rectangular building had been constructed, which Goad's Insurance plan of 1927 indicates was of three storeys with a basement. This plan also denotes the building as 'A Heywood & Son Newspaper Dept Printing', and it is denoted as 'Printing Works' in the 1931 OS map. This building was still extant during the 1960s but has since been demolished.
HER 15828.1.0	Buildings on Lever Street (site of)	SJ 84637 98535	Low	By 1922 a large square building had been constructed at the corner of Warwick and Lever streets. Goad's Insurance plan of 1927 indicates that this building had six floors and a basement and was occupied by 'Seagrave Slade & Co Costumes Bast.
HER 15829.1.0	Warehouse, Lever Street (site of)	SJ 84619 98512	Low	By the time of the 1911 OS survey a large rectangular building had been constructed fronting Lever Street. Goad's Insurance plan of 1927 indicates this building was six-storeyed with a basement and was occupied by 'A Heywood & Son Ltd' and functioned as a 'Paper Station and Fancy Warehouse'.
HER 13865.1.0	Buildings at 1 and 1b Stevenson Square	SJ 84566 98493	Low	Originally Coach and Horses public house, built in 1821–24 and renamed Royal Olympic Tavern c.1838 after neighbouring theatre [see HER 13867.1.0], later Royal Olympic Hotel. Site taken over in 1897–98 by W H Bates & Co, floor cloth manufacturer of 5 & 7 Stevenson Square. Shown on Goad's plan of 1927 as including a basement.
HER 13867.1.0	Buildings at 5–7 Stevenson Square	SJ 84592 98490	Low	Site first developed in the early 1820s when a rectangular building is shown on its NE side, along Faraday Street; also shown on the 1831 map with an extension at its SE corner. The first building here was a temporary meeting house of the Warrenite Methodists, of wood or wood and brick, remodelled as or replaced by a brick-built wagon warehouse.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 13866.1.0	Buildings at 3 Stevenson Square	SJ 84580 98501	Low	Site originally developed in early 1820s with 2 ranges of buildings on NW and SE sides of a central yard, with NE range added by 1831.
HER 13895.1.0	78 Great Ancoats Street (site of)	SJ 84834 98501	Low	Two standing 3-storey buildings of late 18th-century origin although heavily remodelled. Marked on 1831 map (Bancks & Co) as Astley Arms pub with address given as 224 Great Ancoats Street.
HER 13896.1.0	57 to 59 Houldsworth Street (site of)	SJ 84823 98488	Low	A 2-storey, 2-bay building comprising two properties of modern, machine pressed bricks indicating early to mid-20th century construction, occupying footprint of early demolished 19th century buildings.
HER 13897.1.0	36 Dean Street (site of)	SJ 84812 98495	Low	Strip of land cleared of structures. Site of 36 Dean Street, used as a car park with hardcore surface, compacted over demolished remains of workers' cottages. Considered to have high potential to contain buried remains of archaeological interest.
HER 13901.1.0	Marlsbro House	SJ 84684 98405	Low	Initial development of the area may be traced to the early 1780s, when William Stevenson of Urmston purchased some 25 acres of fields that corresponded broadly to an area bounded by the present day Oldham Street, Piccadilly, Great Ancoats Street and Port Street. Stevenson laid out a grid of streets, centred on Stevenson Square, ready for development. Late eighteenth-century maps of the study area show it to have contained two blocks of buildings, one fronting onto Newton Street, and the second on the south side of Faraday Street [then named Friday Street]. The character of these buildings is uncertain, although it is likely that those on Faraday Street comprised two properties that were used, at least in part, as dwellings.
HER 13997.1.0	Dwellings at 4–6 Brewer Street (site of)	SJ 84728 98354	Low	A pair of two small buildings, identified on a Goad's plan of 1886–1901 as 2-storey dwellings. Built between 1808 and 1819. Still standing in 1931–32, but later mapping suggests these buildings were either replaced or modified by 1965. Site now a car park area.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 13998.1.0	Manufactory at 8-10 Brewer Street (site of)	SJ 84724 98346	Low	Rectangular range along Brewer Street built between 1808 and 1819 with yard to the rear. Between 1831 and 1845 replaced by larger range which also occupied the site of its former rear yard, named on the 1848 map as a machine manufactory. A Goad's plan of 1886-1901 shows the building to have been of 3 storeys. Demolished after 1965.
HER 13999.1.0	Engine and boiler house (site of)	SJ 84718 98351	Low	Rectangular range built between 1808 and 1819. Between 1848 and 1889 a larger block was established here, shown on a Goad's plan of 1886-1901 as containing a boiler on the north and a 30hp engine on the south.
HER 15860.1.0	Warehouse and manufactory (site of)	SJ 84711 98340	Low	Works, built between 1808 and 1819, 2 storeys, handmade brick, Flemish and English Garden Wall bond, with hipped roof and rear octagonal brick chimney.
HER 16126.1.0	Workers' housing, Pickford Street (site of)	SJ 8488 9852	Low	Desk-based assessment in March 2011 identified the presence here of a block of 10 back-to-back workers' houses dating to the early 19th century, which were demolished in the late 20th century. No. 6 Jersey Street, which formed the NW corner of the block, served as a private dwelling during the first half of the 19th century. However, by 1863 it was listed in trade directories as a provisions store, a function which continued until its demolition.
HER 16504.1.0	Warehouse/Storehouse (site of)	SJ 8484 9833	Low	The first building to be erected at this site was built in the 1840s and comprised an L-shaped 2-storey structure which was probably a small warehouse [see HER 2113.1.0] and associated storehouse.

REF (HER)	NAME	GRID REF	SIGNIFICANCE	DESCRIPTION
HER 16506.1.0	Canal basin – deposits relating to construction of (probable)	SJ 8473 9834	Low	During excavation of an evaluation trench in 2009, layers observed sloping downwards to the E or SE appeared to follow a slope or cut in the natural clay. This seemed to be heading in the direction of the canal basin [situated a short distance to the east] and may represent part of the original construction of the basin during the C18. The layers above it contained brick fragments and sherds of C18 pottery, fitting in with this date, and possibly represented the filling in of the construction cuts after the building of the basin was completed and the ground levelled in the area during the late C18 and early C19. A similar layer of sticky black silt observed in a second trench to the west was also interpreted as possible remains of a deposition associated with construction of the canal basin.
HER 16507.1.0	Workers' housing (site of)	SJ 8472 9836	Low	Open-area excavation in 2009 revealed walls and footings relating to a series of early (pre-1808) structures comprising walls and footings that did not fit with any of the other structures on site and are not shown on mapping. They had been truncated by the walls of the public house which was built between 1808 and 1819 [HER 16508.1.0], and therefore probably represent a short-lived phase of buildings, by their size probably workers' housing, built after 1787–94 and demolished before 1808.
HER 16508.1.0	Brown's Field Tavern (public house) (site of)	SJ 8471 9836	Low	Open-area excavation in 2009 revealed the remains of an early C19 public house. These included a front room at the NE side with a cellar at the centre and a tile-floored bar room to the SW of this, next to a flagged open courtyard. A covered corridor lay between the courtyard and cellar with access to the cellar, courtyard, tile-floored room and a small toilet to the SE.
HER 16536.1.0	Workers' housing (site of)	SJ 8458 9867	Low	In the mid-18th century, this site still lay within an area of agricultural land. However, by the late 18th century the present-day pattern of streets had been established. A block of buildings is shown at this location on Lewis's map of 1788; this depicts a division between buildings fronting Tib Street and those to the west.

Table 3: Gazetteer of Archaeological Events

REF (HER)	NAME	GRID REF	DESCRIPTION
EGM3195	35 Back Piccadilly (1999)	SJ 8454 9831	Building survey undertaken by Central Archaeological Service, English Heritage.
EGM3353	47-53 (odd) Tib Street (1996)	SJ 8455 9864	Archaeological building survey.
EGM3356	Ashton Canal Corridor (2001)	SJ 8558 9829	Archaeological assessment of a study area which comprised the proposed route corridor for the fast bus routes and combined pedestrian and cycle routes to the Commonwealth Games Stadium, together with areas of proposed site-based environmental improvements along that corridor.
EGM3366	Jacksons Warehouse (2002)	SJ 8479 9834	Archaeological building survey.
EGM3380	Piccadilly Basin Development Phase II, Rochdale Canal (2002)	SJ 8486 9832	Archaeological watching brief.
EGM3646	Dale Street Water Wheel Survey (1996)	SJ 84710 98180	The object of this project was to record the remains of the Rochdale Canal Company's waterwheel, associated machinery and structures surviving at Dale Street in Manchester.
EGM3803	30-34 George Leigh Street (2006)	SJ 84836 98693	DBA undertaken ahead of proposed development on the site.
EGM3807	Lever Street (2006)	SJ 84616 98532	DBA undertaken by UMAU. The development area contained the sites of late 18th century workers' housing, possible commercial properties and 2 public houses. These sites were destroyed in the late 19th-early 20th century during the construction of basements associated with now demolished late 19th-early 20th century buildings. Therefore no further archaeological work is recommended.
EGM3827	1-7 Stevenson Square (2007)	SJ 84583 98495	A desk-based assessment and site inspection of an area containing standing buildings considered to be of local significance. It is recommended that prior to demolition an archaeological survey is carried out.
EGM3841	Brownsfield Mill, Ancoats (2007)	SJ 84896 98416	Archaeological building survey commissioned as part of restoration works to listed structure.
EGM3844	Carvers Warehouse, Rochdale Canal Basin (2006)	SJ 84701 98194	Archaeological building survey of a listed building undertaken to provide an analysis and understanding of the building complex as part of the planning process.

REF (HER)	NAME	GRID REF	DESCRIPTION
EGM3851	74-78 Great Ancoats Street (2008)	SJ 84825 98500	An archaeological desk-based assessment undertaken in response to planning application with recommendation for trial trenching to establish the presence or absence of archaeological remains.
EGM3852	20 to 22 Dale Street (2008)	SJ 84534 98353	Building survey carried out in response to a planning application.
EGM3856	Newton Street (2008)	SJ 84687 98405	DBA carried out to inform planning application ahead of proposed redevelopment of site. Assessment of standing structure presented in separate report.
EGM3882	51 Hilton Street (2008)	N/A	Archaeological DBA undertaken ahead of development. Area considered to have nineteenth-century remains of local significance.
EGM3884	51 Hilton Street (2008)	SJ 84712 98343	Archaeological building survey of nineteenth-century buildings carried out ahead of development.
EGM4017	Vacant land on the corner of Pickford Street and Jersey Street (2011)	SJ 8488 9852	Excavation of an area measuring approximately 24m by 11m to evaluate a proposed development site. The excavation area covered the mapped footprint of a block of early 19th century back-to-back houses.
EGM4030	McConnel & Co Mills (2007)	SJ 8498 9856	Archaeological recording work undertaken during refurbishment works at a historic mills complex. A condition for a watching brief was attached to planning consent. The work undertaken went beyond the planning requirements but fell short of a full archaeological survey
EGM4031	87-91 Great Ancoats Street and vacant land on the corner of Pickford Street and Jersey Street (2011)	SJ 8487 9852	Desk-based assessment of a proposed development site that contained 18th- and 19th-century buildings.
EGM4109	Tariff Street (2014)	SJ 8483 9831	Desk-based assessment of a proposed residential development site adjacent to the Rochdale Canal.
EGM4110	Tariff Street (2009)	SJ 8472 9835	Four trial trenches and subsequent open-area excavation, in advance of development.
EGM4129	Tib Street/Foundry Lane (2014)	SJ 8458 9868	Assessment of the survival of archaeological and heritage assets prior to redevelopment of a corner plot at the junction of Tib Street and Foundry Lane. The site originally held workers' housing dating from the late 18th century which was demolished to make way for a corn mill in the early 19th century. The mill was replaced in the mid to late 20th century by housing. The site is considered to have low to medium archaeological potential.

REF (HER)	NAME	GRID REF	DESCRIPTION
EGM4350	Former Manchester Corporation Electricity Substation (2017)	SJ 8479 9860	Level 2 historic building survey undertaken prior to demolition of a 1920s electricity substation.
EGM4355	Former Edinburgh Castle Public House, Ancoats (2015-16)	SJ 8484 9864	Historic building recording undertaken in advance of renovation of a former public house, providing an analytical descriptive account of the building and its history and development.
EGM4377	Marlsbro House (2018)	SJ 8468 9840	Assessment undertaken to identify the nature, extent and significance of the archaeological resource in order to inform a proposed development requiring the demolition of the existing 4-storey industrial building on the site. A detailed consideration of the above-ground historic environment was presented in a separately commissioned heritage appraisal.
EGM4486	Mangle Street (2020)	SJ 8460 9825	In June 2020, Salford Archaeology was commissioned to undertake an archaeological evaluation and historic building investigation in advance of a residential development on Mangle Street in the Northern Quarter of Manchester city centre. This comprised the excavation of a single trench that measured 7.2m x 6m. The results obtained from the evaluation trenching concluded that some physical remains of the late 18th-century houses survived in-situ. Most of the remains consisted of sub-floor wall foundations. The buildings were not cellared. The historic building investigation of the eastern boundary wall of the site revealed evidence for multi-phased construction activity along the Mangle Street frontage. The earliest fabric related to an 18th-century structure, which was probably built or used as a workshop.
EGM4526	Swan Street (2011)	SJ 8458 9871	Desk-based assessment, undertaken to support the proposed redevelopment of a site in Manchester's Northern Quarter. Preparation of the report followed a site walkover investigation and a comprehensive examination, analysis and assessment of historical records. The report then assesses the significance of the known and potential archaeological resource before detailing a series of recommendations to mitigate and manage this resource during the site's future redevelopment.
EGM454	The Brownsfield Mill (1988)	SJ 8490 9840	Archaeological building survey.

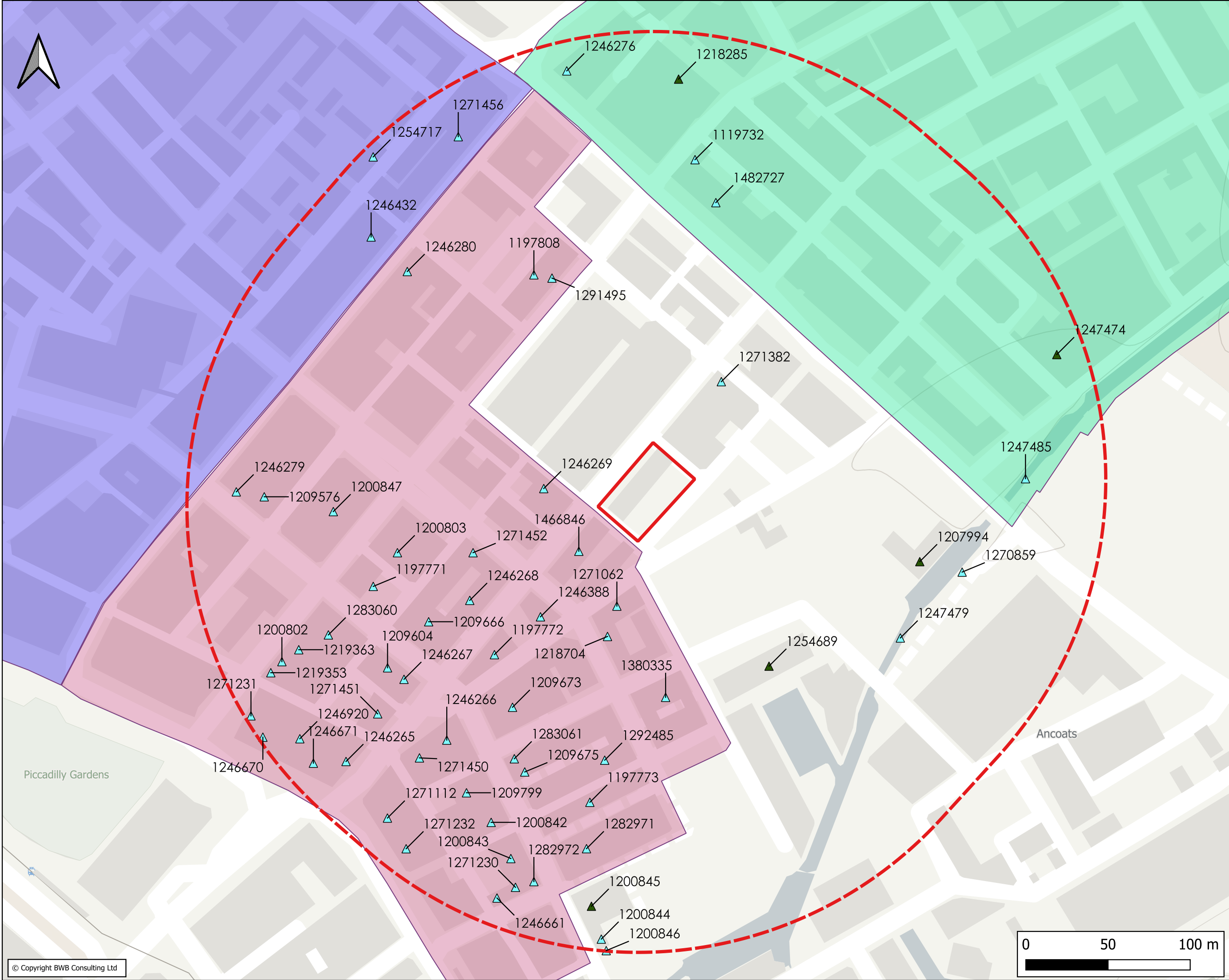
REF (HER)	NAME	GRID REF	DESCRIPTION
EGM4584	Swan Street (2011)	SJ 8458 9871	Watching brief undertaken during groundworks prior to the construction of an office building. Few archaeological deposits were revealed; those that were present included the basement walls of C19 shops and warehouses.
EGM4617	Brownsfield Mill (2016)	SJ 8489 9841	Archaeological desk-based assessment undertaken in advance of proposed refurbishment of the mill for residential purposes. The assessment aimed to identify the nature and significance of the below-ground archaeological resource so as to enable informed recommendations for future treatment of any surviving remains. Record comprises a site inspection and document presenting historical and archaeological evidence for the study area, a gazetteer and map regression. The report also contains a strategic outline for further investigation.
EGM4621	Brownsfield Mill (2016)	SJ 8489 9841	Archaeological desk-based assessment undertaken in advance of proposed refurbishment for residential purposes.
EGM4676	Corner of Mangle Street and Back Piccadilly (2017)	SJ 8460 9825	Desk-based assessment undertaken in advance of proposed development. The aim of the assessment was to gain information from existing historical records, cartographic sources and site investigation to determine the nature of the potential archaeological resource within the application area and to make recommendations to determine future strategy/mitigation and management of the resource. Further, to define the impact of any proposed development on archaeological/historical resources on the periphery of the site. Comprised site visit and visual inspection, a photographic record and documentary research.
EGM4704	Block A Blossom Street (2017)	SJ 8476 9862	Archaeological evaluation of a potential development site, undertaken in advance of proposed development. The site was divided into two blocks; only Block A was examined during the recent evaluation. Comprised an evaluation, consultation of a previously undertaken DBA, archaeological excavation of 5 trenches (4 fully, the fifth abandoned), hand-cleaning of encountered objects, and photographic, written and drawn recording of archaeological features.

REF (HER)	NAME	GRID REF	DESCRIPTION
EGM4723	74-88 Great Ancoats Street (2016)	SJ 8483 9849	Archaeological excavation undertaken in advance of planned development on the site involving the construction of a tower block with commercial units to the ground floor and residential units above. The aim of the assessment was to investigate the potential for below-ground archaeological resource. The evaluation revealed a series of brick buildings and identified an area considered by GMAAS to be worthy of fuller investigation. Comprised archaeological excavation, strip, map and record investigation, photographic recording of archaeological features and deposits.
EGM4815	Port Street (2021)	SJ 8485 9843	A desk-based assessment prepared to support a planning application for redevelopment. The assessment demonstrated that the application site likely remained largely agricultural until the early 19th century, when an arm of the Rochdale Canal was constructed within the site. By 1831 a row of terraced commercial properties and a public house had been built, fronting Great Ancoats Street, and by the mid-19th century a timber and slate wharf had also been established within the development area. A machine tool works and a garage had replaced part of the wharf and the canal arm was filled in by the mid-20th century. All the buildings within the development area have since been demolished.
EGM4816	Port Street (2021)	SJ 8485 9843	A heritage statement prepared to support a planning application for redevelopment.
EGM4820	Dakota Manchester (2017)	SJ 8485 9819	Archaeological evaluation commissioned in advance of proposed development of a nine-storey hotel. The aim of the assessment was to mitigate the damage or loss of archaeological remains. Comprised documentary research (plans), excavation of four trenches, EDM tachometric recording, topographic survey and photographic recording.
EGM4839	25-27 Dale Street (2017)	SJ 8456 9837	Historic building report concerning 25-27 Dale Street, commissioned in advance of proposed development. The aim of the report was to establish the significance of the site and inform the development of proposals for change to the site. Comprised documentary research supplemented by archival and secondary sources, a site inspection/survey and photographic recording.

REF (HER)	NAME	GRID REF	DESCRIPTION
EGM4846	Block B, Blossom Street (2017)	SJ 8482 9862	Evaluation commissioned in advance of proposed development. The aim of the evaluation was to investigate the archaeological interest of the site and record and preserve any remains of archaeological interest. Comprised trial trenching, excavation, photographic recording, and a topographic survey.
EGM4871	Dakota Manchester (2017)	SJ 8482 9817	Archaeological excavation, commissioned in advance of proposed development of a nine-storey tower. The aim of the assessment was to ensure that a record was made of the surviving remains to mitigate their ultimate loss. Comprised archaeological excavation of trenches, GPS planning/recording, photographic recording, field visit/inspection.
EGM4872	Burlington House, Tariff Street (2017)	SJ 8483 9831	Archaeological excavation, commissioned in advance of proposed development of an 11-storey building comprising 91 residential apartments. The aim of the excavation was to satisfy a condition attached to planning consent that required a programme of archaeological excavation to be undertaken in advance of development. Comprised excavation of an open area trench, photographic and written recording and field visits/inspections.
EGM4880	Express Building (2017)	SJ 8473 9867	Heritage statement regarding the Express Building, Manchester, commissioned to inform the development of proposals for the refurbishment of the building for office use. The aim of the report was to provide a heritage appraisal for the building. Comprised documentary research and a building survey.
EGM4935	43-47 Piccadilly (2018)	SJ 8448 9830	Archaeological desk-based assessment undertaken in support of a planning application for the erection of a 10-storey mixed use scheme that incorporates a retained 3-storey Listed Building. The aim of the assessment was to produce a report to enable judgements to be made on the condition and significance of remains and any mitigation that may be necessary on the site in relation to the proposed development. Comprised documentary research and a walkover survey.

REF (HER)	NAME	GRID REF	DESCRIPTION
EGM5014	Blossom Street (2018)	SJ 8479 9860	Archaeological excavation on land bound by Great Ancoats Street, Blossom Street, Henry Street and adjacent properties, with Gun Street through the centre of the site, carried out in advance of proposed development. The proposed development includes the construction of an eight-storey and a seven-storey residential buildings. The assessment was carried out in order to fulfil a condition of planning consent. Comprised a strip, map and record of targeted area within Block A along north-eastern half of Block B; excavation; GPS survey; photographic survey.
EGM5038	Land at Tariff Street (2018)	SJ 8478 9839	Historic environment desk-based assessment, undertaken in advance of submission of a planning application for proposed residential/retail development. The aim of the assessment was to produce a report detailing any archaeological potential, and to assess the potential impacts of the proposed development upon any buried and upstanding archaeological remains, historic buildings, the historic landscape and the settings of nationally designated assets and to assess their significance. Comprised documentary research and a walkover survey.

APPENDIX 2: Location of Non-designated Assets



Notes

1.Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.

2.This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

3.All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.

4.Any discrepancies noted on site are to be reported to the engineer immediately.

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Key

Site Boundary

250m Study Area

Listed Building

II*

II

Conservation Area

Ancoats

Smithfield

Stevenson Square

PM	09.01.25	FINAL ISSUE		GW	JM
Rev	Date	Details of issues/ revision		Drw	Rev

Issues & Revisions

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Client

ATKINS RÉALIS PPS
LIMITED

Project Title

POSTAL STREET,
MANCHESTER

Drawing Title

FIGURE 2: LOCATION OF
DESIGNATED ASSETS

Drawn:	GEORGIE WARDALL	Reviewed:	JIM MACQUEEN
BWB Ref:	220381	Date:	09.01.25
		Scale@A3:	NTS

Drawing Status

FINAL

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
220381-BWB-ZZ-XX-RP-LH-0001	S2	P01

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APPENDIX 3: Location of Archaeological Events

APPENDIX 4: Map Regression

APPENDIX 4



Plate 1: Plan of the Towns of Manchester & Salford (1750)

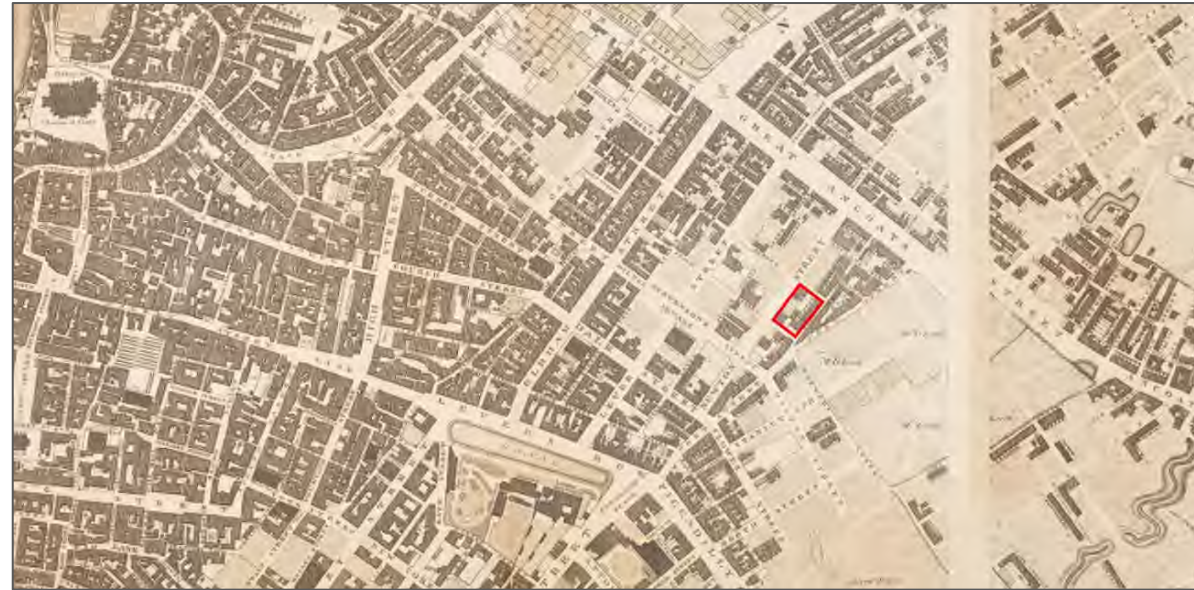


Plate 2: Green & Thornton's Plan of Manchester and Salford (1794)



Plate 3: Plan von Manchester und Saalford in England (1810)



Plate 4: Manchester and Salford 1:10,560 OS plan (1851)



Plate 5: Goad's Insurance Plan of the City of Manchester Vol. II: sheet 31 (1888)



Plate 6: Lancashire CIV.7 25-inch OS plan (1893)



Plate 7: Lancashire CIV.7 25-inch OS plan (1922)



Plate 8: Lancashire CIV.7 25-inch OS plan (1934)



Plate 9: Lancashire Sheet CIV.NE 6-inch OS plan (c. 1947)

APPENDIX 5: Plates

APPENDIX 5



Plate 1: Photograph of the Site taken from Newton Street in 1967 [Manchester Libraries, m03664]



Plate 2: Photograph of the Site taken from the junction of Dean Street and Port Street in 1966 [Manchester Libraries, m01431]

APPENDIX 6: GEOLOGICAL INVESTIGATION REPORT

Postal Street, Manchester

Phase 2 Ground Investigation

Curtins Ref: 080401-CUR-00-XX-RP-GE-002

Revision: P01

Issue Date: 24 August 2022

Client Name: Faithful & Gould (Manchester)

Client Address: The Exchange, 3 New York Street, Manchester, M1 4HN

Site Address: Postal Street, Manchester, M1 1EE



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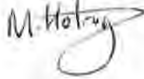
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Rev	Description	Issued by	Checked	Date

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins Limited with respect to the information contained in the report will not extend to any third party.

Author	Signature	Date
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Authorised	Signature	Date
R Allen BSc (Hons) MSc FGS MCIWEM C.WEM CEng Principal Engineer		24 August 2022

Executive Summary

Appointment	In March 2022 Curtins were instructed by Faithful & Gould (Manchester) to undertake a Phase 2 Ground Investigation for on an area of land located directly south of Postal Street and east of Newton Street, in, Manchester, M1 1EE. The site covers an area of 0.16 Ha, centred at National Grid Reference 384730, 398440 The aim of the ground investigation is to characterise the geo-environmental and geotechnical conditions prior to the construction of a 9 storey residential block with +100 apartment units. The ground floor includes reception area and communal amenities, a cycle store, refuse store, and residential apartments in the east and north. A residents courtyard garden is present at ground level.
Current Site Status	The site is located within Manchester City Centre off Postal Street and is currently a hard standing car park to the southeast and a row of single of commercial units adjacent to Newton Street covering the remaining area of the site. The topography of the site is level. The northern boundary is marked by Postal Street, eastern boundary is marked by Dean Street, the southern boundary is marked by Faraday Street, and the western boundary is marked by Newton Street.
Summary of Phase 1	Earliest available mapping between (1850s) records the site as being occupied by a cotton mill and plate manufactory. By 1891 these buildings were demolished and replaced with two rows of terraced houses. By 1969, the terraced houses in the eastern and southern sections of the site were demolished, the houses in the north were demolished by 1985. The garages in northwest were later constructed, with the remaining area of the site occupied by car parking facilities. Based on the site's historical land use, Made Ground is anticipated. BGS mapping indicates superficial deposits comprising glacial till (clay) underlain by the Chester Formation (sandstone). The site is underlain by a Principal Aquifer within the bedrock formation and a Secondary Undifferentiated Aquifer within the superficial deposits. The nearest surface water feature is the Rochdale Canal, 125m southwest of the site. There are no surface water abstractions or discharge consents within 400m. The site not within a source protection zone and there are no groundwater abstraction points within 700m. Primary potential risks to be investigated during this report, as well as establishing ground conditions for geotechnical design, included; potential for land gas and risks to human health and groundwater from Made Ground soils.
Fieldworks Undertaken	The pre-demolition ground investigation works was undertaken between 23rd and 26th May 2022, comprising 1 Np. Cable percussion borehole to 23.30m bgl, 5 No. window sample boreholes to 5.00m to 5.45m bgl and 1 No. rotary borehole to 35.00m bgl, including rock coring. Ground gas and groundwater monitoring standpipes were installed within 5 No. boreholes. Selected soil samples were subject to chemical and geotechnical analysis and six rounds of ground gas monitoring visits have been undertaken.
Encountered Ground Conditions	The ground conditions on site generally comprised tarmac or concrete underlain by granular made ground, and reworked cohesive made ground, to 2.10m to 3.50m bgl. The underlying natural glacial till soils comprise firm or stiff silty sandy gravelly clay, with bands of sandy clayey gravel and clayey sand to 22.90m to 23.80m bgl. The bedrock formation was encountered. The bedrock formation underlying glacial till comprises extremely weak to moderately strong brown fine to coarse grained sandstone. Groundwater levels within the bedrock formation appear consistent throughout the monitoring period, with head level in the region of 22.40m to 22.50m bgl. Localised perched water may be encountered in shallow made ground soils.
Environmental Laboratory Testing and Ground Gas Monitoring Results	With respect to the proposed '<i>Residential without plant uptake</i>' end-use, elevated concentrations of lead (8 No. samples) and arsenic (1 No. sample) were recorded. 5 No. samples, recorded asbestos, recovered as amosite and chrysotile cement, amosite board and amosite loose fibres. Asbestos in soil concentrations in the region of 0.098% w/w and 4.623% w/w were recorded. Bulk asbestos fibre concentrations of 15% were recorded in chrysotile cement in BH01 (0.65m bgl) and RC01 (0.75m bgl). A maximum carbon dioxide concentration of 0.8% %_v and methane below the detection limit has been recorded in the boreholes.
Ground Contamination and Ground Gas Assessment	A Low risk rating is identified to end-users from direct contact, inhalation and ingestion of contaminants within Made Ground soils on site. The building footprint will break the source-pathway-receptor linkage across the whole site, and no volatile contamination was identified. A Moderate risk is identified to construction and maintenance workers. An asbestos management plan should be in place during construction works. Construction and maintenance workers should be provided with PPE during all works, with reference to the environmental chemistry results.

Phase 2 Ground Investigation

	A Low risk is identified to the nearby surface waters, as no gross contamination was identified during the ground investigation, and the nearest receptor is >100m from the site. A Low risk is identified to the underlying Principal Aquifer. No gross contamination identified during ground investigation works. No groundwater body has been identified in the shallow superficial deposits. Given this and the encountered impermeable cohesive Glacial Till, there is no pathway for contaminants to reach the Principal Aquifer receptor. A Low risk is identified to site end-users from ground gas migration and inhalation from soils. The Gas Screening value for the site is taken as 0.008 l/hr for carbon dioxide, corresponding to BS8485 CS1 gas regime requiring no gas protection measures.
Geotechnical Assessment	Given the high anticipated loads associated with the 9 storey apartment building, it is considered that shallow foundations will not be suitable. It is therefore advised that a piled foundation solution is adopted. Pile design and installation are continually evolving processes, it is recommended that specialist piling contractors are contracted as to the suitability and carrying capacity of the piles in the ground conditions pertaining to the site. The carrying capacity of piles depends not only on their size and the ground conditions but also their method of installation. Additional post-demolition investigation is proposed to further inform pile design. The following geotechnical consideration should also be considered: • Presence of existing services; • Based on the findings of the ground investigation, it is recommended that consideration is given to constructing suspended ground floor slabs, bearing on pile caps and supported by a network of beams. Laboratory test results indicate a Design Sulphate Class for concrete may be taken as DS-1 and AEC class of AC-1 for the made ground and natural soils.
Recommendations	Based on the findings of the ground investigation, the following recommendations are made: 1) Additional investigation is required, following demolition of the existing garages on site. Obtain environmental samples from beneath garage footprint, and additional geotechnical information to aid pile design. 2) Asbestos management plan during construction works. 3) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein. 4) A Remediation Strategy and Verification report will be required to detail and approve the above measures and ensure imported soils for soft landscaping are suitable for use. 5) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer. It is further recommended that the above is undertaken in advance of construction works commencing on site.

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1.0 Introduction

1.1 Project Background

In March 2022 Curtins were instructed by Faithful & Gould (Manchester) to undertake a Phase 2 Ground Investigation for an area of land located directly south of Postal Street and east of Newton Street, in Manchester, M1 1EE. The site covers an area of 0.16 Ha, centred at National Grid Reference 384730, 398440

The location and extent of the site is shown in *Figure 2.1* on the following page.

A site location plan is presented on *Figure 2.1*.

It is understood that the proposed site development is a 9 storey residential block with over 100 apartment units. The ground floor includes reception area and communal amenities, a cycle store, refuse store, and residential apartments in the east and north. A residents courtyard garden is present at ground level. A proposed site plan is included in *Appendix A*.

1.2 Scope of Services

A scope for the intrusive ground investigation was developed with the following aims:

- i) Support the associated planning application and support discharge of relevant pre-commencement contaminated land planning conditions; and
- ii) Obtain geotechnical information and characterise shallow site soils for foundation design for the proposed structures.

Specifically, the Phase 2 Ground Investigation Report is intended to:

- a) Determine the risk of the proposed end-user being adversely impacted by potential contamination in shallow site soils that may be present on the site due to its known current, recent and historical use;
- b) Determine if there is a risk to the end-user from soil gases including methane, carbon dioxide, carbon monoxide and hydrogen sulphide;
- c) Characterise site wide natural soils; and
- d) Recommendations for the design of foundations and building ground floor slabs.

Detailed flood risk assessment, ecology, archaeological studies and waste classification for off-site disposal are outside of the scope of this report.

2.0 Phase 1 Preliminary Site Assessment Summary

A Phase 1 Preliminary Risk Assessment report was undertaken by Curtins in November 2021 (Ref. 1). A summary of the detailed findings of this report, comprising current site setting, history, geology and hydrogeology/hydrology is presented within this Section. This Phase 2 report must be read in conjunction with the Phase 1 Preliminary Risk Assessment Report.

2.1 Current Setting

The site is located within Manchester City Centre off Postal Street and is currently a hard standing car park to the southeast and a row of single of commercial units adjacent to Newton Street covering the remaining area of the site. The topography of the site is level. The northern boundary is marked by Postal Street, eastern boundary is marked by Dean Street, the southern boundary is marked by Faraday Street, and the western boundary is marked by Newton Street.

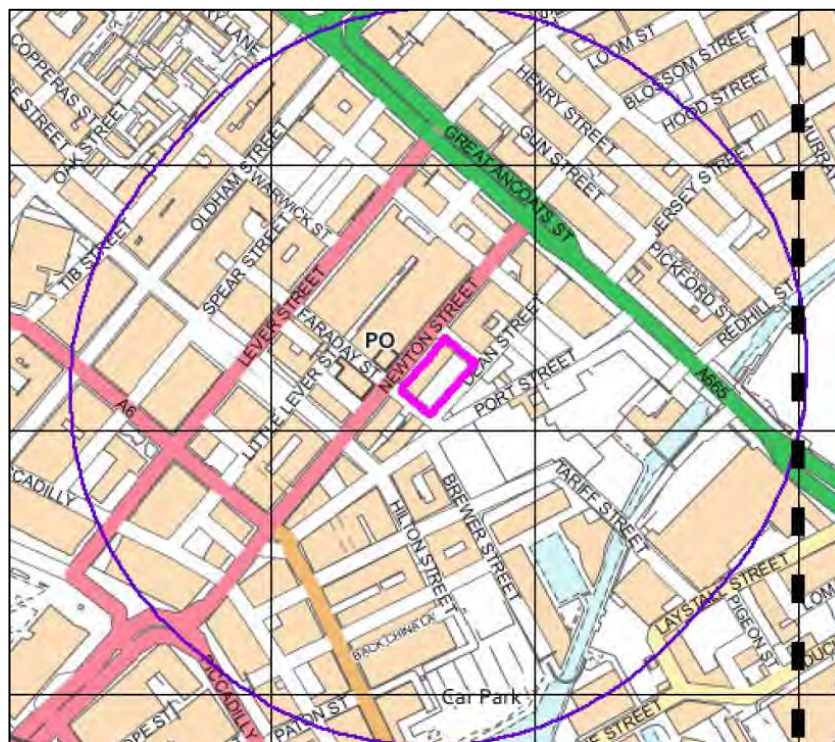


Figure 2.1 – Site Location Plan, approximate site boundary outlined in pink and 250m buffer in purple.
(Landmark Information Group)

2.2 Previous Site Use

Earliest mapping (1848-1851) records the site with industrial buildings including a cotton mill and a plate manufactory. By 1891 these buildings have been demolished and replaced with two rows of terraced houses. By 1969 the terraced houses within the eastern and southern sections of the site have been demolished with the houses in the northern and western demolished by 1985. Two large buildings have

been constructed along the north western boundary adjacent to Newton Street with remain to present day with the south of the site adjacent to Dean Street remaining as car parking.

Throughout the site's history, its surroundings are generally occupied by residential properties and industrial buildings with most being demolished and reconstructed or redeveloped with commercial buildings and car parking with limited contaminative potential.

2.3 Published Geology

A review of British Geological Survey (BGS) map, 1:50,000 Scale, Solid and Drift Editions, Manchester, Sheet 85, (Ref. 2) indicates the following geological sequence:

- Glacial Till Deposits; and
- Chester Formation.

There are no BGS faults recorded on site.

There are 3 BGS recorded boreholes located within 50m of the site boundary (Ref. 2), these are detailed and presented within *Table 4.2* below:

Table 2.3 – Historical Borehole Record from Surrounding Area

Record Reference	Location (NGR)	Details (bottom to top of strata/details/thickness of strata)	
SJ89NW3779	19m Northwest (384700,398460)	0.00m to 0.10m bgl	Bituminous Surfacing (0.10m)
		0.10m to 0.45m bgl	Reinforced Concrete (0.35m)
		0.45m to 0.70m bgl	Made Ground of clay, ashes and brick (0.25m)
		0.70m to 2.90m bgl	Made Ground of soft brown clay with stone and brick inclusions (2.20m)
SJ89NW3986	28m East (384774,398429)	2.90m to 5.00m bgl	Stiff/very stiff brown silty and sandy CLAY with grey fissures, stone and coal inclusions (2.10m)
		5.00m bgl	Borehole terminated
		0.00m to 0.05m bgl	Bituminous Surfacing (0.05m)
		0.05m to 0.25m bgl	Setts (0.20m)
SJ89NW3985	44m Southwest (384692,398379)	0.25m to 0.35m bgl	Made Ground of ashes, cinders and stones (0.10m)
		0.35m to 1.70m bgl	Made Ground of clayey ashes, cinders and brick pieces (0.35m)
		1.70m to 5.30m bgl	Stiff brown silty and sandy CLAY with grey fissures, stone and coal inclusions with very stiff zones (3.60m)
		5.30m	Borehole terminated
SJ89NW3985	44m Southwest (384692,398379)	0.00m to 0.05m bgl	Bituminous Surfacing (0.05m)
		0.05m to 0.25m bgl	Setts (0.20m)
		0.25m to 0.55m bgl	Ashes (0.30m)
		0.55m to 1.20m bgl	Made Ground of stiff brown clay, ashes and brick pieces (0.35m)
SJ89NW3985	44m Southwest (384692,398379)	1.20m to 4.50m bgl	Very stiff brown silty and sandy CLAY with grey fissures, stone and coal inclusions (3.30m)
		4.50m to 6.50m bgl	Firm/stiff silty and sandy laminated CLAY with grey fissures, stone and coal inclusions (2.00m)

Record Reference	Location (NGR)	Details (bottom to top of strata/details/thickness of strata)
		6.50m Borehole terminated

2.3.1 Made Ground Deposits

The BGS maps do indicate Made Ground on site.

2.3.2 Superficial Deposits

Glacial Till Deposits comprising a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

2.3.3 Bedrock Deposits

Bedrock deposits are present as the Chester Formation of Triassic age, comprising sandstone.

2.3.4 Mining and Quarrying

The site is located within a coal mining reporting area; however, is not within a high-risk area and the nearest coal mining features (shafts, outcrops, etc.) are not within 1km of the site. Therefore, risk to the development from historic coal mining is low and has not been considered further.

There are no BGS recorded mineral sites within 1km of the site.

2.3.5 Other Pertinent Geological Existing Geological Records

The previous report confirms that there is a no hazard to very low risk from the following ground stability hazards on the site; collapsible ground, compressible ground, ground dissolution, landslide ground, running sands and shrinking or swelling clay.

UK Radon Mapping confirms the site is situated in area where less than <1% of homes are above the radon action level. Radon protection measures are therefore not considered necessary within the proposed development.

2.4 Hydrogeology and Hydrology

Environment Agency data indicates that the geological sequence underlying the site has the following hydrogeological characteristics:

Table 2.4 – Geological/Hydrogeological Succession

Geology	Associated Hydrogeological Classification
Made Ground	N/A
Glacial Till Deposits ¹	Secondary Undifferentiated Aquifer ³
Chester Formation ²	Principal Aquifer ⁴

Notes:

1. A heterogeneous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
2. Aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type.
3. The formation comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish-brown sandy matrix and consist mainly of pebbles of brown or purple quartzite. Gravel is composed of well-rounded pebbles, cobbles and boulders in a coarse to fine granulestone and silty sandstone matrix.
4. These are layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.

The nearest surface water feature is the Rochdale Canal, located approximately 125m southeast. River Quality is noted as Grade B.

There are no surface water abstractions within 900m and no active discharge consents recorded within 400m of the site.

The site is not situated within a Source Protection Zone (SPZ). There are no groundwater abstraction point within 700m of the site.

There are two pollution incidents to controlled waters recorded within 250m of the site. Recorded 226m south and 250m east both dated 1996 and noted as Category 3 – minor incident.

2.5 Landfill

There are no recorded landfill sites within 700m of the site.

Historical maps identified the presence of a wharf and basin approximately 49m southeast of the site until 1923, that may have been infilled.

The Envirocheck Report (Ref. 1) identifies one potentially infilled land (water) within 50m of the site which was infilled with unknown material in 1923 located 49m southeast which is assumed to be the historic basin and wharf.

2.6 Unexploded Ordnance (UXO) Risk Assessment

Risk mapping for UXO's has placed the site in a moderate-risk area (Ref. 4). Moderate-risk areas are those that show a bomb density of between 11 and 50 bombs per 1000 acres and that may contain potential WWII targets. A review of the available historic mapping does not show any evidence of bomb

damage to the site. The risk mapping indicates that there are Luftwaffe targets approximately 700m north of the site.

Analysis of historical bomb mapping from the University of Manchester (Figure 2.6) shows that less than 74m west from the site a fire bomb (red circle) had hit and damaged a building in June 1941 (Ref. 5).



Figure 2.6: Site boundary shown in red.

Given the proximity to the nearest bomb strike, and no recorded damaged buildings in the immediate vicinity of the site, a detailed UXO risk assessment was not obtained for the ground investigation works.

During construction works, the Principal Contractor should undertake their own unexploded ordnance risk assessment prior to commencement.

2.7 Summary of Phase 1 PCSM

A summary of potential pollutant linkages at the development site identified in the previous Phase 1 reports (Ref. 1) is presented in *Table 2.7*, were identified as requiring further investigation to enable the safe redevelopment of the site.

Table 2.7 – Preliminary Conceptual Site Model

Phase 2 Ground Investigation

Source	Pathway	Receptor	Risk
Significant sources of on-site contamination: - Made Ground of unknown composition from uncontrolled deposition of materials onsite during the construction and demolition of industrial buildings and terraced houses on site - Potential contamination from oils/hydrocarbons relating to the hardstanding car parking on site. Significant sources of off-site contamination: - Uncontrolled deposition of Made Ground during the construction of roads and structures and demolition near and adjacent to the site's boundaries. - Potential contamination from industrial works within 100m surrounding the site. - Potential contamination from oils/hydrocarbons relating to the garage 40m from the site and from hardstanding car parking on site.	Direct contact, ingestion, inhalation (dust and vapours)	End-user of site (High rise residential) & Construction Workers	Moderate
	Vertical migration through the superficial deposits (soils) May occur due to existing service corridors and physical processes including; capillary action and downwards into the natural deposits through infiltration.	Groundwater Secondary Undifferentiated Strata (Superficial deposits)	Moderate/ Low
		Groundwater Principal Aquifer (bedrock)	
		Surface Water (Rochdale canal located over 125m southeast)	Low
Significant sources of ground gas: - Historic basin and wharf located 49m to the southern boundary of the site infilled with unknown material that has the potential to contain organic / putrescible material. - Localised organically rich deposits present within the natural soils..	Vertical and horizontal migration through existing service corridors and the underlying superficial deposits	Site End Users (High rise residential)	Moderate

Potential contaminants of concern associated with the sources identified within the Conceptual Site Model in *Section 6.0* of this reporting include but are not limited to: broad range aliphatic and aromatic hydrocarbons present within any fuel oils; polycyclic aromatic hydrocarbons (PAHs); inorganic compounds including heavy metals; asbestos present in discarded building materials from historical uses of the site.

Potential contaminants associated with the airborne dust/particulates include but are not limited to polycyclic aromatic hydrocarbons and inorganic compounds including toxic metals that are also accounted for by potential onsite contaminants of concern.

3.0 Phase 2 Investigation Scope of Works

Site investigation works were undertaken by Curtins between 23rd and 26th May 2022.

The scope of the ground investigation was designed in general accordance with current UK guidance including:

- LCRM (Ref. 6);
- British Standard (BS) 10175:2011+A2:2017 (Ref. 7);
- BS5930:2015+2020 (Ref. 8); and,
- BS EN1997: Part 2:2007 Eurocode 7 (Ref. 9).

The scope and rationale are summarised in *Table 3.0*.

Table 3.0 – Scope and Rationale of Fieldwork Undertaken

Exploratory Hole Type	Exploratory Hole Reference	Ground Level (m AOD)	Exploratory Hole Depth (m bgl)	Rationale
Cable Percussion Boreholes	BH01	48.81	23.30	To inform foundation design. To obtain soil samples for soil chemical analysis. To allow for ground gas and groundwater monitoring.
Window Sample Boreholes	WS01 WS02 WS03 WS04 WS05	48.86 48.77 48.58 48.54 48.94	5.45 5.00 5.45 5.45 5.45	To inform foundation design. To obtain soil samples for soil chemical analysis. To allow for ground gas and groundwater monitoring.
Rotary Boreholes	RC01	48.69	35.00	To inform foundation design. To obtain soil samples for soil chemical analysis. To allow for ground gas and groundwater monitoring.

For information regarding the location of the exploratory hole locations, refer to Curtins drawing ref. 080401-CUR-00-XX-DR-GE-80004-V01-Exploratory Hole Location Plan, included in Appendix A.

3.1 Soil Logging and Sampling

Exploratory borehole arisings were logged on site by a qualified Engineer. All exploratory holes were logged in accordance with the requirements of BS5930:2020 (Ref. 8) including recording observed visual and olfactory indications of contamination.

Exploratory hole logs are provided in *Appendix B*.

3.2 Monitoring Well Installations

Ground gas and groundwater monitoring slotted 50mm diameter pipes were installed within 3no. window sample boreholes, 1no. cable percussive borehole (shallow and deep installation) and 1no. rotary borehole.

A bentonite seal was placed above and below the screened section of the borehole to minimise potential for downward migration of contaminants and the creation of a preferential migratory pathway. A gravel aggregate surround was installed in the annulus between the sides of the borehole and the slotted sections of pipe.

The monitoring wells were primarily designed to assess the potential for ground gas and to collect groundwater where possible. The screened sections therefore focused on the more permeable near surface deposits which are likely to be producing ground gas.

The installed response zones are summarised in *Table 3.2* below.

Table 3.2 – Monitoring Well Response Zones

Borehole Ref.	Response Zone(s) m bgl (m AOD)	Strata Description(s)
BH01 (shallow)	1.00 – 3.00 (47.71 – 45.71)	Made Ground
BH01 (deep)	19.50 – 22.50 (29.31 – 26.31)	Glacial Till
WS01	1.00 – 2.50 (47.86 – 46.36)	Made Ground
WS03	1.00 – 2.00 (47.58 – 46.58)	Made Ground
WS05	1.00 – 2.20 (47.94 – 46.74)	Made Ground
RC01	26.00 – 35.00	Chester Formation

Copies of borehole logs can be referred to in *Appendix B* of this report.

3.3 Post-Investigation Monitoring

3.3.1 Ground Gas and Groundwater Monitoring

Six groundwater level and ground gas monitoring visits over three months have been undertaken, to assess the groundwater levels and the ground gas conditions. Visits were undertaken between 31st May 2022 and 8th August 2022.

The results of the groundwater level monitoring are detailed in *Section 6.1*.

The results of the ground gas monitoring are detailed in *Section 8.0*.

4.0 Laboratory Analysis

4.1 Geo-environmental Analysis

Representative soil samples were selected for laboratory chemical analysis, based on field observations and to provide information about the encountered ground conditions.

Soil samples were placed in laboratory provided containers and stored in cool boxes prior to being transported to the nominated laboratory under the laboratory's chain of custody documentation. The laboratory selected by Curtins for chemical and geotechnical analysis was Envirolab Ltd (UKAS and MCERTS accredited). Geotechnical analysis was sub-contracted i2 Analytical, (UKAS accredited laboratory).

The sampling positions were generally located in a non-targeted, systematic array, to give an adequate and representative coverage of the sites proposed end use and the immediate environmental setting, concentrated in the near surface deposits.

4.1.1 Soil Analysis

The source material of contaminants of concern potentially present on the site was considered to include, amongst others; organic matter, ash and fill, hydrocarbons (e.g. fuel/oils), polyaromatic hydrocarbons (PAHs), heavy metals, asbestos, VOCs, SVOCs and PCBs. The extent of the above is captured by the broad environmental testing suites listed in *Table 4.1.1*.

Table 4.1.1 – *Environmental Chemistry Analysis Suite: Soils*

Suite Ref.	Analyte	Limit of Detection
Soils Suite	Asbestos Screen	-
	pH Value	0.01 pH
	2:1 Water Soluble Sulphate	0.01 g/l
	Soil Organic Matter (SOM)	0.1% w/w
	Arsenic, Chromium, Chromium VI, Copper, Lead, Nickel, Selenium	1 mg/kg
	Zinc	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.17 mg/kg
	Cyanide (total)	1 mg/kg
	Phenols (screen)	0.2 mg/kg
	PAHs (16 MS)	0.01 – 0.08 mg/kg

Suite Ref.	Analyte	Limit of Detection
	TPH CWG Aro/Ali Split	0.01 – 1 mg/kg
SVOCs/VOCs	SVOCs	100 – 500 µg/kg
	VOCs	1 -10 µg/kg

A total of 9 No. soil samples were obtained from the boreholes and tested for Curtins Suite A. All samples were obtained from the Made Ground.

A total of 3 No. made ground soil samples were tested for SVOCs and VOCs.

Two samples of possible ACM were recovered and sent to the laboratory for assessment. Quantification of the asbestos was undertaken on these samples.

Asbestos quantification was undertaken on three further soil samples where asbestos was positively identified during initial laboratory screening.

Copies of the environmental chemistry testing certificates are presented in *Appendix C*.

4.2 Geotechnical Testing

Soil samples for testing were prepared in accordance with BS1377: Part 1:2016 (Ref. 10). The undertaken geotechnical testing is summarised in *Table 4.2*.

Table 4.2 – Geotechnical Testing

Test Type	Quantity	Standard
In Situ Testing		
Standard Penetration Testing	51	BS 5930: 2015+2020, Clause 41
Laboratory Testing (General Testing - Foundation Design)		
Atterberg Limit	13	BS1377 1990, Part 2 (clause 4.5, 5.3 & 5.4)
Moisture Content	13	BS1377 1990, Part 2
Triaxial Multistage	2	BS 1377:PT2:1990, Part 7.2 BS 1377:PT7:1990: Part 9.4
One-Dimensional Consolidation	2	BS1377 1990, Part 3
Partial Size Distribution (wet sieve)	5	BS EN 17892: Part4:2016, clause 5.2.2 and 5.2.3
Water Soluble Sulphate	21	ISO 17025 MCERTS
pH Value	21	ISO 17025 MCERTS

Test Type	Quantity	Standard
Point Load Strength	10	ISRM 2007
UCS	3	ISRM 2007

The results of the geotechnical testing are summarised in *Section 6.0* of this report.

Copies of the geotechnical testing certificates can be referred to in *Appendix D*.

5.0 Encountered Ground Conditions

The ground conditions across the site, determined during the ground investigation works generally comprised hardstanding, overlying granular and cohesive made ground. Glacial till was recorded beneath the made ground comprising granular and cohesive material, itself underlain by sandstone of the Chester Formation.

5.1 Encountered Ground Conditions

A summary of the ground conditions encountered during the Curtins site investigation works is presented below, with detailed information presented on the exploratory hole logs which can be referred to in *Appendix B*.

Table 5.1 – Summary of Ground Conditions Encountered

Stratum	Depth to top of strata, m bgl (m Above Ordinance Datum (AOD))	Recorded Thickness (m)		Description
		Min	Max	
Made Ground	0.00 (6.20 – 7.00)	2.10	3.50	MADE GROUND of various gravel, sand and clay compositions, including upper tarmacadam layers. Composition varies position to position, see <i>Section 5.2</i> for details.
Glacial Till	1.80 – 3.50	1.50 ¹	21.20	Firm to stiff gravelly sandy silty clay Sandy clayey gravel, Slightly clayey sand
Chester Formation	22.90 – 23.80	0.50 ¹	11.20 ¹	Extremely weak to moderately strong, brown, fine to coarse grained sandstone

1 – Thickness not proved

5.2 Made Ground

Made Ground was encountered in all exploratory hole locations on site, to a maximum depth between 1.80m and 3.50m bgl. The Made Ground comprised various compositions as outlined in *Table 5.1*, details of which are noted below and within the Exploratory Hole Logs in *Appendix B*.

5.2.1 Surface Covering

Tarmacadam was identified at ground level in all exploratory hole locations to depths of between 0.02m bgl and 0.17m bgl.

A concrete layer was identified within WS02 underlying the tarmacadam at a depth 0.15mbgl to a depth of 0.25m bgl.

5.2.2 Granular Made Ground

Granular Made Ground was encountered in all exploratory boreholes at depths of between 0.02m and 2.50m bgl and was found to be underlie the surface covering Made Ground material.

Granular Made Ground was identified at various depths and varied between gravels and sands. The granular Made Ground were predominantly encountered as gravelly, cobbly fine to coarse sands, or sandy clayey cobbly gravels. Gravels and cobbles were typically angular to subrounded brick and concrete, alongside fragments of tarmac, timber, metal, plastic, ash, clinker, ceramic, mudstone, siltstone, quartz and sandstone.

5.2.3 Cohesive Made Ground

Cohesive Made Ground was encountered in BH01, WS02 and RC01 at depths of between 0.95m and 2.40m bgl and was found to be underlie the granular Made Ground material.

Cohesive Made Ground was described as a soft to firm, sandy gravelly clay. Gravels were typically described as angular to subrounded of brick and sandstone. It is likely that the cohesive made ground is reworked natural material.

5.3 Glacial Till

Glacial Till deposits were encountered underling the Glacial Till deposits in all exploratory hole locations. The Glacial Till encountered was predominantly cohesive with small granular deposits interbedded.

Glacial Till deposits were encountered at depths of between 1.80m and 3.50m bgl. The base of this deposit was encountered in BH01 and RC01 at depths of between 22.90m and 23.80m bgl.

The cohesive Glacial Till deposits were predominantly encountered as firm (occasionally soft near surface) or stiff slightly gravelly to very gravelly, sandy, slightly silty to silty clay.

The granular layers of Glacial Till were encountered interbedded within the cohesive deposits, and comprised sandy clayey gravels, and slightly clayey sands. The granular material is laterally discontinuous, deemed to be localised lenses.

5.4 Chester Formation

Chester Formation sandstone bedrock was encountered underlying the Glacial Till deposits in BH01 and RC01 at depths of between 22.90m bgl and 23.80m bgl (25.91m AOD and 24.89m AOD).

The Chester Formation sandstone encountered within BH01 was described as a sandstone recovered as a sandy gravel. This was likely due to the chiselling action of the drilling methodology breaking the solid bedrock.

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The sandstone recovered in RC01 was recorded as extremely weak to moderately strong, brown, fine to coarse grained sandstone. Fractures were described as generally sub-horizontal or sub-vertical, extremely closely to medium spaced, undulating/planar/stepped rough, undulating/planar smooth. Parts of the sandstone horizons have been recovered as non-intact, noted as being weathered to a gravel of sub-angular coarse sandstone.

5.5 Observed Potential Contamination

No potential visual or olfactory contamination was observed during the intrusive investigation works.

5.6 Obstructions Encountered

No obstructions were encountered during the intrusive investigation works.

5.7 Groundwater

A summary of the groundwater levels recorded during the siteworks is presented in *Table 5.7a*.

Table 5.7a – Groundwater Noted During Site Investigation

Borehole Ref.	Water Strikes			
	Strike Depth m bgl (m AOD)	Water Depth after 20 mins m bgl (m AOD)	Strata	Notes
BH01	15.50	15.50	Glacial Till	-
WS02	2.50	-	Made Ground	-
WS03	3.50	-	Glacial Till	-
WS05	2.00	-	Made Ground	-

Six rounds of groundwater monitoring have been undertaken between 31st May 2022 and 8th August 2022, the results of which are presented in *Table 5.7b*.

Table 5.7b – Groundwater Monitoring Results

Borehole Ref.	Installation Strata	Response Zone m bgl (m AOD)	Depth, m bgl (m AOD)					
			31/05/22	16/06/22	28/06/22	19/07/22	01/08/22	08/08/22
BH01 (shallow)	Made Ground	1.00 – 3.00	Dry	2.00	1.96	2.18	1.83	1.73
BH01 (deep)	Glacial Till	19.50 – 22.50	Dry	20.88	21.45	22.34	22.12	20.28
WS01	Made Ground	1.00 – 2.50	- ¹	Dry	Dry	Dry	Dry	Dry
WS03	Made Ground	1.00 – 2.00	Dry	Dry	- ¹	Dry	Dry	Dry

Borehole Ref.	Installation Strata	Response Zone m bgl (m AOD)	Depth, m bgl (m AOD)					
			31/05/22	16/06/22	28/06/22	19/07/22	01/08/22	08/08/22
WS05	Made Ground	1.00 – 2.20	Dry	Dry	Dry	Dry	- ¹	- ¹
RC01	Chester Formation	26.00 – 35.00	- ¹	23.35	22.40	22.36	22.42	22.44

¹ – Unable to access monitoring well

Based upon groundwater elevations and the underlying geology, the following considerations are given to the underlying groundwater regime:

- Groundwater levels within the bedrock formation appear consistent throughout the monitoring period, with head level in the region of 22.40m to 22.50m bgl.
- Localised perched water may be encountered in shallow made ground soils.

6.0 Ground Model

6.1 Made Ground

Made Ground was encountered in all exploratory hole locations, from ground level to a maximum depth between 2.10m and 3.50m bgl.

The geotechnical test results recorded within the Made Ground are summarised in *Table 6.1* below.

Table 6.1 – Summary of Made Ground Geotechnical Test Results

Parameter	No. of Tests	Results
In-Situ Tests		
SPT 'N' Value	14	Min: 1 Max: 29 Average: 12.43
Laboratory Tests - General		
pH	9	Min: 7.79 Max: 8.8 Average: 8.34
Water Soluble Sulphate (mg/l)	9	Min: <10 Max: 90 Average: 27.77

No parametric geotechnical analysis has been undertaken on this stratum due to its unsuitable properties for use as a founding stratum.

6.2 Glacial Till

Glacial Till was recorded underlying the made ground in all exploratory holes locations. It was typically encountered as cohesive deposits with interbedded granular deposits to depths of between 22.90m and 23.80m bgl.

6.2.1 Cohesive Glacial Till Deposits

The geotechnical tests recorded within the cohesive deposits are summarised in *Table 6.2.1a*.

Table 6.2.1a – Summary of geotechnical test results – Glacial Till

Parameter		No. of Tests	Results
In-Situ Tests			
SPT 'N' Value ⁽²⁾		19	Min: 11 Max: 44 Average: 21.37
Laboratory Tests - General			
Atterberg Test	Liquid Limit (%) ⁽¹⁾	13	Min: 20 Max: 51

Parameter	No. of Tests	Results
		Average: 35.46
Plastic Limit (%) ⁽¹⁾	13	Min: 10 Max: 23 Average: 17.15
Plasticity Index (%)	13	Min: 10 Max: 28 Average: 18.31
Modified Plasticity Index (%) ⁽¹⁾	13	Min: 9.4 Max: 28 Average: 18.01
Moisture Content (%)	13	Min: 11 Max: 29 Average: 21.23
pH	13	Min: 7.9 Max: 8.8 Average: 8.45
Water Soluble Sulphate (mg/l)	13	Min: 30 Max: 120 Average: 70
Particle Size Distribution Cobbles Gravel Sand Silt/Clay	1	0 9 42 49
Quick Undrained Multistage Triaxial	2	Min: 75 Max: 125 Average: 100
One Dimensional Consolidation in Oedometer	2	Min: 0.035 Max: 0.14 Average: 0.0875

(1) Modified plasticity index is the plasticity of components <425µm.

(2) Only includes SPTs tests in which full penetration was achieved.

A total of twelve Atterberg Tests were undertaken in the cohesive material indicating the soils behaviour. Results generally indicate low or medium plasticity clay, though BH01 (7.00m bgl) recorded high plasticity clay. The soils have generally low volume change potential in accordance with guidance from NHBC Standards Chapter 4.2 (2021). Samples from BH01 (5.00m bgl, 7.00m bgl), WS01 (2.50m bgl), WS02 (4.00m bgl) and WS04 (2.50m bgl) are classified as being of medium volume change potential. (Ref. 11). The results of the Atterberg Limits are presented on *Figure 6.2.1a*.

The SPT N results are presented on *Figure 6.2.1b* and *Figure 6.2.1c*, predominantly increasing with depth.

A moderately conservative Undrained Shear Strength, C_u , of cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 12) using **Equation 1**:

$$C_u = f_1 \times \text{SPT N} \quad \text{Equation 1}$$

Where:

C_u is the Undrained Shear Strength

f_1 is the Stroud Factor determined from Figure 1.5 (Ref. 13)

SPT N is Characteristic Standard Penetration Test Result

Using an f_1 factor of 6 for an average plasticity index of 18%, C_u values ranging between 54 and 264 kPa were determined. The estimated results generally indicate a medium to very high strength clay. The strength of the cohesive glacial till generally increases with depth.

Two Quick Undrained Multi Stage Triaxial Tests were undertaken. The tests were undertaken in BH01 at depths of 4.00m and 9.00m bgl recording values of 125 kPa and 75 kPa respectively, indicating medium and high strength clays.

Figure 6.2.1d and Figure 6.2.1e, indicates the estimated Undrained Shear Strength of cohesive glacial till derived through correlation with SPTs and plasticity indices. The results are broadly consistent with the correlation between SPT 'N' Values and plasticity.

A moderately conservative unit weight of between 16 and 20 kN/m³ is deemed suitable for medium strength clay, increasing to between 18 and 22 kN/m³ and 18 and 24 kN/m³ for high strength and very high strength cohesive soils, respectively, in accordance with BS8004:2015 (Ref. 14). The unit weight of very high strength cohesive glacial till increases to 20 to 24 kN/m³ below the groundwater table.

A moderately conservative Coefficient of Consolidation, M_v , of the cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 12) described by **Equation 2**:

$$M_v = 1 / (f_2 \times \text{SPT } N) \quad \text{Equation 2}$$

Where:

M_v is the coefficient of consolidation

f_2 is the Stroud Factor determined from Figure 1.5 (Ref. 13)

SPT N is Characteristic Standard Penetration Test Result

Using an f_2 factor of 0.58 for an average plasticity index of 18%, M_v values typically range between 0.039 and 0.192 m²/MN. The results are variable, though generally indicating a very low to medium compressibility clay, generally becoming less compressible with depth. The values are presented in *Figure 6.2.1f* and *Figure 6.2.1g*.

The Angle of Shearing Resistance, ϕ' , for the cohesive Glacial Till has been derived from the correlation with Plasticity Indices (Ref. 15) shown in *Figure 6.2.1h* and *Figure 6.2.1i*.

The Drained and Undrained Young's Modulus, E' and E_u , can be derived through the empirical relationship with Undrained Shear Strength (C_u) described in **Equation 3** and **Equation 4**, shown in *Figure 6.2.1j* and *Figure 6.2.1k*. An increasing with depth Young's modulus is

proposed for design, according to the following relationships obtained from the ICE Manual of Geotechnical Engineering, 2012:

$$E_u = 330 \times c_u \quad \text{Equation 3}$$

$$E' = 200 \times c_u \quad \text{Equation 4}$$

Where:

E_u is the Drained Youngs Modulus, and E' is the Undrained Youngs Modulus

C_u is the Undrained Shear Strength

The Drained and Undrained Young's Modulus, E' and E_u , for the cohesive Glacial Till has been derived from the correlation with Plasticity Indices shown in *Figure 6.2.1h* and *Figure 6.2.1i*.

It should be noted that care should be taken in using linear stiffness values derived from relationships as they do not necessarily reflect the non-linear nature of soil stiffness. The actual stiffness will be strain dependent and non-linear and should be considered in detailed design of sensitive structures.

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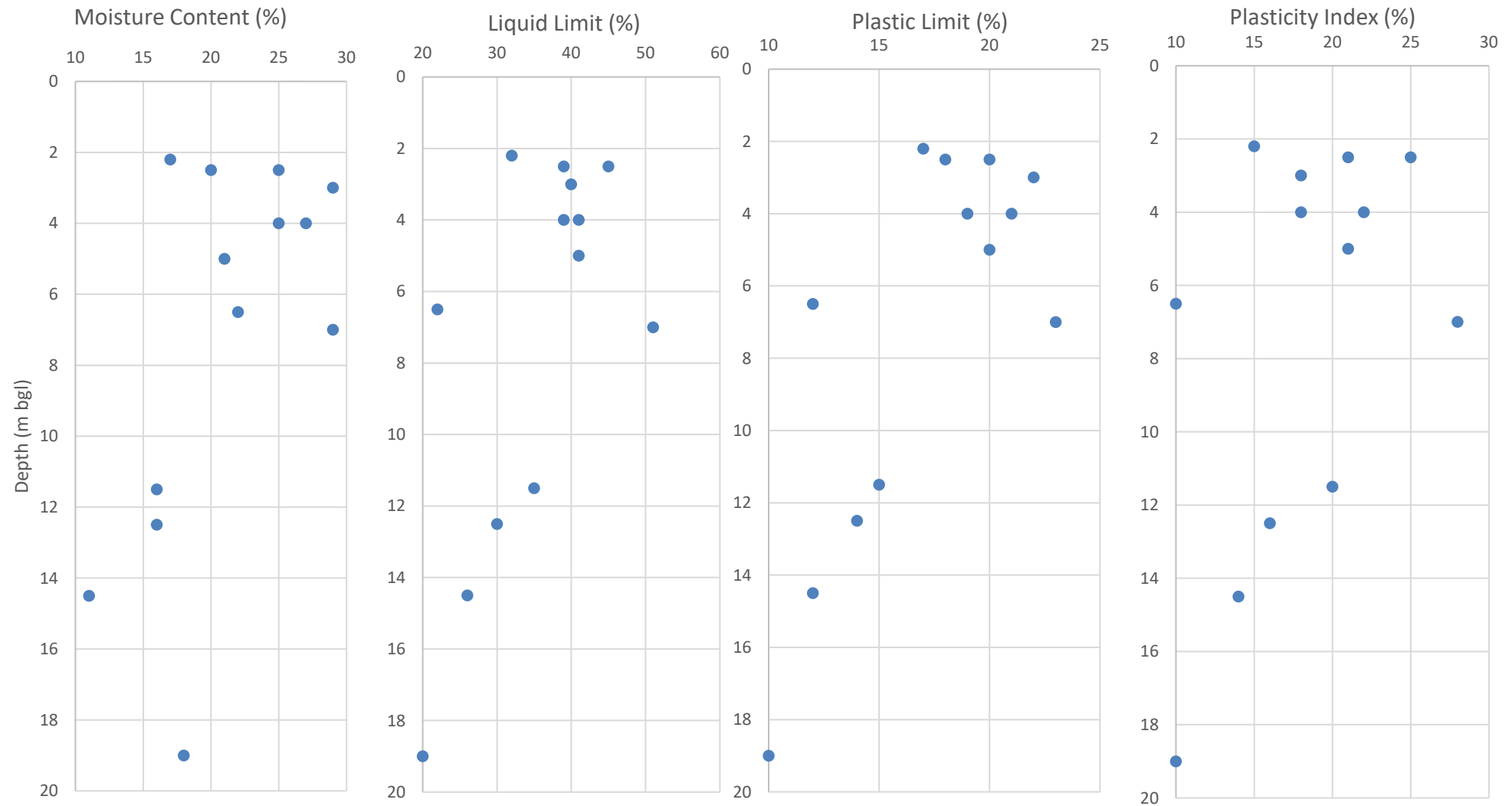


Figure 6.2.1a – Summary of Atterberg Test Results

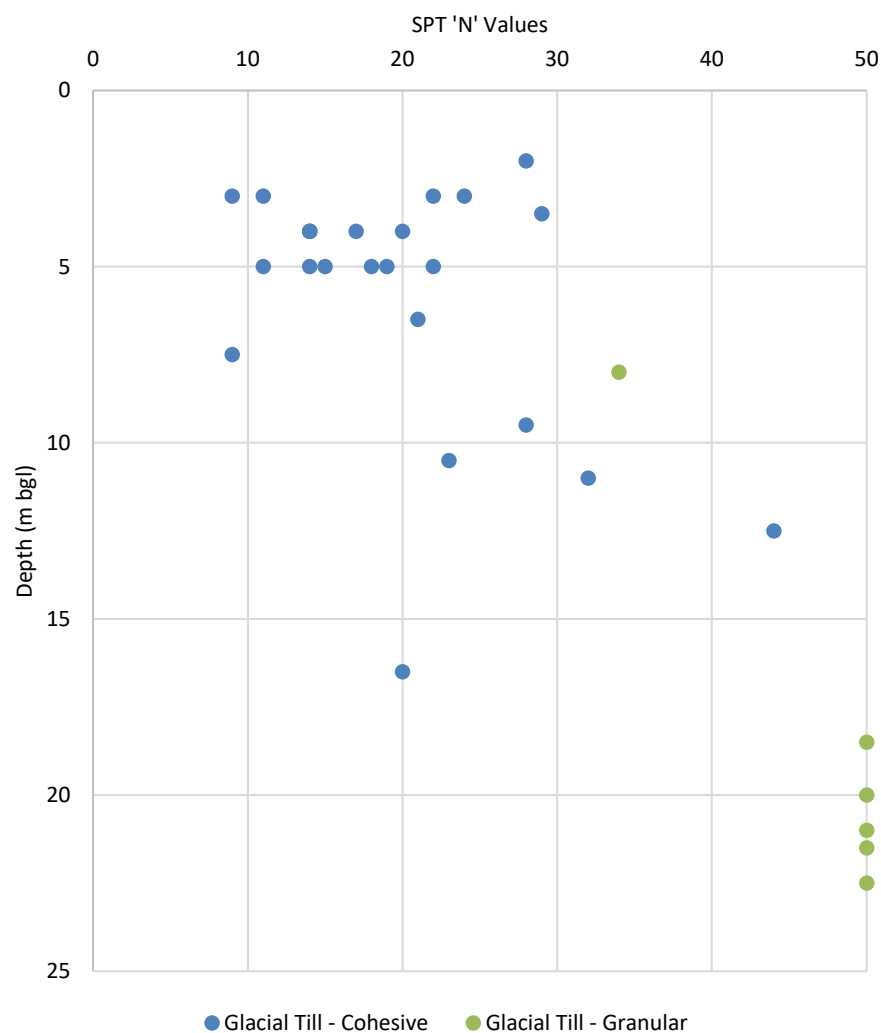


Figure 6.2.1b – Standard Penetration Test vs. Depth

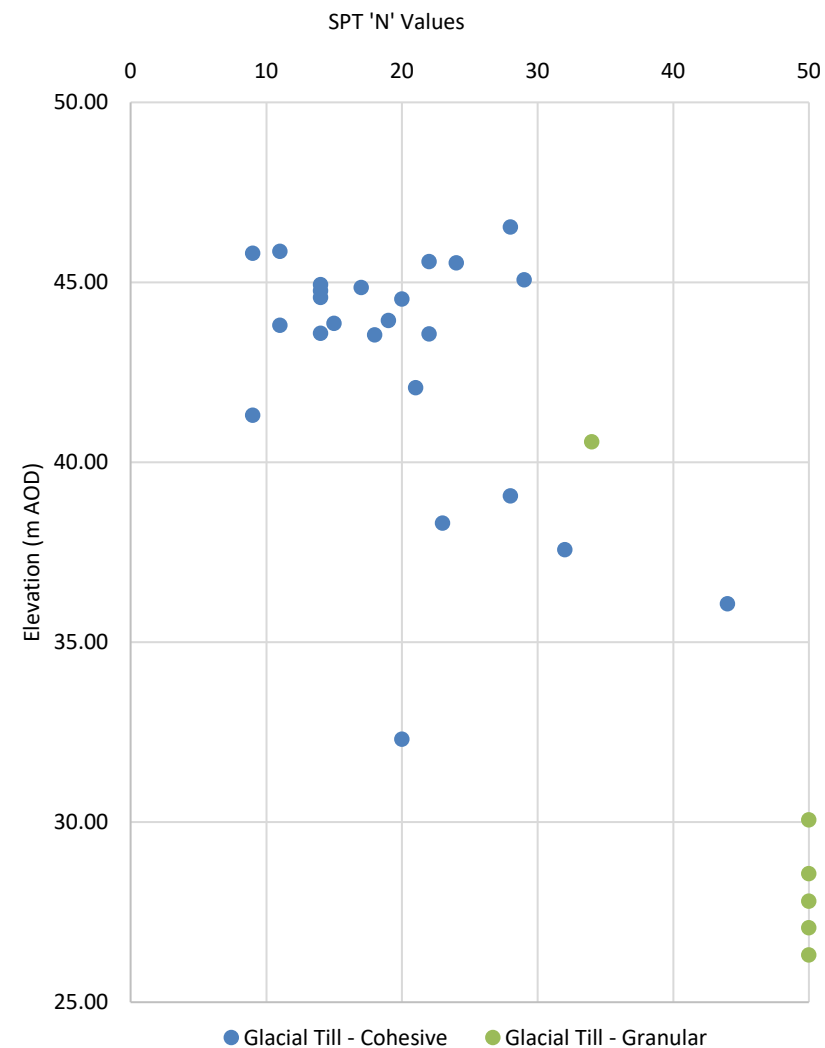


Figure 6.2.1c – Standard Penetration Test vs. Elevation

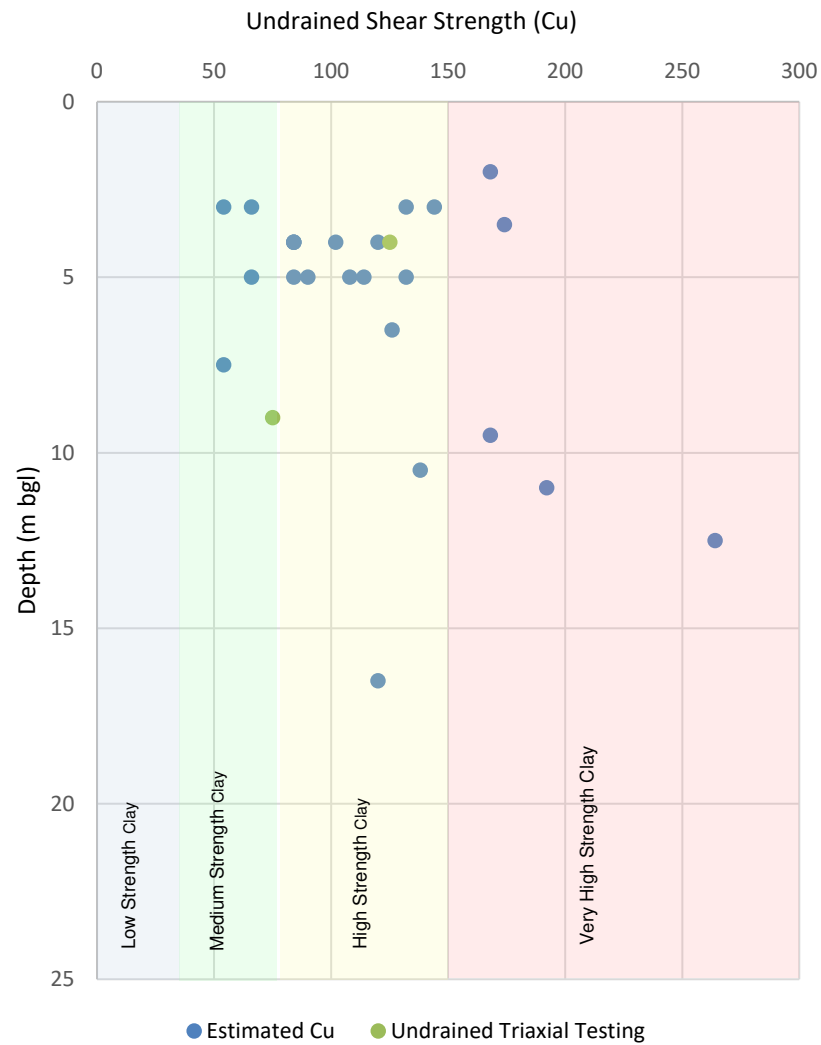


Figure 6.2.1d – Estimated Undrained Shear Strength vs Depth

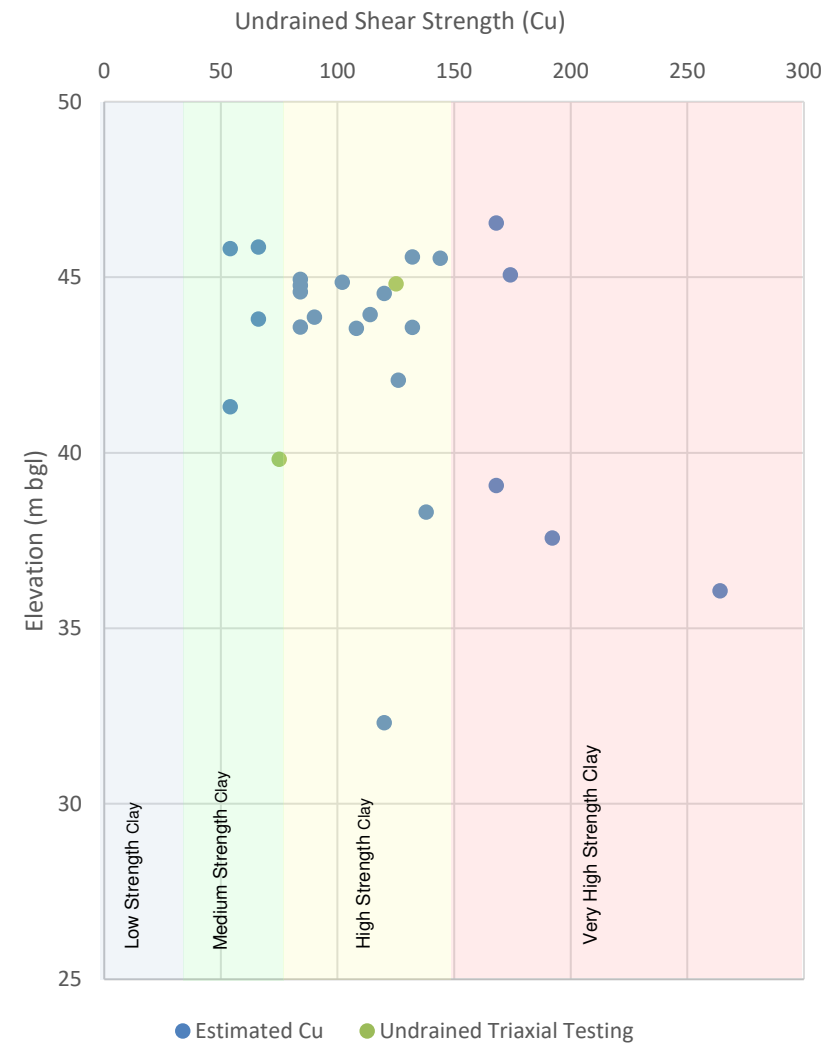


Figure 6.2.1e – Estimated Undrained Shear Strength vs Elevation

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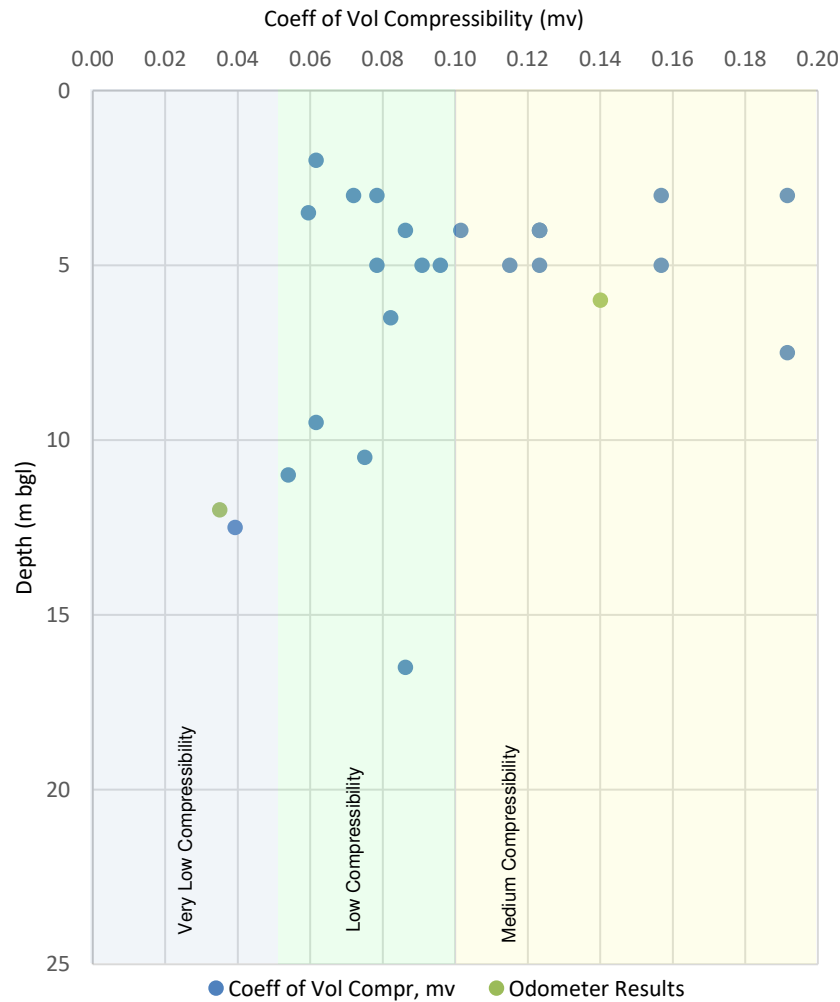


Figure 6.2.1f – Estimated Volume Compressibility Coefficients (Mv) vs Depth

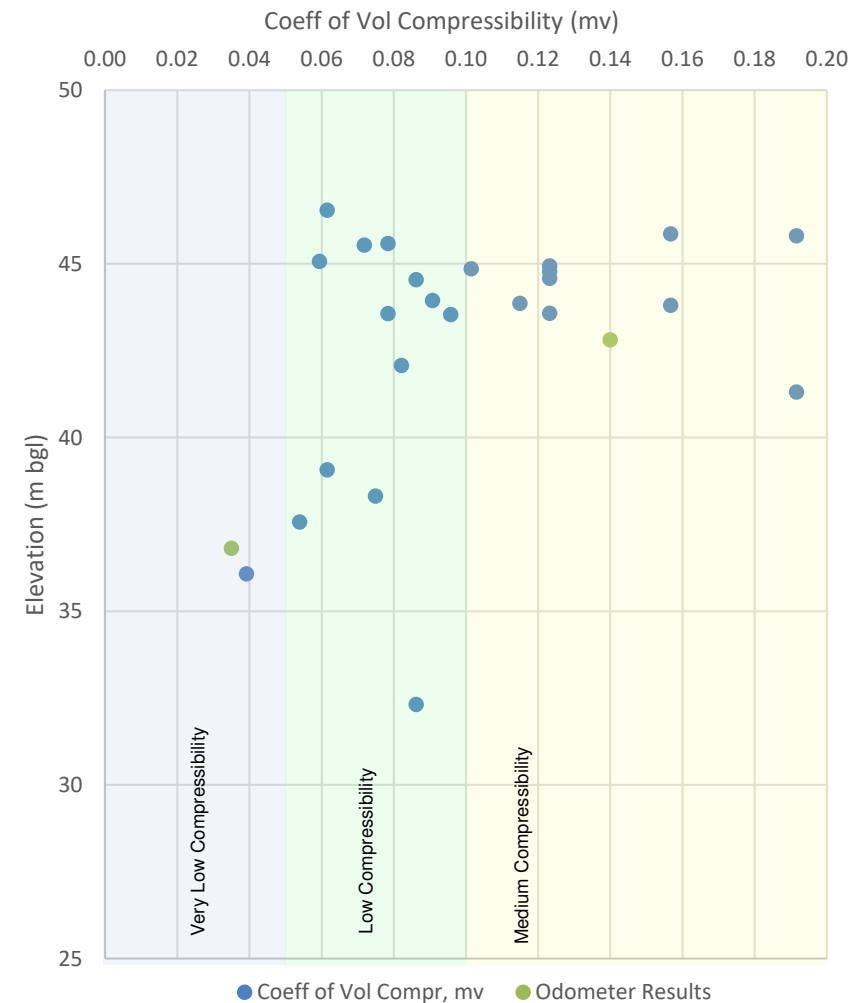


Figure 6.2.1g – Estimated Volume Compressibility Coefficients (Mv) vs Elevation

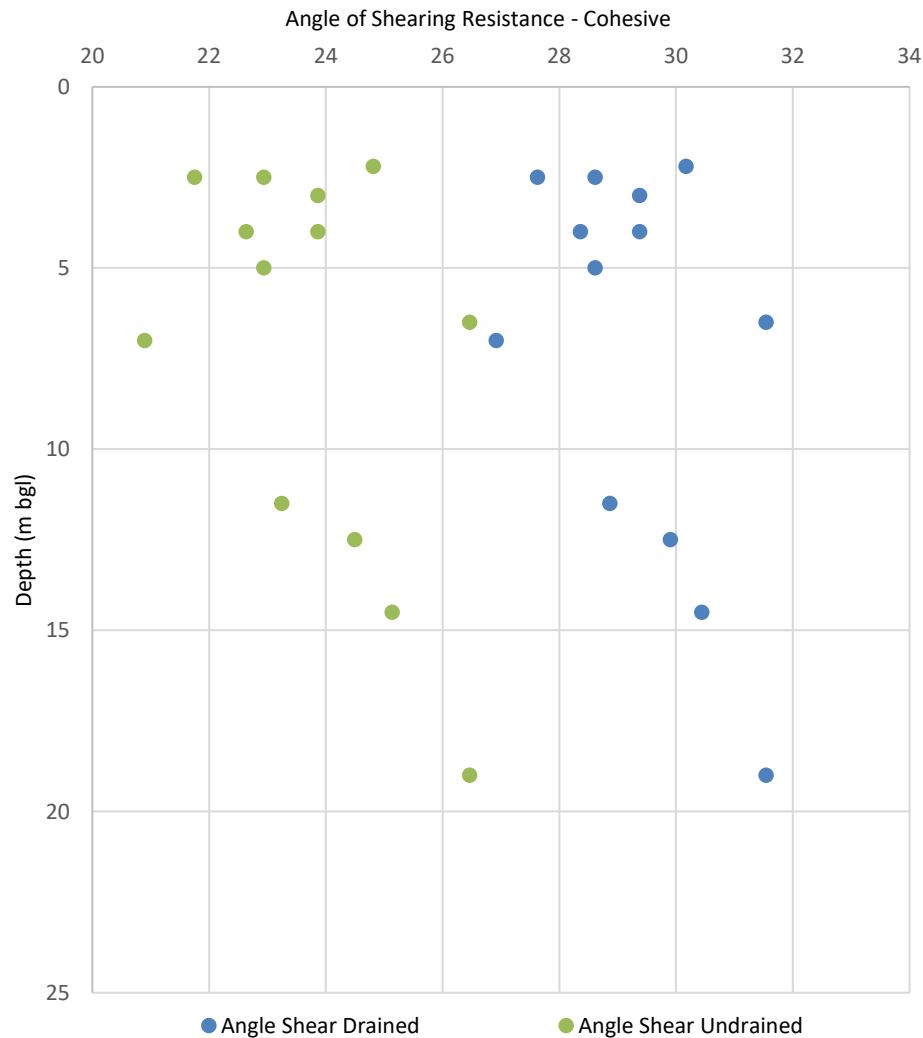


Figure 6.2.1h – Angle of Shearing Resistance (Cohesive) vs Depth

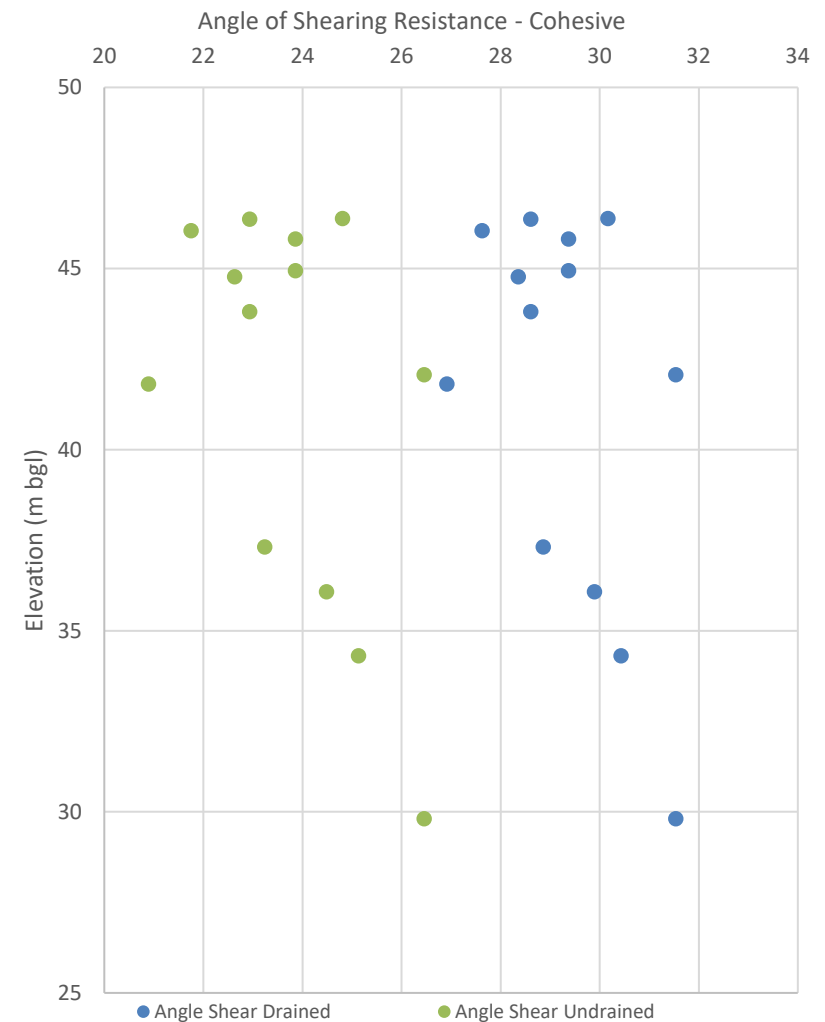


Figure 6.2.1i – Angle of Shearing Resistance (Cohesive) vs Elevation

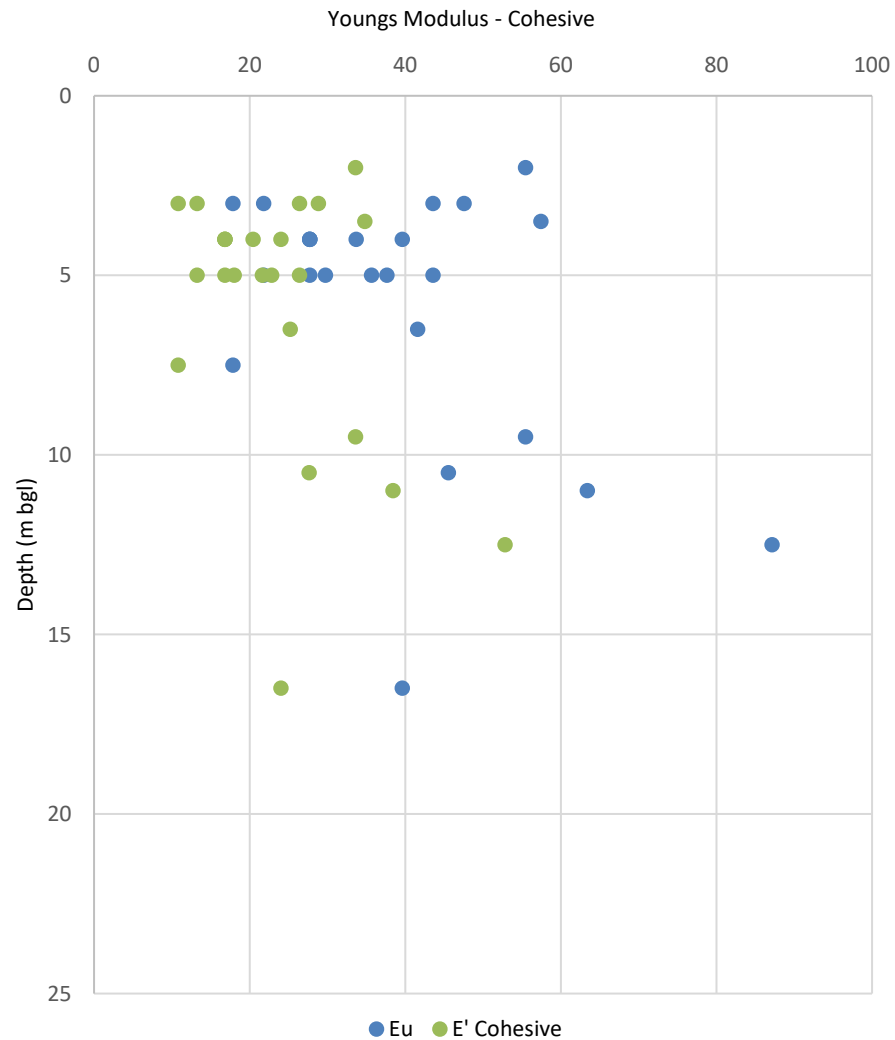


Figure 6.2.1j – Estimated Young's Modulus (Cohesive) vs Depth

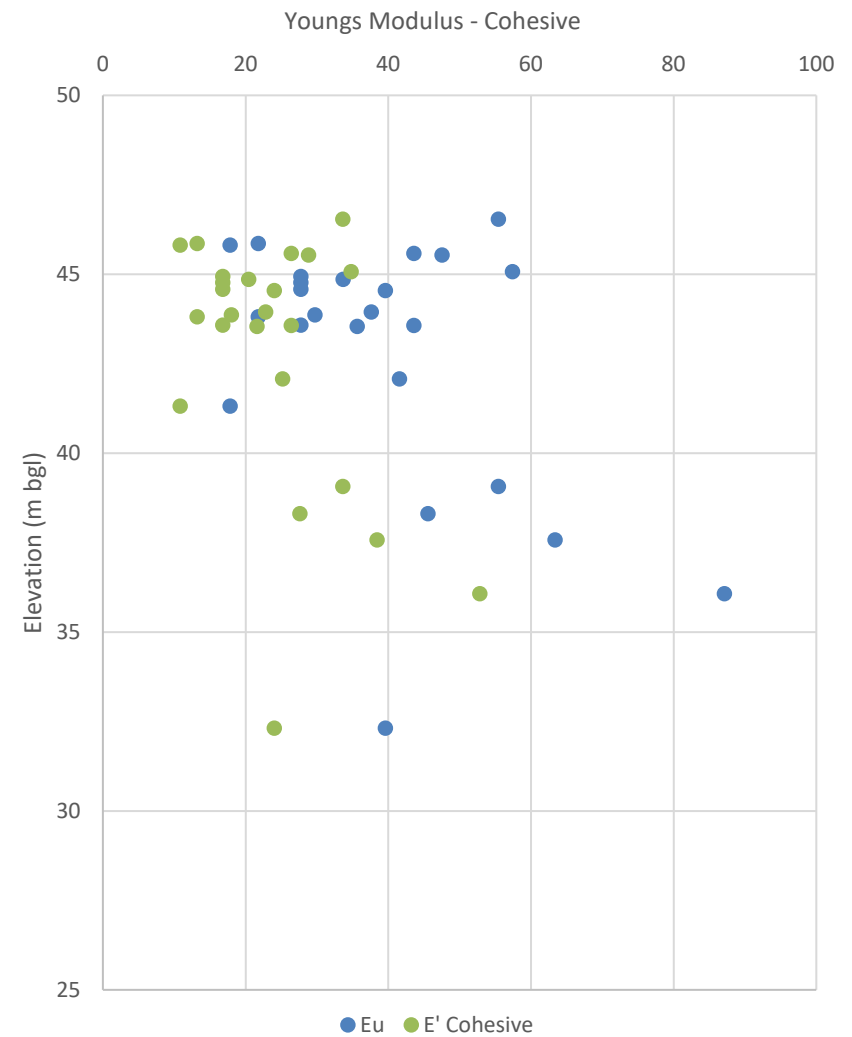


Figure 6.2.1k – Estimated Young's Modulus (Cohesive) vs Depth

6.2.2 Granular Glacial Till Deposits

The geotechnical test results recorded within the granular deposits are summarised in *Table 6.2.2*.

Table 6.2.2 – Summary of granular geotechnical test results

Parameter	No. of Tests	Results
In-Situ Tests		
SPT 'N' Value ⁽¹⁾	1	34
Laboratory Tests - General		
Particle Size Distribution	4	See Figure 6.2.2

(1) Full penetration achieved only

Six SPT 'N' value was recorded, which partially penetrated the granular glacial till deposit, however, only one result achieved full penetration of the strata within BH01. Due to this, no estimated geotechnical parameters of the granular Glacial Till are presented within the ground model.

Figure 6.2.2 summarises the results of ten Particle Size Distribution Tests, generally confirming the field descriptions recorded in the exploratory hole logs.

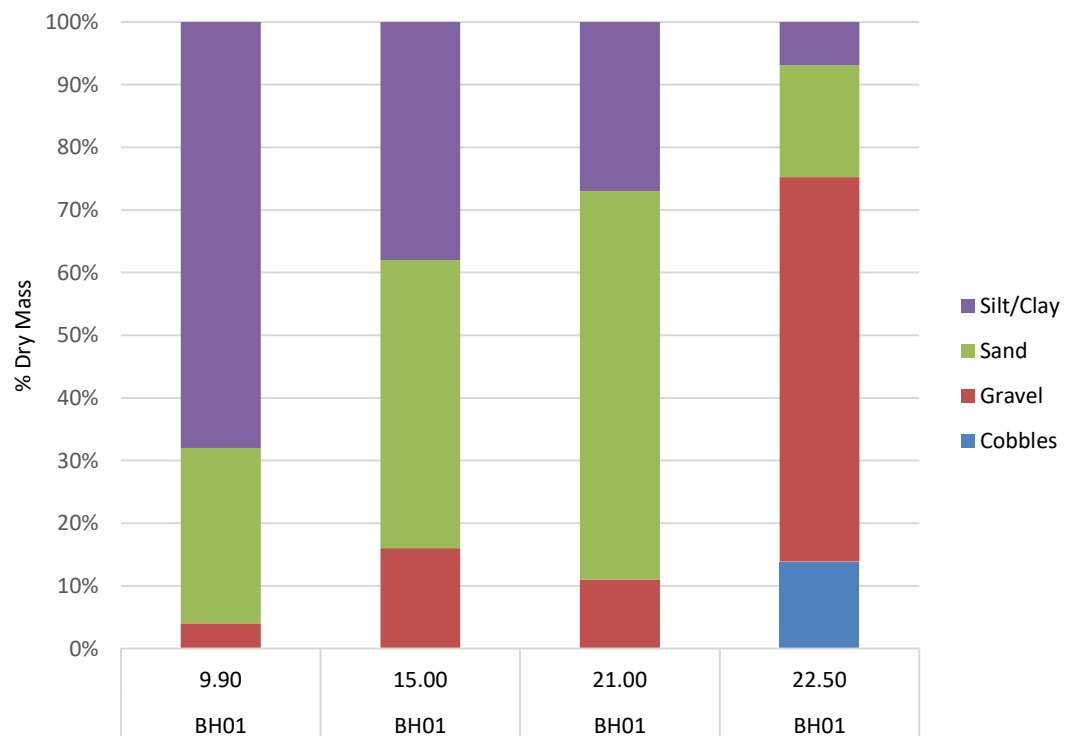


Figure 6.2.2 – Summary of PSD test results

6.3 Chester Formation

The Chester Formation bedrock was encountered underlying Glacial Till deposits in BH01 and RC01. The Chester Formation comprised sandstone deposits solely. Sandstone was recorded as extremely weak to moderately strong, brown, fine to coarse grained sandstone. There were zones of non-intact core recorded in the exploratory holes, details of which can be referred to in exploratory hole logs in *Appendix B*.

Rock Quality Designation (RQD) recorded in the cored samples ranged from 28 to 100% (averaging 66%) which classifies it as of very poor to good rock mass quality, with the quality of rock varying with depth. The 100 RQD was recorded at the top of the bedrock formation, between 24.08m to 24.50m bgl. Total Core Recovery (TCR) and Solid Core Recovery (SCR) are fairly regular between core runs. The Rock Quality Parameters are presented in *Figure 6.3.3a* and *Figure 6.3.3b*.

A summary of the geotechnical testing results for the sandstone bedrock are presented in *Table 6.3b*. Full details of geotechnical testing are included in *Appendix D*.

Table 6.3.2b – Summary of geotechnical test results

Parameter		No. of Tests	Results
In-Situ Tests			
SPT 'N' Value		2	Min: >50 Max: >50 Average: >50
Laboratory Test Results			
Point Load Indices (Is50) (MPa)	Axial Plane	10	Min: 0.09 Max: 0.58
Unconfined Compressive Strength, UCS (MPa)		3	Min: 11.1 Max: 17.7
Derived Parameters			
Estimated UCS from Point Load Indices	Axial Plane	10	Min: 1.98 Max: 12.76

Overall, 10No. axial Point Load Tests (PLT) were undertaken on selected samples of sandstone from rotary cores. Axial plane PLT (Is(50)) results ranged from 0.09MPa and 0.58MPa. No diametral plane tests were undertaken.

An approximation of the unconfined compression strength (UCS) of the rock may be derived from the following relationship, described in *Equation 5*:

$$UCS = PLT \text{ Is}(50) \times f_1 \quad \text{Equation 5 (Tomlinson)}$$

Where f_1 is derived from the correlation between PLT Is(50) and UCS Results

Due to the limited set of UCS results, a published correlation factor of 22 has been used for sandstone (Ref. 13). Based on this relationship, estimated UCS values for bedrock range between 1.98MPa and 12.76MPa for axial tests, indicating the rock tested has strength index of very weak to weak. These findings show a high variability than the strengths indicated during the field descriptions, typically recorded as extremely weak to medium strong. This is likely due to localised areas of lower strength sandstone chosen for laboratory analysis.

The estimated UCS results are not consistent with the UCS testing result which are 14.8MPa, 17.1MPa and 11.1MPa. The reason for termination was due to single shear and axial cleavage. The results indicate that the intact rock is weak. This is generally inconsistent with strength described in the field. The results are shown in *Figure 6.3.3c* and *Figure 6.3.3d*.

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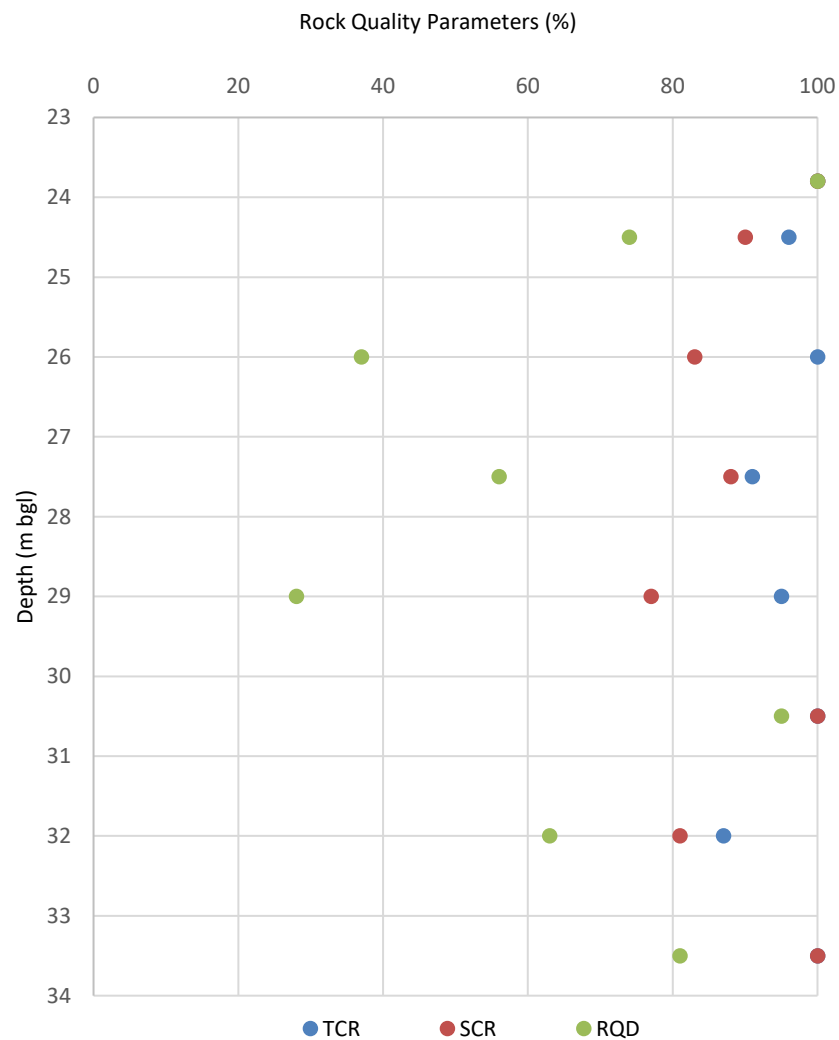


Figure 6.3.3a – Rock Quality Parameters vs. Depth

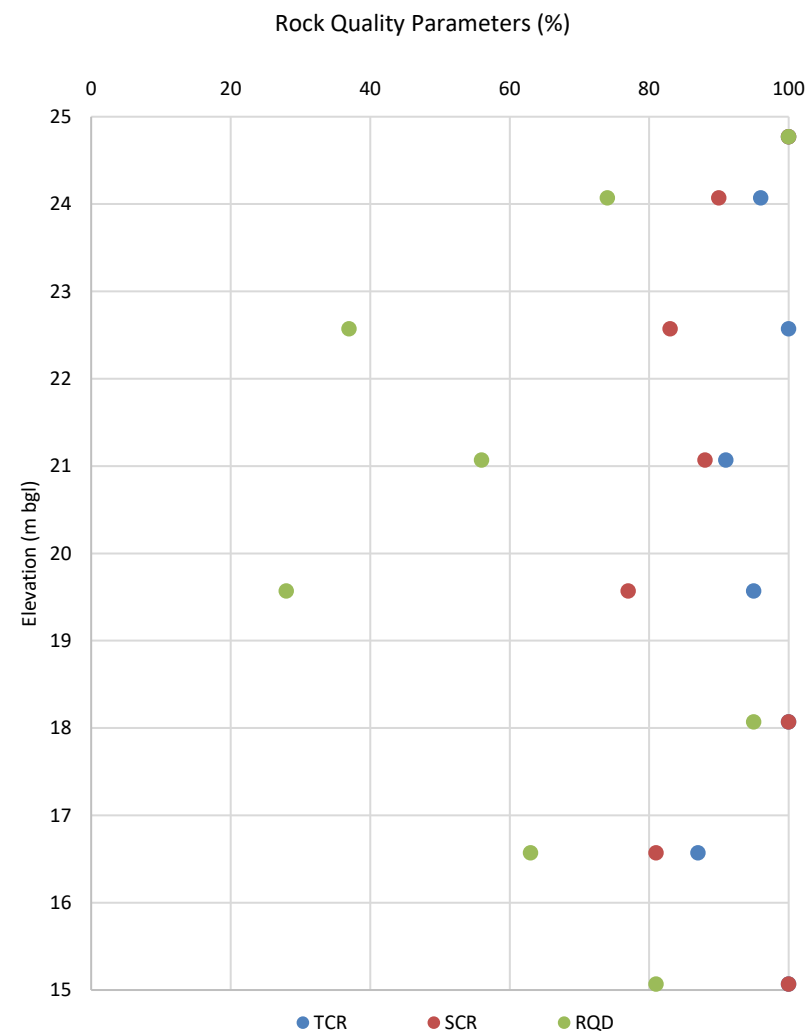


Figure 6.3.3b – Rock Quality Parameters vs. Elevation

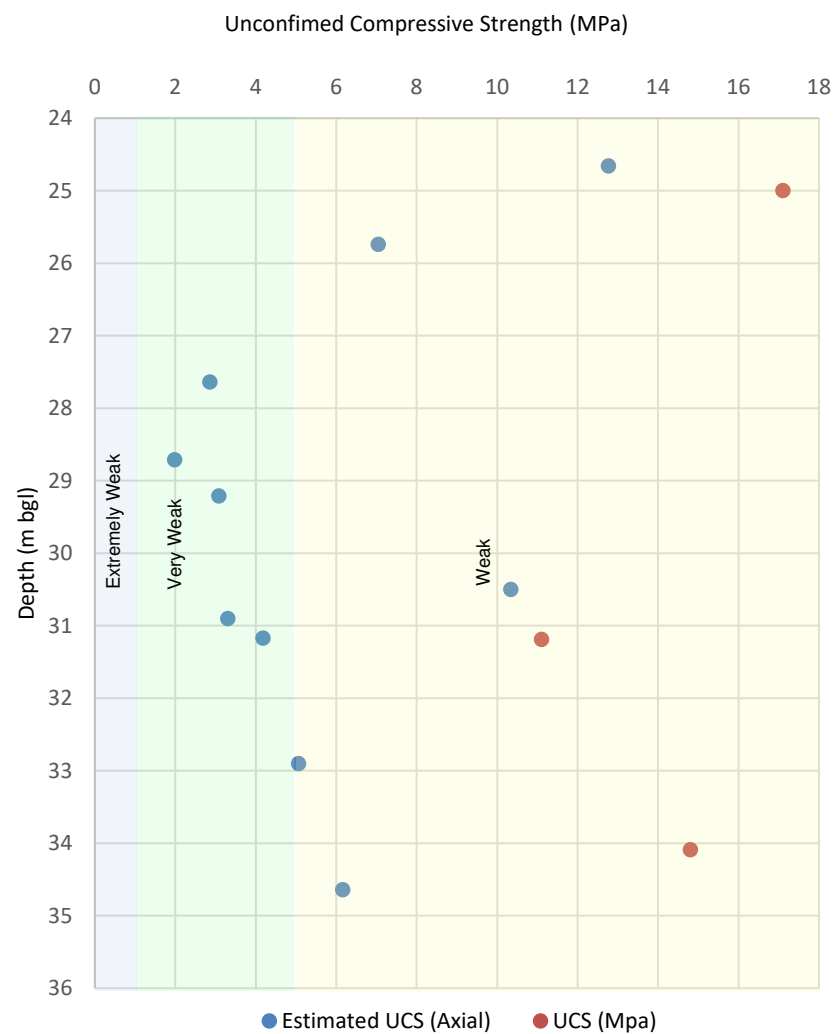


Figure 6.3.3c – Unconfined Compressive Strength vs Depth

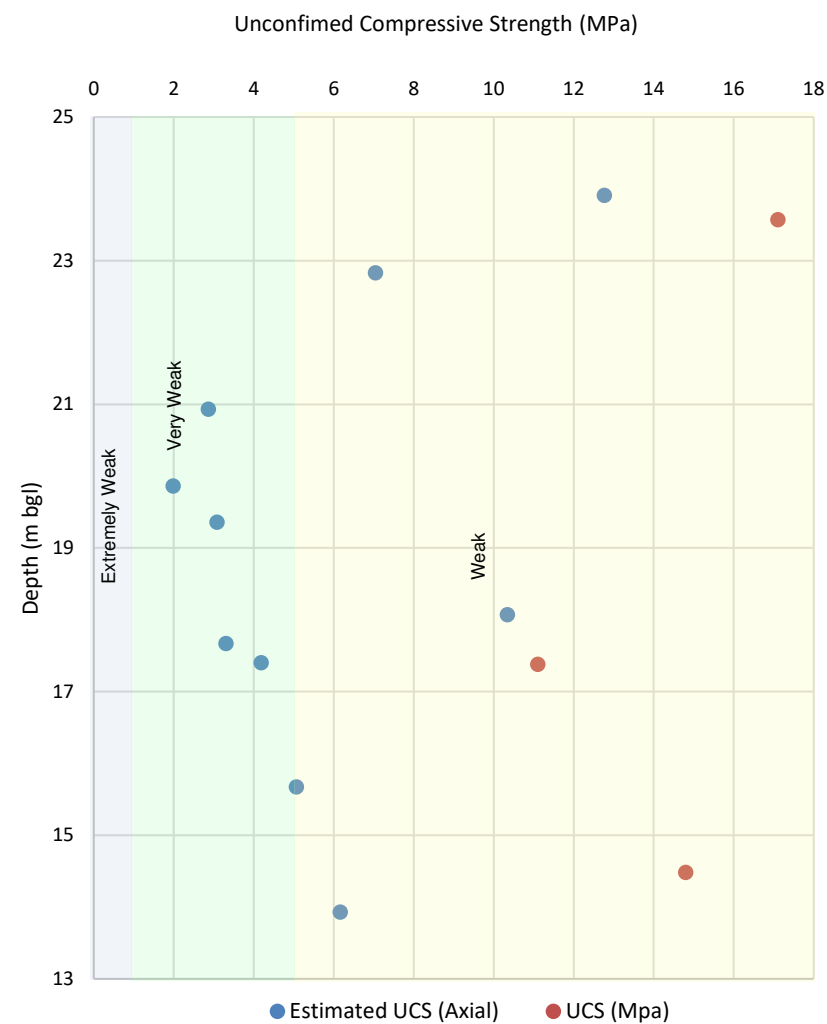


Figure 6.3.3d – Unconfined Compressive Strength vs Elevation

6.4 Aggressive Ground Conditions

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, 3rd edition of 2005 (Ref. 16). A summary of the results obtained as a part of the ground investigation are summarised in *Table 6.4a* below.

Table 6.4a –Aggressive Chemical Environment for Concrete (ACEC) Site Classification

Stratum	Test Type	Range
Made Ground	pH	7.79 – 8.61
	Water Soluble Sulphate (mg/l)	<10 – 90
Glacial Till	pH	7.9 – 8.8
	Water Soluble Sulphate (mg/l)	35 – 120

Table 6.4b –Aggressive Chemical Environment for Concrete (ACEC) Site Classification

Stratum	Design Sulphate Class	ACEC Class ⁽¹⁾
Made Ground	DS-1	AC-1
Glacial Till	DS-1	AC-1

(1) ACEC assessment was based on the *mobile* groundwater condition for a *brownfield* scheme area.

In these conditions, and as a preliminary assessment and subject to further testing, it is considered that deterioration of buried concrete due to sulphate or acid attack is unlikely to occur. The preliminary design of buried concrete, based on the Curtins ground investigation, according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-1 (AC-1) conditions assuming mobile groundwater for the Made Ground.

7.0 Ground Contamination Assessment

This section of the report includes the assessment of the potential contamination, solid, liquid and gas, identified on the subject site which may present a risk to the proposed end users, associated utilities and the wider environment.

In guidance published by the Environment Agency, the risk to human health or controlled waters is determined through an assessment of pollutant linkages between a source of contamination (within the ground or groundwater either on or off site) and a sensitive receptor such as end users of the site, building materials, edible plants grown in gardens or groundwater abstracted for drinking. This is termed a source-pathway-receptor relationship. The same model is applied to the assessment of risk arising from ground gases as detailed within BS8576:2013 (Ref. 17).

These models have a common approach, which is one of a tiered assessment. At each stage of the assessment further detail can be applied to the conceptual site model to provide a detailed interpretation on a site by site basis. As part of the planning process this approach is adopted to establish either if the site is 'suitable for use' or whether additional work or else remedial work is required for the site to be deemed so.

The sub-sections hereafter therefore incorporate the first tier (Tier 1) of this approach otherwise referred to as the Generic Quantitative Risk Assessment (GQRA). The GQRA builds on the qualitative risk assessment presented in the Phase 1 Desk Study (Ref. 1) conjunction with observations made during the ground investigation and is based solely on the results of the chemical and other testing data obtained as part of Curtins ground investigation. The GQRA is used to build/refine the Conceptual Site Model (CSM) for the site as detailed and presented in *Section 9.0* of this report.

The following sections present more detail on the risk assessment methodology rationale for the main receptors.

7.1 Human Health GQRA

Detailed guidance on human health risk assessment is available within several documents, published by both the Environment Agency and Defra. Guidance includes Contaminated Land Exposure Assessment (CLEA) v1.071 model (Ref. 18) Report SC050021/SR2: Human Health Toxicological Assessment of Contaminants in Soil (Ref. 19) and Report SC059921/SR3: Updated Technical Background to the CLEA Model (Ref. 20).

A generic quantitative risk assessment (GQRA) has been carried out for the Potential Contaminant Linkages (PCLs) investigated by screening of soil contamination data against relevant Generic Assessment Criteria (GAC) where available, including:

- i) **Soil Guideline Values (SGVs):** These have been published by the Environment Agency and are trigger values for screening out low risk areas of land contamination. SGV's give an indication of representative average concentrations of chemicals in soil, below which long-term health risks

are likely to be minimal. SGVs have been published for several contaminants including arsenic, cadmium, mercury, nickel, selenium, BTEX, phenols and dioxins, furans and dioxin-like PCB substances for land uses including residential, allotments and commercial. The SGVs have been developed for a sandy loam soil with 6% soil organic matter (SOM) content;

- ii) **Supplementary Screening Values (SSVs):** In addition to the SGVs developed by the EA, other third-party organisations have derived SSVs for a wider range of contaminants and land uses using the CLEA Model. Curtins have adopted these numbers where applicable, including those developed by Atkins AtriskSoil™, the LQM/CIEH Suitable for Use Levels (S4UL) and EIC/AGS/CL:AIRE published thresholds;
- iii) **Category 4 Screening Levels (C4SLs):** In March 2014 Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, hexavalent chromium and lead. These values were derived to support the revised Part 2A Statutory Guidance issued in 2012 (Ref. 21) in which four categories of contaminated land are included, ranging from Category 1 (significant/high risk) to Category 4 (low risk). C4SLs are not representative of significant possibility of significant harm (SPoSH) and are low risk levels which, and therefore where the C4SLs are not exceeded, land can be demonstrated to be in Category 4 and cannot be determined as contaminated land.

7.1.1 Adopted Soil Human Health GACs Screening Methodology

The proposed use of the site, noted as a 9 storey residential block with 85-100 apartment units. The ground floor includes reception area and communal amenities, a cycle store, refuse store, and residential apartments in the east and north. A residents courtyard garden is present at ground level with associated areas of soft landscaping.

This end use is most analogous with a *Residential without plant uptake* end use scenario, accounting for the absence of soft landscaping or gardens and so the assessment has been undertaken against the following GACs, in order of preference for the development:

1. Environment Agency Soil Guideline Values,
2. CL:AIRE, AGS, EIC. Soil Generic Assessment Criteria for Human Health Risk Assessments,
3. LQM/CIEH 2015 S4ULs for Human Health Risk Assessment, and
4. DEFRA Category 4 Screening Levels.

The soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e. the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for the Made Ground site soils ranged from 1.97 to 10.44%.

With consideration for a calculated geometric average, Made Ground soils determine a SOM of 1.00%. As such, a comparison against Tier 1 Thresholds for a conservative SOM of 1% for made ground.

The adopted GAC's are listed in *Appendix F*.

7.1.2 Generic Assessment Criteria Screening of Soil Laboratory Results

The results of the environmental testing can be referred to in *Appendix C*, with testing undertaken on a total of nine soil samples.

With respect to the proposed end use of the site, exceedances of Lead and Mercury were recorded with respect to a *Residential without plant uptake* end-use. These exceedances are reported below in *Table 7.1.2a* below.

Table 7.1.2a – Summary of GAC exceedances compared against 'Commercial' thresholds

Determinant	Exploratory Hole ID	Depth (m bgl)	Stratum	Concentration (µg/kg)	GAC (mg/kg)
Arsenic	WS03	1.70	Made Ground	35	35
Lead	WS01	0.30	Made Ground	679	310
	WS02	0.40	Made Ground	1600	
	WS02	1.50	Made Ground	685	
	WS03	1.70	Made Ground	361	
	WS04	1.00	Made Ground	363	
	BH01	0.25	Made Ground	1580	
	BH01	0.75	Made Ground	3380	
	RC01	0.40	Made Ground	566	

All soil samples (plus two additional possible asbestos samples) were screened for asbestos, positive identification was reported within five samples. The results are summarised below in *Table 7.1.2b*.

Table 7.1.2b – Positively Identified Asbestos

Borehole Ref.	Depth (m bgl)	Strata	Determinant	Quantification (% w/w)
WS04	1.00	Made Ground	Amosite Cement and Chrysotile Cement	0.339
WS05	0.60	Made ground	Amosite Board & Amosite Loose Fibres	0.098
BH01	0.65	Made Ground	Chrysotile Cement (Bulk fibre)	15
BH01	0.75	Made Ground	Chrysotile Cement	4.623
RC01	0.75	Made Ground	Chrysotile Cement (Bulk fibre)	15

8.0 Ground Gas Assessment

The assessment of risk presented by ground gases is assessed with reference to guidance published by CIRIA (Assessing Risks Posed by Hazardous Ground Gases to Buildings, C665 (Ref. 22), BSI Publication Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings BS8485:2015+2019 (Ref. 23) and other broadly accepted references such as the Ground Gas Handbook 2009 (Ref. 24).

The ground gas risk assessment adopts a tiered approach. In the first instance this involves a re-evaluation of the Conceptual Site Model described within the Phase 1 Preliminary Site Assessment and thereafter validating this conceptual model with the ground gas data, the semi-quantitative risk assessment.

8.1 Ground Gas Monitoring Results

To characterise the site's ground gas regime and validate the qualitative assessment of ground gas risk standpipe installations were incorporated within selected boreholes, as detailed in *Section 3.2*.

An initial programme of six gas monitoring visits over three months was proposed. Six gas monitoring visits have been undertaken, between 31st May 2022 and 8th August 2022 with barometric pressure recorded between 1011 and 1019mb. Rising barometric pressure was recorded on the first visit, steady state on the final visit and falling barometric state on the second, third, fourth and fifth visits.

The results log sheets are contained within *Appendix E* and summarised in *Table 8.1a*.

Table 8.1a – Summary of Ground Gas Monitoring Results

Exploratory Hole ID	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Peak Gas Flow (l/hr)	Steady State Gas Flow (l/hr)
BH01 (shallow)	<0.1	0.4	20.4	-1.7	<0.1
BH01 (deep)	<0.1	0.7	5.4	22.6/-12.8	<0.1
RC01	<0.1	0.7	19.6	-42.6	<0.1
WS01	<0.1	0.8	19.7	10.1	<0.1
WS03	0.1	0.6	11.7	-22.7	<0.1
WS05	<0.1	0.2	20.3	<0.1	<0.1

Methane (CH₄) was recorded below the instrument's detection limit within all the monitoring wells throughout the monitoring period.

Maximum carbon dioxide (CO₂) concentrations were recorded of 0.8% in WS08 on the fourth monitoring visit.

Carbon monoxide (CO) and hydrogen sulphide was recorded within several boreholes across the monitoring visits. However, all concentrations recorded were less than 5 and 3 parts per million respectively.

The greatest peak air flow rate was recorded in RC01 at -42.6 l/hr on the sixth monitoring visit. All peak air flow rates recorded during the monitoring period returned to a steady state of <0.1 l/hr..

8.2 Ground Gas Assessment

The Conceptual Site Model presented in *Section 2.7* highlighted made ground with degradable organic content as a potential source of ground gas generation. The report suggests no records of organic rich drift deposits (e.g. peat) being present. Noxious and asphyxiate gases were attributed to include, but not limited to, carbon dioxide, carbon monoxide, methane and hydrogen sulphide. The Phase 1 identified a **Moderate** Risk.

Made ground soils were encountered in all boreholes across the site. Monitoring wells were installed in 4 No. borehole locations to assess the gassing potential and associated risk from such soils.

A total of 6 No. monitoring visits have been undertaken, under various atmospheric conditions, including rising, falling and steady barometric state, and during precipitation events. On this basis, the steady state air flow rates and maximum gas concentrations will be used to derive the gas screening value for the site.

In accordance with BS8485:2015 (Ref. 23) consideration of the recorded soil gas flow rates, presented below, enables hazardous gas flow rates (Q_{hg}) to be evaluated. Q_{hg} can be derived for both 'representative' and 'worst case' scenarios and a comparison made in support of an appropriate assessment of ground gas risk. The 'representative' scenario considers the highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole, and the 'worst case' check uses the highest Q_{hg} across the entire dataset irrespective of location and discrete monitoring events.

Evaluation of the 'representative' scenario and worst case check records a maximum Q_{hg} of 0.008 l/hr for carbon dioxide where the maximum reading 0.8% v/v was used. This is taken as the gas screening value (GSV) for the site.

Methane was recorded below the limit of detection on all monitoring visits and therefore the risk is low.

The GSV indicates a CS1 classification on site, no gas protection measures are required.

The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction. Appropriate ground gas monitoring and safety measures should be in place during the works, as the potential presence of ground gases could pose a risk in any confined spaces of deep excavations.

9.0 Revised Conceptual Site Model

The Preliminary Conceptual Site Model (PCSM) presented in the Phase 1 Report (Ref.1) and discussed in *Section 2.7* of this report has been revised following the GQRA in *Section 7.0* above. The Revised Conceptual Site Model (CSM) is summarised in the table overleaf.

The CSM details the source-pathway-receptor linkages or potential pollutant linkages (PPL) that have been identified as relevant for the site. The GQRA details the associated level of risk relating to these potential pollutant linkages.

The CSM follows the framework outlined within CIRIA C552 (Ref. 25) which is summarised within *Appendix G*.

The 'risk rating' within the CSM refers to the risk that the source, pathway, receptor linkage or PPL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation.

Risks presented by Mining are discussed and assessed within *Section 2.4.4*.

Risks presented by Unexploded Ordnance are discussed and assessed in *Section 2.6*.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 (Ref. 26) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk.

It has been assumed that any future construction works on site will be undertaken in compliance with these requirements and therefore construction workers involved in the building works at the site have been discounted as a human receptor in the conceptual site model.

Reference should be given to the environmental testing results discussed within *Section 7.0* and presented within *Appendix C*.

Qualitative Risk
AssessmentGeneric
Quantitative Risk
AssessmentDetailed
Quantitative Risk
Assessment or;
Remedial Action

- The table below represents the Second stage in the land quality risk assessment process; the Revised Conceptual Site Model following the Quantitative Risk Assessment.
- For a development site to be deemed 'suitable for use' the level of risk needs to be brought down to acceptable levels, i.e. low to very low risk. The purpose of each stage of risk assessment is ultimately to establish if there is a requirement for additional levels of assessment to be made to have sufficient confidence to support a risk characterisation or management decision, e.g. remedial action.
- In the absence of specific site data, a Generic Quantitative Risk Assessment is invariably recommended.

Conceptual Site Model			Generic Qualitative Risk Assessment			Comments	Action
Identified Source	Pathway(s)	Receptor(s)	Consequence	Likelihood of Occurrence	Risk Rating		
Exceedances in the Made Ground were identified when compared to <i>Residential without plant uptake</i> end-use thresholds for Metals (Arsenic and Lead). Asbestos detected in multiple locations (loose fibres and bulk)	Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation	Site end-users High rise residential	Medium Human Health Risk	Unlikely	Low	Environmental chemical analysis recorded with respect to a ' <i>Residential without plant uptake</i> ' end use scenario. Asbestos detected in multiple locations, including fragments	Asbestos management plan during construction works. Construction workers to be provided with appropriate PPE for the works being undertaken, with reference to the environmental chemical results presented herein.
	Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation	Construction and maintenance workers	Medium	Likely	Moderate	A residents courtyard garden is present at ground level with associated areas of soft landscaping.. Elevated concentrations recorded are of non-volatile contaminants, and therefore the pathway between site soils and end users is broken by the building footprint. Remediation would be required in areas of soft landscaping.	Remedial action to be detailed within Remediation Strategy.
	Vertical and horizontal migration through superficial deposits	Controlled Waters (Groundwater) Secondary Undifferentiated Aquifer (Superficial) Principal Aquifer (Bedrock) The site is not located within a Source Protection Zone.	Medium	Unlikely	Low	No gross contamination identified during ground investigation works. No groundwater body has been identified in the shallow superficial deposits. Given this and the encountered impermeable cohesive Glacial Till, there is no pathway for contaminants to reach the Principal Aquifer receptor.	No further action required
	Horizontal migration over and through the superficial deposits (soils)	Controlled Waters (Surface Water) Nearest surface water feature is the Rochdale canal located over 125m southeast No surface water abstraction points within 900m.	Medium	Unlikely	Low	Considering the distance from the site to the nearest surface water receptor and the encountered contamination within the Made Ground, this pathway is considered unlikely.	No further action required
Deep made ground and organic matter and/or contamination as source material for the generation of ground gas.	Ground gas & vapour migration and inhalation	Site end-users Residential End Users	Medium	Unlikely	Low	All boreholes recorded low concentrations of Carbon Dioxide (<5% v/v). Methane recorded below the limit of detection (<0.1%).	No gas protection measures are required. .
		Construction and maintenance workers	Medium Standard Health & Safety precautions likely to be used by workers)	Unlikely	Low	GSV for the site of 0.008 l/hr for carbon dioxide. A Characteristic Situation 1 (CS1) gas regime has been established to date.	The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction

10.0 Engineering Assessment and Recommendations

10.1 Introduction

This section will assess the relevant geotechnical issues for the proposed development comprise a 9 storey residential apartment building. The proposed development plan is contained within *Appendix A*.

The engineering assessment considers foundation design, bearing capacity, settlement, excavations, and pavement design for the site. Finished Floor Levels for the buildings and structures along with structural details and loadings have not yet been provided. It should be noted that detail may change in the development of designs beyond the issue of this Phase 2 Report and the Construction Designer should satisfy themselves regarding the adequacy of their design and proposed approach to construction by reference to the on-going project design proposals, the ground investigation information and their own examination of the site.

10.2 Summary of Ground Conditions

The ground conditions on site generally comprised made ground from ground level to 2.10m to 3.50m bgl, comprising a tarmac or concrete surface covering, underlain by granular made ground, with fragments of brick, concrete, tarmac, timber, metal, plastic, ash, clinker, ceramics, mudstone, siltstone, quartz and sandstone, or cohesive made ground, comprising likely reworked natural material.

Natural soils comprise generally cohesive glacial till, comprising firm or stiff brown slightly gravelly to very gravelly, sandy, slightly silty to silty clay. Thin, localised, lenses of granular soils were also encountered. Extremely weak to moderately strong brown sandstone bedrock of the Chester Formation was encountered at 22.90m to 23.80m bgl (25.91m to 24.89m AOD).

Groundwater head level within the bedrock is in the region of 22.40m to 22.50m bgl.

Localised perched water may be encountered in shallow made ground soils.

10.3 Geotechnical Considerations

10.3.1 Presence of Existing Services

The presence of existing services may require capping and/or diversion associated with the development, which should be managed through the appropriate utility suppliers during the construction phase. The Principal Contractor should ensure that appropriate mitigation measures are put in place during the construction phase (i.e. during excavation of foundations).

10.3.2 Obstructions and Relict Foundations

Although no obstructions were recorded during the ground investigation, relict foundations may be encountered during excavations, and foundations associated with the existing garaged will require breaking out. There is potential for obstructions to be encountered beyond the findings of this investigation.

10.3.3 Variable Made Ground

Made Ground was encountered in all the exploratory hole locations from ground level to depths of between 2.10m and 3.50m bgl across the site. The Made Ground should not be considered as a suitable founding stratum.

10.4 Foundation Options

10.4.1 Shallow Foundations

Due to the likely loads of the proposed development, comprising a 9 storey residential apartment building, and deep Made Ground (2.10m to 3.50m bgl), it is considered that traditional shallow foundations are unlikely to be suitable.

10.4.2 Piled Foundations

It is therefore advised that a piled foundation solution is adopted.

Pile design and installation are continually evolving processes, it is recommended that specialist piling contractors are contracted as to the suitability and carrying capacity of the piles in the ground conditions pertaining to the site.

The carrying capacity of piles depends not only on their size and the ground conditions but also their method of installation.

Pile design and installation are continually evolving processes, it is recommended that specialist piling contractors are contracted as to the suitability and carrying capacity of the piles in the ground conditions pertaining to the site.

Additional post-demolition investigation is proposed to further inform pile design.

10.5 Ground Floor Slabs

Based on the findings of the ground investigation, it is recommended that consideration is given to constructing suspended ground floor slabs, bearing on pile caps and supported by a network of beams. Soft/deleterious material should be removed and replaced with suitably compacted granular fill.

10.6 Excavations

Based on observations on site, together with the results of in-situ and laboratory tests, it is considered that excavations to <1.20m bgl should stand unsupported in the short term. Side support for safety purposes should of course be provided to all excavations which appear unstable, and those >1.20m deep, in accordance with Health and Safety Regulations.

Suitable side slope angles must be checked and provided by a suitably qualified temporary works contractor for any excavations.

Groundwater may be encountered as seepages in shallow excavations for foundations or services as perched water present. It is considered that groundwater inflows, if encountered, may be controlled by pumping from sumps.

Excavation through layers of Made Ground encountered across the site should be feasible using conventional site plant.

10.7 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest (Ref. 16) and laboratory testing undertaken accordingly in *Section 6.4*.

In the consideration of sulphate attack on buried concrete, reference has been made to BRE SD1 (2005 Ed), which classifies the site as a brownfield site with a mobile groundwater conditions the results of the concrete classification tests received have indicated a DS-1, AC-1 classification for the Made Ground and natural soils.

11.0 Conclusions & Recommendations

11.1 Conclusions

A revised tabulated revised Conceptual Site Model has been derived following the findings on the Generic Quantitative Risk Assessment risk assessment and is presented in *Section 9.0*.

11.1.1 Ground Contamination

With respect to the proposed end use of the site, elevated concentrations of lead were recorded in 8 No. made ground soil samples and arsenic in 1 No. soil sample. with respect to Residential without home grown produce end-use. Asbestos was identified within 5 No. samples, recovered as amosite and chrysotile cement, amosite board and amosite loose fibres. Asbestos in soil concentrations in the region of 0.098% w/w and 4.623% w/w were recorded. Bulk asbestos fibre concentrations of 15% were recorded in chrysotile cement in BH01 (0.65m bgl) and RC01 (0.75m bgl).

A **Low** risk to proposed site end-users from direct contact, inhalation and ingestion of contaminants within Made Ground soil is determined. No volatile contamination was identified and the proposed building footprint will break any source-pathway-receptor linkage.

5 No. samples, recovered as amosite and chrysotile cement, amosite board and amosite loose fibres. Asbestos in soil concentrations in the region of 0.098% w/w and 4.623% w/w were recorded. Bulk asbestos fibre concentrations of 15% were recorded in chrysotile cement in BH01 (0.65m bgl) and RC01 (0.75m bgl). included herein. A **Moderate** risk is identified to construction and maintenance workers. An asbestos management plan should be in place during construction works. Construction and maintenance workers should be provided with PPE during all works, with reference to the environmental chemistry results.

11.1.2 Ground Gas Assessment

Methane concentrations was recorded below the limit of detection on all monitoring visits.

Maximum carbon dioxide concentrations were recorded at 0.8% v/v, recorded in WS1 on the fourth monitoring visit. Evaluation of the 'representative' scenario and worst case check records a maximum Q_{hg} of 0.008 l/hr for carbon dioxide where the maximum reading 0.8% v/v was used. This is taken as the gas screening value (GSV) for the site.

Therefore a Characteristic Situation 1 (CS1) gas regime has been assigned to the site.

A **Low** risk rating is therefore identified to proposed site end users from inhalation of hazardous ground gases corresponding to CS1 gas regime and no ground gas protection measures required.

The Curtins Phase 1 Report (Ref. 1) confirms the site is situated in a lower probability radon area where <1% of homes are above the radon action level. On this basis radon protection measures are not considered necessary in the construction of new dwellings or extensions.

11.2 Recommendations

Based on the findings of the ground investigation, the following recommendations are made:

- 1) Additional investigation is required, following demolition of the existing garages on site. Obtain environmental samples from beneath garage footprint, and additional geotechnical information to aid pile design.
- 2) Asbestos management plan during construction works.
- 3) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein and within *Appendix C*.
- 4) A Remediation Strategy and Verification report will be required to detail and approve the above measures and ensure imported soils for soft landscaping are suitable for use.
- 5) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer.

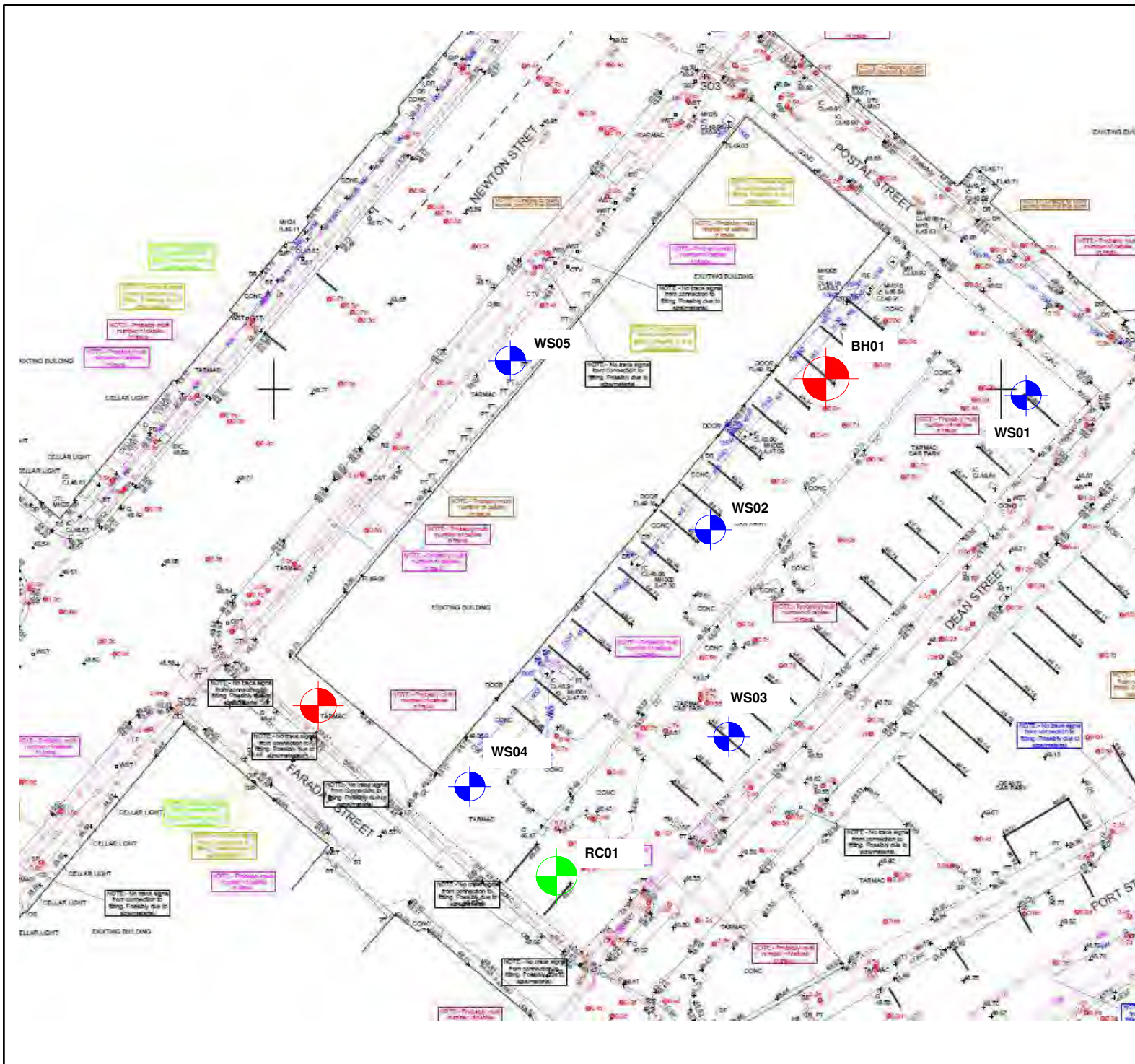
12.0 References

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Appendix A – Drawings

- Curtins (2022) 080401--CUR-00-XX-DR-GE-80004-P02 Exploratory Hole Location Plan.
- Hawkins Brown (2021) POST-HBA-ZZ-00-DR-A-20-0100-P.13 Postal Street Proposed Floor Plan – Ground Floor



PRE-DEMOLITION INVESTIGATION

-  CABLE PERCUSSIVE BOREHOLE
-  WINDOW SAMPLE BOREHOLE
-  ROTARY CORED BOREHOLE

POST-DEMOLITION INVESTIGATION

-  CABLE PERCUSSIVE BOREHOLE
-  MACHINE EXCAVATED TRIAL PITS

Rev:	Description:	Date:	By:	Chkd:
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Structures - Civils - Environmental - Infrastructure - Transport Planning - Sustainability - Expert Advisory Services
Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status:

INFORMATION

Project:

POSTAL STREET

Drg Title:

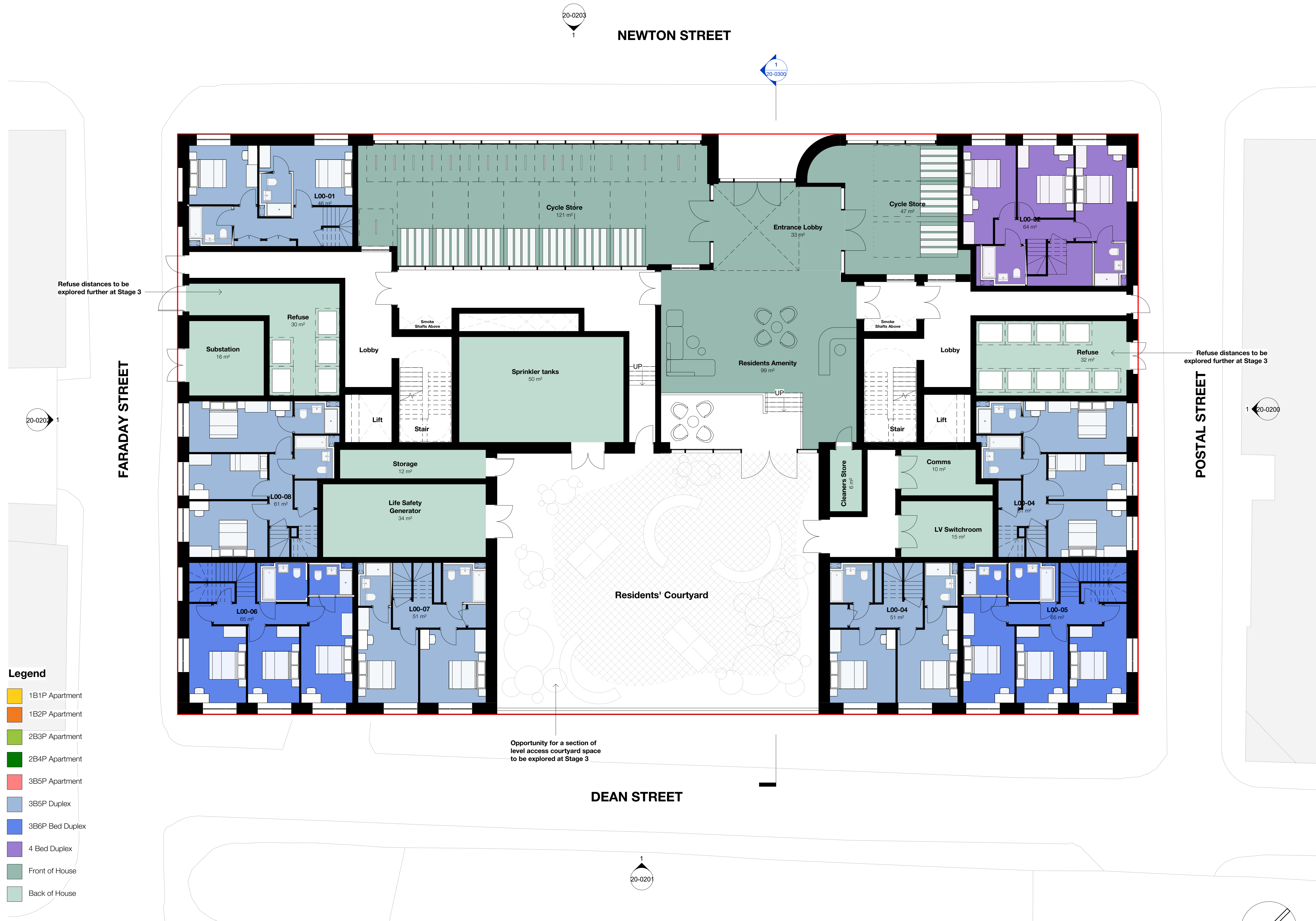
EXPLORATORY HOLE LOCATION PLAN

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	12/05/2022	JL	RA

Drg No:	Rev:
080401-CUR-00-XX-DR-GE-80004	P02

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Note: Finished floor level of ground floor
Townhouses are to be are level +850mm
as shown on elevations and sections.



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No implied licence exists. This drawing should not be used to calculate areas for the purposes of valuation. Do not scale this drawing. All dimensions to be checked on the site by the contractor and such dimensions to be their responsibility. All work must comply with relevant British Standards and Building Regulations requirements. Drawing errors and omissions to be reported to the architect. To be read in conjunction with Architect's specification and other consultant information.

Rev	Description	Date
P.1	Issued for Information	22.11.21
P.2	Issued for Information	08.12.21
P.3	Issued for Information	26.01.22
P.4	Issued for Information	27.01.22
P.5	Issued for Coordination	01.02.22
P.6	Issued for Information	09.02.22
P.7	Issued for Information	22.03.22
P.8	Issued for Information	25.03.22
P.9	Issued for Information	08.04.22
P.10	Stage 2 Issue	22.04.22
P.11	Stage 2 Revised Layout	24.06.22
P.12	Issued for Information	04.08.22
P.13	Issued for Information	19.08.22

3C Tariff Street
Manchester M1 2FF
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Hawkins\Brown

Project
Postal Street
Postal Street
Manchester
M1 2EE

Drawing
Proposed Floor Plan - Ground
Floor

Scale @ A1
1 : 100
Date
22/11/21

Drawn By
TM
Checked By
TD

Job Number 210258	Status S2	Purpose of Issue Issued for Information
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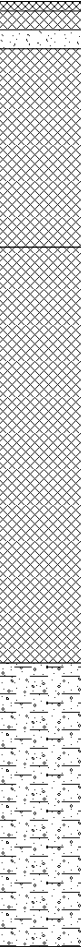
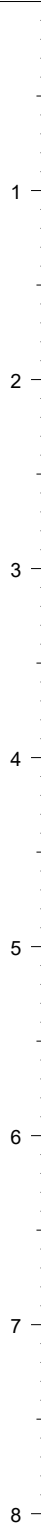
Drawing No. POST-HBA-ZZ-00-DR-A-20-0100	Rev P.13
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Appendix B – Exploratory Hole Logs

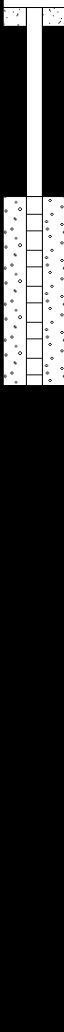
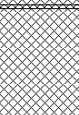
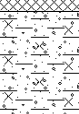
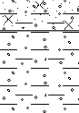
- 2022 Exploratory Borehole logs.
 - Window Sample Boreholes WS01 – WS05
 - Cable Percussion Boreholes BH01
 - Rotary Borehole RC01

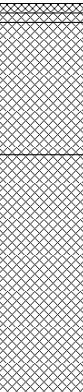
					Borehole Log		Borehole No. WS01 Sheet 1 of 1		
Project Name: Postal Street				Project No. 080401		Co-ords: 384751.64 - 398449.70		Hole Type WS	
Location: Northern Quarter, Manchester				Level: 48.86		Scale 1:40			
Client: Faithful & Gould				Dates: 24/05/2022 - 24/05/2022		Logged By JL			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			48.81		MADE GROUND: Tarmacadam	1	
	0.30	ES							MADE GROUND: Greyish brown clayey gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, sandstone, concrete, plastic and mudstone. Cobbles are angular to subangular of brick.
	0.75	ES							2
	1.20		N=1 (1,0/0,0,1,0)						
	2.00		N=17 (1,0/3,5,5,4)	2.15	46.71			3	
	2.50	D							Firm brown slightly gravelly CLAY. Gravel is subangular to rounded, fine to medium of sandstone and mudstone.
	3.00		N=11 (3,4/6,1,0,4)					4	
	3.60	D		3.50	45.36				Orangish brown very clayey fine to medium SAND.
	4.00		N=17 (3,3/4,4,4,5)	4.05	44.81			5	
	5.00		N=15 (2,3/4,3,4,4)						Firm brown slightly sandy gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of sandstone and mudstone
		5.45			43.41		End of borehole at 5.45 m	6	
								7	
								8	

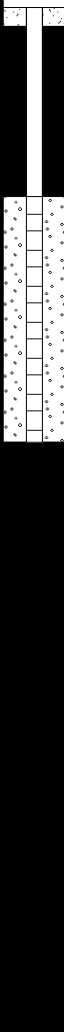
Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered. Borehole installed with ground gas/water monitoring installation to 2.50m bgl in Made Ground.

					Borehole Log		Borehole No. WS02 Sheet 1 of 1		
Project Name: Postal Street				Project No. 080401		Co-ords: 374729.50 - 398440.40		Hole Type WS	
Location: Northern Quarter, Manchester				Level: 48.77		Scale 1:40			
Client: Faithful & Gould				Dates: 24/05/2022 - 24/05/2022		Logged By JL			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05	48.72		MADE GROUND: Tarmacadam	
		0.15			0.15	48.62		MADE GROUND: Yellowish grey gravelly SAND. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of concrete, brick and sandstone.	
		0.25			0.25	48.52		MADE GROUND: Concrete	
		1.30	ES		1.30	47.47		MADE GROUND: Blackish grey slightly clayey gravelly SAND, with occasional cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, concrete, plastic, ash, clinker, and sandstone. Cobbles are angular to subangular of brick.	
		2.00			2.00			MADE GROUND: Soft to firm brown gravelly CLAY. Gravel is angular to subrounded, fine to coarse of brick, concrete, sandstone and mudstone (reworked natural)	
		2.00							2
		3.00							3
		4.00	D	N=6 (1,0/1,0,2,3)					
		4.00							
		5.00							5
		5.00							6
		5.00							7
		5.00							8
End of borehole at 5.00 m									
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 2.50m bgl. Borehole backfilled with arisings.									



					Borehole Log			Borehole No. WS03 Sheet 1 of 1			
Project Name: Postal Street					Project No. 080401		Co-ords: 384731.17 - 398426.14		Hole Type WS		
Location: Northern Quarter, Manchester					Level: 48.58		Scale 1:40		Logged By TW		
Client: Faithful & Gould					Dates: 23/05/2022 - 23/05/2022						
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.05	48.53		MADE GROUND: Tarmacadam	1		
					0.15	48.43		MADE GROUND: Yellowish brown sandy GRAVEL. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, sandstone, mudstone and quartz.			
					0.17	48.41		MADE GROUND: Tarmacadam			
					1.20	N=20 (1,0/3,8,6,3)				MADE GROUND: Brown slightly clayey sandy GRAVEL, with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, sandstone, and quartz. Cobbles are angular of brick.	1
					1.70	ES	1.60	46.98		MADE GROUND: Brown clayey gravelly SAND. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, ceramic, siltstone and quartz.	
					2.00	N=10 (4,4/3,2,2,3)	2.10	46.48		Soft greyish brown silty slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and quartz.	2
					2.20 - 2.65	D				Firm brown slightly silty gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and quartz. Sand bands within clay from 3.00m to 3.20m bgl.	
					3.00	N=22 (3,3/5,5,6,6)	2.80	45.78		Firm to stiff greyish brown thinly laminated very silty slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of siltstone and sandstone.	3
							3.50	45.08		Firm orangish brown slightly clayey slightly sandy SILT.	
					4.00	N=14 (2,3/3,3,4,4)	4.00	44.58		Firm brown slightly silty gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and quartz.	5
					4.00 - 4.45	D	4.90	43.68		End of borehole at 5.45 m	
				5.00	N=14 (2,3/3,3,3,5)	5.45	43.13				
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 3.50m bgl. Borehole installed with ground gas/water monitoring installation to 2.00m bgl in Made Ground.											
											

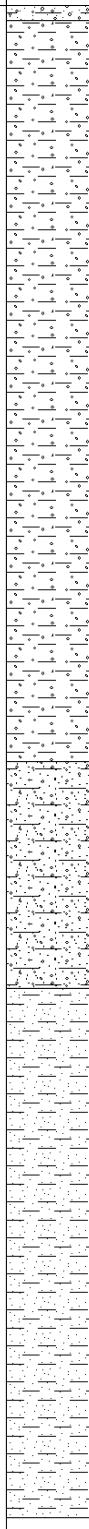
					Borehole Log			Borehole No. WS04 Sheet 1 of 1		
Project Name: Postal Street				Project No. 080401		Co-ords: 384713.65 - 398422.16		Hole Type WS		
Location: Northern Quarter, Manchester						Level: 48.54		Scale 1:40		
Client: Faithful & Gould						Dates: 24/05/2022 - 24/05/2022		Logged By JL		
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.05	48.49		MADE GROUND: Tarmacadam	1	
					0.10	48.44		MADE GROUND: Orangish brown clayey gravelly SAND. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete and sandstone.		
		1.00	ES		0.80	47.74		MADE GROUND: Brown gravelly SAND, with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, sandstone and quartz. Cobbles are angular of brick.		
		1.20		N=29 (2,3/5,10,7,7)				MADE GROUND: Brown slightly clayey gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of brick, concrete, ash, sandstone and quartz. Cobbles are angular of brick.		
		2.00		N=28 (5,10/13,7,3,5)	2.10	46.44		Firm brown slightly gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of mudstone and sandstone.		
		2.50	D					Becoming stiff from 2.50m bgl.		
		3.00		N=24 (3,4/5,6,6,7)						
		3.80	D							
		4.00		N=20 (2,4/4,5,5,6)						
		5.00		N=18 (3,3/4,4,5,5)						
				5.45	43.09		End of borehole at 5.45 m		6	
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered. Borehole backfilled with arisings.										7
										8

				Borehole Log				Borehole No. WS05 Sheet 1 of 1			
Project Name: Postal Street				Project No. 080401		Co-ords: 384717.74 - 398453.56		Hole Type WS			
Location: Northern Quarter, Manchester				Level: 48.94		Scale 1:40		Logged By TW			
Client: Faithful & Gould				Dates: 25/05/2022 - 25/05/2022							
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.02	48.92		MADE GROUND: Tarmacadam			
					0.10	48.84				MADE GROUND: Grey gravelly SAND. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of concrete, sandstone and mudstone.	
					0.40	48.54				MADE GROUND: Orangish brown sandy GRAVEL. Gravel is subangular to rounded, fine to coarse of brick, concrete, ash, sandstone and quartzite	
		0.60	ES							MADE GROUND: Yellowish brown gravelly slightly clayey SAND. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of brick, concrete, sandstone and quartz.	
		1.20		N=27 (1,1/3,3,7,14)			<i>Siltstone cobbles from 0.70 to 1.20m bgl. Becoming clayey from 1.30m bgl.</i>				
		1.80					MADE GROUND: Reddish brown sandy gravel with occasional cobbles. Gravel is subangular to subrounded, fine to coarse of ash, concrete, sandstone, and quartz. Cobbles are angular of brick				
		2.00		N=2 (0,0/1,0,0,1)						Firm blackish brown silty gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of brick, ash, sandstone and quartz.	
		2.40	ES							Soft brown silty CLAY	
		3.00		N=8 (1,0/2,3,2,1)							
							3.20	45.74			
							3.80	45.14			
		4.00 4.00 - 4.45		D	N=14 (2,2/2,3,4,5)						
											
		5.00			N=9 (1,2/1,2,3,3)						
							5.45	43.49			End of borehole at 5.45 m
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 2.0m bgl. Borehole installed with ground gas/water monitoring installation to 2.30m bgl in Made Ground.											
											

						Borehole Log		Borehole No. BH01 Sheet 1 of 3	
Project Name: Postal Street				Project No. 080401		Co-ords: 384738.14 - 398450.85		Hole Type CP	
Location: Northern Quarter, Manchester						Level: 48.81		Scale 1:50	
Client: Faithful & Gould						Dates: 23/05/2022 - 24/05/2022		Logged By JL	
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	ES	N=15 (2,2/7,4,2,2)	0.05 0.10	48.76 48.71		MADE GROUND: Tarmacadam	
		0.65 0.75	ES ES	N=7 (1,1/2,1,2,2)	0.95	47.86		MADE GROUND: Greyish blackish brown slightly clayey very gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, tarmac, timber, metal, sandstone, concrete and plastic. Cobbles are angular to subangular of brick.	
		1.20 1.20	B					MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular to subrounded, fine to coarse of brick and sandstone (reworked natural)	
		2.00 2.00	D						
		3.00 3.00 3.00	B D	N=9 (1,0/1,2,3,3)	2.45	46.36		Soft light brown very sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to medium of sandstone and mudstone	
		4.00 - 4.45	U	Ublow=68	3.15	45.66		Firm brown slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of sandstone.	
		4.50	D					Becoming a stiff clay from 4.50m bgl.	
		5.00 5.00	D	N=11 (2,2/2,3,3,3)				Sand bands within clay from 5.10m to 9.50m bgl, max 10cm thick.	
		6.00 - 6.45	U	Ublow=78	9.50	39.31		Brown clayey slightly sandy GRAVEL of subangular to rounded, fine to coarse of sandstone, mudstone and coal.	
		6.50	D						
		7.00	D						
		7.50 7.50	D	N=9 (1,1/2,2,2,3)					
	8.50	D		9.50	39.31				
	9.00 - 9.45	U	Ublow=120						
	9.50	D							
				9.90					

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 15.50m bgl. Refusal on bedrock at 22.90m bgl. Borehole installed with ground gas/water monitoring installation to 22.50m bgl in Glacial Till.

Continued on next sheet

					Borehole Log		Borehole No. BH01 Sheet 2 of 3			
Project Name: Postal Street				Project No. 080401		Co-ords: 384738.14 - 398450.85		Hole Type CP		
Location: Northern Quarter, Manchester				Level: 48.81		Scale 1:50				
Client: Faithful & Gould				Dates: 23/05/2022 - 24/05/2022		Logged By JL				
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					10.10	38.71		Stiff brown slightly gravelly CLAY. Gravel is subrounded to rounded, fine to coarse of sandstone and mudstone.		
	10.50 10.50 10.50	B D	N=23 (5,5/5,5,6,7)						11	
	11.50	D								
	12.00 - 12.45	U	Ublow=110						12	
	12.50	D								
	13.50 13.50 13.50	B D	50 (25 for 110mm/50 for 40mm)						13	
	14.50	D								
	15.00 15.00 - 15.45	B U	Ublow=120	15.00	33.81	Brown slightly clayey gravelly SAND. Sand is medium to coarse. Gravel is subrounded to rounded, fine to coarse of sandstone.			14	
	16.00	D								15
	16.50 16.50 16.50	B D	N=20 (6,12/6,3,5,6)	16.50	32.31				Stiff brown sandy CLAY.	16
	17.50 - 17.95	U	Ublow=120							17
	18.50	D								18
	19.00	D								19
19.50 19.50 19.50	B D	50 (25 for 105mm/50 for 105mm)				20				
Continued on next sheet										

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 15.50m bgl. Refusal on bedrock at 22.90m bgl. Borehole installed with ground gas/water monitoring installation to 22.50m bgl in Glacial Till.



					Borehole Log				Borehole No. BH01 Sheet 3 of 3	
Project Name: Postal Street					Project No. 080401		Co-ords: 384738.14 - 398450.85		Hole Type CP	
Location: Northern Quarter, Manchester					Level: 48.81		Scale 1:50		Logged By JL	
Client: Faithful & Gould					Dates: 23/05/2022 - 24/05/2022					
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		20.50	D	50 (25 for 70mm/50 for 110mm)	21.00	27.81		Brown coarse SAND.	21	
		21.00	B							
		21.00	D							
		21.00								
		21.80	D		21.80	27.01		Brown very sandy GRAVEL of subrounded to rounded, medium to coarse sandstone, mudstone, coal and siltstone.	22	
		22.50	B							
		22.50								
		23.00		50 (25 for 120mm/50 for 180mm)	22.90	25.91		SANDSTONE recovered as brown sandy GRAVEL of angular to subangular, medium to coarse sandstone.	23	
		23.00		50 (25 for 25mm/50 for 25mm)						
		23.30	D	50 (25 for 15mm/50 for 20mm)	23.40	25.41				
							End of borehole at 23.40 m	24		
								25		
								26		
								27		
								28		
								29		
								30		
Remarks										
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater encountered at 15.50m bgl. Refusal on bedrock at 22.90m bgl. Borehole installed with ground gas/water monitoring installation to 22.50m bgl in Glacial Till.									AGS	

					Borehole Log		Borehole No. RC01 Sheet 1 of 4		
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC	
Location: Northern Quarter, Manchester				Level: 48.69		Scale 1:50			
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022		Logged By TW			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05	48.64		MADE GROUND: Tarmacadam	1 2 3 4 5 6 7 8 9 10
	0.10			0.10	48.59	MADE GROUND: Brown sandy GRAVEL of subangular to subrounded, fine to coarse of concrete and brick.			
	0.12			0.12	48.57	MADE GROUND: Tarmacadam			
	0.40	ES				MADE GROUND: Dark brown slightly sandy slightly clayey GRAVEL, with frequent cobbles. Gravel is angular to subrounded, fine to coarse of brick, concrete, ash, and sandstone. Cobbles are angular to subangular of brick.			
	0.75	ES				Abundant cobbles of brick from 0.30m to 0.60m bgl.			
	1.20	D	N=14 (1,2/1,4,4,5)	1.50	47.19	MADE GROUND: Greyish blackish brown slightly clayey very gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, tarmac, timber, metal, sandstone, concrete and plastic. Cobbles are angular to subangular of brick.			
	1.20					MADE GROUND: Orangish grey sandy GRAVEL of angular to subrounded, fine to coarse, brick, concrete and sandstone			
	2.00	D		2.00	46.69	MADE GROUND: Soft to firm brown gravelly slightly sandy CLAY. Gravel is angular to rounded, fine to coarse of brick, and sandstone (reworked natural)			
				2.40	46.29	Soft to firm brown slightly gravelly slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.			
				2.60	46.09				
		3.50		N=29 (3,4/5,8,8,8)					
		5.00		N=22 (4,4/4,6,6,6)					
		6.50	D	N=21 (3,5/5,5,5,6)	6.35	42.34	Firm to stiff brown gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.		
		6.50			7.10	41.59	Brown slightly clayey SAND (poor recovery)		
		8.00		N=34 (2,5/7,8,9,10)					
					8.75	39.94	Stiff brown gravelly slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.		
		9.50	D	N=28 (1,3/4,8,7,9)					
		9.50							

Continued on next sheet

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

					Borehole Log			Borehole No. RC01 Sheet 2 of 4	
Project Name: Postal Street					Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC
Location: Northern Quarter, Manchester					Level: 48.69		Scale 1:50		
Client: Faithful & Gould					Dates: 23/05/2022 - 26/05/2022		Logged By TW		
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		11.00		N=32 (3,4/5,9,9,9)					11
		12.50 12.50	D	N=44 (3,5/11,10,12,11)					12
		14.00		N=50 (5,8/50 for 288mm)					13
		15.50 15.50	D	N=50 (5,9/50 for 235mm)	15.40	33.29		Firm brown very gravelly CLAY. Gravel is subrounded to rounded, fine to medium of sandstone, shale, coal, quartz and mudstone	14
		17.00		50 (20 for 55mm/50 for 105mm)					15
		18.50 18.50	D	50 (25 for 70mm/50 for 135mm)	17.50	31.19		Brown slightly clayey gravelly SAND (poor recovery). Gravels is subrounded to rounded, medium to coarse of sandstone, mudstone and shale	16
					20.00	28.69			17
Continued on next sheet									18
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.									19



					Borehole Log		Borehole No. RC01 Sheet 3 of 4			
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC		
Location: Northern Quarter, Manchester				Level: 48.69		Scale 1:50				
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022		Logged By TW				
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		20.00		50 (25 for 70mm/50 for 77mm)	23.80	24.89		Brown very clayey sandy GRAVEL of rounded, fine to coarse, sandstone, mudstone, limestone and shale.		
		21.50 21.50	D	50 (10,15/50 for 105mm)						
		24.08 - 24.50	C							Weak, thinly bedded, brown medium grained SANDSTONE <i>Moderately spaced, 0-5 degrees, planar and stepped smooth</i>
		24.66 - 24.78	C							<i>Very closely to medium spaced, 10-15 degrees, planar rough</i>
			25.00 - 25.33	C						
			25.74 - 25.94	C						
			26.02 - 26.10	C		26.78	21.91		Set 1-Extremely closely to closely spaced, 5-10 degrees, planar rough. Set 2-Closely spaced, 85 degrees, planar rough	
			27.64 - 27.80	C						Extremely weak to weak, thinly bedded, brown coarse grained SANDSTONE
			28.36 - 28.49	C		27.75	20.94		Set 1-Extremely closely to moderately spaced, 5-10 degrees, planar rough. Set 2-Medium spaced, 65 degrees, planar smooth	
			28.72 - 28.97	C						Weak, thinly bedded, brown medium grained SANDSTONE
			29.21 - 29.38	C		29.13	19.56		Set 1-Very closely to closely spaced, 0-5 degrees, planar rough and planar smooth. Set 2-Medium spaced, 45 degrees, planar rough	
										Extremely weak, thinly bedded, brown medium to coarse grained SANDSTONE
Continued on next sheet										

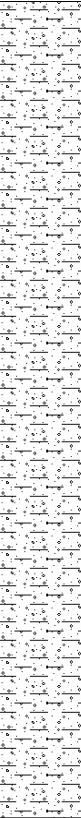
Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

					Borehole Log		Borehole No. RC01 Sheet 4 of 4		
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC	
Location: Northern Quarter, Manchester				Level: 48.69		Scale 1:50			
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022		Logged By TW			
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		30.01 - 30.08	C		30.42	18.27		Weak to moderately strong, thinly bedded, brown fine to medium grained SANDSTONE. <i>Very closely to medium spaced, 5-15 degrees, planar and undulating rough, planar smooth</i>	
		30.50 - 30.80	C						
		30.90 - 31.11	C						
		31.17 - 31.35	C						
		31.51 - 31.78	C						
			32.00 - 32.33	C		33.15	15.54		Gravel band of subangular fine to medium sandstone and mudstone at 32.69m to 32.78m bgl <i>Very closely to closely spaced, 10-15 degrees, planar rough</i>
		32.90 - 33.09	C						
		33.60 - 33.68	C						
		34.09 - 34.45	C						
		34.68 - 34.86	C						
					34.47	14.22		Weak, thinly bedded, brown coarse grained SANDSTONE with frequent gravel inclusions <i>Very closely to medium spaced, 5-10 degrees, planar rough and planar smooth</i>	
					35.00	13.69		Weak, thinly bedded, brown fine grained SANDSTONE	
End of borehole at 35.00 m									
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.									



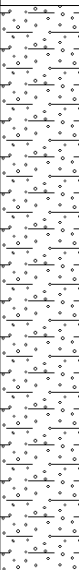
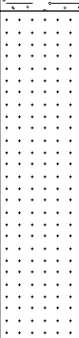
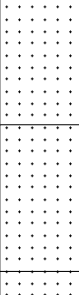
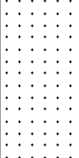
								Rotary Core Log		Borehole No. RC01 Sheet 1 of 4	
Project Name: Postal Street				Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC			
Location: Northern Quarter, Manchester				Level: 48.69		Scale 1:50		Logged By TW			
Client: Faithful & Gould				Dates: 23/05/2022 - 26/05/2022							
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
1		0.05					0.05	48.64		MADE GROUND: Tarmacadam	1
		0.10					0.10	48.59		MADE GROUND: Brown sandy GRAVEL of subangular to subrounded, fine to coarse of concrete and brick.	
		0.12					0.12	48.57		MADE GROUND: Tarmacadam	
		0.40	ES							MADE GROUND: Dark brown slightly sandy slightly clayey GRAVEL, with frequent cobbles. Gravel is angular to subrounded, fine to coarse of brick, concrete, ash, and sandstone. Cobbles are angular to subangular of brick.	
		0.75	ES							Abundant cobbles of brick from 0.30m to 0.60m bgl.	
		1.20	D				1.50	47.19		MADE GROUND: Greyish blackish brown slightly clayey very gravelly SAND, with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of brick, tarmac, timber, metal, sandstone, concrete and plastic. Cobbles are angular to subangular of brick.	
		2.00	D				2.00	46.69		MADE GROUND: Orangish grey sandy GRAVEL of angular to subrounded, fine to coarse, brick, concrete and sandstone	
		2.00 - 3.50		73	0	0	2.40	46.29		MADE GROUND: Soft to firm brown gravelly slightly sandy CLAY. Gravel is angular to rounded, fine to coarse of brick, and sandstone (reworked natural)	
							2.60	46.09		Soft to firm brown slightly gravelly slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and coal.	
		3.50 - 5.00		100	0	0					
2		5.00 - 6.50		97	0	0				Firm to stiff brown gravelly CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	2
		6.50	D				6.35	42.34			
		6.50 - 8.00		43	0	0	7.10	41.59		Brown slightly clayey SAND (poor recovery)	
		8.00 - 9.50		57	0	0	8.75	39.94		Stiff brown gravelly slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	
		9.50	D								
Continued on next sheet											10

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

							Rotary Core Log			Borehole No. RC01 Sheet 2 of 4					
Project Name: Postal Street							Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC				
Location: Northern Quarter, Manchester							Level: 48.69		Scale 1:50		Logged By TW				
Client: Faithful & Gould							Dates: 23/05/2022 - 26/05/2022								
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description					
				TCR	SCR	RQD									
		9.50 - 11.00	D	100	0	0	15.40	33.29		Firm brown very gravelly CLAY. Gravel is subrounded to rounded, fine to medium of sandstone, shale, coal, quartz and mudstone	11				
		11.00 - 12.50		87	0	0					12				
		12.50		100	0	0					13				
		12.50 - 14.00													
		14.00 - 15.50	87	0	0	D					17.50	31.19		Brown slightly clayey gravelly SAND (poor recovery). Gravels is subrounded to rounded, medium to coarse of sandstone, mudstone and shale	15
		15.50	77	0	0										16
		15.50 - 17.00													
		17.00 - 18.50	13	0	0										18
18.50	13	0				0	19								
18.50 - 20.00								20.00	28.69		Continued on next sheet	20			

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.



							Rotary Core Log				Borehole No. RC01 Sheet 3 of 4				
Project Name: Postal Street							Project No. 080401		Co-ords: 384702.48 - 398428.53			Hole Type RC			
Location: Northern Quarter, Manchester							Level: 48.69			Scale 1:50					
Client: Faithful & Gould							Dates: 23/05/2022 - 26/05/2022			Logged By TW					
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description					
				TCR	SCR	RQD									
		20.00 - 21.50	D	37	0	0	23.80	24.89		Brown very clayey sandy GRAVEL of rounded, fine to coarse, sandstone, mudstone, limestone and shale.		21			
		21.50 - 23.00		0	0	0						22			
		23.00 - 23.80		38	0	0						23			
		23.80 - 24.50		100	100	100						24			
		24.50 - 24.66	C	96	90	74	26.78	21.91		Weak, thinly bedded, brown medium grained SANDSTONE <i>Moderately spaced, 0-5 degrees, planar and stepped smooth</i> <i>Very closely to medium spaced, 10-15 degrees, planar rough</i>		24			
		24.66 - 24.78	C									25			
		24.78 - 25.00	C									25			
		25.00 - 25.33	C									25			
		25.33 - 25.74	C	100	83	37	27.75	20.94		Set 1-Extremely closely to closely spaced, 5-10 degrees, planar rough. Set 2-Closely spaced, 85 degrees, planar rough		26			
		25.74 - 25.94	C									26			
		25.94 - 26.02	NI									26			
		26.02 - 26.10	C									26			
		26.10 - 26.00	15	100	83	37				Extremely weak to weak, thinly bedded, brown coarse grained SANDSTONE		27			
		26.00 - 27.50	15	100	83	37						27			
		27.50 - 27.64	NI	91	88	56						27			
		27.64 - 27.80	C									28			
		27.80 - 27.50	C								28				
		27.50 - 28.36	C								28				
		28.36 - 28.72	C	95	77	28	29.13	19.56		Set 1-Very closely to closely spaced, 0-5 degrees, planar rough and planar smooth. Set 2-Medium spaced, 45 degrees, planar rough Extremely weak, thinly bedded, brown medium to coarse grained SANDSTONE		28			
		28.72 - 28.97	C									29			
		28.97 - 29.21	NI									29			
		29.21 - 29.38	C									29			
		29.38 - 30.00	13	95	77	28						30			
Continued on next sheet															
Remarks Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.															
															

							Rotary Core Log		Borehole No. RC01 Sheet 4 of 4				
Project Name: Postal Street							Project No. 080401		Co-ords: 384702.48 - 398428.53		Hole Type RC		
Location: Northern Quarter, Manchester							Level: 48.69		Scale 1:50		Logged By TW		
Client: Faithful & Gould							Dates: 23/05/2022 - 26/05/2022						
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description			
				TCR	SCR	RQD							
		30.01 - 30.08	C				30.42	18.27		Weak to moderately strong, thinly bedded, brown fine to medium grained SANDSTONE. <i>Very closely to medium spaced, 5-15 degrees, planar and undulating rough, planar smooth</i>	31		
		30.50 - 30.80	NI C										
		30.90 - 31.11	C										
		31.17 - 31.35	C	100	100	95	33.15	15.54		Gravel band of subangular fine to medium sandstone and mudstone at 32.69m to 32.78m bgl <i>Very closely to closely spaced, 10-15 degrees, planar rough</i>	32		
		30.50 - 32.00	C										
		31.51 - 31.78	C										
		32.00 - 32.33	C							Weak, thinly bedded, brown coarse grained SANDSTONE with frequent gravel inclusions <i>Very closely to medium spaced, 5-10 degrees, planar rough and planar smooth</i>	33		
		32.00 - 33.50	NI	87	81	63	34.47	14.22				Weak, thinly bedded, brown fine grained SANDSTONE	34
		32.90 - 33.09	C 7										
		33.60 - 33.68	C										
	34.09 - 34.45	C	100	100	81	35.00	13.69		End of borehole at 35.00 m	35			
	33.50 - 35.00	C											
	34.68 - 34.86	C								36			
										37			
										38			
										39			
										40			

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strikes could not be recorded due to use of water flush. Refusal on bedrock at 23.80m bgl. Borehole installed with ground gas/water monitoring installation to 35.0m bgl in sandstone bedrock.

Appendix C – Chemical Laboratory Testing Results

- May 2022 Investigation
 - Envirolab, Final Analytical Test Report 22-05332-1

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/05332
Issue Number: 1

Date: 09 June, 2022

Client: Curtins Consulting (Manchester)
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: Jonathan Lord
Project Name: Postal Street, Manchester
Project Ref: B080401
Order No: EBMA 3399
Date Samples Received: 23/05/22
Date Instructions Received: 30/05/22
Date Analysis Completed: 09/06/22

Approved by:

A handwritten signature in black ink, appearing to read "Richard Wong".

Richard Wong
Client Manager

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	7.94	7.86	8.36	8.34	7.79	8.38	8.14	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.02	<0.01	0.05	0.02	0.01	<0.01	0.09	g/l	0.01	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic Matter _D ^{M#}	7.9	4.9	4.9	18.0	GLB	GLB	3.4	% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	29	13	11	35	15	<1	6	mg/kg	1	A-T-024s
Boron (water soluble) _D	<1.0	1.2	1.2	<1.0	<1.0	<1.0	<1.0	mg/kg	1	A-T-027s
Cadmium _D ^{M#}	2.5	1.7	1.6	2.2	1.9	1.4	1.3	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	221	75	183	195	43	15	63	mg/kg	1	A-T-024s
Chromium _D ^{M#}	26	28	23	23	17	22	18	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead _D ^{M#}	679	1600	685	361	363	73	1580	mg/kg	1	A-T-024s
Mercury _D	3.05	0.59	0.93	2.82	1.84	1.14	2.12	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	31	30	29	41	15	18	15	mg/kg	1	A-T-024s
Selenium _D ^{M#}	2	<1	1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc _D ^{M#}	146	91	99	127	100	65	264	mg/kg	5	A-T-024s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD	NAD	Amosite & Chrysotile	Amosite	NAD			A-T-045
Asbestos Matrix (visual) ₀	-	-	-	-	Cement	Board	-			A-T-045
Asbestos Matrix (microscope) ₀	-	-	-	-	-	Loose Fibres	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? ₀	N/A	N/A	N/A	N/A	Yes	No	N/A			A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) ₀	-	-	-	-	0.339	0.098	-	% w/w	0.001	A-T-054

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
PAH-16MS										
Acenaphthene _A ^{M#}	0.05	<0.01	<0.01	<0.01	<0.01	0.30	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	0.02	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	0.09	0.02	<0.02	<0.02	0.04	0.22	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.35	0.10	<0.04	<0.04	0.05	0.58	0.09	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.39	0.09	<0.04	<0.04	<0.04	0.47	0.12	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.50	0.10	<0.05	<0.05	0.06	0.62	0.15	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.23	0.06	<0.05	<0.05	<0.05	0.20	0.10	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.19	<0.07	<0.07	<0.07	<0.07	0.20	<0.07	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	0.54	0.11	<0.06	<0.06	0.07	0.74	0.10	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.10	<0.04	<0.04	<0.04	<0.04	0.07	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	0.67	0.20	<0.08	<0.08	0.14	2.74	0.23	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	0.02	<0.01	<0.01	<0.01	0.01	0.05	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.26	0.06	<0.03	<0.03	<0.03	0.24	0.10	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	0.41	0.15	<0.03	0.04	0.14	0.46	0.04	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	0.82	0.21	<0.07	<0.07	0.12	2.76	0.30	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	4.64	1.10	<0.08	<0.08	0.63	9.68	1.23	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
TPH CWG with Clean Up *C1										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	3	<1	5	<1	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	1	<1	<1	4	4	1	<1	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	25	5	3	24	22	102	23	mg/kg	1	A-T-055s
Total Aliphatics _A	26	5	3	31	26	109	23	mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	<1	<1	<1	1	<1	mg/kg	1	A-T-055s
Aro >C10-C12 _A	1	<1	<1	1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16 _A	5	2	<1	6	2	12	1	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	18	5	<1	21	5	51	5	mg/kg	1	A-T-055s
Aro >C21-C35 _A	82	21	4	100	28	119	25	mg/kg	1	A-T-055s
Total Aromatics _A	106	28	4	129	36	182	31	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	132	33	6	160	62	291	54	mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
SVOC										
4-Bromophenyl phenyl ether _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Hexachlorobenzene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Diethyl phthalate _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Dimethyl phthalate _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Dibenzofuran _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Carbazole _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Butylbenzyl phthalate _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate _A	<500	-	-	-	-	<500	-	µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
4-Nitrophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
3+4-Methylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
4-Chloro-3-methylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Nitrophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Methylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Chlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,6-Dinitrotoluene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4-Dinitrotoluene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4-Dimethylphenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4-Dichlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4,6-Trichlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2,4,5-Trichlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Chloronaphthalene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
2-Methylnaphthalene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Phenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Pentachlorophenol _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
n-Diethylphthalate _A	<500	-	-	-	-	<500	-	µg/kg	500	A-T-052s
n-Dibutylphthalate _A	<100	-	-	-	-	125	-	µg/kg	100	A-T-052s
Nitrobenzene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Isophorone _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
Hexachloroethane _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Hexachlorocyclopentadiene _A	<100	-	-	-	-	<100	-	µg/kg	100	A-T-052s
Perylene _A	<100	-	-	-	-	110	-	µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
VOC										
Dichlorodifluoromethane _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Chloromethane _A	<10	-	-	-	-	<10	-	µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene) _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromomethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Chloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Trichlorofluoromethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1-Dichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Carbon Disulphide _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Dichloromethane _A	<5	-	-	-	-	<5	-	µg/kg	5	A-T-006s
trans 1,2-Dichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1-Dichloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
cis 1,2-Dichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
2,2-Dichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromochloromethane _A [#]	<5	-	-	-	-	<5	-	µg/kg	5	A-T-006s
Chloroform _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,1-Trichloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1-Dichloropropene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Carbon Tetrachloride _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dichloroethane _A [#]	<2	-	-	-	-	<2	-	µg/kg	2	A-T-006s
Benzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Trichloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Dibromomethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromodichloromethane _A [#]	<10	-	-	-	-	<10	-	µg/kg	10	A-T-006s
cis 1,3-Dichloropropene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Toluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
trans 1,3-Dichloropropene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,2-Trichloroethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,3-Dichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Tetrachloroethene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Dibromochloromethane _A [#]	<3	-	-	-	-	<3	-	µg/kg	3	A-T-006s
1,2-Dibromoethane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS02	WS03	WS04	WS05	BH01			
Depth to Top	0.30	0.40	1.50	1.70	1.00	0.60	0.25			
Depth To Bottom										
Date Sampled	24-May-22	24-May-22	24-May-22	23-May-22	23-May-22	25-May-22	23-May-22			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4A	5A	6A	6A	4A	4A	4A			
Chlorobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Ethylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
m & p Xylene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
o-Xylene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Styrene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromoform _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Isopropylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2,3-Trichloropropane _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
Bromobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
n-Propylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
2-Chlorotoluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
4-Chlorotoluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
tert-Butylbenzene _A [#]	<2	-	-	-	-	<2	-	µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
sec-Butylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
4-Isopropyltoluene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,3-Dichlorobenzene _A	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,4-Dichlorobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
n-Butylbenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dichlorobenzene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP) _A	<2	-	-	-	-	<2	-	µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene _A	<3	-	-	-	-	<3	-	µg/kg	3	A-T-006s
Hexachlorobutadiene _A [#]	<1	-	-	-	-	<1	-	µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene _A	<3	-	-	-	-	<3	-	µg/kg	3	A-T-006s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
% Stones >10mm _A	-	<0.1	<0.1	-				% w/w	0.1	A-T-044
pH _D ^{M#}	-	8.61	8.21	-				pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	0.01	0.03	-				g/l	0.01	A-T-026s
Cyanide (total) _A ^{M#}	-	<1	<1	-				mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	-	<0.2	<0.2	-				mg/kg	0.2	A-T-050s
Organic Matter _D ^{M#}	-	GLB	4.5	-				% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	-	13	24	-				mg/kg	1	A-T-024s
Boron (water soluble) _D	-	<1.0	<1.0	-				mg/kg	1	A-T-027s
Cadmium _D ^{M#}	-	2.0	2.4	-				mg/kg	0.5	A-T-024s
Copper _D ^{M#}	-	122	113	-				mg/kg	1	A-T-024s
Chromium _D ^{M#}	-	18	26	-				mg/kg	1	A-T-024s
Chromium (hexavalent) _D	-	<1	<1	-				mg/kg	1	A-T-040s
Lead _D ^{M#}	-	3380	566	-				mg/kg	1	A-T-024s
Mercury _D	-	2.18	1.82	-				mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	-	19	27	-				mg/kg	1	A-T-024s
Selenium _D ^{M#}	-	<1	<1	-				mg/kg	1	A-T-024s
Zinc _D ^{M#}	-	613	362	-				mg/kg	5	A-T-024s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	-	Chrysotile	NAD	-						A-T-045
Asbestos Matrix (visual) _D	-	Cement	-	-						A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-						A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	-	Yes	N/A	-						A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) _D	-	4.623	-	-				% w/w	0.001	A-T-054
Bulk Fibre ID (inc. matrix) ^										
Bulk Fibre Identification _D [#]	Chrysotile	-	-	Chrysotile						A-T-045
Bulk Fibre Identification Matrix (visual) _D	Cement	-	-	Cement						A-T-045
Bulk Fibre Identification - Suitable for Water Absorption Test? _D	Yes	-	-	Yes						A-T-045
Bulk Fibre Quantification % Asbestos in ACM										
Bulk Fibre - % Asbestos in ACM (HSG264) _D	15	-	-	15				% w/w	0.001	A-T-054

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
PAH-16MS										
Acenaphthene _A ^{M#}	-	0.01	0.02	-				mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	-	<0.01	<0.01	-				mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	-	0.05	0.08	-				mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	-	0.32	0.33	-				mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	-	0.29	0.37	-				mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	-	0.39	0.43	-				mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	-	0.21	0.38	-				mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	-	0.15	0.17	-				mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	-	0.39	0.44	-				mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	-	0.05	0.10	-				mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	-	0.75	0.69	-				mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	-	<0.01	0.01	-				mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	-	0.24	0.42	-				mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	-	<0.03	0.04	-				mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	-	0.20	0.27	-				mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	-	0.79	0.65	-				mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	-	3.84	4.40	-				mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
TPH CWG with Clean Up *C1										
Ali >C5-C6 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	-	<1	<1	-				mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	-	<1	1	-				mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	-	<1	5	-				mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	-	<1	5	-				mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	-	34	185	-				mg/kg	1	A-T-055s
Total Aliphatics _A	-	34	196	-				mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	-	<1	4	-				mg/kg	1	A-T-055s
Aro >C10-C12 _A	-	<1	2	-				mg/kg	1	A-T-055s
Aro >C12-C16 _A	-	3	6	-				mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	-	7	14	-				mg/kg	1	A-T-055s
Aro >C21-C35 _A	-	36	115	-				mg/kg	1	A-T-055s
Total Aromatics _A	-	46	141	-				mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	-	79	337	-				mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s
MTBE _A [#]	-	<0.01	<0.01	-				mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
SVOC										
4-Bromophenyl phenyl ether _A	-	-	<100	-				µg/kg	100	A-T-052s
Hexachlorobenzene _A	-	-	<100	-				µg/kg	100	A-T-052s
Diethyl phthalate _A	-	-	<100	-				µg/kg	100	A-T-052s
Dimethyl phthalate _A	-	-	<100	-				µg/kg	100	A-T-052s
Dibenzofuran _A	-	-	<100	-				µg/kg	100	A-T-052s
Carbazole _A	-	-	<100	-				µg/kg	100	A-T-052s
Butylbenzyl phthalate _A	-	-	<100	-				µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate _A	-	-	<500	-				µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane _A	-	-	<100	-				µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether _A	-	-	<100	-				µg/kg	100	A-T-052s
4-Nitrophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
3+4-Methylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
4-Chloro-3-methylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Nitrophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Methylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Chlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,6-Dinitrotoluene _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4-Dinitrotoluene _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4-Dimethylphenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4-Dichlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4,6-Trichlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2,4,5-Trichlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Chloronaphthalene _A	-	-	<100	-				µg/kg	100	A-T-052s
2-Methylnaphthalene _A	-	-	<100	-				µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether _A	-	-	<100	-				µg/kg	100	A-T-052s
Phenol _A	-	-	<100	-				µg/kg	100	A-T-052s
Pentachlorophenol _A	-	-	<100	-				µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine _A	-	-	<100	-				µg/kg	100	A-T-052s
n-Dioctylphthalate _A	-	-	<500	-				µg/kg	500	A-T-052s
n-Dibutylphthalate _A	-	-	167	-				µg/kg	100	A-T-052s
Nitrobenzene _A	-	-	<100	-				µg/kg	100	A-T-052s
Isophorone _A	-	-	<100	-				µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
Hexachloroethane _A	-	-	<100	-				µg/kg	100	A-T-052s
Hexachlorocyclopentadiene _A	-	-	<100	-				µg/kg	100	A-T-052s
Perylene _A	-	-	186	-				µg/kg	100	A-T-052s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
VOC										
Dichlorodifluoromethane _A	-	-	<1	-				µg/kg	1	A-T-006s
Chloromethane _A	-	-	<10	-				µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene) _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromomethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Chloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Trichlorofluoromethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1-Dichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Carbon Disulphide _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Dichloromethane _A	-	-	<5	-				µg/kg	5	A-T-006s
trans 1,2-Dichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1-Dichloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
cis 1,2-Dichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
2,2-Dichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromochloromethane _A [#]	-	-	<5	-				µg/kg	5	A-T-006s
Chloroform _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,1-Trichloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1-Dichloropropene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Carbon Tetrachloride _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dichloroethane _A [#]	-	-	<2	-				µg/kg	2	A-T-006s
Benzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Trichloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Dibromomethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromodichloromethane _A [#]	-	-	<10	-				µg/kg	10	A-T-006s
cis 1,3-Dichloropropene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Toluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
trans 1,3-Dichloropropene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,2-Trichloroethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,3-Dichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Tetrachloroethene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Dibromochloromethane _A [#]	-	-	<3	-				µg/kg	3	A-T-006s
1,2-Dibromoethane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s

Envirolab Job Number: 22/05332

Client Project Name: Postal Street, Manchester

Client Project Ref: B080401

Lab Sample ID	22/05332/10	22/05332/11	22/05332/12	22/05332/13				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH01	BH01	RC01	RC01						
Depth to Top	0.65	0.75	0.40	0.75						
Depth To Bottom										
Date Sampled	23-May-22	23-May-22	23-May-22	23-May-22						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	8	4A	4A	8						
Chlorobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane _A	-	-	<1	-				µg/kg	1	A-T-006s
Ethylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
m & p Xylene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
o-Xylene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Styrene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromoform _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Isopropylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane _A	-	-	<1	-				µg/kg	1	A-T-006s
1,2,3-Trichloropropane _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
Bromobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
n-Propylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
2-Chlorotoluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
4-Chlorotoluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
tert-Butylbenzene _A [#]	-	-	<2	-				µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
sec-Butylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
4-Isopropyltoluene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,3-Dichlorobenzene _A	-	-	<1	-				µg/kg	1	A-T-006s
1,4-Dichlorobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
n-Butylbenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dichlorobenzene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP) _A	-	-	<2	-				µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene _A	-	-	<3	-				µg/kg	3	A-T-006s
Hexachlorobutadiene _A [#]	-	-	<1	-				µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene _A	-	-	<3	-				µg/kg	3	A-T-006s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

EPH CWG results have humics mathematically subtracted through instrument calculation

TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Curtins Consulting (Manchester), Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG Project: Postal Street, Manchester Clients Project No: B080401	Project No: 22/05332 Date Received: 30/05/2022 (am) Cool Box Temperatures (°C): 14.5, 13.9
--	--

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples $5 \pm 3^{\circ}\text{C}$), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/05332/1	22/05332/3	22/05332/4	22/05332/5	22/05332/6	22/05332/7	22/05332/9	22/05332/10	22/05332/11	22/05332/12	22/05332/13
Client Sample No											
Client Sample ID/Depth	WS01 0.30m	WS02 0.40m	WS02 1.50m	WS03 1.70m	WS04 1.00m	WS05 0.60m	BH01 0.25m	BH01 0.65m	BH01 0.75m	RC01 0.40m	RC01 0.75m
Date Sampled	24/05/22	24/05/22	24/05/22	23/05/22	23/05/22	25/05/22	23/05/22	23/05/22	23/05/22	23/05/22	23/05/22
A-T-006s	06/06/2022					06/06/2022				06/06/2022	
A-T-019s	08/06/2022	08/06/2022	08/06/2022	08/06/2022	08/06/2022	08/06/2022	08/06/2022		08/06/2022	08/06/2022	
A-T-022s	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-024s	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022		07/06/2022	07/06/2022	
A-T-026s	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022		09/06/2022	09/06/2022	
A-T-027s	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022		07/06/2022	07/06/2022	
A-T-031s	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022		07/06/2022	07/06/2022	
A-T-032 OM	07/06/2022	07/06/2022	07/06/2022	07/06/2022	01/06/2022	01/06/2022	07/06/2022		01/06/2022	07/06/2022	
A-T-040s	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022		09/06/2022	09/06/2022	
A-T-042sTCN	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-044	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-045	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022	01/06/2022
A-T-050s	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022		06/06/2022	06/06/2022	
A-T-052s	07/06/2022					07/06/2022				07/06/2022	
A-T-054					08/06/2022	08/06/2022		06/06/2022	08/06/2022		06/06/2022
A-T-055s	06/06/2022	06/06/2022	06/06/2022	06/06/2022	06/06/2022	07/06/2022	06/06/2022		06/06/2022	07/06/2022	

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Appendix D – Geotechnical Laboratory Testing Results

- May 2022 Investigation
 - i2 Analytical, Final Analytical Test Report 22-62615-1
 - i2 Analytical, Final Analytical Test Report 22-62619-1

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

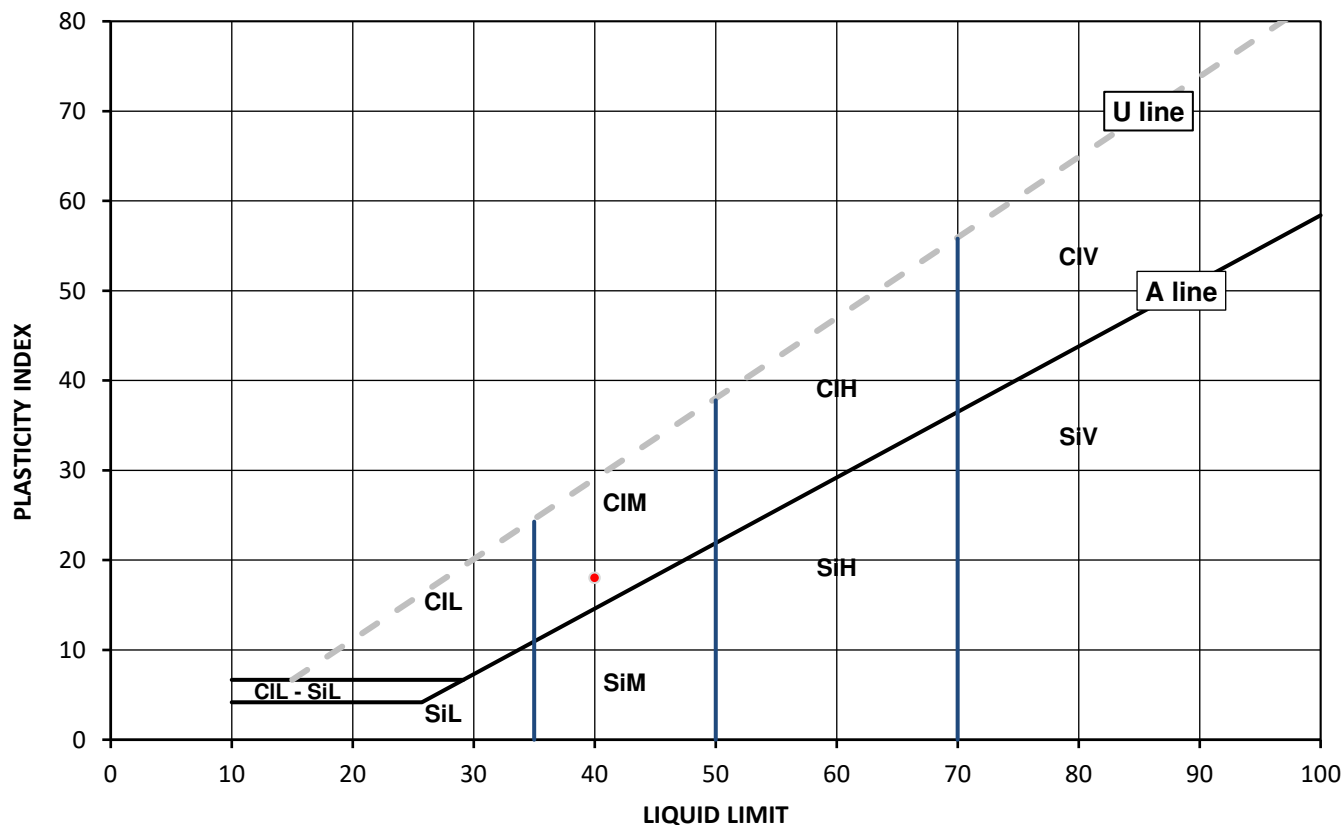
Test Results:

Laboratory Reference: 2300450
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 3.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	40	22	18	91



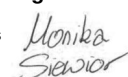
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

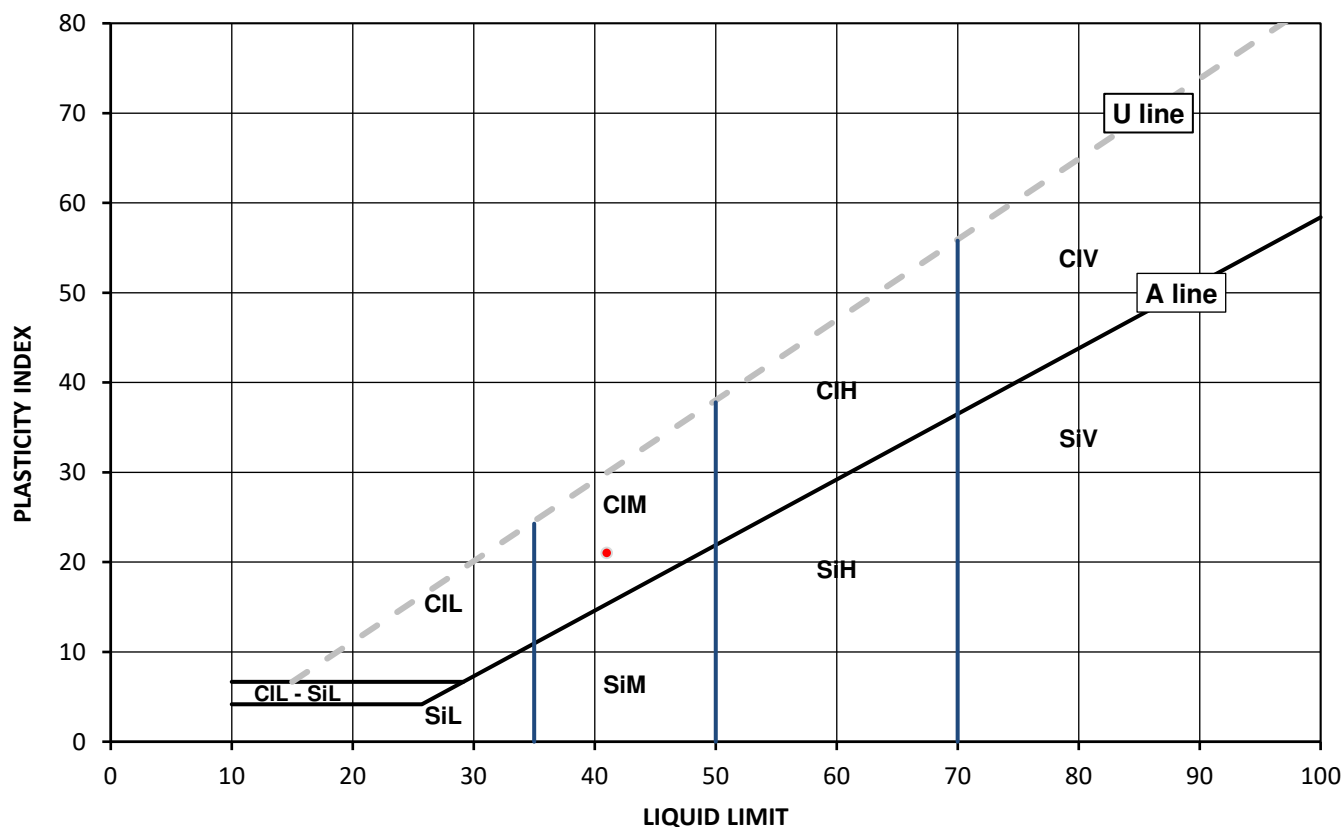
Test Results:

Laboratory Reference: 2300452
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 5.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
21	41	20	21	100



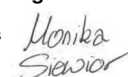
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

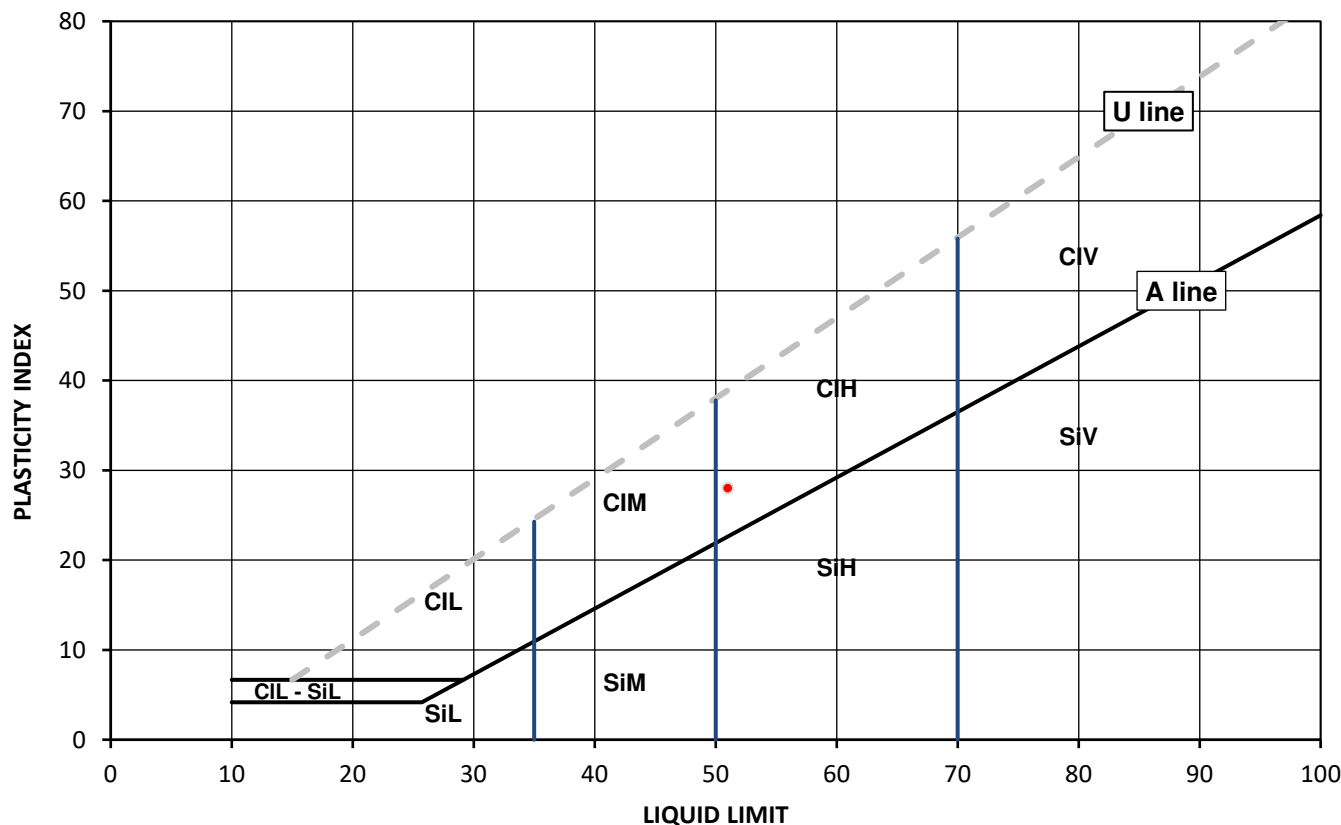
Test Results:

Laboratory Reference: 2300454
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly sandy CLAY

Depth Top [m]: 7.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	51	23	28	100



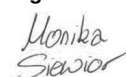
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

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i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

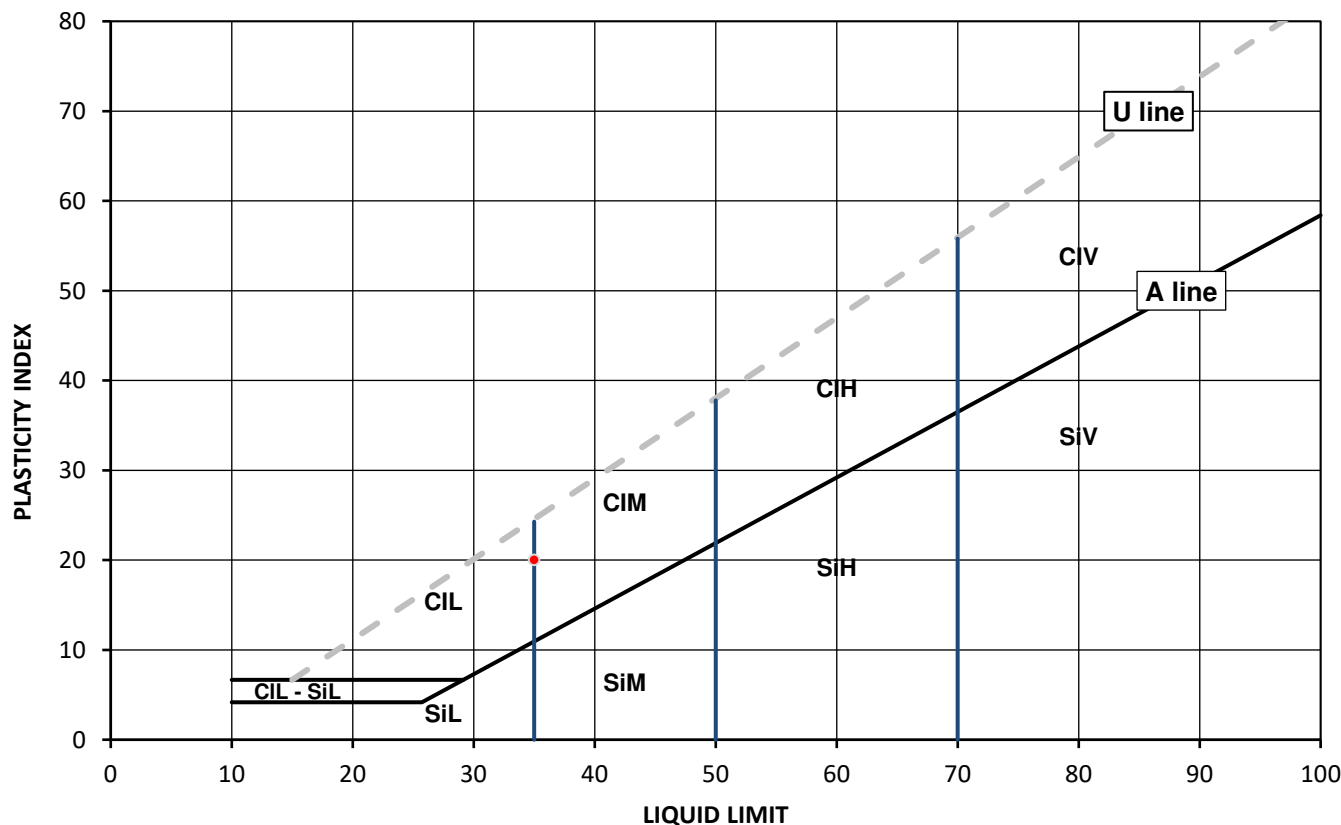
Test Results:

Laboratory Reference: 2300457
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 11.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	35	15	20	100



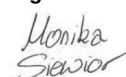
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	L Low below 35
Si	Silt	M Medium 35 to 50
		H High 50 to 70
		V Very high exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

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i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

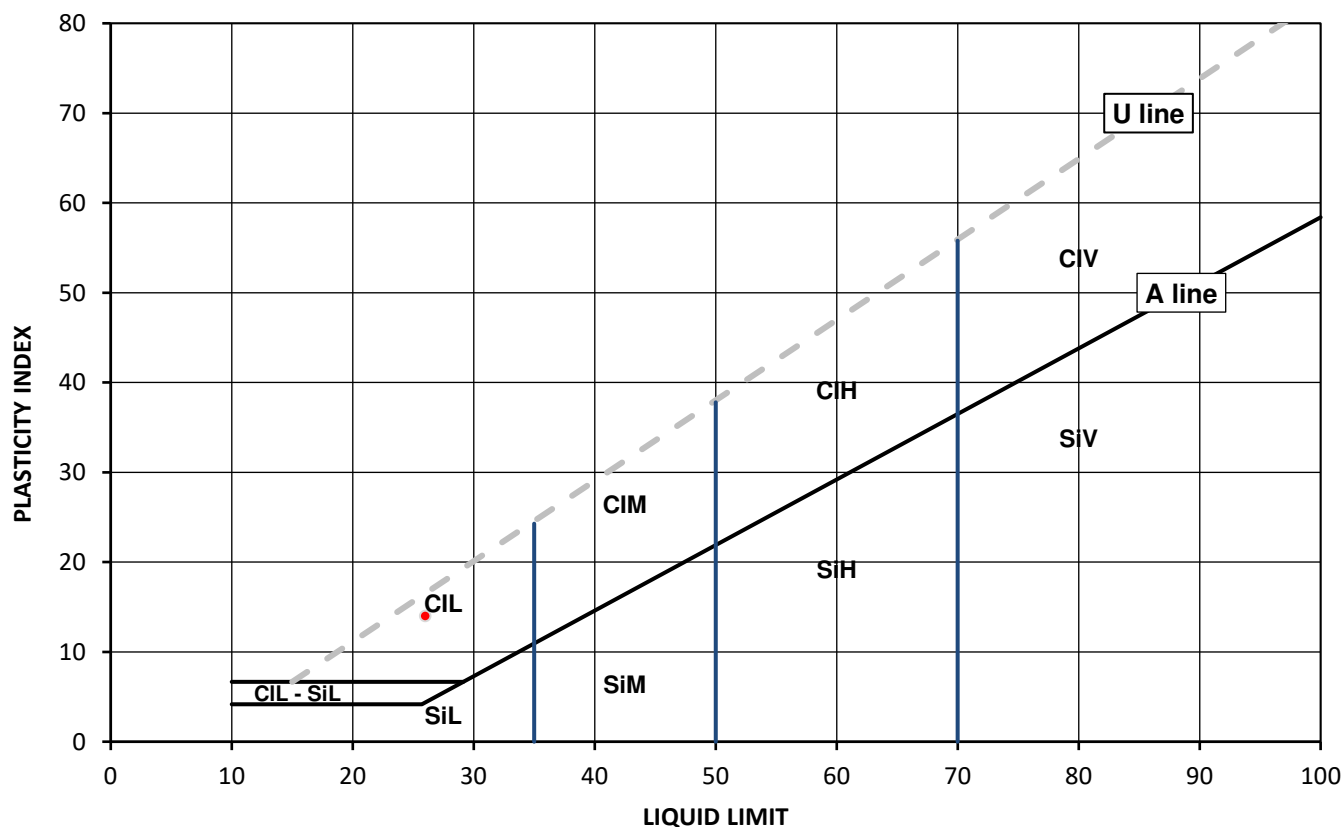
Test Results:

Laboratory Reference: 2300460
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 14.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
11	26	12	14	98



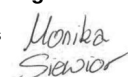
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

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i2 Analytical Ltd
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Northampton NN4 7EB

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Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

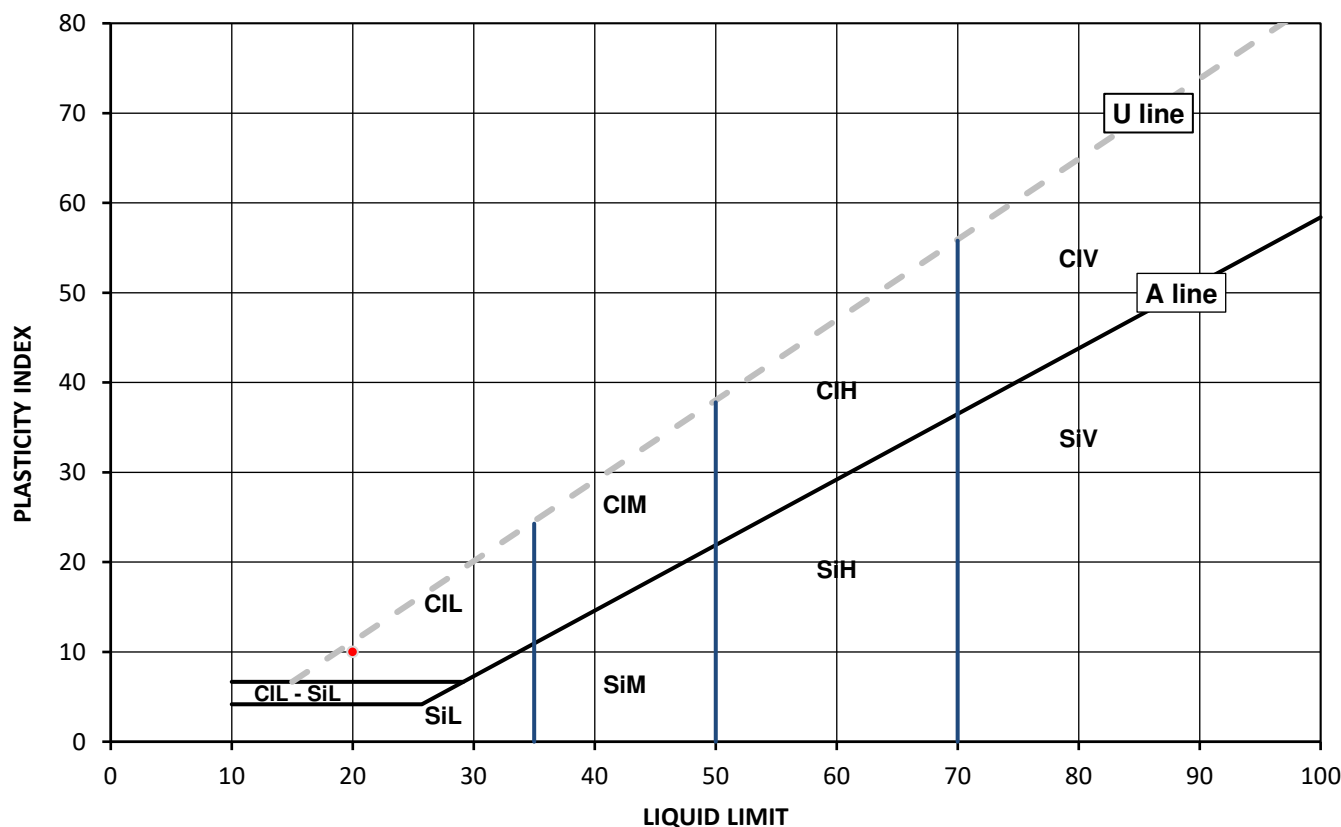
Test Results:

Laboratory Reference: 2300462
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly clayey SAND

Depth Top [m]: 19.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	20	10	10	96



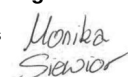
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

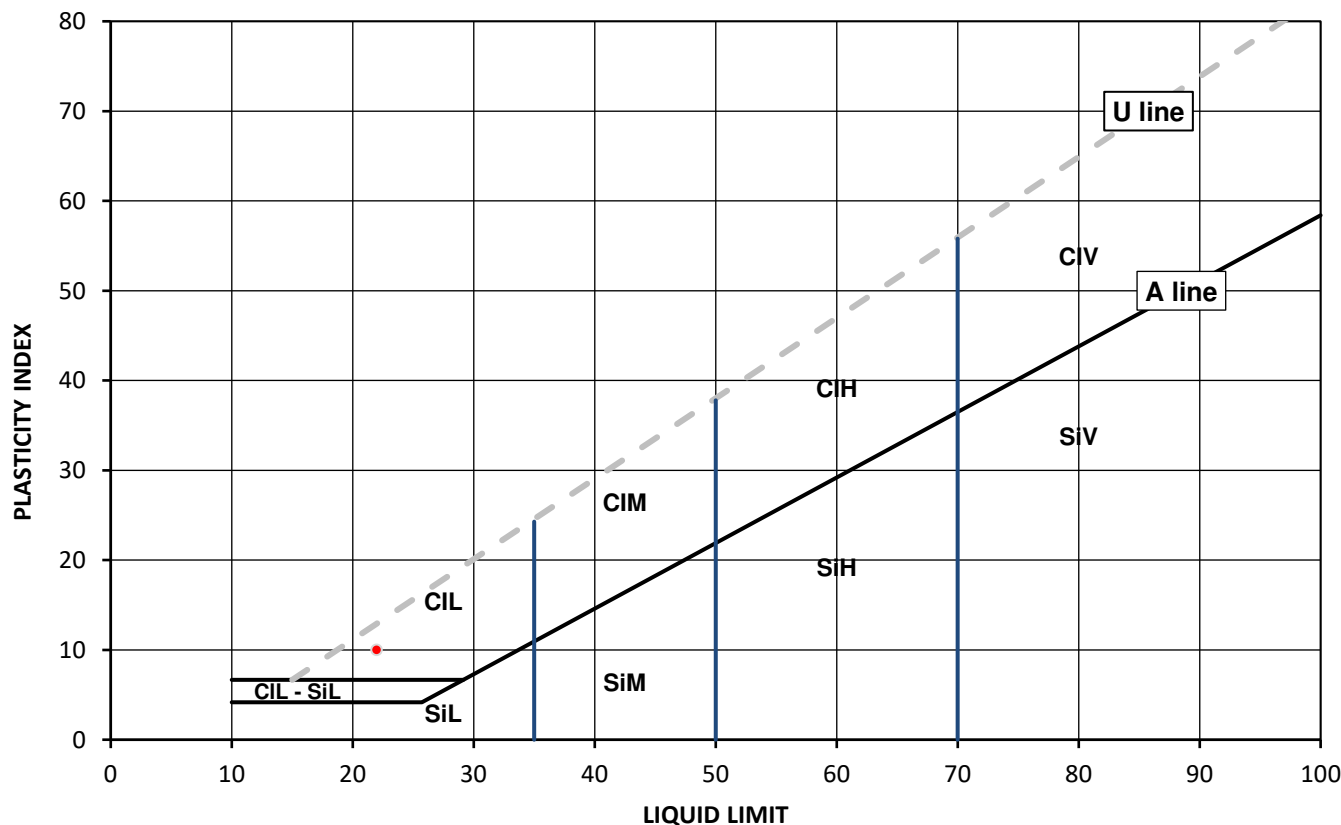
Test Results:

Laboratory Reference: 2300465
Hole No.: RC01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly clayey SAND

Depth Top [m]: 6.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	22	12	10	94



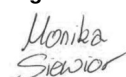
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

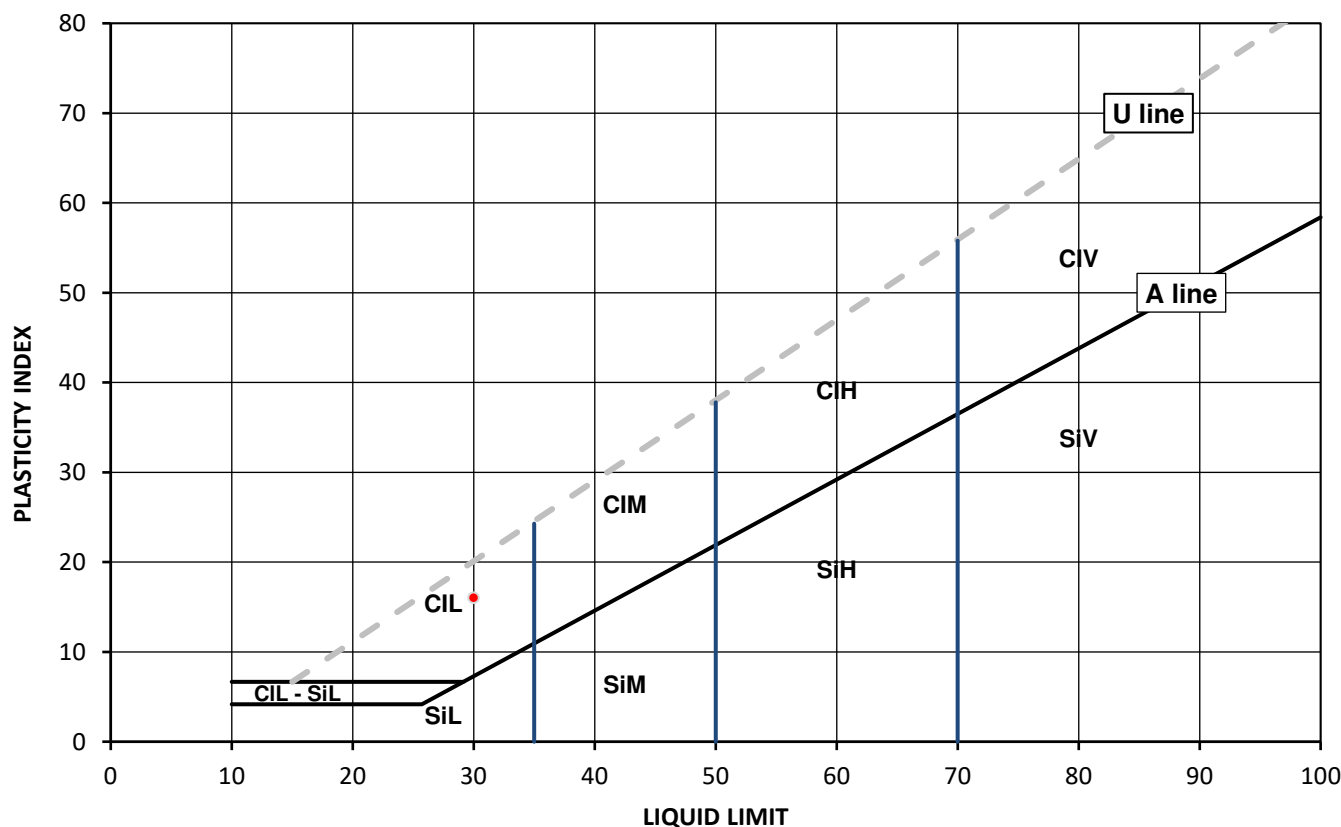
Test Results:

Laboratory Reference: 2300466
Hole No.: RC01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 12.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	30	14	16	98



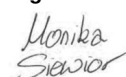
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
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Northampton NN4 7EB

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Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

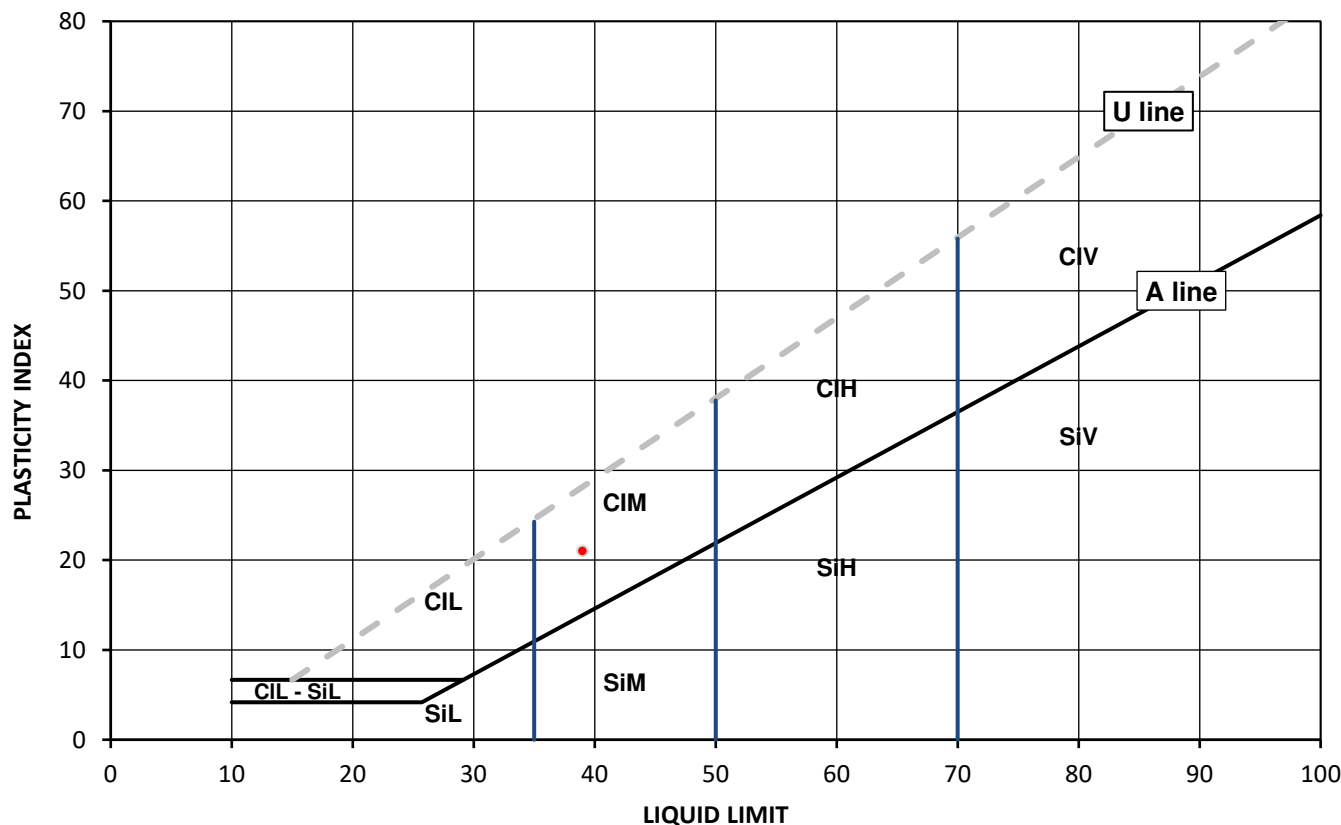
Test Results:

Laboratory Reference: 2300481
Hole No.: WS01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 2.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	39	18	21	100



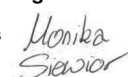
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
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Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

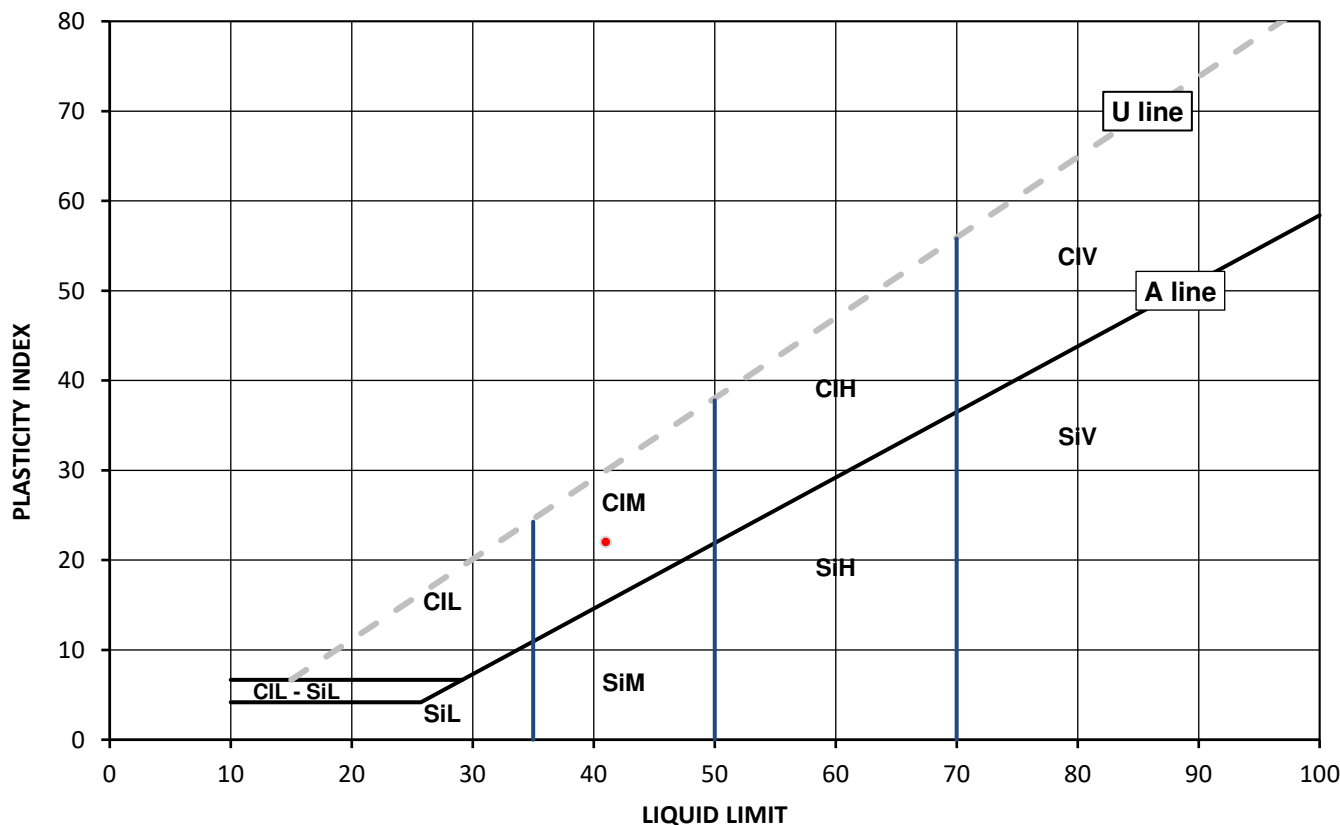
Test Results:

Laboratory Reference: 2300482
Hole No.: WS02
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 4.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
27	41	19	22	97



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

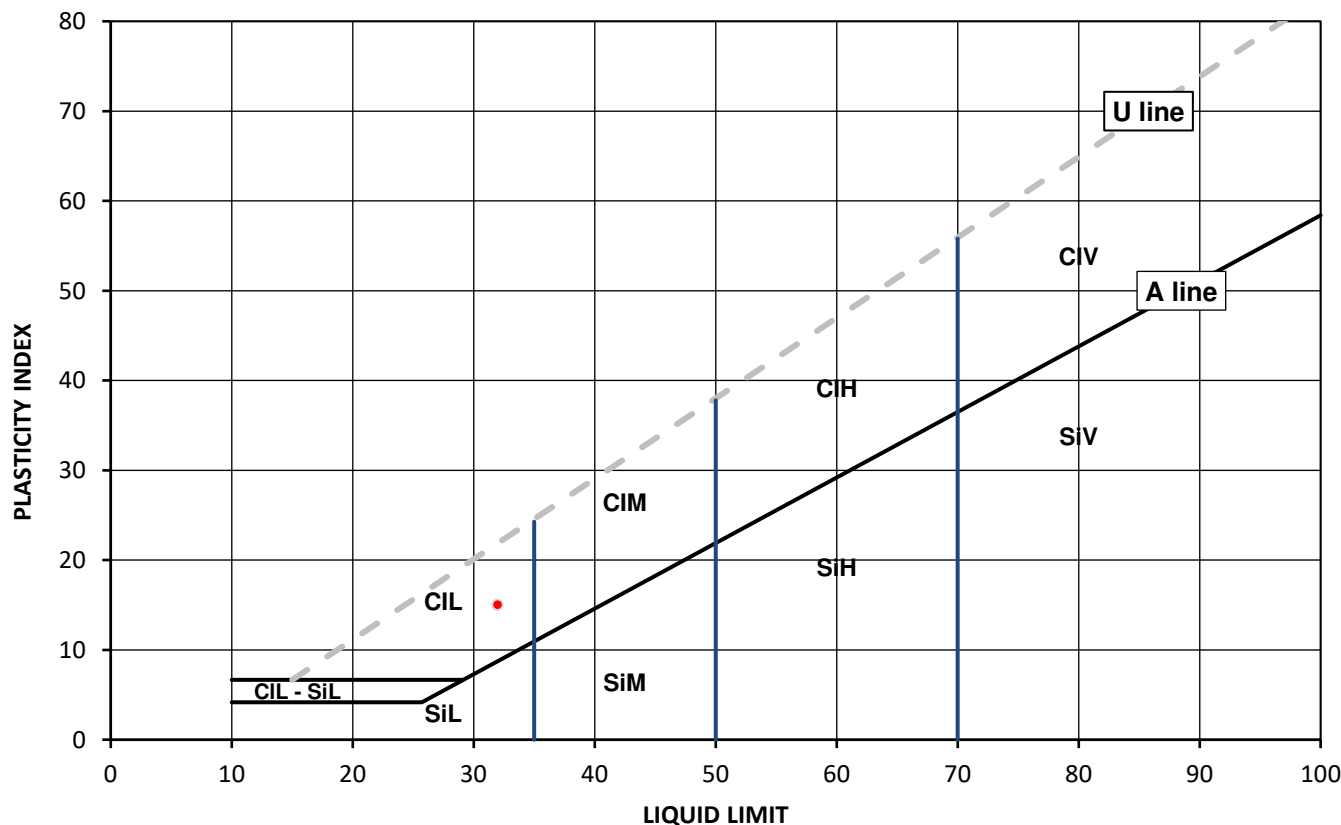
Test Results:

Laboratory Reference: 2300483
Hole No.: WS03
Sample Reference: Not Given
Sample Description: Brown very sandy CLAY

Depth Top [m]: 2.20
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	32	17	15	100



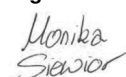
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

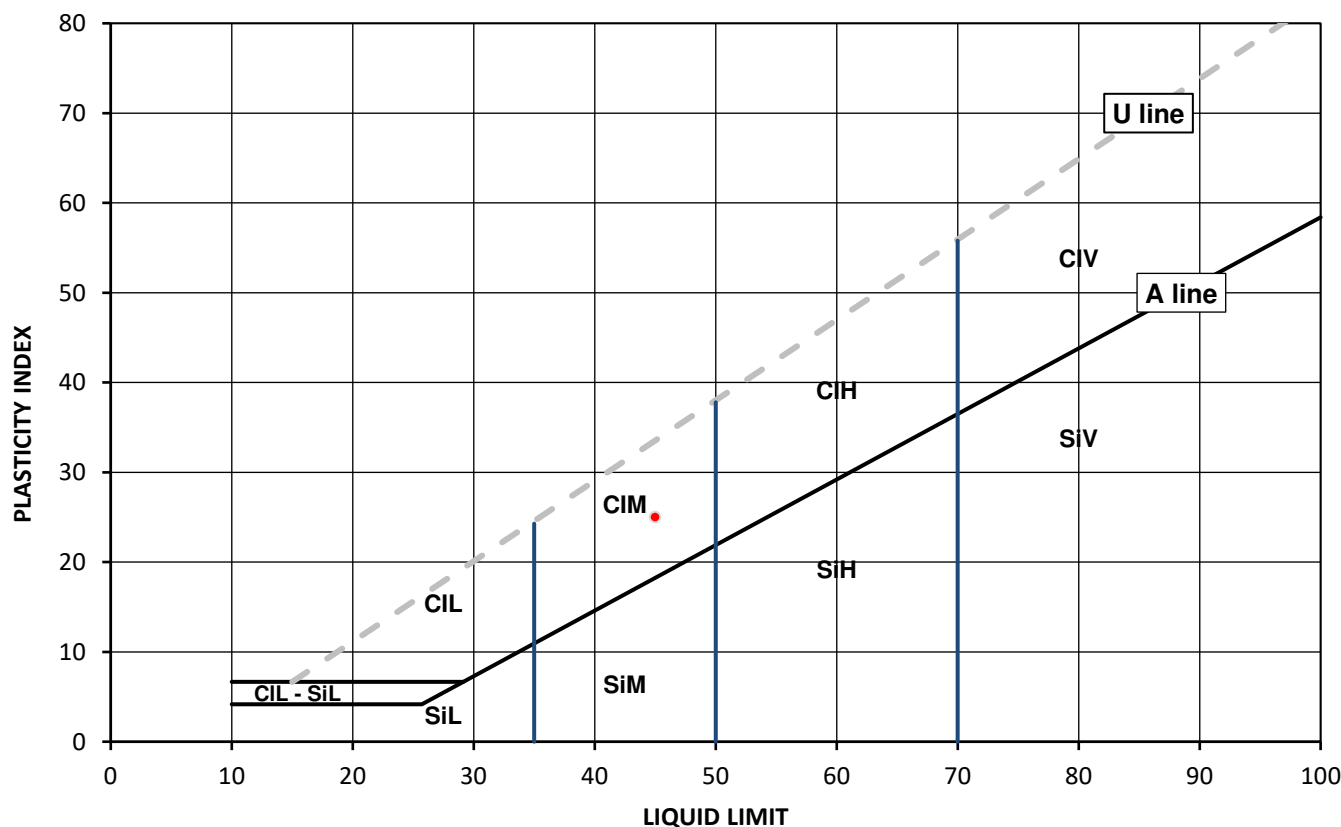
Test Results:

Laboratory Reference: 2300484
Hole No.: WS04
Sample Reference: Not Given
Sample Description: Brown slightly sandy CLAY

Depth Top [m]: 2.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
20	45	20	25	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 25/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

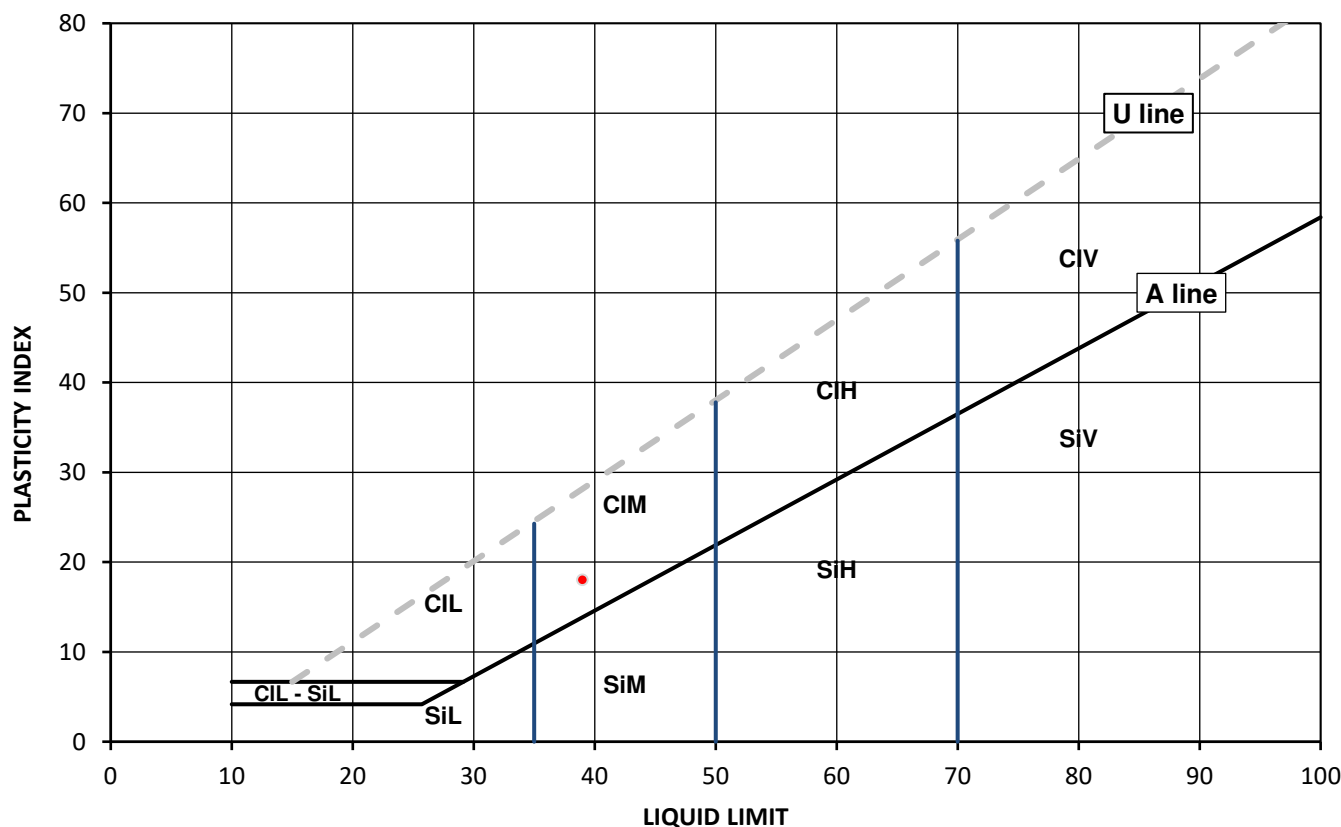
Test Results:

Laboratory Reference: 2300485
Hole No.: WS05
Sample Reference: Not Given
Sample Description: Brown sandy CLAY

Depth Top [m]: 4.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	39	21	18	100



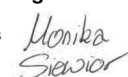
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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4041

Client: CURTINS
 Client Address: Merchant Exchange, 17-19 Whitworth Street
 West,
 Manchester, M1 5WG
 Contact: EBMA Testing
 Site Address: Postal Street

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
 Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
 1990: Clause 8.2

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Environmental Science

Client Reference: B080401
 Job Number: 22-62615
 Date Sampled: 23/05 - 24/05/2022
 Date Received: 26/05/2022
 Date Tested: 10/06/2022
 Sampled By: Client - JL

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-2 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2300450	BH01	Not Given	3.00	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	29		91	40	22	18						
2300452	BH01	Not Given	5.00	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	21		100	41	20	21						
2300454	BH01	Not Given	7.00	Not Given	D	Brown slightly sandy CLAY	Atterberg 4 Point	29		100	51	23	28						
2300457	BH01	Not Given	11.50	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	16		100	35	15	20						
2300460	BH01	Not Given	14.50	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	11		98	26	12	14						
2300462	BH01	Not Given	19.00	Not Given	D	Brown slightly gravelly clayey SAND	Atterberg 4 Point	18		96	20	10	10						
2300465	RC01	Not Given	6.50	Not Given	D	Brown slightly gravelly clayey SAND	Atterberg 4 Point	22		94	22	12	10						
2300466	RC01	Not Given	12.50	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	16		98	30	14	16						
2300481	WS01	Not Given	2.50	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	25		100	39	18	21						
2300482	WS02	Not Given	4.00	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	27		97	41	19	22						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Siewior

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 Reporting Specialist
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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street
West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05 - 25/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-2 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2300483	WS03	Not Given	2.20	Not Given	D	Brown very sandy CLAY	Atterberg 4 Point	17		100	32	17	15						
2300484	WS04	Not Given	2.50	Not Given	D	Brown slightly sandy CLAY	Atterberg 4 Point	20		100	45	20	25						
2300485	WS05	Not Given	4.00	Not Given	D	Brown sandy CLAY	Atterberg 4 Point	25		100	39	21	18						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

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Contact: EBMA Testing

Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF WATER CONTENT**

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B080401

Job Number: 22-62615

Date Sampled: 23/05 - 24/05/2022

Date Received: 26/05/2022

Date Tested: 10/06/2022

Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2300450	BH01	Not Given	3.00	Not Given	D	Brown slightly gravelly sandy CLAY		29	Sample was quartered, oven dried at 106.1 °C			
2300452	BH01	Not Given	5.00	Not Given	D	Brown sandy CLAY		21	Sample was quartered, oven dried at 106.1 °C			
2300454	BH01	Not Given	7.00	Not Given	D	Brown slightly sandy CLAY		29	Sample was quartered, oven dried at 106.1 °C			
2300457	BH01	Not Given	11.50	Not Given	D	Brown sandy CLAY		16	Sample was quartered, oven dried at 106.1 °C			
2300460	BH01	Not Given	14.50	Not Given	D	Brown slightly gravelly very sandy CLAY		11	Sample was quartered, oven dried at 106.1 °C			
2300462	BH01	Not Given	19.00	Not Given	D	Brown slightly gravelly clayey SAND		18	Sample was quartered, oven dried at 106.1 °C			
2300465	RC01	Not Given	6.50	Not Given	D	Brown slightly gravelly clayey SAND		22	Sample was quartered, oven dried at 106 °C			
2300466	RC01	Not Given	12.50	Not Given	D	Brown slightly gravelly very sandy CLAY		16	Sample was quartered, oven dried at 106 °C			
2300481	WS01	Not Given	2.50	Not Given	D	Brown sandy CLAY		25	Sample was quartered, oven dried at 106 °C			
2300482	WS02	Not Given	4.00	Not Given	D	Brown slightly gravelly sandy CLAY		27	Sample was quartered, oven dried at 106 °C			

Comments:

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Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05 - 25/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2300483	WS03	Not Given	2.20	Not Given	D	Brown very sandy CLAY		17	Sample was quartered, oven dried at 106.1 °C			
2300484	WS04	Not Given	2.50	Not Given	D	Brown slightly sandy CLAY		20	Sample was quartered, oven dried at 106.1 °C			
2300485	WS05	Not Given	4.00	Not Given	D	Brown sandy CLAY		25	Sample was whole tested, oven dried at 106 °C			

Comments:

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Signed:

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4041

TEST CERTIFICATE**DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



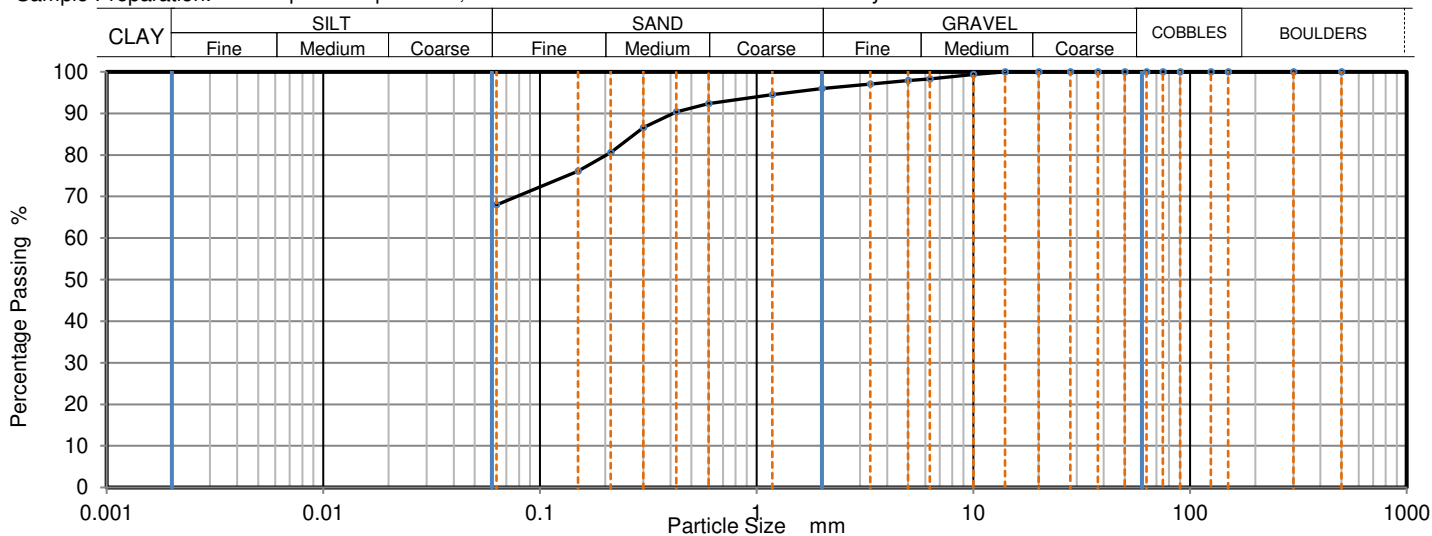
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300456
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY
Sample Preparation: Sample was quartered, oven dried at 106.1 °C and broken down by hand.

Depth Top [m]: 9.90
Depth Base [m]: Not Given
Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	98		
3.35	97		
2	96		
1.18	95		
0.6	92		
0.425	90		
0.3	87		
0.212	81		
0.15	76		
0.063	68		

Sample Proportions	% dry mass
Very coarse	0
Gravel	4
Sand	28
Fines <0.063mm	68

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	N/A
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:**Signed:**

Monika Siewior

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TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

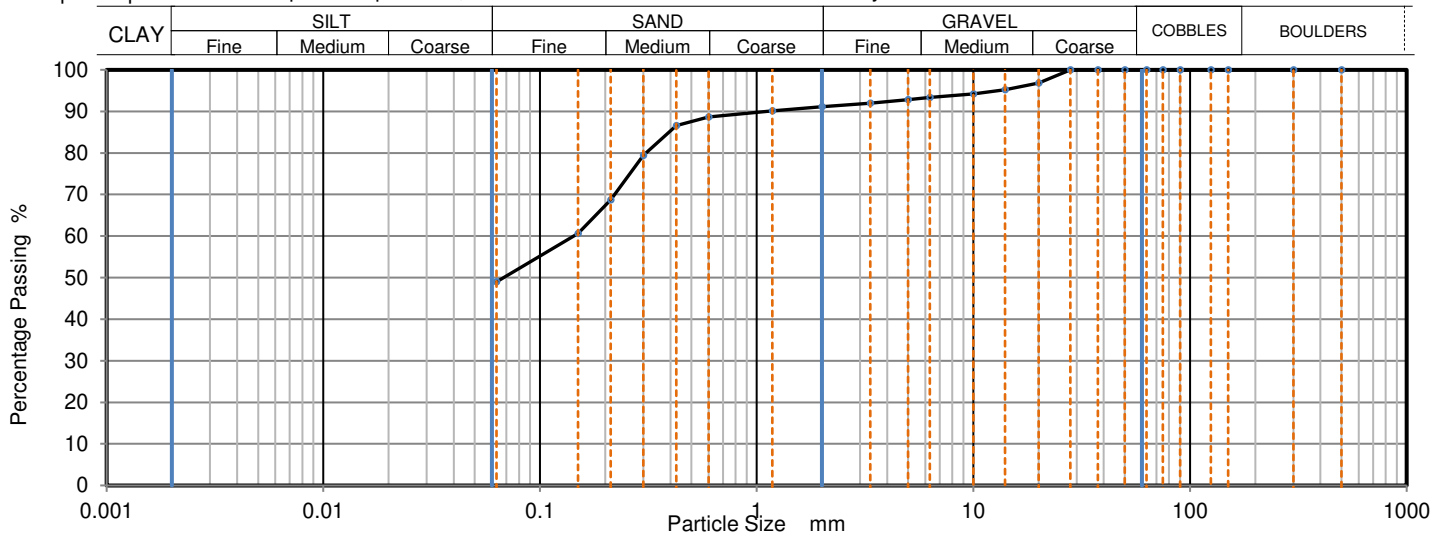
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300459
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown gravelly very sandy CLAY
Sample Preparation: Sample was quartered, oven dried at 106.1 °C and broken down by hand.

Depth Top [m]: 13.50
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	97		
14	95		
10	94		
6.3	93		
5	93		
3.35	92		
2	91		
1.18	90		
0.6	89		
0.425	87		
0.3	79		
0.212	69		
0.15	61		
0.063	49		

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	42
Fines <0.063mm	49

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 2.3
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

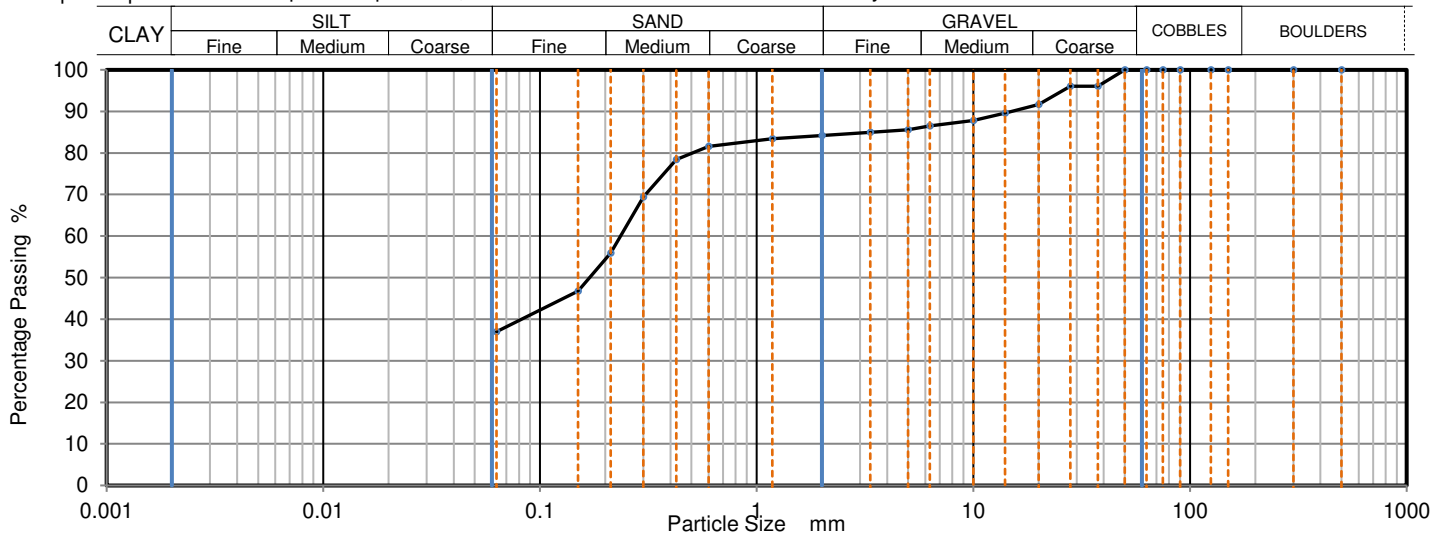
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300461
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown gravelly very clayey SAND
Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 15.00
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	96		
20	92		
14	90		
10	88		
6.3	87		
5	86		
3.35	85		
2	84		
1.18	83		
0.6	82		
0.425	78		
0.3	69		
0.212	56		
0.15	47		
0.063	38		

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	46
Fines <0.063mm	38

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 3.7
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

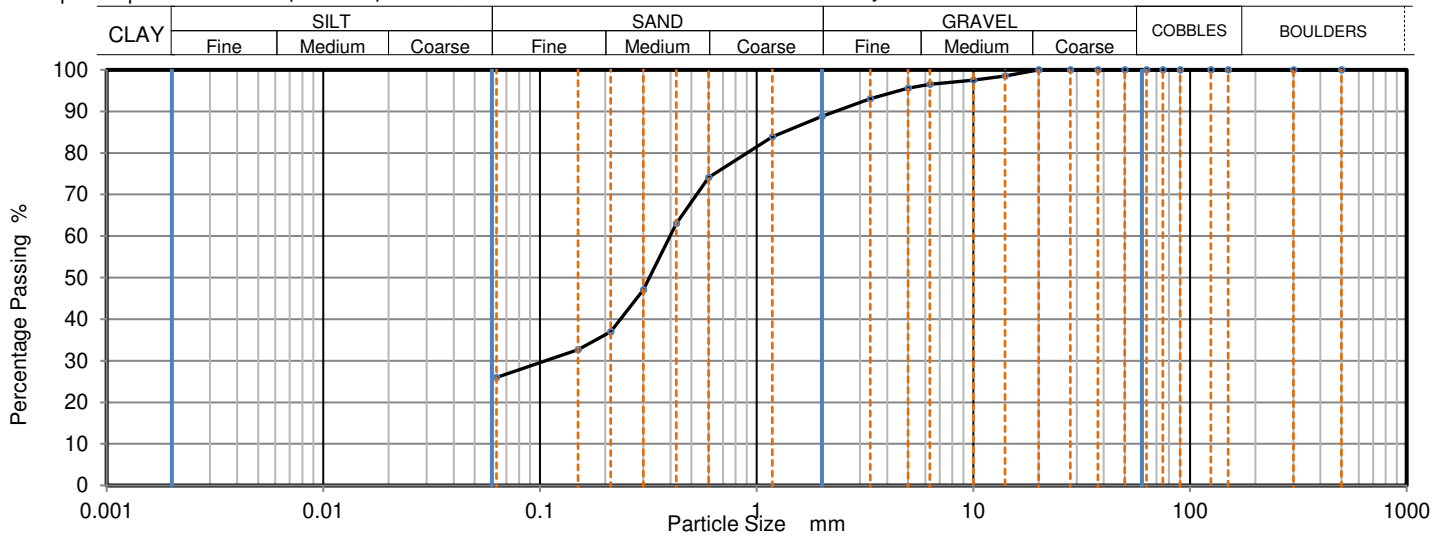
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300463
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown gravelly clayey SAND
Sample Preparation: Sample was quartered, oven dried at 106.1 °C and broken down by hand.

Depth Top [m]: 21.00
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	97		
5	96		
3.35	93		
2	89		
1.18	84		
0.6	74		
0.425	63		
0.3	47		
0.212	37		
0.15	33		
0.063	27		

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	62
Fines <0.063mm	27

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 6.3
Curvature Coefficient	

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



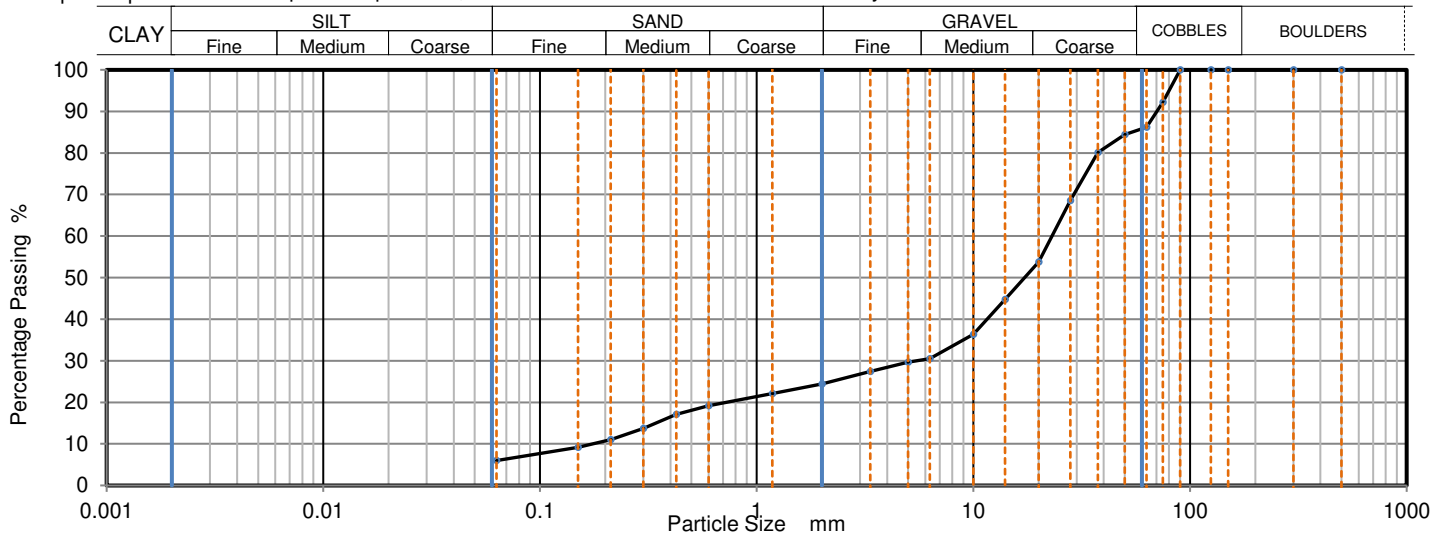
Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG
Contact: EBMA Testing
Site Address: Postal Street
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 24/05/2022
Date Received: 26/05/2022
Date Tested: 15/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300464
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly clayey sandy GRAVEL with cobbles
Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 22.50
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	92		
63	86		
50	84		
37.5	80		
28	69		
20	54		
14	45		
10	36		
6.3	31		
5	30		
3.35	27		
2	24		
1.18	22		
0.6	19		
0.425	17		
0.3	14		
0.212	11		
0.15	9		
0.063	7		

Sample Proportions	% dry mass
Very coarse	14
Gravel	62
Sand	18
Fines <0.063mm	7

Grading Analysis	
D100	mm 90
D60	mm 23
D30	mm 5.5
D10	mm 0.176
Uniformity Coefficient	130
Curvature Coefficient	7.5

Uniformity Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B080401

Job Number: 22-62615

Date Sampled: 26/05/2022

Date Received: 26/05/2022

Date Tested: 13/06/2022

Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2300468	RC01	Not Given	14.66	14.73	C	Orangish brown SANDSTONE	WC = 6.2%	1	A	U	YES	-	99.9	56.0	46.0	2.8	76.5	0.48	0.58
2300470	RC01	Not Given	25.74	25.94	C	Orangish brown SANDSTONE	WC = 8.4%	1	A		YES	-	101.0	49.0	45.0	1.6	76.1	0.27	0.32
2300471	RC01	Not Given	27.64	27.80	C	Orangish brown SANDSTONE	WC = 7.2%	1	A		YES	-	99.8	63.0	55.0	0.7	83.6	0.10	0.13
2300472	RC01	Not Given	28.71	28.97	C	Orangish brown SANDSTONE	WC = 11.5%	1	A	U	YES	-	98.8	62.0	58.0	0.5	85.4	0.07	0.09
2300473	RC01	Not Given	29.21	29.38	C	Orangish brown SANDSTONE	WC = 12.3%	1	A	U	YES	-	99.5	66.0	58.0	0.8	85.7	0.11	0.14
2300474	RC01	Not Given	30.50	30.80	C	Orangish brown SANDSTONE	WC = 7.7%	1	A	U	YES	-	101.1	78.0	58.0	2.8	86.4	0.37	0.47
2300475	RC01	Not Given	30.90	31.11	C	Orangish brown SANDSTONE	WC = 9.2%	1	A	U	YES	-	100.5	63.0	56.0	0.9	84.6	0.12	0.15
2300476	RC01	Not Given	31.17	31.35	C	Orangish brown SANDSTONE	WC = 10.3%	1	A	U	YES	-	100.4	63.0	56.0	1.1	84.6	0.15	0.19
2300478	RC01	Not Given	32.90	Not Given	C	Orangish brown SANDSTONE	WC = 7.6%	1	A	U	YES	-	99.9	85.0	74.0	1.6	97.0	0.17	0.23
2300480	RC01	Not Given	34.64	Not Given	C	Orangish brown SANDSTONE	WC = 8.4%	1	A	U	YES	-	100.3	62.0	54.0	1.6	83.0	0.22	0.28

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS**

Tested in Accordance with: ISRM, 2007, p153, part 1

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B080401

Job Number: 22-62615

Date Sampled: 26/05/2022

Date Received: 26/05/2022

Date Tested: 13/06/2022

Sampled By: Client - JL

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Specimen Dimensions (2)				Bulk density (2)	Water Content (1)	Uniaxial Compression (3)			
		Reference	Depth Top	Depth Base	Type			Diameter	Length	H/D	Orientation of sample			Condition	Stress Rate	Mode of failure	UCS
			m	m													
2300467	RC01	Not Given	14.09	14.50	C	Orangish brown SANDSTONE		100.7	273.2	2.7	Vertical	2.31	3.9	as received	0.0377	S + AC	14.8
2300469	RC01	Not Given	25.00	25.33	C	Orangish brown SANDSTONE		100.5	286.2	2.8	Vertical	2.26	6.1	as received	0.0378	S + AC	17.1
2300479	RC01	Not Given	34.09	Not Given	C	Orangish brown SANDSTONE		100.8	275.7	2.7	Vertical	2.21	12.0	as received	0.0376	S + AC	11.1

Note: 1 - ISRM p87 test 1, water content at 105 ± 3 °C, specimen as tested for UCS, 2 - ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density, 3 - ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials, above notes apply unless annotated otherwise in the remarks. Compaction machine: VJ Tech AUTOCON - VJT 51-3011; Mode of failure legend: S - Single shear, MS - multiple shear, AC - Axial cleavage, F - Fragmented

Comments:

Signed:

 Monika Siewior
 Reporting Specialist
 for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with: BS 1377-7: 1990: Clause 9

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing
Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 14/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300451
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown sandy CLAY
Sample Preparation: Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.

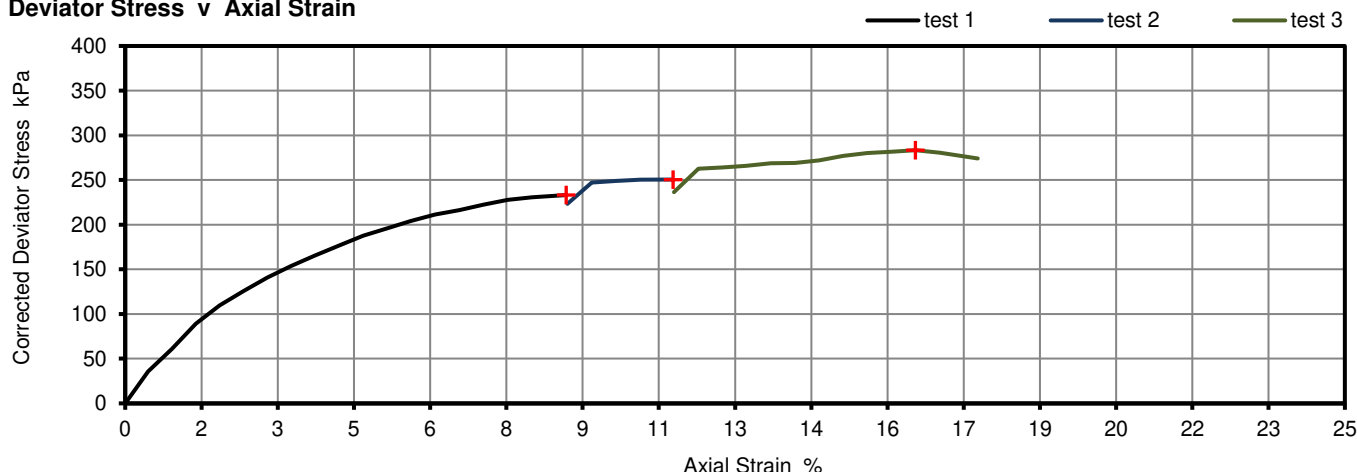
Depth Top [m]: 4.00
Depth Base [m]: 4.45
Sample Type: U

Length	200.58	mm
Diameter	101.61	mm
Bulk Density	2.10	Mg/m ³
Moisture Content	25	%
Dry Density	1.68	Mg/m ³
Membrane thickness	0.28	mm

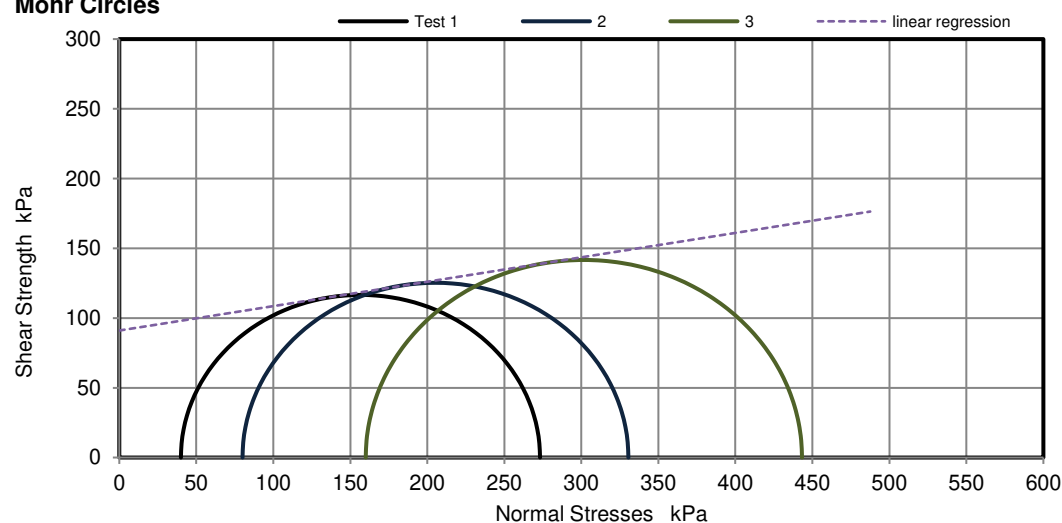
Rate of Strain
Stage Number
Cell Pressure
Axial Strain at failure
Deviator Stress, ($\sigma_1 - \sigma_3$) f
Shear strength, cu
Mode of failure
Membrane Correction

1.99			%/min
1	2	3	
40	80	160	kPa
9.0	11.2	16.2	%
233	251	283	kPa
117	125	142	kPa
Compound			
0.57	0.67	0.89	kPa

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Linear Regression
 ϕ_u 9.9 °
cu 91 kPa

Note: Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

Remarks: Correction values: 40kPa=19N, 80kPa=38N, 160kPa=86N.

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with: BS 1377-7: 1990: Clause 9

Client: CURTINS
Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing
Site Address: Postal Street

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 14/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300455
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY
Sample Preparation: Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.

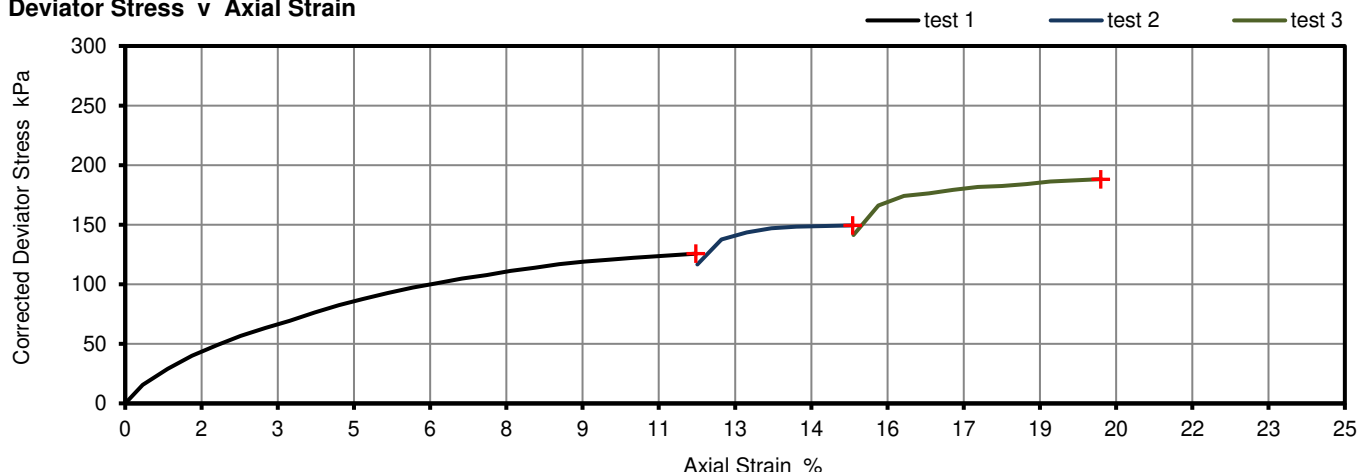
Depth Top [m]: 9.00
Depth Base [m]: 9.45
Sample Type: U

Length	139.08	mm
Diameter	69.50	mm
Bulk Density	2.18	Mg/m ³
Moisture Content	16	%
Dry Density	1.89	Mg/m ³
Membrane thickness	0.25	mm

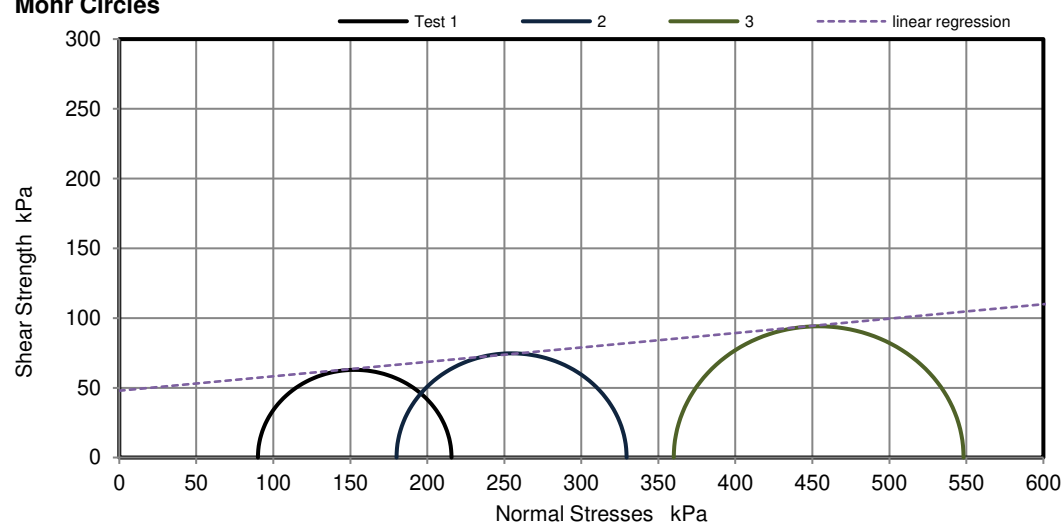
Rate of Strain
Stage Number
Cell Pressure
Axial Strain at failure
Deviator Stress, ($\sigma_1 - \sigma_3$) f
Shear strength, cu
Mode of failure
Membrane Correction

2.00			%/min
1	2	3	
90	180	360	kPa
11.7	14.9	20.0	%
126	149	188	kPa
63	75	94	kPa
Compound			
0.90	1.09	1.38	kPa

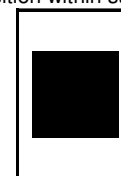
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Linear Regression
 ϕ_u 5.9 °
cu 48 kPa

Note: Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

Remarks: Correction values: 90kPa=43N, 180kPa=97N, 360kPa=184N.

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

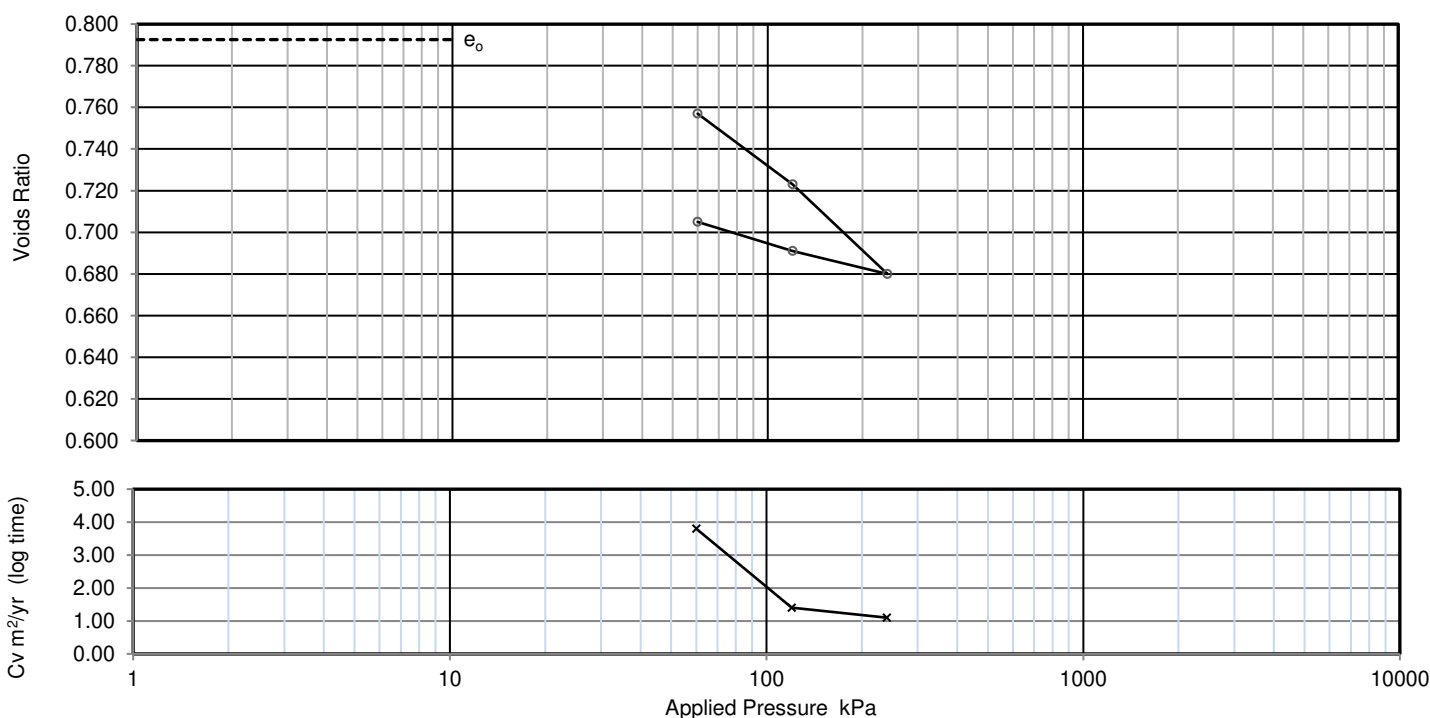
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300453
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 6.00
Depth Base [m]: 6.45
Sample Type: U

[illegible]

Preparation

Carried out on top of U100

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Total test time

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.10	-	mm
20.10	19.12	mm
30	30	%
1.92	2.02	Mg/m3
1.48	1.55	Mg/m3
0.793	0.705	
99	113	%
22.0		°C
Not measured		kPa
		%
5		days

Note: Cv corrected to 20°C

Remarks:

Signed:

Monika Siewior
Reporting Specialist

for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 17/06/2022

GF 172.16



DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: CURTINS

Client Address: Merchant Exchange, 17-19 Whitworth Street West,
Manchester, M1 5WG

Contact: EBMA Testing

Site Address: Postal Street

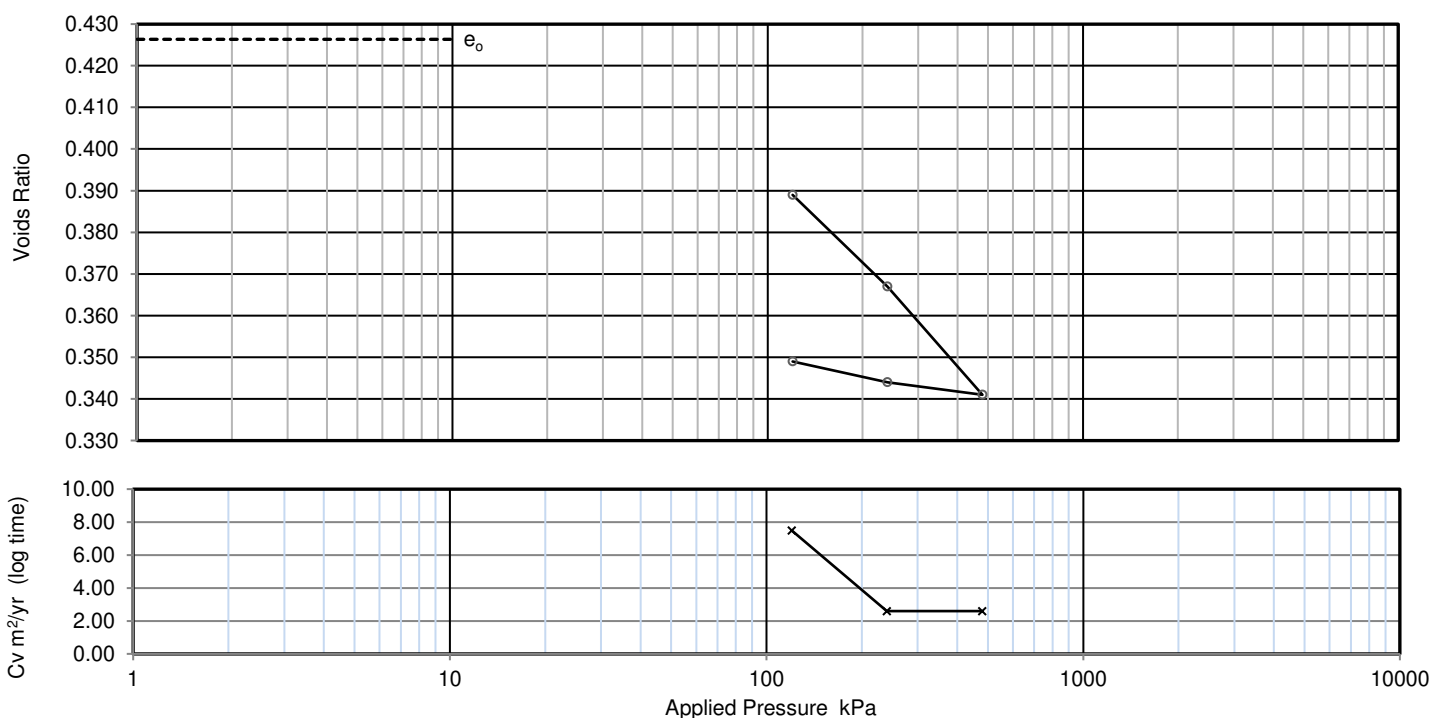
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B080401
Job Number: 22-62615
Date Sampled: 23/05/2022
Date Received: 26/05/2022
Date Tested: 10/06/2022
Sampled By: Client - JL

Test Results:

Laboratory Reference: 2300458
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 12.00
Depth Base [m]: Not Given
Sample Type: U

[illegible]

Preparation

Carried out on top of U100

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Total test time

Vertical	
assumed	2.65 Mg/m3
N/A	%
N/A	%

Initial	Final	
50.00	-	mm
20.00	18.92	mm
18	17	%
2.18	2.29	Mg/m3
1.86	1.96	Mg/m3
0.426	0.349	
109	125	%
22.0		°C
Not measured		kPa
5		days

Note: Cv corrected to 20°C

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Monika
Sienior

Monika Siewior
Reporting Specialist

for and on behalf of i2 Analytical Ltd

**EBMA Testing**

Curtins
Merchant Exchange
17-19 Whitworth Street West
Manchester
M1 5WG

i2 Analytical Ltd.
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Analytical Report Number : 22-62619

Project / Site name:	Postal Street	Samples received on:	26/05/2022
Your job number:	B080401	Samples instructed on/ Analysis started on:	06/06/2022
Your order number:	EBMA 3400	Analysis completed by:	16/06/2022
Report Issue Number:	1	Report issued on:	17/06/2022
Samples Analysed:	13 soil samples		

Signed:

Martyna Langer
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 22-62619
 Project / Site name: Postal Street
 Your Order No: EBMA 3400

Lab Sample Number				2300510	2300511	2300512	2300513	2300514
Sample Reference				BH01	BH01	BH01	BH01	BH01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00	6.50	8.50	12.50	18.50
Date Sampled				23/05/2022	23/05/2022	23/05/2022	23/05/2022	24/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	18	15	14	7.6
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	7.9	8.5	8.5	8.4
Total Sulphate as SO4	%	0.005	MCERTS	0.028	0.05	0.043	0.027	0.022
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.03	0.12	0.085	0.054	0.086
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	4.3	10	9.9	7.6	4.1
Total Sulphur	%	0.005	MCERTS	0.016	0.054	0.084	0.081	0.036
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	40	29	37	21
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	20	14	19	11

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number: 22-62619
 Project / Site name: Postal Street
 Your Order No: EBMA 3400

Lab Sample Number				2300515	2300516	2300517	2300518	2300519
Sample Reference				BH01	RC01	RC01	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				21.00	9.50	15.50	2.50	4.00
Date Sampled				24/05/2022	24/05/2022	24/05/2022	24/05/2022	24/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	3.3	12	10	15	17
Total mass of sample received	kg	0.001	NONE	0.5	0.5	1	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.6	8.8	8.5	8.4
Total Sulphate as SO ₄	%	0.005	MCERTS	0.011	0.024	0.029	0.046	0.052
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.035	0.057	0.04	0.048	0.12
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.3	6.5	3.2	5.1	6.9
Total Sulphur	%	0.005	MCERTS	0.011	0.066	0.029	0.017	0.034
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	12	21	16	15	20
Magnesium (leachate equivalent)	mg/l	2.5	NONE	6	11	8.2	7.4	9.7

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number: 22-62619
 Project / Site name: Postal Street
 Your Order No: EBMA 3400

Lab Sample Number				2300520	2300521	2300522
Sample Reference				WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				2.20-2.65	2.50	4.00-4.45
Date Sampled				24/05/2022	24/05/2022	25/05/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	14	23
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	8.5	8.6
Total Sulphate as SO ₄	%	0.005	MCERTS	0.034	0.043	0.04
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.06	0.11	0.065
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	5.5	13	22
Total Sulphur	%	0.005	MCERTS	0.024	0.021	0.02
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	15	23	7.8
Magnesium (leachate equivalent)	mg/l	2.5	NONE	7.5	11	3.9

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 22-62619
Project / Site name: Postal Street

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2300510	BH01	None Supplied	3	Brown clay with gravel.
2300511	BH01	None Supplied	6.5	Brown clay.
2300512	BH01	None Supplied	8.5	Brown clay.
2300513	BH01	None Supplied	12.5	Brown clay.
2300514	BH01	None Supplied	18.5	Brown clay and sand with gravel.
2300515	BH01	None Supplied	21	Brown sand with gravel.
2300516	RC01	None Supplied	9.5	Brown sandy clay with gravel.
2300517	RC01	None Supplied	15.5	Brown clay and sand.
2300518	WS01	None Supplied	2.5	Brown clay and sand.
2300519	WS02	None Supplied	4	Brown clay.
2300520	WS03	None Supplied	2.20-2.65	Brown clay.
2300521	WS04	None Supplied	2.5	Brown clay.
2300522	WS05	None Supplied	4.00-4.45	Brown clay.



Analytical Report Number : 22-62619
Project / Site name: Postal Street

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Appendix E – Ground Gas Monitoring Results

- Visits 1 – 6

Curtins

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project:	Postal Street	Date:	31/05/2022
Job Number:	B080401	Visit:	1
Client:	Faithful & Gould	Weather:	Cloudy, Showers
Barometric State:	Rising	Ground Conditions:	Wet

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1011										Dry	2.12	1
BH01 (d)	1011										Dry	22.50	1
RC01	1011												2
WS01	1011												2
WS03	1011	0.0	0.0	0.0	0.0	0.4	0.4	11.7	0	1	Dry	2.00	
WS05	1011	0.0	0.0	0.0	0.0	0.2	0.2	20.3	0	0	Dry	2.27	
MAX		0.0	0.0	0.0	0.0	0.4	0.4	20.3	0	1			

Notes**Logged by****TW**

- 1 Borehole cap flooded - unable to gas monitor.
 2 Parked car over borehole - unable to monitor.

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

GAS MONITORING LOG SHEET

Project:	Postal Street	Date:	16/06/2022
Job Number:	B080401	Visit:	2
Client:	Faithful & Gould	Weather:	Sunny
Barometric State:	Falling	Ground Conditions:	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1017	0.0	0.0	0.0	0.0	0.1	0.1	20.6	0	1	2.0	2.20	1
BH01 (d)	1017	0.0	0.0	0.0	0.0	0.0	0.0	20.9	0	0	20.88	22.50	1
RC01	1014	0.0	0.0	0.0	0.0	0.0	0.0	20.7	0	0	22.35	>30	1,2
WS01	1015	0.0	0.0	0.0	0.0	0.0	0.0	20.8	0	1	Dry	1.85	1
WS03	1017	0.0	0.0	0.0	0.0	0.4	0.4	20.3	0	0	Dry	2.00	1
WS05	1016	0.0	0.0	0.0	0.0	0.2	0.2	207.0	2	1	Dry	2.26	1
MAX		0.0	0.0	0.0	0.0	0.4	0.4	207.0	2	1			

Notes

- 1 Steady state gas flow achieved instantly
- 2 Monitored on the 17/06/2022

Logged by RT

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

Curtins

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG

Tel: 0161 236 2394

Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project: Postal Street**Date:** 28/06/22**Job Number:** B080401**Visit:** 3**Client:** Faithful & Gould**Weather:** Sunny, Warm**Barometric State:** Falling**Ground Conditions:** Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1015	0.0	0.0	0.0	0.0	0.0	0.0	20.5	0	1	1.96	2.20	
BH01 (d)	1015	12.7	0.0	0.0	0.0	0.6	0.6	9.8	0	3	21.45	22.50	1
RC01	1015	0.0	0.0	0.0	0.0	0.0	0.0	20.7	0	0	22.40	>30	
WS01	1014	10.1	0.0	0.0	0.0	0.0	0.0	20.8	0	1	Dry	1.85	2
WS03	1014										Dry	2.00	3
WS05	1014	0.0	0.0	0.0	0.0	0.1	0.1	20.3	1	1	Dry	2.26	
MAX		12.7	0.0	0.0	0.0	0.6	0.6	20.8	1	3			

Notes**Logged by**

TW

- 1 Steady state gas flow rate reached after 2 minutes
- 2 Steady state gas flow rate reached after 30 seconds
- 3 Borehole covered by parked car

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

GAS MONITORING LOG SHEET

Project:	Postal Street	Date:	19/07/22
Job Number:	B080401	Visit:	4
Client:	Faithful & Gould	Weather:	Sunny, Warm
Barometric State:	Falling	Ground Conditions:	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1015	0.0	0.0	0.0	0.0	0.4	0.4	20.5	0	5	2.18	2.20	
BH01 (d)	1015	22.6	0.0	0.0	0.0	0.3	0.3	16.8	0	1	22.34	22.50	1
RC01	1015	-0.6	0.0	0.0	0.0	0.7	0.7	19.6	0	1	22.36	>30	1
WS01	1015	0.0	0.0	0.0	0.0	0.8	0.8	19.7	0	3	Dry	1.85	
WS03	1015	0.0	0.0	0.0	0.0	0.5	0.5	19.5	0	3	Dry	2.00	
WS05	1014	0.0	0.0	0.0	0.0	0.2	0.2	21.1	0	0	Dry	2.26	
MAX		22.6	0.0	0.0	0.0	0.8	0.8	21.1	0	5			

Notes

Logged by TW

1 Steady state gas flow rate reached after 4 minutes.

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

GAS MONITORING LOG SHEET

Project:	Postal Street	Date:	01/08/22
Job Number:	B080401	Visit:	5
Client:	Faithful & Gould	Weather:	Dry and Sunny
Barometric State:	Falling	Ground Conditions:	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1014	-0.1	0.0	0.0	0.0	0.2	0.2	20.4	3	0	1.83	2.20	1
BH01 (d)	1014	-12.8	0.0	0.0	0.0	0.7	0.6	5.4	2	0	22.12	22.52	
RC01	1014	0.0	0.0	0.0	0.0	0.0	0.0	20.7	0	0	22.42	>30	
WS01	1014	0.0	0.0	0.0	0.0	0.1	0.1	20.8	0	0	Dry	1.87	
WS03	1014	0.1	0.0	0.0	0.0	0.6	0.6	19.8	0	0	Dry	2.02	
WS05	1014												2
0													
0													
0													
0													
0													
0													
0													
0													
0													
MAX		0.1	0.0	0.0	0.0	0.7	0.6	20.8	3	0			

Notes

Logged by JL

- 1 Steady state gas flow rate reached after 2 minutes
- 2 Parked car over borehole - unable to monitor.

1% gas volume = 10,000 ppm
 Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
 All other gases recorded at 'steady state' unless otherwise stated

GAS MONITORING LOG SHEET

Project: Postal Street **Date:** 08/08/22
Job Number: B080401 **Visit:** 6
Client: Faithful & Gould **Weather:** Sunny
Barometric State: Steady **Ground Conditions:** Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH01 (s)	1019	-1.7	0.0	0.0	0.0	0.2	0.2	20.6	0	0	1.73	2.20	1
BH01 (d)	1019	0.0	0.0	0.0	0.0	0.3	0.1	20.3	0	0	20.28	22.68	
RC01	1019	-42.6	0.0	0.0	0.0	0.2	0.0	19.7	0	0	22.44	>30	1,2
WS01	1019	0.0	0.0	0.0	0.0	0.3	0.2	19.8	0	0	Dry	2.86	
WS03	1019	-22.7	0.0	0.0	0.0	0.2	0.1	20.2	0	0	Dry	1.97	1
WS05	-	-	-	-	-	-	-	-	-	-	-	-	3
0													
0													
0													
0													
0													
0													
0													
0													
0													
MAX		0.0	0.0	0.0	0.0	0.3	0.2	20.6	0	0			

Notes

- 1 - Steady state air flow rate recorded after 1 second.
- 2 - Depth of monitoring well greater than length of dip tape (30m)
- 3 - Monitoring well could not be accessed due to parked car.

Logged by

RT

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
 All other gases recorded at 'steady state' unless otherwise stated

Appendix F – GAC Screening Thresholds

- Curtins GAC Tier 1 Thresholds

Adopted Soil Generic Assessment Criteria
Sandy loam with 6% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 21	6 21	1.8 170	33 49	7.7 21	220 250
Lead	200	310	80	2,300	630	1,300
Mercury (<i>elemental</i>)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (<i>inorganic</i>)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
<i>Aliphatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅₋₅ - EC ₆	160	160	3900	12000	600000	180000
EC ₅₋₆ - EC ₈	530	530	13000	40000	620000	320000
EC ₅₋₈ - EC ₁₀	150	150	1700	11000	13000	21000
EC ₁₀₋₁₀ - EC ₁₂	760	770	7300	47000	13000	24000
EC ₁₂₋₁₂ - EC ₁₆	4300	4400	13000	90000	13000	26000
EC ₅₋₁₆ - EC ₃₅	110000	110000	270000	1800000	250000	490000
EC ₃₅₋₃₅ - EC ₄₄	110000	110000	270000	1800000	250000	490000
<i>Aromatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅₋₅ - EC ₇	300	1400	57	86000	56000	92000
EC ₅₋₇ - EC ₈	660	3900	120	180000	56000	100000
EC ₅₋₈ - EC ₁₀	190	270	51	17000	5000	9300
EC ₁₀₋₁₀ - EC ₁₂	380	1200	74	34000	5000	10000
EC ₁₂₋₁₂ - EC ₁₆	660	2500	130	38000	5000	10000
EC ₅₋₁₆ - EC ₂₁	930	1900	260	28000	3800	7800
EC ₂₁₋₂₁ - EC ₃₅	1700	1900	1600	28000	3800	7900
EC ₃₅₋₃₅ - EC ₄₄	1700	1900	1600	28000	3800	7900
Aliph + Arom EC >44-70	1900	1900	3000	28000	3800	7900
Aromatic						
Benzene	0.33 0.87	1.0 3.3	0.07 0.18	95 98	73 140	110 230
Ethyl benzene	350	840	90	2800⁽⁸⁾ [66000]	2800⁽⁸⁾ [25000]	2800⁽⁸⁾ [27000]
Toluene	610	2700	120	4400⁽⁸⁾ [190000]	4400⁽⁸⁾ [56000]	4400⁽⁸⁾ [100000]
Xylene ⁽⁹⁾	230	290	160	2600⁽⁸⁾ [32000]	2600⁽⁸⁾ [43000]	2600⁽⁸⁾ [31000]
Phenol	420	520	280	3200⁽¹⁴⁾ (38000)	3200⁽¹⁴⁾ (10000)	3200⁽¹⁴⁾ (9300)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	13	13	24	1100	4900	3000
Acenaphthylene	920	6000	160	100000	15000	30000
Acenaphthene	1100	6000	200	100000	15000	30000
Fluorene	860	4500	160	71000	9900	20000
Phenanthrene	440	1500	90	23000	3100	6300
Anthracene	11000	37000	2200	540000	74000	150000
Fluoranthene	890	1600	290	23000	3100	6400
Pyrene	2000	3800	620	54000	7400	15000
Benz(a)anthracene	13	15	13	180	29	62
Chrysene	27	32	19	350	57	120
Benzo(b)fluoranthene	3.7	4.0	3.9	45	7.2	16.0
Benzo(k)fluoranthene	100	110	130	1200	190	440
Benzo(a)pyrene	3.0 5.0	3.2 5.3	3.5 5.7	36 77	5.7 10	13 21
Indeno(123cd)pyrene	41	46	39	510	82	180
Dibenzo(ah)anthracene	0.3	0.32	0.43	3.6	0.58	1.4
Benzo(ghi)perylene	350	360	640	4000	640	1600
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.0014	0.0015	0.0018	0.12	3.5	5.4
Trichloroethene (TCE)	0.075	0.08	0.21	5.7	120	120
1,1,1,2 Tetrachlorethane	6.4	8.2	4.4	560	1400	2100
Tetrachlorethane (PCE)	0.90	0.92	3.6	95	1400	1500
1,1,1 Trichlorethane	39	40	240	3000	140000	100000

Notes

- All values above are in mg/kg
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- Soil organic matter (SOM) is assumed to be 6% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 <u>21</u>	6 <u>21</u>	1.8 <u>170</u>	33 <u>49</u>	7.7 <u>21</u>	220 <u>250</u>
Lead	<u>200</u>	<u>310</u>	<u>80</u>	<u>2,300</u>	<u>630</u>	<u>1,300</u>
Mercury (elemental)	1	1	26	26	16	26 ⁽⁸⁾ [30]
Mercury (inorganic)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 <u>79</u>	170 <u>170</u>
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
<i>Aliphatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₆	78	78	1700	5900	590000	130000
EC ₆ - EC ₈	230	230	5600	17000	610000	220000
EC ₈ - EC ₁₀	65	65	770	4800	13000	18000
EC ₁₀ - EC ₁₂	330	330	4400	23000	13000	23000
EC ₁₂ - EC ₁₆	2400	2400	13000	82000	13000	25000
EC ₁₆ - EC ₃₅	92000	92000	270000	1700000	250000	480000
EC ₃₅ - EC ₄₄	92000	92000	270000	1700000	250000	480000
<i>Aromatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₇	140	690	27	46000	56000	84000
EC ₇ - EC ₈	290	1800	51	110000	56000	95000
EC ₈ - EC ₁₀	83	110	21	8100	5000	8500
EC ₁₀ - EC ₁₂	180	590	31	28000	5000	9700
EC ₁₂ - EC ₁₆	330	2300	57	37000	5100	10000
EC ₁₆ - EC ₂₁	540	1900	110	28000	3800	7700
EC ₂₁ - EC ₃₅	1500	1900	820	28000	3800	7800
EC ₃₅ - EC ₄₄	1500	1900	820	28000	3800	7800
Aliph + Arom EC >44-70	1800	1900	2100	28000	3800	7800
<i>Aromatic</i>						
Benzene	0.16	0.49	0.035	50	72	100
Ethyl benzene	150	380	39	1200⁽⁸⁾ [35000]	1200⁽⁸⁾ [24000]	1200⁽⁸⁾ [22000]
Toluene	270	1300	51	1900⁽⁸⁾ [110000]	1900⁽⁸⁾ [56000]	1900⁽⁸⁾ [95000]
Xylene ⁽⁹⁾	98	120	70	1200⁽⁸⁾ [14000]	1200⁽⁸⁾ [42000]	1200⁽⁸⁾ [23000]
Phenol	290	420	140	1500⁽¹⁴⁾ (35000)	1500⁽¹⁴⁾ (10000)	1500⁽¹⁴⁾ (8300)
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>						
Naphthalene	5.6	5.6	10	460	4900	1900
Acenaphthylene	420	4600	69	97000	15000	30000
Acenaphthene	510	4700	85	97000	15000	30000
Fluorene	400	3800	67	68000	9900	20000
Phenanthrene	220	1500	38	22000	3100	6200
Anthracene	5400	35000	950	540000	74000	150000
Fluoranthene	560	1600	130	23000	3100	6300
Pyrene	1200	3800	270	54000	7400	15000
Benz(a)anthracene	11	14	6.5	170	29	56
Chrysene	22	31	9.4	350	57	110
Benzo(b)fluoranthene	3.3	4.0	2.1	44	7.2	15
Benzo(k)fluoranthene	93	110	75	1200	190	410
Benzo(a)pyrene	2.7	3.2	2	35	5.7	12
Indeno(123cd)pyrene	36	46	21	510	82	170
Dibenzo(ah)anthracene	0.28	0.32	0.27	3.6	0.57	1.3
Benzo(ghi)perylene	340	360	470	4000	640	1500
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00087	0.001	0.001	0.077	3.5	5
Trichloroethene (TCE)	0.034	0.036	0.091	2.6	120	91
1,1,1,2 Tetrachlorethane	2.8	3.5	1.9	250	1400	1800
Tetrachlorethane (PCE)	0.39	0.4	1.5	42	1400	1100
1,1,1 Trichlorethane	18	18	110	1300	140000	76000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs
- Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 1% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 21	6 21	1.8 170	33 49	7.7 21	220 250
Lead	200	310	80	2,300	630	1,300
Mercury (<i>elemental</i>)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (<i>inorganic</i>)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
EC ₅₋₅ - EC ₆	42	42	730	3200	570000	95000
EC ₆₋₆ - EC ₈	100	100	2300	7800	600000	150000
EC ₈₋₈ - EC ₁₀	27	27	320	2000	13000	14000
EC ₁₀₋₁₀ - EC ₁₂	130	130	2200	9700	13000	21000
EC ₁₂₋₁₂ - EC ₁₆	1100	1100	11000	59000	13000	25000
EC ₁₆₋₁₆ - EC ₃₅	65000	65000	260000	1600000	250000	450000
EC ₃₅₋₃₅ - EC ₄₄	65000	65000	260000	1600000	250000	450000
Aromatic risk banded hydrocarbons - TPHCWG method						
EC ₅₋₅ - EC ₇	70	370	13	26000	56000	76000
EC ₇₋₇ - EC ₈	130	860	22	56000	56000	87000
EC ₈₋₈ - EC ₁₀	34	47	8.6	3500	5000	7200
EC ₁₀₋₁₀ - EC ₁₂	74	250	13	16000	5000	9200
EC ₁₂₋₁₂ - EC ₁₆	140	1800	23	36000	5100	10000
EC ₁₆₋₁₆ - EC ₂₁	260	1900	46	28000	3800	7600
EC ₂₁₋₂₁ - EC ₃₅	1100	1900	370	28000	3800	7800
EC ₃₅₋₃₅ - EC ₄₄	1100	1900	370	28000	3800	7800
Aliph + Arom EC >44-70	1600	1900	1200	28000	3800	7800
Aromatic						
Benzene	0.08	0.3	0.017	28	72	90
Ethyl benzene	65	170	16	520⁽⁸⁾ [17000]	520⁽⁸⁾ [24000]	520⁽⁸⁾ [17000]
Toluene	120	610	22	860⁽⁸⁾ [59000]	860⁽⁸⁾ [56000]	860⁽⁸⁾ [87000]
Xylene ⁽⁹⁾	41	53	28	480⁽⁸⁾ [69000]	480⁽⁸⁾ [41000]	480⁽⁸⁾ [17000]
Phenol	180	310	66	760⁽¹⁴⁾ (31000)	760⁽¹⁴⁾ (10000)	760⁽¹⁴⁾ (7600)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	2.3	2.3	4.1	190	4900	1200
Acenaphthylene	170	2900	28	83000	15000	29000
Acenaphthene	210	3000	34	84000	15000	29000
Fluorene	170	2800	27	63000	9900	20000
Phenanthrene	95	1300	15	22000	3100	6200
Anthracene	2400	31000	380	520000	74000	150000
Fluoranthene	280	1500	52	23000	3100	6300
Pyrene	620	3700	110	54000	7400	15000
Benz(a)anthracene	7.2	11	2.9	170	29	49
Chrysene	15	30	4.1	350	57	93
Benzo(b)fluoranthene	2.6	3.9	0.99	44	7.1	13
Benzo(k)fluoranthene	77	110	37	1200	190	370
Benzo(a)pyrene	2.2	3.2	0.97	35	5.7	11
Indeno(123cd)pyrene	27	45	9.5	500	82	150
Dibenzo(ah)anthracene	0.24	0.31	0.14	3.5	0.57	1.1
Benzo(ghi)perylene	320	360	290	3900	640	1400
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00064	0.00077	0.00055	0.059	3.5	4.8
Trichloroethene (TCE)	0.016	0.017	0.041	1.2	120	70
1,1,1,2 Tetrachlorethane	1.2	1.5	0.79	110	1400	1500
Tetrachlorethane (PCE)	0.18	0.18	0.65	19	1400	810
1,1,1 Trichlorethane	8.8	9	48	660	140000	57000

Notes

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- Soil organic matter (SOM) is assumed to be 1% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Appendix G – Risk Assessment Methodology

The site-specific risk assessment, presented in this report, follows the principle of establishing whether there is a viable linkage between a contaminant source to a potential receptor, via an exposure pathway.

The risk assessment corresponds with the total site area and incorporates both descriptive (qualitative) and, where available, numerical (quantitative) lines of evidence.

Risk assessment is the process of collating known information on a hazard or set of hazards to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of contaminant source on a site does not necessarily mean there is a risk.

The risk assessment considers the likelihood of an event taking place (accounting for the presence of the source and receptor and the viability of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment, the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to an ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in an ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Secondary A aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	<i>Harm is likely to arise</i> to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	<i>It is possible</i> that without appropriate further action <i>harm could arise</i> to a designated receptor. It is relatively <i>unlikely</i> that any such harm would be <i>severe</i> , and if any harm were to occur it is <i>more likely</i> that such harm would be <i>relatively mild</i> .
Low Risk	<i>It is possible</i> that <i>harm could arise</i> to a designated receptor from an identified hazard. It is <i>likely</i> that, at worst, if any harm was realised any effects would be <i>mild</i> .
Very Low Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation.

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