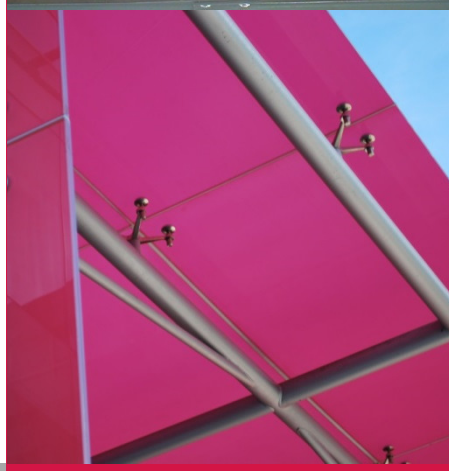

# Decant Village, NMGH

## Phase 2 Ground Investigation

Curtins Ref: 075805-CUR-00-XX-RP-GE-0001

Revision: P01

Issue Date: 20 October 2020

Client Name: Greater Manchester NHS Foundation Trust

Client Address: Harrop House, Bury New Road, Prestwich, Manchester, M25 3BL

Site Address: North Manchester General Hospital (NMGH), Ellis Drive, Crumpsall, Manchester, M8 5R.

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# Executive Summary

| | |
|---|---|
| **Appointment** | In July 2020 Curtins were instructed by Greater Manchester NHS Foundation Trust to undertake a Phase 2 Ground Investigation for Decant Village at North Manchester General Hospital, Ellis Drive, Crumpsall M8 5RL (approximately centred on NGR SD 84800 02100) that covers an area of approximately 0.18 Ha.<br><br>Development plans comprise the construction of an offsite manufactured four storey modular building for use of temporary office accommodation. |
| **Current Site Status** | The site entrance is located off Ellis Drive, Crumpsall, M8 5RL. The site is part of the wider North Manchester General Hospital (NMGH), currently occupied by a service yard and car park associated with the Estates and Transport Department. The site is generally flat, surveyed to be 74.49m to 75.70m AOD. |
| **Summary of Preliminary Site Assessment** | Historical mapping shows the site remains an area of undeveloped agricultural land from 1848 to 1950. Two ponds are located 50m and 60m southeast of the site, no longer present from 1894.<br><br>By 1950 the north of the site is occupied by tennis courts and a bowling green, with the remainder of the site a sports ground until 1978. The Manchester Workhouse is present directly north of the site from 1894, later extended to the east becoming North Manchester General Hospital by 1978. From 1978 the site is occupied by a car park with an electrical sub-station 20m east. Made Ground deposits are not indicated to be present onsite according to BGS, however given the previous uses deposits are anticipated to be present. Superficial soils are indicated as Glacial Till deposits overlying the Chester Formation (bedrock).<br><br>Environment Agency data indicates that the site, corresponding with the underlying bedrock geology, overlies a Principal Aquifer. The Glacial Till deposit is associated with a Secondary Undifferentiated Aquifer. The site is not located within a Source Protection Zone (SPZ).<br><br>Nearest surface water feature is the River Irk approximately 464m east of site. |
| **Fieldworks Undertaken** | Fieldworks were carried out between 10th and 13th August and on the 26th August, comprising one cable percussion with rotary open-hole follow-on and four window sample boreholes. Three hand dug pits were advanced primarily for the identification of possible tanks below the raised concrete slab on site.<br><br>BH101-BH101A was advanced up to 42.0m bgl (33.37m AOD), terminated in granular superficial deposits.<br><br>Ground gas and groundwater monitoring standpipes were installed within the cable percussive with rotary open-hole follow-on exploratory hole (BH101-BH101A) and three of the window sample boreholes (WS101 to WS103). Selected soil samples were subjected to laboratory analysis. No groundwater samples were taken. Six ground gas monitoring visits have been undertaken. |
| **Encountered Ground Conditions** | Made Ground was encountered in all exploratory hole locations from ground level to depths between 0.80 and 1.30m bgl. This generally comprised a tarmacadam layer overlying a sandy gravel layer which in turn overlies a sandy clayey gravel or a slightly sandy gravelly clay. Gravel comprises dolomite hardcore and brick. In BH101-BH101A a very gravelly sand was encountered above the sandy gravel layer. In all hand pits (HP101 to HP103) a slightly sandy SILT was noted.<br><br>Underlying the Made Ground the superficial deposits were highly variable, comprising cohesive and granular Till. The cohesive Till deposits were recorded as soft to firm slightly to sandy Clay and soft to firm slightly sandy to sandy Silt. In BH101-BH101A the silt was thinly laminated and in WS101 it was recorded as organic. Cohesive Till deposits were absent in the northern-most window samples, indicating the top of these deposits deepen northwards to greater than 5.45m bgl. The base of the cohesive deposits, as recorded in BH101-BH101A, was 38.0m bgl (37.37m AOD).<br><br>The granular Till deposits comprised a loose to medium dense, becoming dense, slightly clayey Sand. In BH101-BH101A and WS104 the granular Till deposits were recorded as a slightly gravelly Sand. BH101-BH101A recorded granular deposits from 3.45-8.90m bgl and 38.0-42.0m bgl, with the base of the superficial deposits not confirmed.<br><br>Bedrock was not encountered in any of the exploratory holes.<br><br>During returned monitoring visits, shallow groundwater levels were recorded 73-74m AOD, with BH101-101A recorded deeper groundwater 66.72 - 66.88m AOD. |
| **Environmental Laboratory Testing** | With respect to the proposed *'Commercial'* end-use of the site, no exceedances were noted in within the samples collected. Soil samples were also screened for asbestos, no suspected asbestos containing materials were identified in any of the laboratory testing. Concentrations of SVOCs and VOCs were recorded below thresholds where available and concentrations of PCBs were recorded below the Environmental Agency Soil Guidance Values for dioxins, furans and dioxin-like PCBs in Soil. |

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| | |
|---|---|
| **Ground Gas Assessment** | During the ground gas monitoring programme methane ($CH_4$) was recorded below the instrument's detection limit within all the monitoring wells.<br><br>Maximum carbon dioxide ($CO_2$) concentrations were recorded at 0.8% in BH101-BH101A on the sixth monitoring visit. Gas flow was recorded at a maximum steady state flow rate of 2.2 l/hr in WS101 on the sixth visit. The 'representative' scenario records a maximum $Q_{hg}$ of 0.0022 l/hr for carbon dioxide. The site is therefore classified as CS1. |
| **Geotechnical Assessment** | The Made Ground, shallow cohesive and granular Glacial Till deposits do not provide suitable founding strata for the proposed development. As such, it is likely a piled foundation is used to transfer the loads to the firm becoming very stiff cohesive deposits below to provide suitable resistance for the proposed loads. It is recommended that a specialist piling contractor is consulted for advice on most suitable piling solution and design. A suitably qualified temporary works designer and an experienced piling contractor must be consulted prior to commencement of any works.<br><br>No ground floor slabs are proposed for the temporary office accommodation development.<br><br>Based on the laboratory test results it is considered that a Design Sulphate Class may be taken as DS-1 with an ACEC class of AC-1 within Made Ground and a Design Sulphate Class of DS-1 with an ACEC class of AC-1 within superficial deposits being appropriate. |
| **Recommendations** | Based on the findings of the ground investigation, the following recommendations are made:<br><br>1) It is recommended that specialist piling contractors are to be consulted to establish suitable pile design.<br>*2)* 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.*<br>3) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer. |

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# Appendices

**Appendix A** **Drawings**

**Appendix B** **Exploratory Hole Logs**

**Appendix C** **Chemical Laboratory Testing Results**

**Appendix D** **Geotechnical Laboratory Testing Results**

**Appendix E** **Ground Gas Monitor Results**

**Appendix F** **GAC Screening Thresholds**

**Appendix G** **Risk Assessment Methodology**

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# 1.0 Introduction

## 1.1 Project Background

Curtins were instructed by Greater Manchester NHS Foundation Trust in July 2020 to undertake an initial Phase 2 Ground Investigation for Decant Village at North Manchester General Hospital, Ellis Drive, Crumpsall M8 5RL. The site is centred on National Grid Reference (NGR) SD 84800 02100 and covers an area of approximately 0.18 Ha. The site location plan is presented on *Figure 2.1*.

The proposed development comprises an offsite manufactured four storey modular building for use of temporary office accommodation. A Finished Floor Level of approximately 75.3m AOD is proposed. A current proposed development plan is included in *Appendix A.*

## 1.2 Scope of Services

The Phase 2 Ground Investigation Report will characterise the environmental and geotechnical conditions of the site. The ground investigation has been undertaken to assess the ground and groundwater conditions at the proposed location of the temporary office accommodation.

The Phase 2 Ground Investigation Report is intended to determine:

a) Likely 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) If there is a risk to the end-user from soil gases including methane, carbon dioxide, carbon monoxide and hydrogen sulphide;
c) Recommendations for the design of foundations and building ground floor slabs; and
d) Recommendations for the specification of sub-structure concrete.

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

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# 2.0 Preliminary Site Assessment Summary

A Phase 1 Desktop Study was undertaken for the site by Curtins Consulting in July 2020 (Ref.1). A summary of the detailed findings of this Desktop Study, comprising current site setting, history, geology and hydrogeology/hydrology is presented within this Section with reference to additional information sources.

## 2.1 Current Setting

The site entrance is located off Ellis Drive, Crumpsall, M8 5RL, as shown on *Figure 2.1*. The site is part of the wider North Manchester General Hospital and is currently an area of hardstanding used as a service yard and car parking area associated with the hospital's Estates and Transport Department.

The site is bounded to the north by Ellis Road followed by the majority of the North Manchester General Hospital, to the east by Eyam Road and areas of car parking associated with the hospital and to the west by the hospital's Estates and Transport department. The south of the site is bound by Magna Drive, followed by residential properties.

Main access to the site is from Ellis Drive through the service yard gates.

A topographical survey of the show record current site levels to range from, 74.49m AOD at the entrance from Ellis Drive, to 75.70m AOD in the southeastern corner. The site is relatively flat and level.

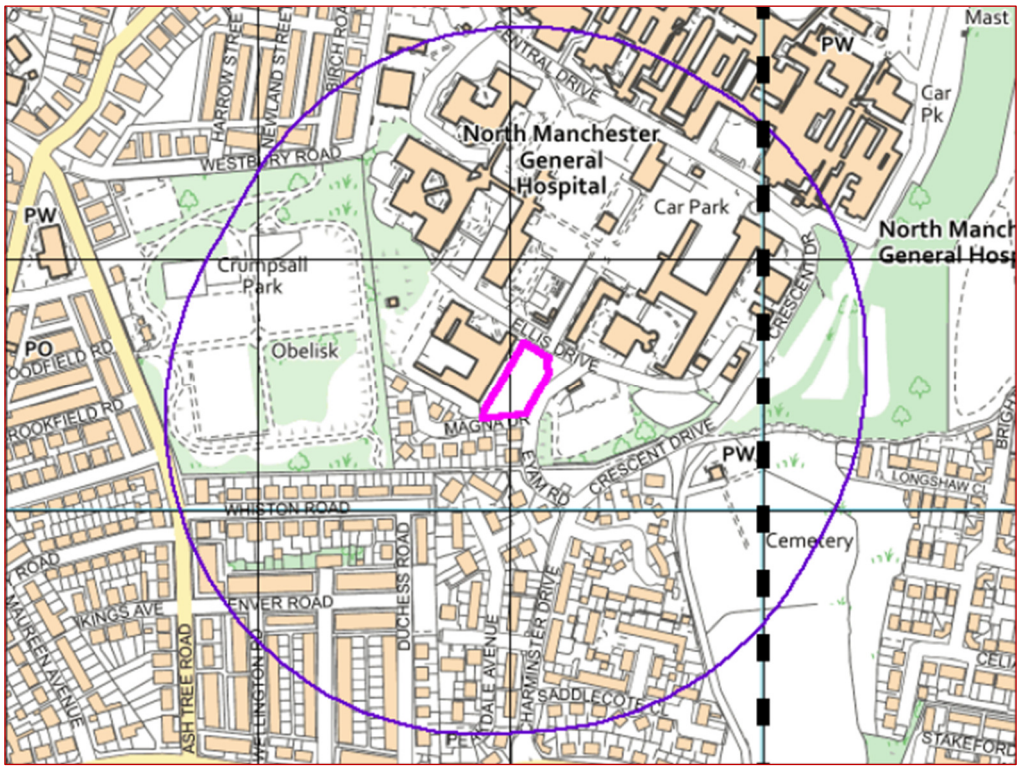


***Figure 2.1*** *– Site Location Plan (site boundary shown in pink, 100m buffer shown in purple). Crown Copyright. License number 100020245*

## 2.2 Previous Site Use

A review of the available historical maps (Ref. 1) for the site has been undertaken with specific reference to the potential sources of contamination.

Earliest historical map (1848) shows the site remains an undeveloped area of agricultural land with a footpath along the western boundary until 1950.

The surrounding land is generally agricultural fields with Crumpsall Hall located 100m southwest, no longer present from 1923, and Clarkville Farm 250m southeast. Two ponds are located 50 and 60m southeast of the site, no longer present on maps from 1894.

From 1894 The Manchester Workhouse (later Crescent Road Institution) is recorded immediately north of the site and a *Brick Works* 250m southwest which is no long present from 1908 and presumably infilled. The surrounding areas become populated by residential and commercial properties.

By 1950 the north of the site is occupied by a tennis court and bowling green, with a sports ground occupying the remainder of the site. Crescent Road Institution is renamed Springfield Hospital in 1950 and is extended to the west.

By 1978 the Springfield Hospital becomes North Manchester General Hospital immediately north of the site and the sporting grounds (including the tennis court and bowling green) is no longer recorded on site. From 1978 the site is occupied by a car park with an electrical sub-station recorded 20m east and a car park immediately west of the site.

By 1992 an unnamed building, is present immediately south of the site, later demolished in 2020 and replaced by residential properties.

## 2.3 Published Geology

A study of the British Geological Survey (BGS) maps,1:50,000 (Solid and Drift Edition, Sheet No. 085, 2011) (Ref. 2) indicates the following geological sequence underlying the site:

- **Superficial Deposits**: Glacial Till
- **Solid Geology:** Chester Formation

There are no BGS borehole logs within 250m of the development site available to review.

### 2.3.1 Made Ground Deposits

Made Ground deposits are not indicated on the geological maps; however, it is anticipated that Made Ground of unknown composition will be present in parts of the site, associated with the construction of the car park on site and redevelopment in the surrounding area.

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### 2.3.2 Superficial Deposits

Superficial deposits are recorded as Glacial Till deposits. The Till deposits are expected to consist of a heterogenous mixture of clay, sand, gravel and boulders that vary widely in size and shape.

Glaciofluvial Sheet Deposits (sand and gravel) are also recorded in close proximity to the site and may be encountered interbedded with the Glacial Till (clay) deposits.

### 2.3.3 Bedrock Deposits

The site is underlain by a Chester Formation, typically comprising conglomerate and sandstone beds with subordinate beds of mudstone.

## 2.4 Hydrogeology and Hydrology

Environment Agency and the Phase 1 Report (Ref. 1) data indicates that the geological sequence underlying the site has the following hydrogeological characteristics:

| Geology | Associated Hydrogeological Classification |
|---|---|
| Made Ground deposits are not indicated to be present | N/A |
| Glacial Till | Secondary Undifferentiated Aquifer[1] |
| Chester Formation | Principal Aquifer[2] |

*Notes:*

1. *Assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.*
2. *Layers of rock or drift deposits that have high intergranular and/or river base flow on a strategic scale. They provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.*

There are no recorded faults directly on site. The nearest fault is located approximately 80m north of the site orientated northwest-southwest.

The site is not located within a Source Protection Zone (SPZ).

There are no groundwater abstraction points within 500m of the site.

The nearest surface water feature is the River Irk, 464m east of the site which flows towards the south and has a river quality of GAQ Grade E with a flow rate of less than 2.5 cumecs.

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## 2.5 Unexploded Ordnance (UXO) Risk Assessment

The likelihood of UXO being encountered on a development site is influenced by several factors including; the proximity to strategic targets, the nature of the development works being undertaken and evidence of local damage in the post-war periods amongst others. To determine the likelihood of UXO being present on a site, a step-wise risk assessment process is followed. This process is outlined within CIRIA C681 Unexploded Ordnance: A Guide for the Construction Industry (Ref. 3).

Risk mapping (Ref. 4) for UXO's has placed the site in a Moderate Risk area. Moderate-risk areas are those with a bombing density of up to 11-50 bombs per 1000 acres and may contain WWII targets.

The Phase 1 report (Ref. 1) indicated no evidence of ruins or significant bomb damage within 1km of the site and no significant targets noted within 1km of the site boundary.

Considering the above and that the site was occupied throughout the war period and developed after the war, Curtins identified a low risk of encountering UXO during Ground Investigation works.

Contractors undertaking excavations works should carry out their own UXO Risk Assessment in respect to their works.

## 2.6 Landfill

There are no operational or historic landfills within 250m of the site, the closest is 290m south with no records of the type of waste disposed. There are no records of licenced waste management facilities within 500m of the site.

There are four potentially infilled land (water and non-water) recorded within 250m of the site. The closest recorded is 35m south associated with an unknown filled ground, most likely a small pond.

## 2.7 Summary of Phase 1 Conceptual Site Model

*Table 2.7* records initial Potential Pollutant Linkages (PPL) identified which are to be assessed further through the Phase 2 Investigation.

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**Table 2.7 –** *Potential Pollutant Linkages*

| Source | Pathway | Receptor | Risk Rating |
|---|---|---|---|
| **On-site sources of potential contamination:**<br><br>Potential contamination associated with Made Ground of unknown composition from uncontrolled deposition of construction materials on-site during construction of the tennis courts, bowling green and later, the car park.<br><br>Potential contamination associated with Made Ground of unknown composition from uncontrolled deposition during demolition of buildings on site.<br><br>**Off-site sources of potential contamination:**<br><br>Potential contamination associated with the construction of the residential and commercial properties off site.<br><br>Potential contamination associated with the various *Works* within 250m of the site.<br><br>Uncontrolled deposition of Made Ground within 250m of the site associated with the back fill of ponds within 250m of the site. | Direct contact, ingestion, inhalation (dust and vapours) | **Site End Users**<br><br>(Hospital - Commercial) | **Moderate / Low** |
| **On and off-site soils with the potential to generate ground gases:**<br><br>Potential ground gas generation from Made Ground containing organic/putrescible content on site.<br><br>Historically infilled land within 250m of the site of unknown material. | Vertical and horizontal migration through underlying superficial deposits into buildings and air spaces | **Site End Users**<br><br>(Hospital - Commercial) | **Moderate / Low** |

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Potential contaminants of concern associated with any Made Ground present include, amongst others; broad range aliphatic and aromatic hydrocarbons present within any fuel oils; inorganic compounds including heavy metals; organic compounds including PCBs present with the *Works* and Workhouse within 250m of the site; and asbestos present in discarded building materials.

The qualitative risk assessment determined the above risks associated with the proposed development of the site warrant further investigation.

It was recommended that a ground investigation is conducted to both confirm this assessment and provide data in support of the structural and civil engineering design. The scope of the investigation undertaken in detailed in *Section 3.0*.

The risks presented to controlled waters (groundwater and surface water) were identified as Low and Very Low respectively. As such, the risks have not been considered further at this stage. In the event unexpected ground conditions are encountered during the investigation, water samples should be obtained with subsequent chemical analysis to re-assess the risk to controlled waters.

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# 3.0 Ground Investigation Scope of Works

Site investigation works were undertaken by Curtins between the 10th and 13st August and the 26th August 2020.

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

- LCRM (Ref. 5);
- British Standard (BS) 10175:2011+A2:2017 (Ref. 6);
- BS5930:2015+2020 (Ref. 7);
- and BS EN1997: Part 2:2007 Eurocode 7 (Ref. 8).

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

***Table 3.0** – Scope and Rationale of Fieldwork Undertaken*

| Exploratory Hole Type | Exploratory Hole Ref. | Exploratory Hole Depth (m bgl) | Rationale |
|---|---|---|---|
| **Cable Percussion Borehole with Rotary open-hole Follow-on** | **BH101-BH101A** | **42.00** | Confirm the ground and groundwater conditions.<br>Collect Soil Samples for chemical analysis.<br>Collect samples for geotechnical soil testing.<br>Gas and groundwater level monitoring. |
| **Window Sample Boreholes** | **WS101**<br>**WS102**<br>**WS103**<br>**WS104** | **5.45**<br>**5.45**<br>**5.45**<br>**5.45** | Confirm shallow ground and groundwater conditions.<br>Collect Soil Samples for chemical analysis.<br>Collect samples for geotechnical soil testing.<br>Gas and groundwater level monitoring. |
| **Hand Dug Foundation Pits** | **HP101**<br>**HP102**<br>**HP103** | **1.20**<br>**1.25**<br>**1.20** | Confirm the ground conditions.<br>Confirm presence or absence of buried tanks or foundations below raised concrete slab. |

BH101 was drilled using cable percussive techniques with SPTs to 20.00m with rotary open-hole follow-on (BH101) to 42.00m bgl in order to confirm depth to bedrock; however the borehole was terminated at 42m bgl (33.37m AOD) with bedrock was not encountered. For ease of writing and understanding, exploratory hole logs BH101 and BH101A were combined.

For the location of the exploratory holes refer to Curtins drawing ref: 075805-CUR-00-XX-DR-GE-80004-P01 located in *Appendix A*. Exploratory hole locations were surveyed upon completion of the works, with the surveyed ground levels of the exploratory holes added to the logs, contained within *Appendix B.*

## 3.1 Soil Logging and Sampling

Exploratory hole arisings were logged onsite by a qualified Engineer from Curtins and in accordance with the requirements of BS5930 (Ref. 7). No observed visual and olfactory indications of contamination were recorded. Exploratory hole logs are provided in *Appendix B*.

## 3.2 Monitoring Well Installations

Groundwater monitoring 50mm diameter slotted pipes were installed within the cable percussive exploratory hole with rotary open-hole follow-on (BH101-BH101A) and three of the window sample boreholes (WS101 to WS103). Bentonite seal was placed at the top and bottom of each of the exploratory holes, surrounding the screened sections of the pipe. A gravel surround was installed in the annulus between the sides of the borehole and the slotted sections of the pipe.

The monitoring wells were designed to assess the potential for ground gas and monitor groundwater levels in all exploratory holes. No groundwater samples were collected. The screened sections therefore focused on the more permeable deposits where encountered, where ground gas and groundwater may be encountered.

A summary of the response zone is presented in *Table 3.2*.

***Table 3.2 –*** *Monitoring Well Response Zones*

| Borehole Ref. | Response Zone m bgl (m AOD) | Strata Description(s) (Principal Strata in Capitals) |
|---|---|---|
| BH101-BH101A | 11.00 – 13.80 (64.37 – 61.57) | COHESIVE TILL |
| WS101 | 1.30 – 4.00 (74.03 – 71.33) | GRANULAR TILL and COHESIVE TILL |
| WS102 | 0.80 – 4.10 (74.61 – 71.31) | GRANULAR TILL and COHESIVE TILL |
| WS103 | 0.80 – 3.50 (73.97 – 71.27 | GRANULAR TILL |

A copy of the borehole logs can be referred to in *Appendix B* of this report.

## 3.3 Post-Investigation Monitoring

### 3.3.1 Groundwater and Ground Gas Monitoring

Six groundwater level and ground gas monitoring visits over six weeks have been undertaken, to assess the groundwater levels and the ground gas conditions identified in *Section 2.0.*

The results of the groundwater level monitoring are detailed in *Section 5.8.*

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# 4.0 Laboratory Testing

## 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.

Selected soil samples for chemical testing 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 analysis was Envirolab (UKAS and MCERTS accredited) and for geotechnical analysis was Structural Soils (UKAS accredited).

Given the lack of any obvious sources of potential contamination the sampling positions were generally located in a non-targeted, systematic array to give 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), heavy metals, and asbestos. The presence of localised Semi/Volatile Organic Compounds (SVOCs & VOCs), Poly Chlorinated Biphenyls (PCBs) could also not be ruled out due to the present of the historic Workhouse (now NMGH) adjacent to site and tanks on-site without record of decommission.

The extent of the above is captured by the broad environmental testing suites listed in *Table 4.1.1* below.

***Table 4.1.1 –*** *Environmental Chemistry Analysis Suite: Soils*

| Suite Ref. | Analyte | LOD |
|---|---|---|
| Soils Suite A | Asbestos Screen, asbestos quantification (%), pH, 2;1 Water Soluble Sulphate & Soil Organic Matter (SOM) | - |
| | Arsenic, Chromium, Chromium VI, Copper, Lead, Selenium, Nickel | 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 |

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| Suite Ref. | Analyte | LOD |
|---|---|---|
| | PAHs (USEPA 16) | 0.01 to 0.08 mg/kg |
| | TPH (Aro/Ali Split) | 0.01 to 1.0 mg/kg |
| Additional Soil Analysis | Semi-volatile Organic Compounds (SVOC) | 0.1 to 0.5 mg/kg |
| | Volatile Organic Compounds (VOC) | 0.001 to 0.01mg/kg |
| | Speciated PCB-EC7 & WHO12 | 0.001 to 0.002µg/l |

Soil samples were taken from the top 2.00m of exploratory hole locations (BH101-BH101A, and WS101 to WS103); all were tested for Suite A. The sample at 0.80m bgl in WS101 was also tested for VOCs and SVOCs, and speciated PCB-EC7 and WHO12 due to the proximity to one of the possible fuel tanks on site.

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

### 4.1.2 Groundwater Analysis

No groundwater samples were taken on site.

## 4.2 Geotechnical Testing

Soil samples for testing were prepared in accordance with BS1377: Part 1:2016 (Ref. 9). 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 | 36 | BS 5930: 2015, Clause 41 |
| **Laboratory Testing** | | |
| Atterberg Limit | 4 | BS1377 1990, Part 2 (clause 4.5, 5.3 & 5.4) |
| Multistage Triaxial compression test | 2 | BS1377 1990, Part 7 (clause 9.0) |
| Water Soluble Sulphate | 7 | IS0 17025 MCERTS |
| pH Value | 7 | IS0 17025 MCERTS |
| Moisture Content | 4 | BS1377 1990, Part 2 |
| PSD | 6 | BS1377 1990, Part 2 (clause 9.2) |

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

Copies of the geotechnical testing certificates are presented in *Appendix D*.

# 5.0 Ground Conditions

The ground conditions across the site, determined during the Curtins ground investigation works, generally comprised Made Ground of a layer of tarmacadam overlying a very sandy gravel with occasional cobbles, above a slightly sandy clayey gravel or slightly sandy slightly gravelly clay. This typically overlay superficial deposits comprising interbedded cohesive clay and silt deposits and granular sand deposits.

The solid geology was not encountered during the investigation.

## 5.1 Encountered Ground Conditions

A summary of the ground conditions encountered during the site investigation works is presented below, with detailed information presented on the exploratory hole logs included in *Appendix B*.

A summary of the geotechnical test results recorded within the superficial deposits are presented in *Section 6.0*. Full details of the geotechnical results can be found in *Appendix D*.

***Table 5.1 –*** *Summary of Ground Conditions Encountered*

| Stratum | Depth to top of strata, m bgl (m AOD) | Thickness (m) | | Description |
|---|---|---|---|---|
| | | Min | Max | |
| **MADE GROUND** | 0.00 (75.41 – 74.77) | 0.80 | 1.30 | MADE GROUND: Tarmacadam<br>***Overlying***<br>MADE GROUND: Grey sandy angular to subangular fine to gravel of dolomite hardcore and concrete with occasional cobbles. Sand is fine to coarse.<br>***Overlying***<br>MADE GROUND: Dark brownish grey sandy clayey angular to subangular fine to coarse gravel of dolomite hardcore. Sand is fine to coarse.<br>***OR***<br>MADE GROUND: Dark greyish brown slightly sandy gravelly clay. Sand is fine to coarse. Grave is angular to subangular fine to coarse of brick and dolomite hardcore. |
| **SUPERFICIAL DEPOSITS – Cohesive Glacial Till** | 1.00 – 2.30 (74.51 – 73.11) | 0.30[1] | 29.10 | Soft to firm brown slightly to very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone.<br>***And***<br>Soft to firm greyish brown slightly sandy to sandy SILT. Sand is fine. |
| **SUPERFICIAL DEPOSITS – Granular Glacial Till** | 0.80 – 3.45 (74.61 – 71.92) | 0.50 | 7.55[2] | Loose to medium dense, becoming dense brownish grey slightly clayey fine to coarse SAND. |

1 Thickness not proven in hand pits

2 Base not always proven

## 5.2 Made Ground

Made Ground was encountered in all of the exploratory hole locations from ground level to depths of between 0.80m and 1.30m bgl across the site. The Made Ground generally comprised a tarmacadam layer (0.10m thickness) overlying a sandy gravel layer (0.20m to 0.40m thickness), which in turn overlies sandy clayey gravel or a slightly sandy gravelly clay (0.40m to 0.90m thickness). The sand is typically fine to coarse and the gravel fine to coarse, angular to subangular of dolomite hardcore and brick

In exploratory hole BH101-BH101A a layer of very gravelly fine to coarse sand with angular to subangular fine to coarse gravel of dolomite hardcore and concrete was encountered above the sandy gravel encountered in all exploratory holes.

In exploratory hole WS101 angular cobbles of dolomite hardcore and concrete were encountered in the sandy gravel layer.

In exploratory holes HP101 to HP103 instead of the clay layer noted in all other exploratory holes, a darkish grey-black slightly sandy slightly clayey to very clayey angular to subangular fine to medium gravel of brick, ash and rare coal fragments is noted. Sand is fine to coarse.

## 5.3 Glacial Till

The superficial deposits encountered beneath the site were generally as anticipated from published geological data. The Glacial Till which is described by the BGS as an heterogenous mixture of clay, sand, gravel, and boulders (diamicton) varying widely in composition, was encountered to depths of up to c. 42.00m bgl (33.37m AOD) where proven. The base of this layer has not been encountered.

Due to the variability in the composition of the Till (i.e. interbedded granular and cohesive materials) and the little appreciable distinction with the Glaciofluvial Sheet Deposits present close to the site, (owing to similar deposition and geomorphological processes), this report has classified the soils based on engineering behaviour as opposed to the nomenclature used by the BGS. Therefore, the natural superficial deposits have been interpreted and assessed as either 'Cohesive Till' or 'Granular Till' in respect to their geotechnical assessment. However, a brief description of the geological units is presented below.

<u>Cohesive Till</u>

The cohesive layers of the Glacial Till are recorded as a soft to firm slightly to very sandy slightly gravelly Clay and a soft to firm greyish brown slightly sandy to sandy Silt. Typically, the sand is fine to coarse and the gravel is angular to subangular fine to coarse of sandstone. The silt layer is recorded as thinly laminated in BH101-BH101A and as a firm blackish brown organic Silt in WS101.

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These cohesive deposits were encountered in BH101-BH101A and WS102 whilst the silt deposits were encountered in BH101-BH101A, WS101 and HP101 to HP103.

The cohesive deposits of WS101 and WS102 were recorded interbedded between granular deposits, at 1.80-2.10m bgl and 2.30-3.00m bgl respectively. No cohesive deposits were recorded in the northern boreholes of WS03 and WS04 which were terminated at 5.45m bgl (69.32-69.62m AOD), indicating the top of the cohesive deposits deepen towards the northern area of the site.

The base of the cohesive deposits was recorded in BH101-BH101A at 38.00m bgl (37.37m AOD), with the borehole terminated in granular deposits at 42.00m bgl.

Granular Till

The Glacial Till granular deposits are encountered in all exploratory holes, excluding HP101 to HP103, from depths between 0.8m bgl to 3.45m bgl. It appears to be common near the surface based upon the window sampler borehole encounters. Generally, the deposits comprised a loose to medium dense, becoming dense, brownish grey slightly clayey fine to coarse Sand. In BH101-BH101A and WS104, the granular deposits encountered are a slightly gravelly fine to coarse Sand, with angular to subangular fine to medium gravel of sandstone.

BH101-BH101A recorded granular deposits from 3.45-11.00m bgl and 38.0-42.0m bgl, with the base of the superficial deposits not confirmed.

WS101 and WS102 in the southern area of the site recorded granular deposits underlying Made Ground at 1.30-1.80m and 0.80-2.30m bgl respectively. A cohesive band was found to be interbedded between the initial granular layer and a second granular layer which extended from 2.10m (WS101) and 2.30m bgl (WS102) to the base of the boreholes at 5.45m bgl.

WS103 and WS104 in the northern area of the site, recorded granular deposits directly underlying the Made Ground at 0.80m and 0.90m bgl respectively. These deposits extended to the end of the boreholes at 5.45m bgl, with no underlying cohesive deposits encountered before termination of these boreholes.

## 5.4 Bedrock Deposits

The Chester Formation bedrock was not encountered in any of the exploratory hole locations, with BH101A terminated at 42m bgl (33.37m AOD).

## 5.5 Observed Potential Contamination

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

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## 5.6 Obstructions Encountered

No obstructions were encountered.

## 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 |
| BH101-BH101A | 11.00 (64.37) | 10.70 (64.67) | Cohesive Till | 0.30m rise after 20 mins. Strike at boundary of Clay and Silt. |
| BH101-BH101A | 18.50 (56.87) | 18.20 (57.17) | Cohesive Till | 0.30m rise after 20 mins |

Six rounds of groundwater monitoring have been undertaken between 1st September and 5th October 2020, 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) | 01/09/20 | 08/09/20 | 17/09/20 | 24/09/20 | 01/10/20 | 05/10/20 |
|---|---|---|---|---|---|---|---|---|
| | | | Depth m bgl (m AOD) | Depth m bgl (m AOD) | Depth m bgl (m AOD) | Depth m bgl (m AOD) | Depth m bgl (m AOD) | Depth m bgl (m AOD) |
| BH101-BH101A | Cohesive Till | 11.00 – 13.80 (64.37 – 61.57) | 8.55 (66.82) | 8.54 (66.83) | 8.60 (66.77) | 8.65 (66.72) | 8.51 (66.86) | 8.49 (66.88) |
| WS101 | Interbedded Cohesive and Granular Till | 1.30 – 4.00 (74.03 – 71.33) | 1.73 (73.60) | 0.81 (74.52) | 1.42 (73.91) | 1.52 (73.81) | 1.10 (74.23) | 1.14 (74.19) |
| WS102 | Interbedded Cohesive and Granular Till | 0.80 – 4.10 (74.61 – 71.31) | 1.06 (74.35) | 0.89 (74.52) | 1.08 (74.33) | 1.07 (74.34) | 1.07 (74.34) | -* |
| WS103 | Granular Till | 0.80 – 3.50 (73.97 – 71.27) | 1.00 (73.77) | 0.74 (74.03) | 1.00 (73.77) | -* | 1.00 (73.77) | -* |

* Borehole inaccessible due to parked vehicle

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

- A groundwater table appears to be present within the granular till at shallow depths below the site in the order of 73 to 74 mAOD.

- Groundwater levels were also encountered at greater depths at BH101/BH101A (namely 66.72m to 66.88m AOD) also within the granular till and may represent a deeper groundwater level below the site which may be in hydrological connectivity with the shallower level.

It should be noted that the comments on groundwater conditions are based on observations made at the time of the investigation (August 2020) and are likely indicative of summer conditions and it is possible that variable groundwater levels are recorded in winter months.

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# 6.0 Ground Model

## 6.1 Made Ground

Made Ground was encountered in all exploratory holes.

The geotechnical test results recorded within the Made Ground are summarised in *Table 6.1.* No in-situ SPT or laboratory geotechnical testing has been undertaken on this stratum due to its unsuitable properties for use as a founding stratum.

***Table 6.1 –*** *Summary of geotechnical test results – Glacial Till*

| Parameter | No. of tests | Results |
|---|---|---|
| pH | 5 | Min: 6.56<br>Max: 7.59<br>Average: 7.22 |
| Water Soluble Sulphate (mg/l) | 5 | Min: 10<br>Max: 50 |

## 6.2 Glacial Till

The Made Ground is underlain by Glacial Till deposits and typically recorded as cohesive and granular strata which are described separately below.

### 6.2.1 Cohesive Glacial Till

The geotechnical test results recorded within the cohesive Glacial Till deposits are summarised in *Table 6.2.1.*

***Table 6.2.1 –*** *Summary of geotechnical test results – Cohesive Glacial Till*

| Parameter | | No. of Tests | Results |
|---|---|---|---|
| **In-Situ Tests** | | | |
| SPT 'N' Value [(2)] – Cohesive | | 13 | Min: 8<br>Max: 50<br>Average: 32.8 |
| **Laboratory Tests** | | | |
| Atterberg Test | Liquid Limit (%)[1] | 2 | 24 & 30 |
| | Plastic Limit (%)[1] | 2 | 17 & 17 |
| | Plasticity Index (%)[1] | 2 | 7 & 13 |
| | Modified Plasticity Index (%)[3] | 2 | 6.93 & 11.96 |
| Moisture Content (%) | | 4 | Min: 17<br>Max: 27<br>Average: 21 |
| pH | | 6 | Min: 7.09<br>Max: 8.38<br>Average: 7.74 |

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| Parameter | No. of Tests | Results |
|---|---|---|
| Water Soluble Sulphate (mg/l) | 6 | Min: 20<br>Max: 120<br>Average: 70 |
| Quick Undrained Multistage Triaxial – Cu (kPa) | 2 | Min: 19<br>Max: 70 |

(1) Excludes non-plastic test result
(2) Only includes SPTs tests in which full penetration was achieved.
(3) Modified plasticity index is the plasticity of components <425µm.

A total of two Atterberg Tests were undertaken in the cohesive material, these indicate low plasticity clays.

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

A moderately conservative unit weight of 18 kN/m$^3$ is deemed suitable for medium to high strength cohesive soils from a review of the published values (Ref. 10).

A moderately conservative Undrained Shear Strength, Cu, of cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 11) using Equation 1:

$$Cu = f_1 \times SPT\ N \qquad \textbf{Equation 1}$$

*Where:*

*Cu is the Undrained Shear Strength*

*$f_1$ is the Stroud Factor determined from Figure 1.5 (Ref. 12)*

*SPT N is Characteristic Standard Penetration Test Result*

Due to the small cohort of plasticity index data, an f1 value of 5.2 has been selected based upon literature, rather than through a correlation with plasticity index (CIRIA C504). Cu values ranging between 41.6 kPa and 260 kPa were determined. The estimated results indicate a variable strength from low strength clay to very high strength clay. The Undrained Multistage Triaxial testing reported a Cu value of 19 kPa and 70 kPa, indicating a low and medium strength clay, still suggesting an increase in strength with depth. Typically, the results indicate an increase in strength with an increase in depth, see *Figure 6.2.1c* and *Figure 6.2.1d*.

The Angle of Shearing Resistance, ϕ', for the cohesive Glacial Till has been derived from the correlation with Plasticity Indices (Ref. 13). A peak angle of drained shearing resistance of 31° is recommended based on this correlation taking into consideration the guidance from Gibson (1953) and Trenter (1999) regarding the variation in angle of friction with Plasticity Index for UK Glacial Tills.

The Drained and Undrained Young's Modulus, E' and Eu, can be derived for cohesive material from the relationship with SPT N values (Ref. 15), as presented in Equation 3 and Equation 4.

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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:

Eu = 330 x cu **Equation 2**

E' = 200 x cu **Equation 3**

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.

Moderately conservative Drained and Undrained Young's Modulus, E' and Eu, have been estimated using this correlation and are shown on *Figure 6.2.1g* and *Figure 6.2.1h*.

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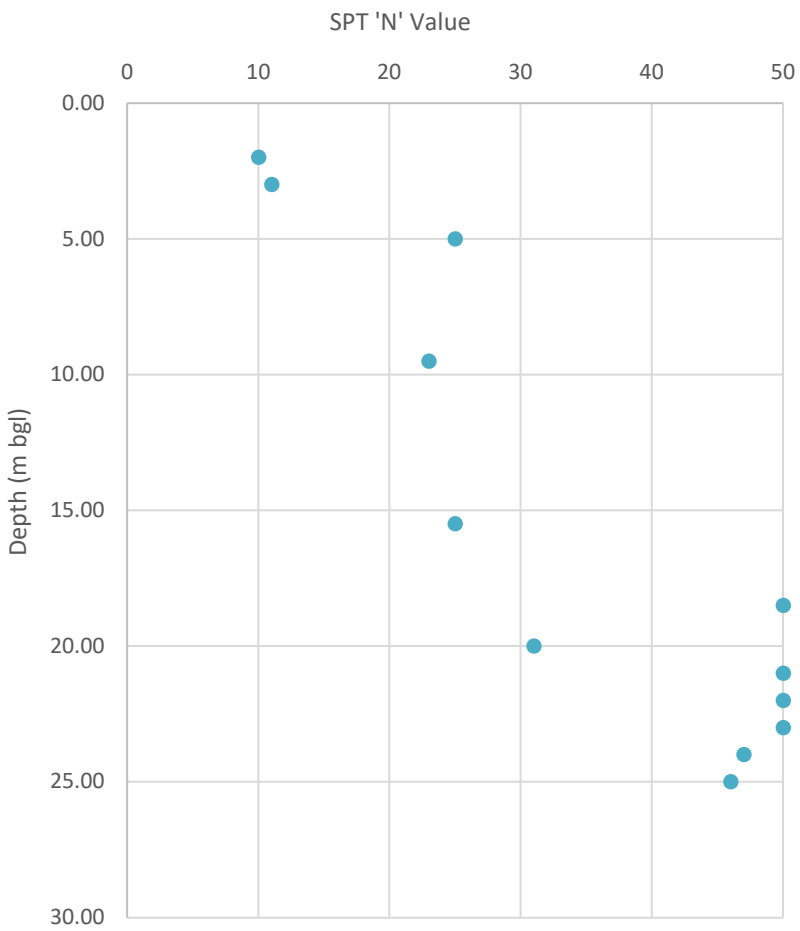


***Figure 6.2.1a –*** *Standard Penetration Test vs. Depth - Cohesive*

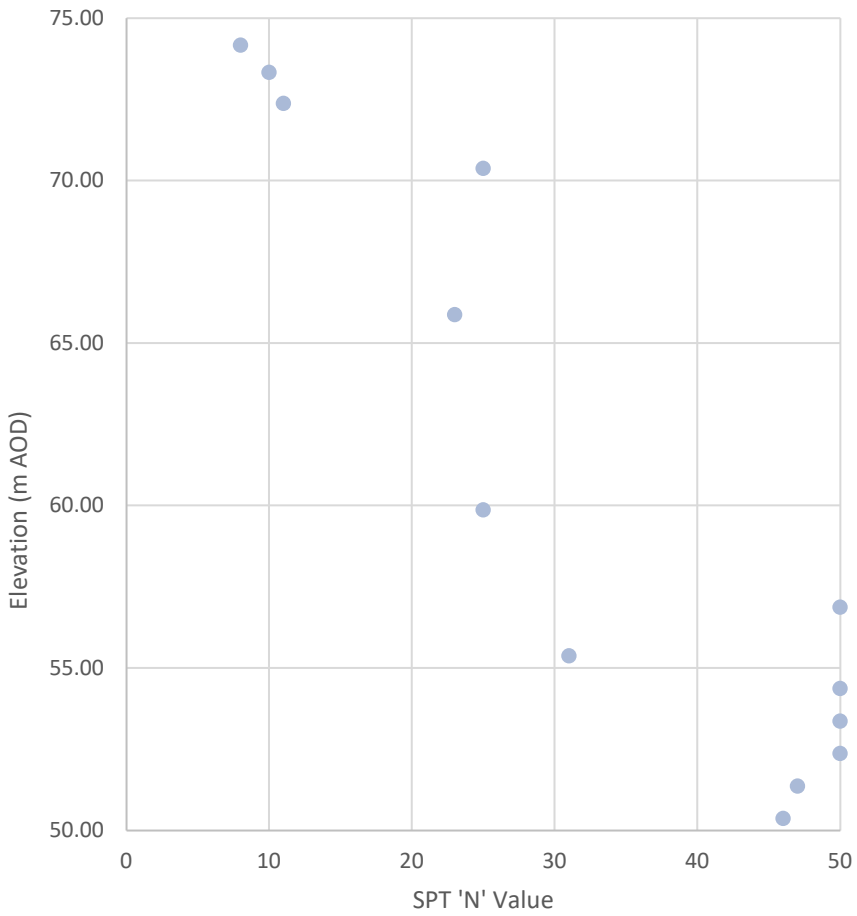


***Figure 6.2.1b –*** *Standard Penetration Test vs. Elevation - Cohesive*

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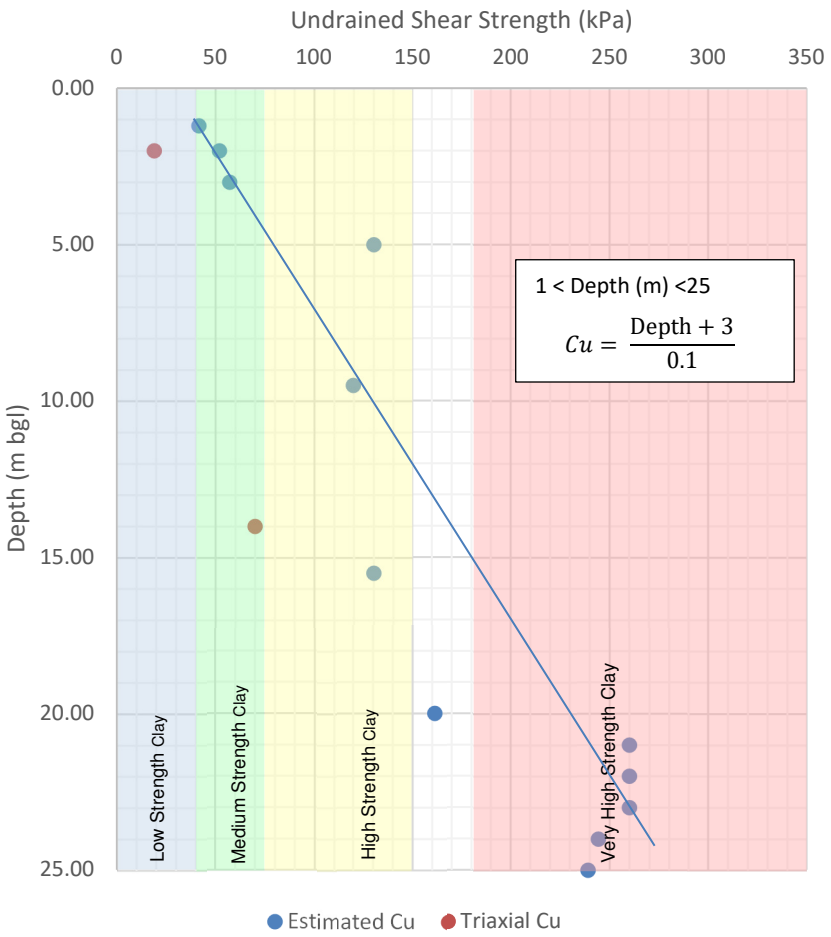


***Figure 6.2.1c** – Estimated Undrained Shear Strength vs Depth*

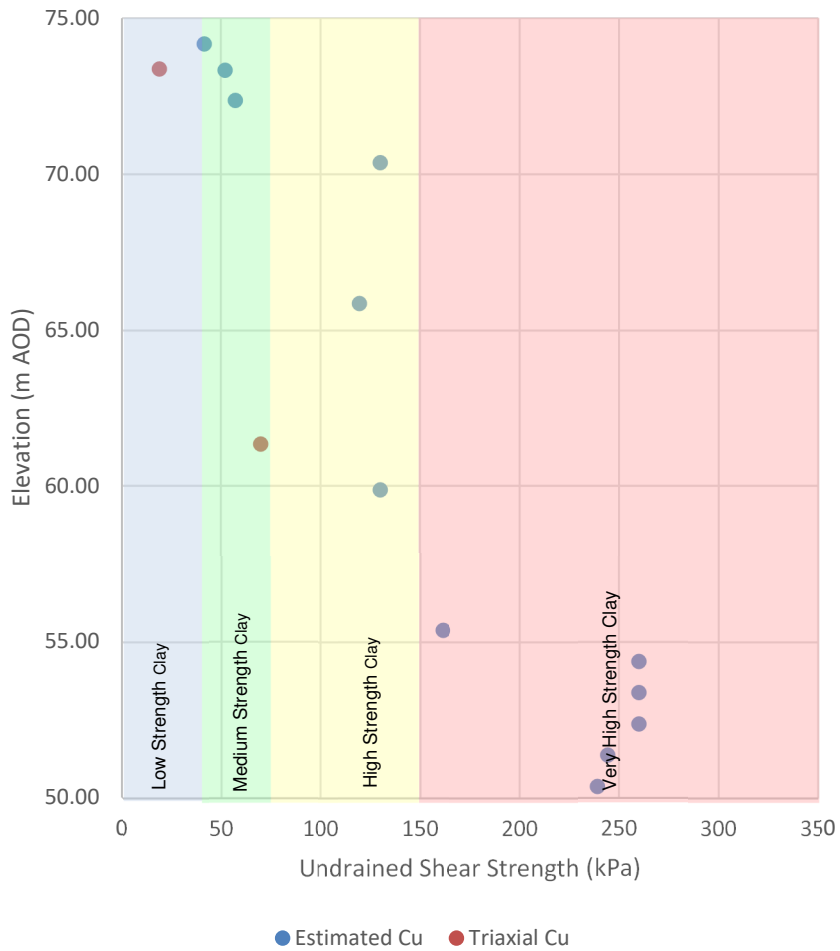


***Figure 6.2.1d** – Estimated Undrained Shear Strength vs Elevation*

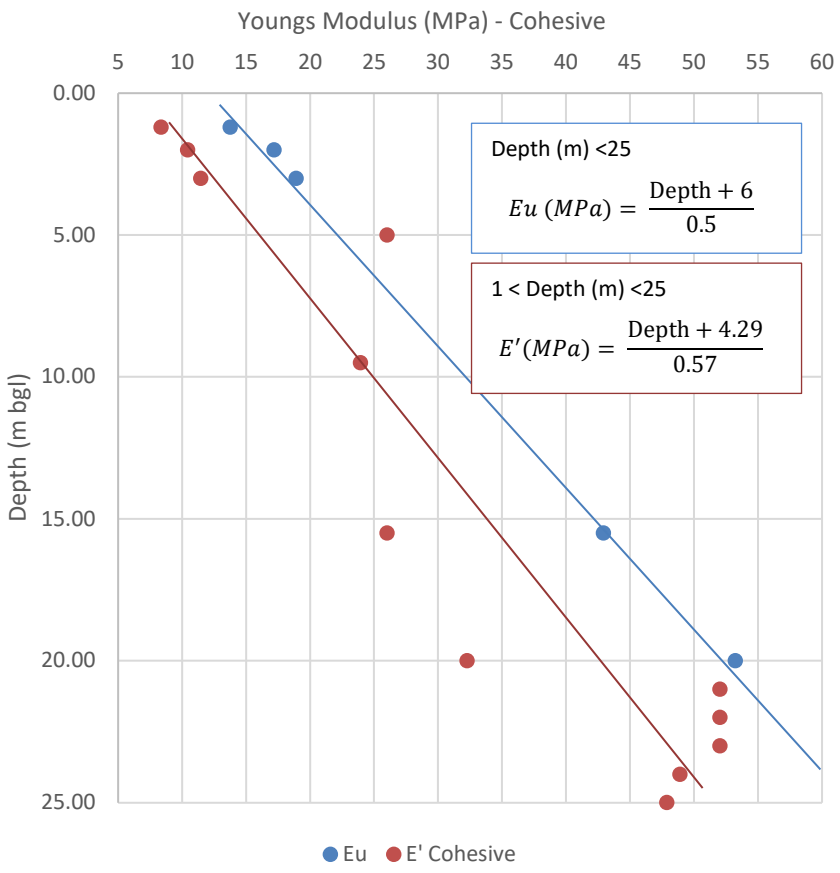


***Figure 6.2.1g** – Estimated Young's Modulus (Cohesive) vs Depth*

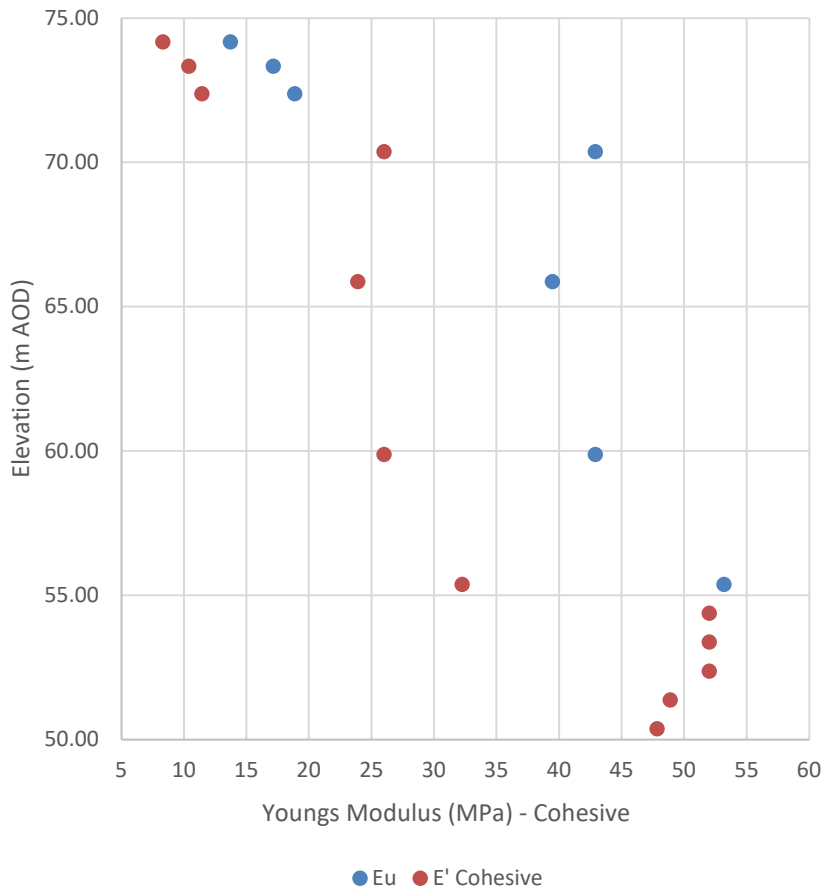


***Figure 6.2.1h** – Estimated Young's Modulus (Cohesive) vs Depth*

### 6.2.2 Granular Glacial Till Deposits

The geotechnical test results recorded within the Granular Glacial Till deposits are summarised in *Table 6.2.2.*

***Table 6.2.2** – Summary of geotechnical test results – Granular Glacial Till*

| Parameter | No. of Tests | Results |
|---|---|---|
| **In-Situ Tests** | | |
| SPT 'N' Value | 23 | Min: 2<br>Max: 50<br>Average: 20.4 |
| **Laboratory Tests** | | |
| pH | 3 | Min: 6.75<br>Max: 8.23<br>Average: 7.5 |
| Water Soluble Sulphate (mg/l) | 3 | Min: 10<br>Max: 50<br>Average: 23.3 |
| Particle Size Distribution | 6 | See *Appendix D* for Results |

Twenty-three SPT 'N' values were recorded in the granular strata, ranging between 20 and refusal at 50. The SPT 'N' results indicate a loose to very dense state of compaction across the site. The results are shown on *Figure 6.2.2a* and *Figure 6.2.2b,* indicating a general increase in 'N' value with increase in depth.

The PSD results carried out in the laboratory show variability in the material with 50/50 weight percentages of sand and clay detailed.

A moderately conservative unit weight of 18 kN/m$^3$ is deemed suitable for loose to dense granular soils above water and a unit weight of 20 kN/m$^3$ is deemed suitable for deposits below groundwater, from a review of published values (Ref. 10).

The Angle of Internal Friction, ϕ', for the granular Glacial Till has been derived from a review of relationships with SPT N values (Ref. 12 & 10) and published values. A value of 33° has been selected based on these graphs. The values are shown on *Figure 6.2.2c* and *Figure 6.2.2d.*

The Drained Young's Modulus, E', can be derived for granular material from the relationship with SPT N values (Ref. 16), as presented in Equation 5.

$$E' = (SPT\ N / 2) + 7.5 \qquad \textbf{Equation 5}$$

*Where:*

*E' is the Drained Youngs Modulus*

*SPT N is Characteristic Standard Penetration Test Result*

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The estimated drained Young's Modulus, E', for granular Glacial Till deposits from correlation with SPT N values (Ref. 16) are presented on *Figure 6.2.2e* and *Figure 6.2.2f*..

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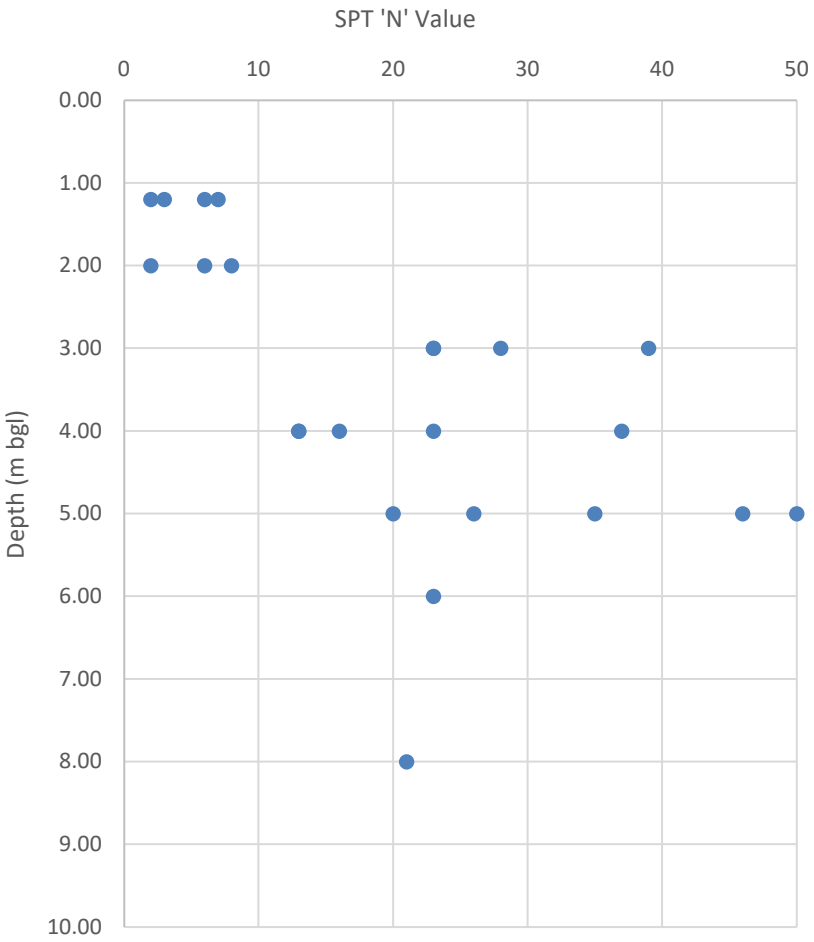


***Figure 6.2.2a –*** *Standard Penetration Test vs. Depth - Granular*

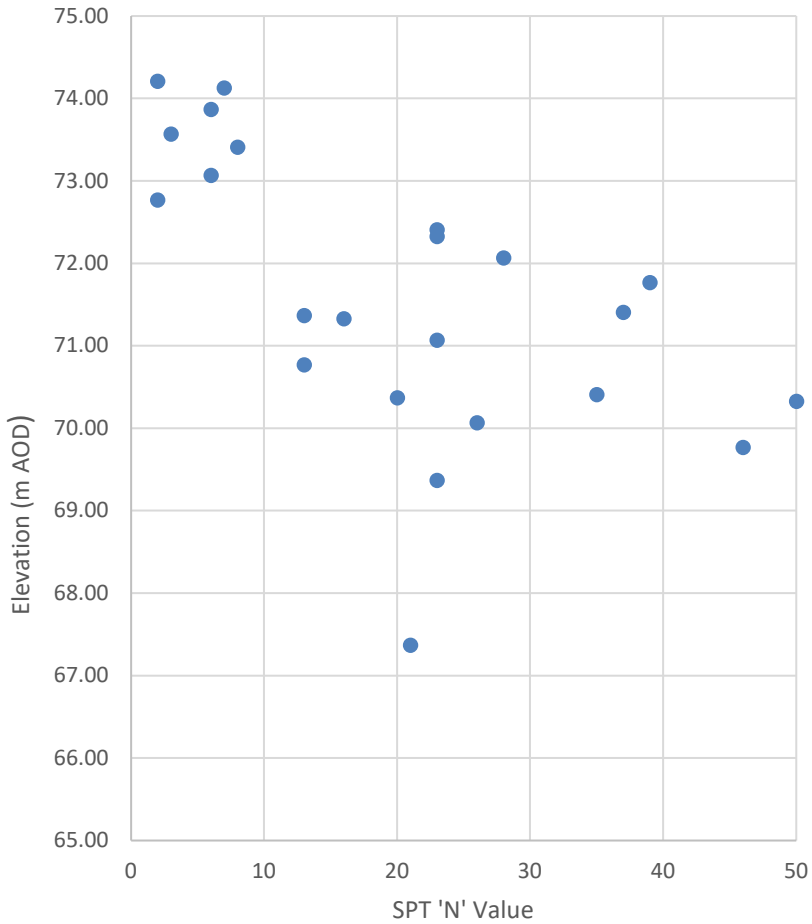


***Figure 6.2.2b –*** *Standard Penetration Test vs. Elevation - Granular*

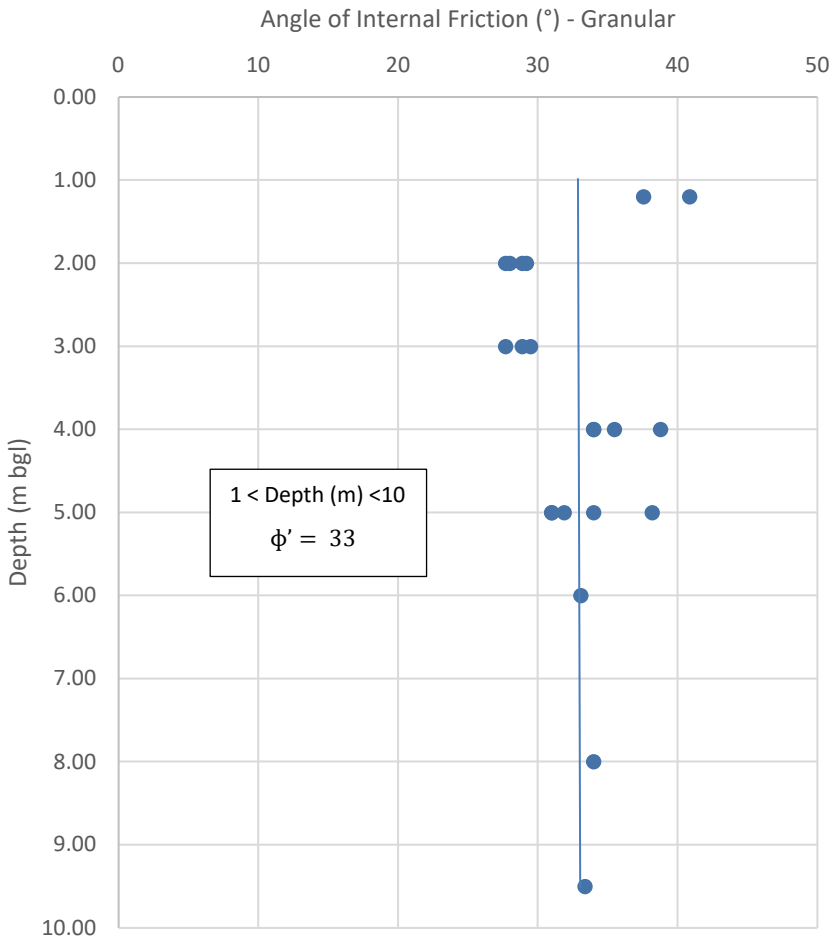


***Figure 6.2.2c –*** *Angle of Internal Friction (Granular) vs Depth*

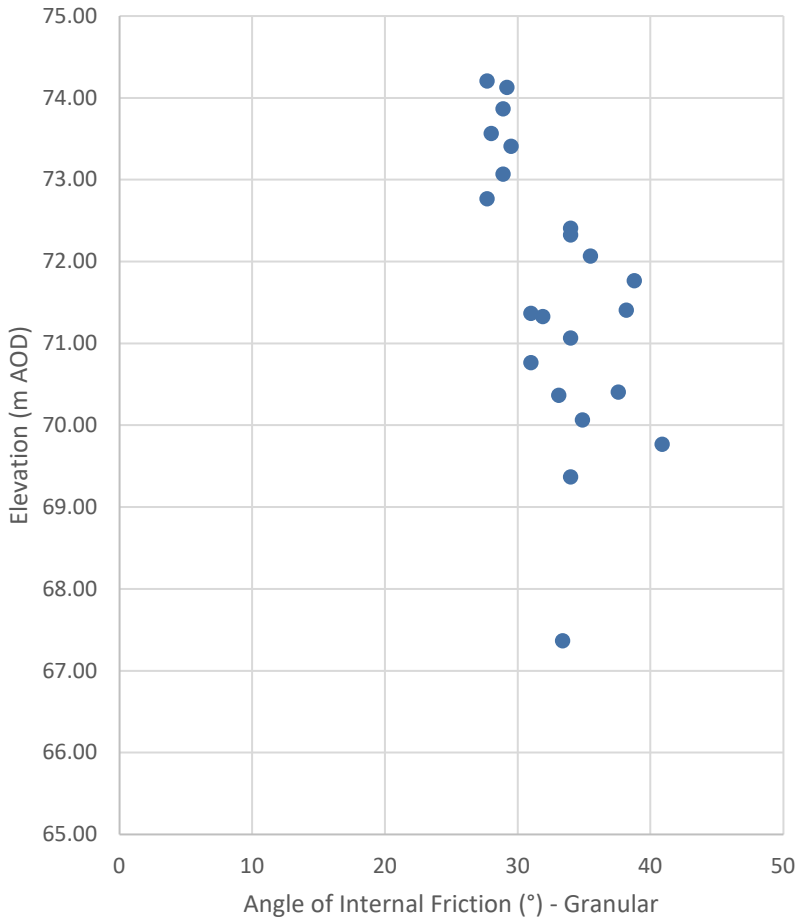


***Figure 6.2.2d –*** *Angle of Internal Friction (Granular) vs Elevation*

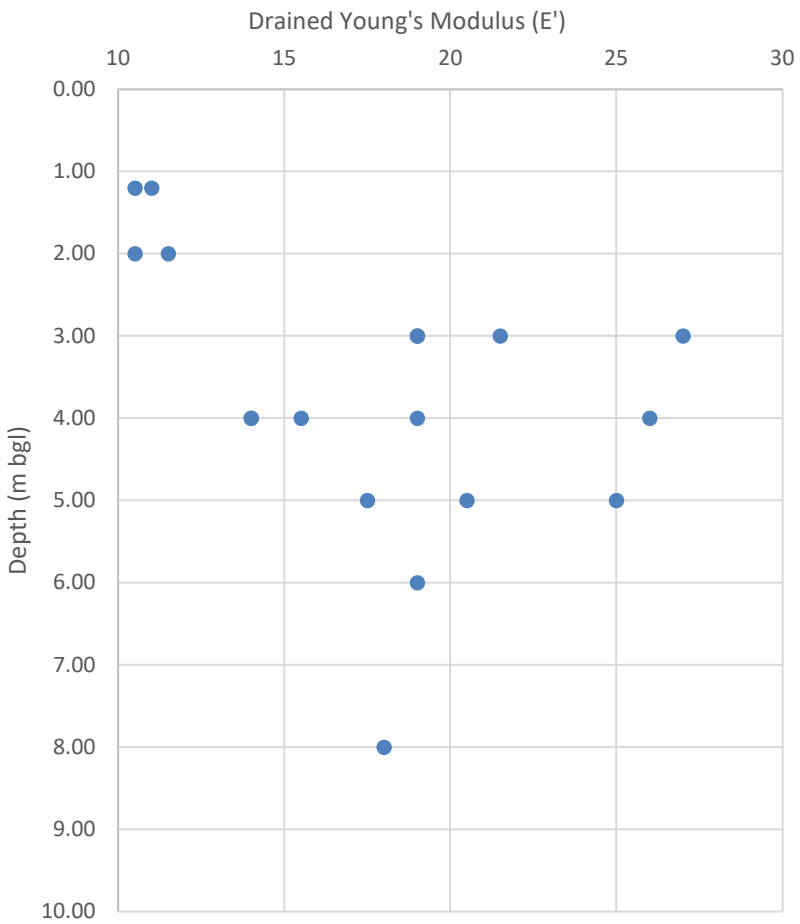


***Figure 6.2.2e** – Estimated Drained Young's Modulus (Granular) vs Depth*

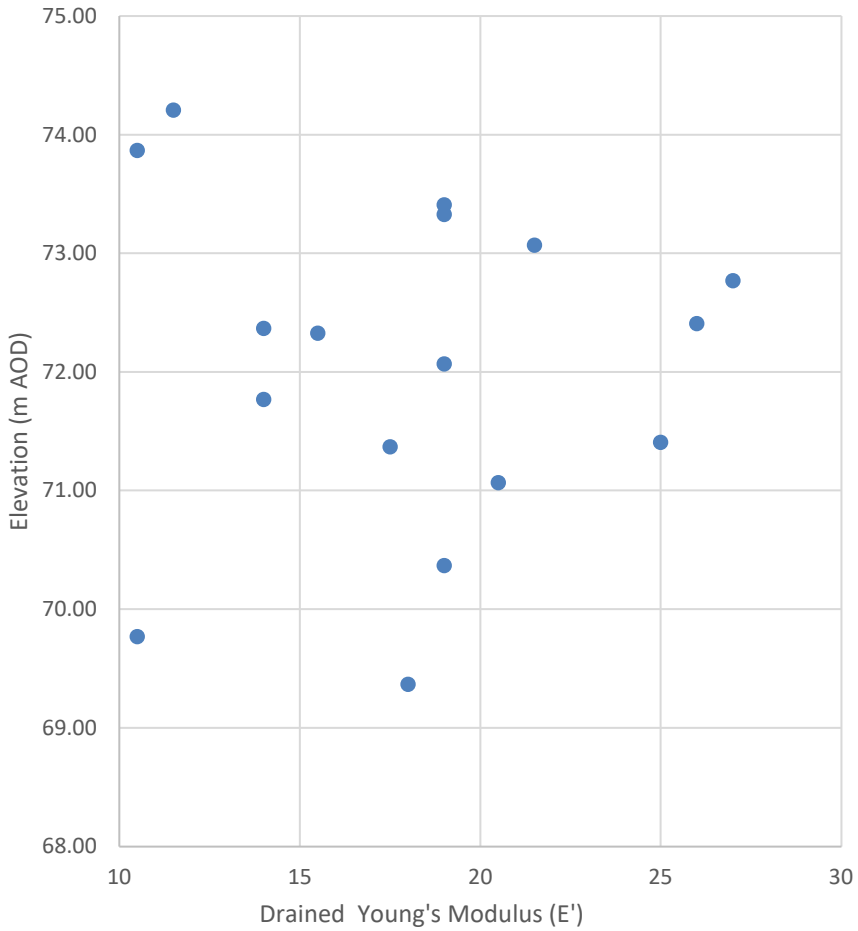


***Figure 6.2.2f** – Estimated Drained Young's Modulus (Granular) vs Elevation*

## 6.3 Ground Model – Geotechnical Parametric Analysis Summary

The estimated parameters derived for the ground conditions are summarised in *Table 6.3a.*

***Table 6.3a** – Material Properties*

| Strata | Parameter | Characteristic Value | Rationale | Reference |
|---|---|---|---|---|
| Cohesive Glacial Till | Unit Weight, γ (kN/m³) | 18 | Published Values | Ref. 10 (BS 8004, 2020) |
| | Undrained Shear Strength, Cu (kN/m²) | 1 < Depth (m) < 25 $Cu = \frac{\text{Depth} + 3}{0.1}$ | Geotechnical test results and correlation with SPT N values and Plasticity Index | Ref.11 (Stroud, 1975) |
| | Drained angle of shearing resistance, ϕ' (°) | 31 | Correlation with Plasticity Index | Ref.13 (Gibson, 1953) and Ref. 14 (Trenter 1999) |
| | Youngs Modulus, E' | 1 <Depth (m) <25 $E'(MPa) = \frac{\text{Depth} + 4.29}{0.57}$ | Correlation with SPT N values | Ref. 15 (ICE, 2012) |
| | Youngs Modulus, Eu | 1<Depth (m) <25 $Eu\ (MPa) = \frac{\text{Depth} + 6}{0.5}$ | Correlation with SPT N values | Ref. 15 (ICE, 2012) |
| Granular Glacial Till | Unit Weight, γ (kN/m³) | 20 | Published Values | Ref.10 (BS 8004, 2020) |
| | Drained angle of shearing resistance, ϕ' (°) | 33 | Correlation with SPT N Values | Ref.16 (Peck et al., 1975) |
| | Youngs Modulus, E' | Highly Variable | Correlation with SPT N Values | Ref. 15 (Yandizo, 1967) |

## 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. 17). 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 | 6.56 – 7.59 |
| | Water Soluble Sulphate (mg/l) | 10 - 50 |

| Stratum | Test Type | Range |
|---|---|---|
| Glacial Till | pH | 6.75 – 8.38 |
| | Water Soluble Sulphate (mg/l) | 10 - 120 |

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 according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-1 (AC-1) conditions assuming mobile groundwater.

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# 7.0 Ground and Groundwater Contamination Assessment

## 7.1 Human Health

The soil results will be screened against the 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. 18) 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 current use of the site is noted as a service yard associated with the Estates and Transport Department, with the proposed development a four storey modular building for use of temporary office accommodation. This land use is most analogous with a *Commercial* end-use scenario and so assessment has been undertaken against the following GACs, in order of preference:

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.

Atkins At Risk derived Commercial SSV thresholds have been supplemented for VOC and SVOC compounds where thresholds are not available in the GACs for listed above.

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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 soils ranged from 2.0% to 14.4%. The high organic content encountered in the soils is typically representative of the shallower Made Ground, however high SOM was noted in WS101 at 1.80m with a SOM of 6.6%.

With consideration for a calculated geometric average, soils from the Made Ground determine a SOM of 5.68% while deeper soils maintain a lower valuation of 5.05%. As such, a comparison against Generic Assessment Criteria (GAC) thresholds for a conservative SOM of 2.5% and 1.0% for *Commercial* end-use has been adopted for made ground and natural soil features respectively.

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 respect to the proposed *Commercial* end-use of the site, there are no exceedances noted within samples collected.

Concentrations of SVOCs and VOCs were recorded below thresholds where available with many determinands recorded below limits of detection. Concentrations of PCB's were recorded below the Environmental Agency Soil Guidance Values for dioxins, furans and dioxin-like PCBs in Soil.

All soil samples were screened for asbestos. No suspected asbestos containing materials (ACMs) were identified within any of the exploratory hole logs or laboratory screening.

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# 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. 19), BSI Publication code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings BS8485:2015 (Ref. 20) and other broadly accepted references such as the Ground Gas Handbook 2009 (Ref. 21).

The 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 Risk Assessment (desk study) (Ref. 1) 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 three of the window sample boreholes (WS101 to WS103) and the cable percussive/rotary borehole as detailed in *Section 3.2*.

An initial programme of six gas monitoring visits over six weeks was proposed. Six gas monitoring visits have been undertaken between 1st September and 5th October 2020, with barometric pressure recorded between 983 and 1025mb. Falling barometric pressure was recorded on the first (01/09), third (17/09) and fourth (24/09) and sixth (24/09) visits, steady on the second (08/09) and fifth (01/10) visits and rising on the sixth (05/10) visit.

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) |
|---|---|---|---|---|---|
| BH101-BH101A | <0.0 | 0.8 | 18.5 | -7.2 | -0.1 |
| WS101 | <0.0 | 0.1 | 20.3 | 13.8 | 2.2 |
| WS102 | <0.0 | 0.3 | 19.4 | 0.0 | 0.0 |
| WS103 | <0.0 | <0.1 | 20.6 | 0.0 | 0.0 |

Methane ($CH_4$) was recorded below the instrument's detection limit within all the monitoring wells.

Hydrogen Sulphide ($H_2S$) was recorded in all monitoring wells, a maximum concentration was recorded as 5ppm in BH101-BH101A on the first visit. Carbon Monoxide (CO) was recorded in all monitoring wells, a maximum concentration was recorded at 7ppm in BH101-BH101A on the first visit.

Maximum carbon dioxide ($CO_2$) concentrations were recorded at 0.8% in BH101-BH101A on the sixth monitoring visit. Gas flow was recorded at a maximum peak flow rate of 13.8 l/hr and a maximum steady state flow rate of 2.2l/hr in WS101 on the sixth visit.

## 8.2 Ground Gas Assessment

The Conceptual Site Model presented in *Section 2.7* highlighted the Made Ground as a potential source of ground gas generation. The report suggests no records of organic rich drift deposits (e.g. peat) being present however, or historic or active landfills within close proximity to the site, however there is filled land within 250m of the site, the closest 35m south of the site in relation to the infill of a small pond. 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**/**Low** Risk.

Made Ground soils were encountered to a maximum depth of 1.30m bgl. The ground investigation revealed ground model generally consistent with the preliminary conceptual site model. The natural deposits encountered were exclusively Glacial Till.

In accordance with BS8485:2015 (Ref. 20) 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. For a 'representative' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) steady state flow rates and maximum gas concentrations are adopted, whilst for a 'worst case' scenario (highest $Q_{hg}$ across the entire dataset irrespective of location and discrete monitoring events) peak flows and gas concentrations are adopted.

Evaluation of the 'representative' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) records a maximum $Q_{hg}$ of 0.0022 l/hr for carbon dioxide where maximum steady state readings were used. Methane was recorded below the limit of detection.

Evaluation of the 'worst case' scenario (highest $Q_{hg}$ across the entire dataset irrespective of location and discrete monitoring events) records a maximum $Q_{hg}$ of 0.011 l/hr for carbon dioxide maximum steady state readings were used. Methane was recorded below the limit of detection.

Given the completed data set from across the site, with ground gas monitoring completed on six occasions over a period of six weeks and varying atmospheric conditions, the 'representative' $Q_{hg}$ scenario is deemed representative and has been adopted as the sites GSVs. The hazardous gas flow rates for both carbon dioxide and methane indicates a CS1 classification on site.

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.

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# 9.0 Revised Conceptual Site Model

The Preliminary Conceptual Site Model (PCSM) presented *Section 2.7* and discussed in *Section 2.0* 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. 22) 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 Unexploded Ordnance is discussed and assessed in *Section 2.5*.

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. 23) 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*.

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Qualitative Risk Assessment → Generic Quantitative Risk Assessment → Detailed 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** | | |
| No potential sources of contamination identified. | Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation (indoor & outdoor air) | **Commercial end users** | **Medium**<br>Human Health Risk | **Unlikely** | **Low** | No exceedances in the Made Ground and natural when compared to Commercial end-use thresholds.<br><br>No exceedances identified within SVOC, VOC or speciated PCB test results.<br><br>No suspected asbestos containing materials (ACMs) were identified within any of the exploratory hole logs or laboratory screening. | No further action required. |
| | | **Construction and maintenance workers** | | | | | |
| | Soil dust ingestion/inhalation produced during construction | **Adjacent residents** | | | | | |
| | Vertical and horizontal migration of soluble phase contamination through groundwater. | **Controlled Waters**<br>(Surface Water)<br><br>Nearest surface water feature is River Irk 464m east | **Mild** | **Unlikely** | **Very Low** | No evidence of free product or gross contamination was evident during the ground investigation.<br><br>Significant distance for contamination to migrate to reach the River Irk. | No further action required. |
| | Vertical and horizontal migration of soluble phase contamination through superficial deposits and bedrock. | **Controlled Waters**<br>(Groundwater)<br><br>Secondary Undifferentiated Aquifer (Superficial)<br><br>Principal Aquifer (Bedrock) | **Medium** | **Unlikely** | **Low** | No evidence of free product or gross contamination was evident during the ground investigation.<br><br>Not within a Source Protection Zone (SPZ).<br><br>Considering the low permeability of the underlying ground conditions (Glacial Till) this SPR linkage likelihood is considered unlikely. | |
| Potential ground gas generation from Made Ground containing organic/putrescible content on site and off site. | Ground gas & vapour migration and inhalation. Vertical and horizontal migration through existing service corridors and the underlying superficial deposits. | **Site End Users** | **Medium**<br>Human Health Risk | **Unlikely** | **Low** | Using the 'borehole $Q_{hg}$/ 'representative' scenario, due to a full data set within varying pressures, the calculated $Q_{hg}$ for the site was -0.036 l/hr for carbon dioxide. Methane was recorded below the limit of detection.<br><br>Characteristic Gas Situation is assessed as CS1 no gas protection measures are required in accordance with BS8485. | No further action required. |

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## 9.1 Summary of Significant Pollutant Linkages

A **Low** risk rating is identified to site end-users and construction workers, from soils and dust from inhalation and ingestion. No further action is required.

A **Low** and **Very Low** risk rating is identified to controlled waters (Groundwater and Surface Waters) following the ground investigation, where no major sources of contamination were identified and limited pathways due to low permeability superficial deposits and the significant distance to nearest surface water feature.

A **Low** risk rating is identified to site end users from ground gases arising from Made Ground and natural soils migrating into buildings and subsequent inhalation by on-site employees. This corresponds to a Characteristic Gas Situation assessed as CS1, therefore no gas protection measures are required.

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# 10.0 Geotechnical Assessment and Recommendations

## 10.1 Introduction

This section will discuss the ground and groundwater conditions encountered across the site and assess their associated risks for the proposed scope of the works. The proposed development is included in *Appendix A* and comprises an offsite manufactured four storey modular building for use of temporary office accommodation. A Finished Floor Level of approximately 75.3m AOD is proposed.

It must be noted that at the time of writing this report, the structural details and loadings have not been provided. As such, any changes in the development of designs beyond the issue of this Ground Investigation Report to the client, should be further investigated by the Construction Designer.

## 10.2 Geotechnical Considerations

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).

Variable Made Ground

Made Ground was encountered in all of the exploratory hole locations from ground level to depths of between 0.80m and 1.30m bgl across the site. The Made Ground should not be considered as a suitable founding stratum.

Presence of low strength natural deposits

Low strength deposits of cohesive till and very loose deposits of granular till were encountered during intrusive investigation works to depths of approximately 3m below current ground level (approx. 71m AOD).

Based on the proposed development engineering levels and likely loadings it is unlikely the near surface deposits of till would be considered a suitable foundation stratum without ground improvement. This is described in Foundations Options section below.

Foundation Options

Based on the ground and groundwater conditions encountered in the exploratory holes, it is considered that it will not currently be possible to support the proposed development on conventional spread foundations as such foundations would need to be taken down below any Made Ground and weak superficial soils and be placed in the medium dense till deposits which were encountered at depths of

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at least 3.00m below existing ground level in the exploratory holes (71m AOD). Excavations would also have to be carried out through the shallow groundwater below the site present at depths of between 73 to 74 mAOD which would further reduce any allowable bearing capacity for these soils (Meyerhof (1956) and Craig (2004).

Therefore it is recommended at this stage that consideration be given to the following options:

- Improvement of bearing capacity of the ground by ground improvement using vibro compaction / replacement techniques prior to foundation construction. Following ground improvement adopt ground bearing floor slabs and shallow foundations.
- Excavate near surface soils and replace with a structural fill (6N/6P) and found structure on a raft foundation. This will require design by a competent structural engineer will require a full geotechnical analysis and further testing to analyse the potential for total and differential settlements across the structure. Groundwater management may be required for excavations for a raft foundation and if internal column loads are locally high this option is likely to be unfavourable;
- Excavate and remove buried foundations, structures and obstructions. Support building structures on piled foundations.

In view of the above, and subject to confirmation of building loads, piled foundations may be considered the best option to take the load of the structure to suitable bearing soils at depth. In these ground conditions, it is considered that some form of bored and in-situ cast concrete piled foundation with reinforced concrete ground beams should prove satisfactory.

It is considered likely that bored/Continuous Flight Auger (CFA) piles would be the most suitable piling technique for this site. This suggestion does not however preclude the consideration of other pile types being used.

It is important to note that the specific pile design will depend on a number of factors including the particular details of the piling system to be adopted. The advice of a specialist piling contractor should be sought such that the final design of the piles can be undertaken and the suitability of the particular piling system can be considered. All information relating to the site should be provided to the piling contractor including historical drawings.

## 10.3 Ground Floor Slabs

No ground floor slabs are proposed for the proposed temporary office accommodation development.

## 10.4 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest 1 (Ref. 17) and laboratory testing undertaken accordingly in *Section 7.0*. Based on the laboratory test results it is considered that a Design

Sulphate Class may be taken as DS-1 with an ACEC class of AC-1 for both the Made Ground and the Glacial Till.

## 10.5 Excavation and Support

Observations during the intrusive works and subsequent monitoring indicate that a shallow groundwater table is present below the site at levels of between 73 to 74 mAOD, close to the proposed FLL of 75.30m AOD. Groundwater is therefore considered likely to be encountered during shallow excavations below the site and any excavations for foundations and services are likely to require close side support in the short term.

The chosen contractor should provide details on how they intend to ensure the safety and stability of proposed excavations.

In accordance with Health and Safety Regulations, side support for safety purposes should be provided to all excavations which appear unstable and those more than 1.20m deep. Excavations shallower than 1.20m deep, requiring personnel access, will require closed side support.

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# 11.0 Geo-environmental Conclusions & Recommendations

## 11.1 Conclusions

### 11.1.1 Ground and Groundwater Contamination

The environmental chemistry soil results have been compared with the Generic Assessment Criteria (GAC) for soils with respect to human health against '*Commercial'* thresholds.

With respect to the proposed end-use of the site no exceedances have been noted with respect to the GAC thresholds. No suspected asbestos containing materials (ACMs) were identified within any of the exploratory hole logs or during laboratory screening.

A **Low** risk rating is identified to site end-users and construction workers, from soils during inhalation and ingestion of soil or dust.

A **Low** risk rating is identified to controlled waters (Groundwater and Surface Waters) following the ground investigation, where no major sources of contamination were identified and limited pathways due to low permeability superficial deposits and the significant distance to nearest surface water feature.

During the ground gas monitoring programme methane (CH4) was recorded below the instrument's detection limit within all the monitoring wells.

Maximum carbon dioxide (CO2) concentrations were recorded at 0.6% in BH101-BH101A on the first monitoring visit. Gas flow was recorded at a maximum peak flow rate of -7.2 l/hr in BH101-BH101A on the second visit.

A Gas Screening Value of -0.036 l/hr for carbon dioxide was calculated. The site was classified as CS1.

A **Low** risk rating is identified to site end users from ground gases arising from Made Ground and natural soils migrating into buildings and subsequent inhalation by on-site employees. This corresponds to a Characteristic Gas Situation assessed as CS1, therefore no gas protection measures are required.

## 11.2 Recommendations

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

1) It is recommended that specialist piling contractors are to be consulted to establish suitable pile design.

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2) 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.

3) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer.

# 12.0 References

1. Curtins (2020) *Phase 1 Preliminary Risk Assessment, Decant Village, NMGH*, Ref. 075805-CUR-00-XX-RP-GE-001-V02 dated August 2020.
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18. Department of Environment Food and Rural Affairs (DEFRA). (2012) Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (report no. PB13735).
19. CIRIA (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings (report no. C665).
20. British Standards Institution (2015) Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (report no.BS8485:2015 +A1:2019).
21. S Wilson, G Card, S Haines (2009) Ground Gas Handbook Cathness, Scotland, Whittles Publishing.
22. CIRIA (2001) Contaminated Land Risk Assessment. A guide to good practice (report no. C552).
23. CITB (2015) Construction (Design and Management) Regulations.

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# Appendix A – Drawings

- Curtins (August 2020), *Exploratory Hole Location Plan for NMGH Site Plt 2 (Decant Village)*, ref. 075805-CUR-00-XX-DR-GE-80004-V01
- Development Plans:
    - 6512-SRA-E1-00-DR-A-20200-P02
    - 6512-SRA-E1-XX-DR-A-00004-P02

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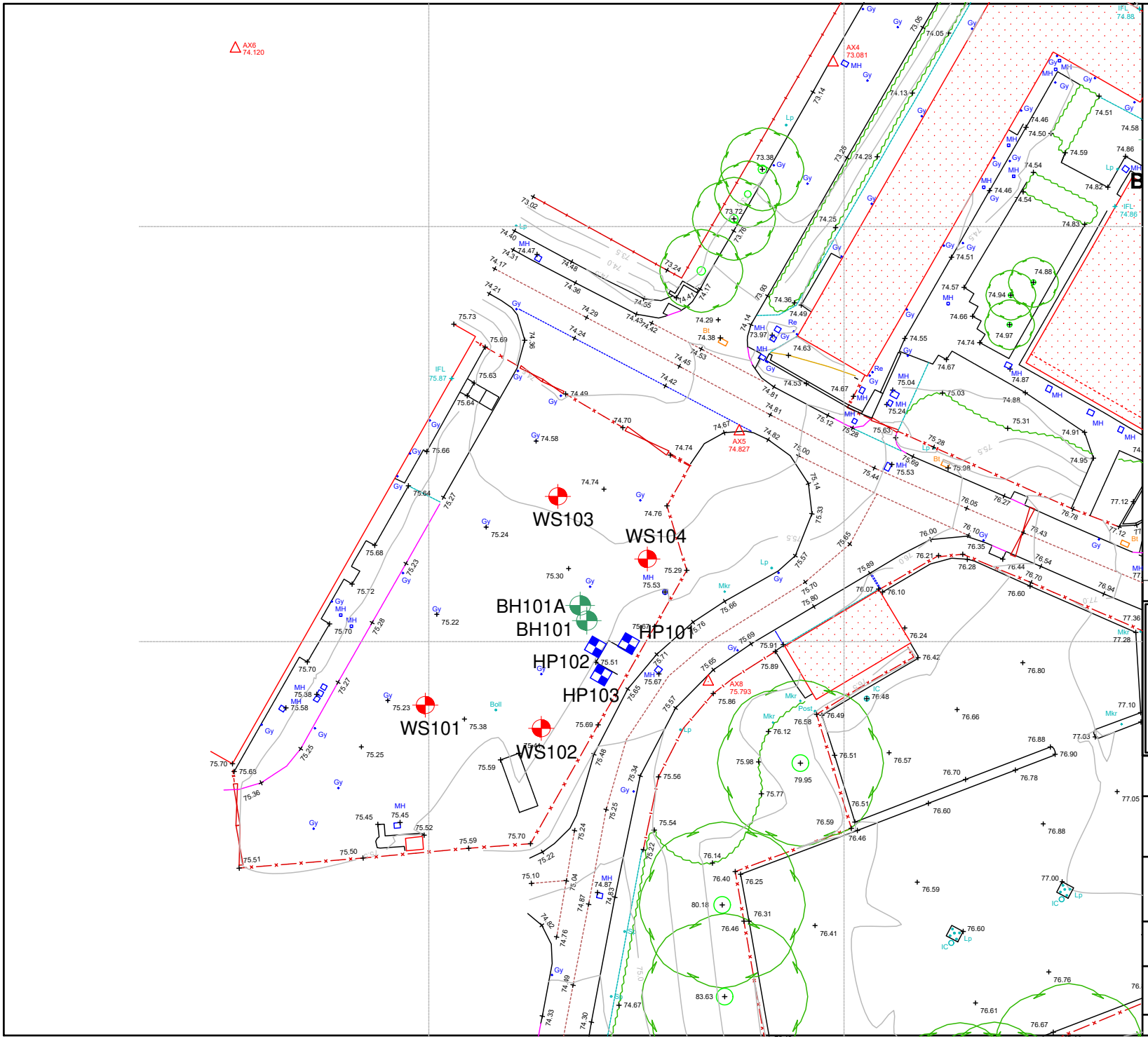


CABLE PERCUSSIVE BOREHOLE LOCATION

WINDOW SAMPLE BOREHOLE LOCATION

HAND EXCAVATED FOUNDATION PIT LOCATION

| Rev: | Description: | Date: | By: | Chkd: |
|---|---|---|---|---|


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Status:

INFORMATION

Project:

**NMGH SITE PLT 2 (DECANT VILLAGE)**

Drg Title:

**EXPLORATORY HOLE LOCATION PLAN**

| Scale: | Size: | First Issue: | Drawn: | Checked: |
|---|---|---|---|---|
| NTS | A3 | 28/08/2020 | ZH | ZH |

| Drg No: | Rev: |
|---|---|
| 075805-CUR-00-XX-DR-GE-80004 | P01 |

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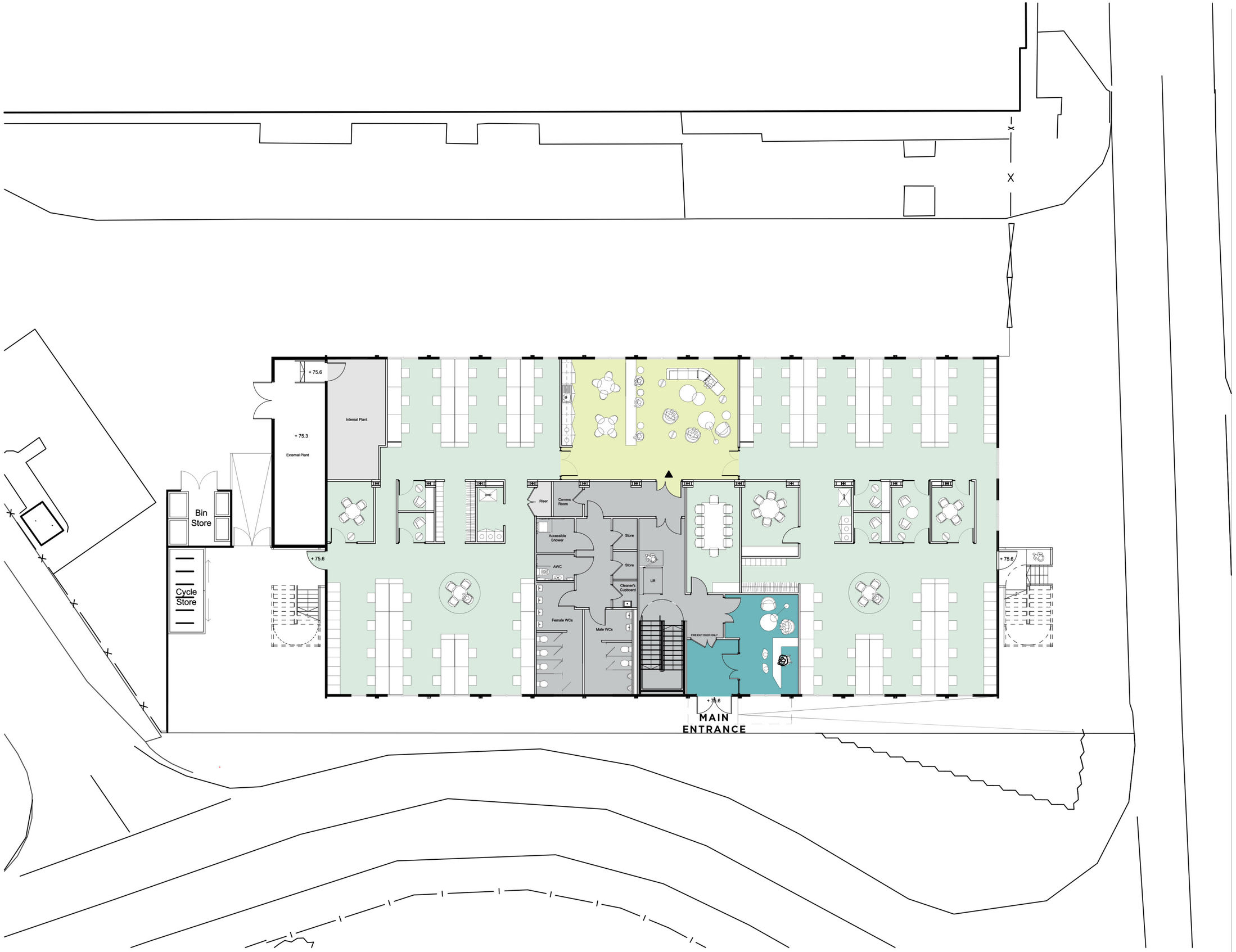


# Ground Floor Plan
1:200

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All levels subject to further coordination with Curtins and Modular Contractor

## Key:

- Core
- Office
- Teapoint/Social
- Reception
- Plant

| REV. | DATE | AMENDMENT |
|---|---|---|
| P01 | 03/08/20 | FIRST ISSUE |
| P02 | 11/09/20 | General Update, building moved 2m towards east boundary |

KEYPLAN

CLIENT

NHS
Manchester University
NHS Foundation Trust

bruntwood

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PROJECT
6512 North Manchester General Hospital Masterplan

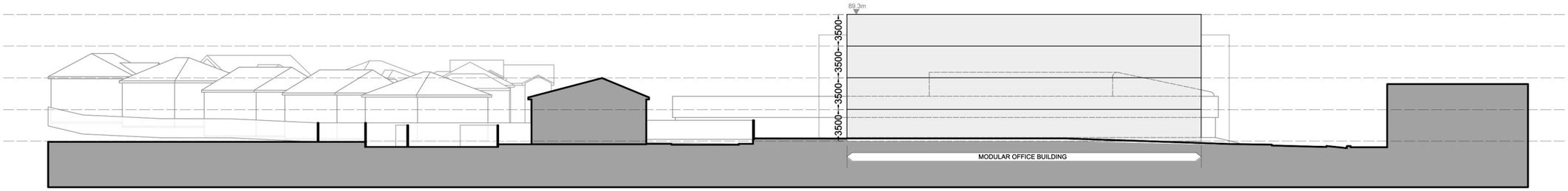
| SCALE@A3 | DATE | ORIGINATOR | CHECKED | AUTHORISED |
|---|---|---|---|---|
| 1:200 | 01/08/20 | SS | DB | AS |

General Arrangement
Ground Floor Plan

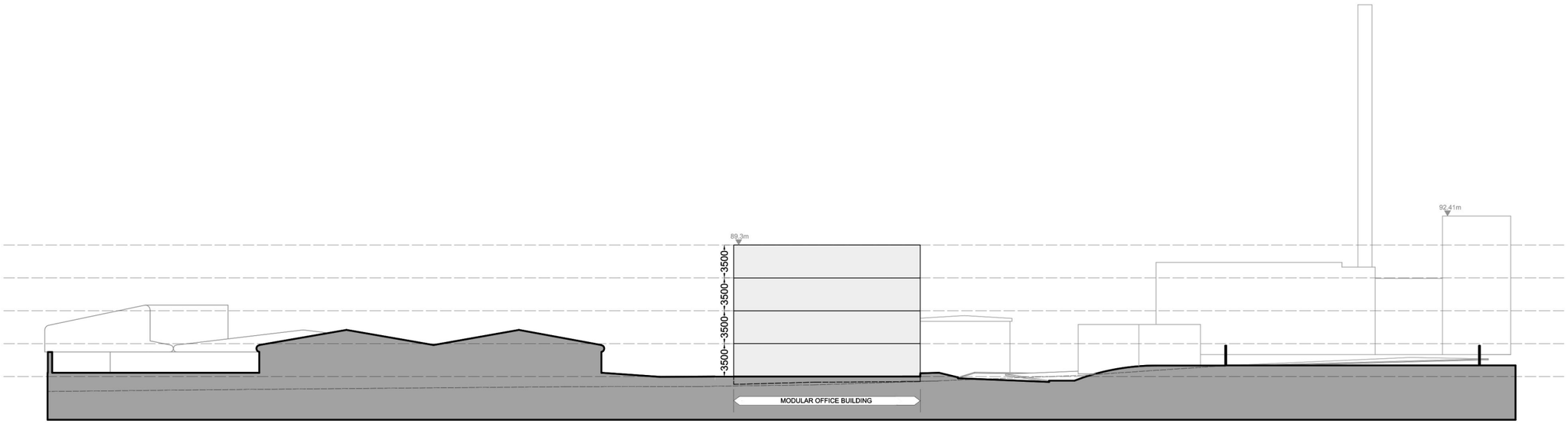
Stage 2

| STATUS | PURPOSE FOR ISSUE | SR NO. |
|---|---|---|
| S2 | For Information | 6512 |

| DRAWING NO. | REV. |
|---|---|
| 6512 - SRA - E1 - 00 - DR - A - 20200 | P02 |




## Site Section A-A
1:500




## Site Section B-B
1:500

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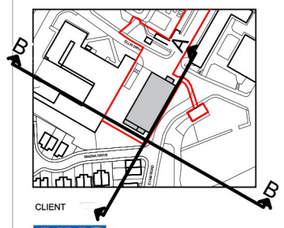
| REV. | DATE | AMENDMENT |
|---|---|---|
| P01 | 05/08/20 | FIRST ISSUE |
| P02 | 11/09/20 | Modular building moved 2m closer to the east boundary |

KEYPLAN

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6512 North Manchester General Hospital Masterplan

| SCALE@A3 | DATE | ORIGINATOR | CHECKED | AUTHORISED |
|---|---|---|---|---|
| 1:500 | 01/08/20 | SS | DB | AS |

Site Sections

Stage 2

| STATUS | PURPOSE FOR ISSUE | SR NO. |
|---|---|---|
| S2 | For Information | 6512 |

| DRAWING NO. | REV. |
|---|---|
| 6512 - SRA - E1 - XX - DR - A - 00004 | P02 |

# Appendix B – Exploratory Hole Logs

- Cable Percussive Borehole with Rotary Open-hole Follow-on Log
- Window Sample Borehole Logs
- Foundation Pit Logs

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# Borehole Log

Borehole No. **BH01**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384918.48 - 402256.61 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 73.31 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 20/08/2020 - 21/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0.15 | 73.16 | | MADE GROUND: Black tarmacadam. | |
| | | 0.30 - 1.20 | B | | 0.30 | 73.01 | | MADE GROUND: Reddish brown tiling over dark grey gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of tarmac, brick and tile. | |
| | | 0.50 - 0.60 | ES | | 0.40 | 72.91 | | MADE GROUND: Concrete. | |
| | | 1.20 | | N=10 (1,2/3,3,2,2) | | | | MADE GROUND: Brownish grey gravelly fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick. Cobbles are subangular of brick. | 1 |
| | | 1.20 - 1.60 | B | | 1.50 | 71.81 | | Medium dense brown slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium of sandstone. | |
| | | 2.00 | | N=5 (1,/1,1,1,2) | | | | *From 1.50 to 2.00m loose.* | 2 |
| | | 2.00 - 2.45 | B | | | | | | |
| | | 2.50 - 2.60 | ES | | | | | | |
| | | 3.00 | | N=26 (3,3/4,5,8,9) | | | | *From 3.00 to 3.50m dense.* | 3 |
| | | 3.00 - 3.45 | B | | | | | | |
| | | 3.00 - 3.45 | D | | | | | | |
| | | 4.00 | | N=22 (5,6/5,5,6,6) | | | | | 4 |
| | | 4.00 - 4.45 | B | | | | | | |
| | | 4.00 - 4.45 | D | | | | | | |
| | | 5.00 | | N=19 (4,4/4,5,5,5) | | | | | 5 |
| | | 5.00 - 5.45 | B | | | | | | |
| | | 5.00 - 5.45 | D | | | | | | |
| | | 6.00 | | N=11 (2,2/3,3,2,3) | | | | | 6 |
| | | 6.00 - 6.45 | B | | | | | | |
| | | 6.00 - 6.45 | D | | | | | | |
| | | 7.00 | D | | | | | | 7 |
| | | 7.50 | | N=14 (1,1/2,3,3,6) | | | | | |
| | | 7.50 - 7.95 | B | | | | | | |
| | | 7.50 - 7.95 | D | | | | | | 8 |
| | | 8.50 | D | | | | | | |
| | | 9.00 | | N=13 (2,2/3,3,4,3) | | | | | 9 |
| | | 9.00 - 9.45 | B | | | | | | |
| | | 9.00 - 9.45 | D | | | | | | |
| | | 10.00 | D | | | | | | 10 |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 16.50m.

# Borehole Log

Borehole No. **BH01**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384918.48 - 402256.61 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 73.31 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 20/08/2020 - 21/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10.50 | | N=4 (3,3/1,1,1,1) | | | | *From 10.50 to 13.50m loose.* | |
| | | 10.50 - 10.95 | B | | | | | | |
| | | 10.50 - 10.95 | D | | | | | | 11 |
| | | 11.50 | D | | | | | | |
| | | 12.00 | | N=5 (1,/1,1,1,2) | | | | | 12 |
| | | 12.00 - 12.45 | B | | | | | | |
| | | 13.00 | D | | | | | | 13 |
| | | 13.50 | | N=15 (1,1/3,3,3,6) | | | | | |
| | | 13.50 - 13.95 | B | | 13.70 | 59.61 | | Very stiff greyish brown slightly sandy slightly gravelly CLAY frequently interbedded with thin to thick bands of fine to coarse sand. Gravel is angular to subangular fine to medium of sandstone. | |
| | | 13.50 - 13.95 | D | | | | | | 14 |
| | | 14.50 | D | | | | | | |
| | | 15.00 - 15.45 | U | Ublow=120 | | | | | 15 |
| | | 15.50 | D | | | | | | |
| | | 16.00 | D | | | | | | 16 |
| | ▼ | 16.50 | | 50 (6,6/50 for 295mm) | | | | | |
| | | 16.50 - 16.95 | B | | | | | | |
| | | 16.50 - 16.95 | D | | | | | | 17 |
| | | 17.50 | D | | | | | | |
| | | 18.00 | | N=50 (8,8/50 for 285mm) | | | | | 18 |
| | | 18.00 - 18.45 | B | | | | | | |
| | | 18.00 - 18.45 | D | | | | | | |
| | | 19.00 | D | | | | | | 19 |
| | | 19.50 - 19.95 | U | Ublow=105 | | | | | |
| | | 20.00 | D | | | | | | 20 |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 16.50m.

AGS

# Borehole Log

Borehole No.
**BH01**
Sheet 3 of 3

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384918.48 - 402256.61 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 73.31 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 20/08/2020 - 21/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | | |
| | | 21.00 | D | | | | | | 21 |
| | | 21.00 | | N=41 (8,9/9,10,11,11) | | | | | |
| | | 21.00 - 22.00 | B | | | | | | |
| | | | | | | | | | 22 |
| | | 22.50 - 22.95 | U | Ublow=110 | | | | | |
| | | 23.00 | D | | | | | | 23 |
| | | 24.00 | D | | | | | | 24 |
| | | 24.00 | D | | | | | | |
| | | 24.00 | | N=43 (7,8/10,11,10,12) | | | | | |
| | | 24.00 - 25.00 | B | | | | | | |
| | | | | | 25.00 | 48.31 | | End of borehole at 25.00 m | 25 |
| | | | | | | | | | 26 |
| | | | | | | | | | 27 |
| | | | | | | | | | 28 |
| | | | | | | | | | 29 |
| | | | | | | | | | 30 |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 16.50m.

AGS

# Borehole Log

Borehole No. **BH02**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384998.01 - 402197.17 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 78.55 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 19/08/2020 - 21/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0.20 | 78.35 | | MADE GROUND: Black tarmacadam. | |
| | | | | | 0.50 | 78.05 | | MADE GROUND: Brown and grey sandy angular to subangular fine to coarse gravel of dolomite hardcore and tarmacadam. Sand is fine to coarse. | |
| | | 1.00 | ES | | 1.00 | 77.55 | | MADE GROUND: Brown slightly gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of brick. | 1 |
| | | 1.20 | | N=13 (3,3/3,4,3,3) | 1.20 | 77.35 | | MADE GROUND: Brown slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick and terracotta. | |
| | | 1.20 - 1.65 | D | | | | | Medium dense greyish brown slightly clayey fine to coarse SAND frequently interbedded with thin to thick bands of clay. | |
| | | 2.00 | B | | | | | | 2 |
| | | 2.00 | | N=15 (3,3/4,3,4,4) | | | | | |
| | | 2.00 - 2.45 | D | | | | | | |
| | | 3.00 | B | | | | | | 3 |
| | | 3.00 | | N=29 (6,5/6,7,8,8) | | | | | |
| | | 3.00 - 3.45 | D | | | | | | |
| | | 4.00 | B | | | | | | 4 |
| | | 4.00 | | N=23 (5,6/5,4,8,6) | | | | | |
| | | 4.00 - 4.45 | D | | | | | | |
| | | 5.00 | B | | | | | | 5 |
| | | 5.00 | | N=17 (4,4/4,5,4,4) | | | | | |
| | | 5.00 - 5.45 | D | | | | | | |
| | | | | | | | | | 6 |
| | | 6.50 - 6.95 | U | Ublow=42 | | | | | |
| | | 7.00 | D | | | | | | 7 |
| | | 8.00 | | N=18 (3,4/4,4,5,5) | | | | *From 8.00 to 11.00m thinly to thickly spaced thin laminations of black sand.* | 8 |
| | | 8.00 - 8.45 | D | | | | | | |
| | | 9.00 - 9.95 | D | | | | | | 9 |
| | | 9.50 | | N=17 (4,4/4,4,4,5) | | | | | |
| | | | | | | | | | 10 |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 14.50m.

# Borehole Log

Borehole No.
**BH02**
Sheet 2 of 3

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384998.01 - 402197.17 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 78.55 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 19/08/2020 - 21/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | 11.00<br>11.00 - 11.45 | D | N=21 (5,5/6,5,5,5) | | | | | 11 |
| | | | | | | | | | 12 |
| | | 12.50<br>12.50 - 12.95 | D | N=18 (4,4/4,4,5,5) | | | | | 13 |
| | | 14.00<br>14.00 - 14.45 | D | N=21 (4,5/5,5,6,5) | | | | | 14 |
| | | | | | | | | *From 14.90 to 15.00m soft grey slightly sandy silty clay. Sand is fine to medium.* | 15 |
| | | 15.50<br>15.50 - 15.95 | D | N=29 (6,6/6,7,8,8) | | | | | 16 |
| | | 17.00<br>17.00 - 17.45 | D | N=18 (4,4/4,5,4,5) | | | | | 17 |
| | | | | | | | | | 18 |
| | | 18.50 - 18.95 | U | Ublow=100 | | | | | |
| | | 19.00 | D | | | | | | 19 |
| | | 20.00 | | N=42 (6,6/7,9,11,15) | | | | | 20 |

Continued on next sheet

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 14.50m.

# Borehole Log

Borehole No.
**BH02**
Sheet 3 of 3

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384998.01 - 402197.17 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 78.55 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 19/08/2020 - 21/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 20.00 - 20.45 | D | | | | | |
| | | 21.50 - 21.95 | U | Ublow=100 | | | | |
| | | 23.00 - 23.45 | D | | 23.00 | 55.55 | | Very stiff brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone. |
| | | | | | 25.00 | 53.55 | | End of borehole at 25.00 m |

21 22 23 24 25 26 27 28 29 30

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 14.50m.

AGS

# Borehole Log

Borehole No. **BH03**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384886.26 - 402160.40 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 74.95 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 14/08/2020 - 18/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.00 - 0.30 | ES | | | | | Grass over TOPSOIL: Brown slightly sandy slightly gravelly clay with frequent rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to medium of brick and slate. | |
| | | | | | 0.50 | 74.45 | | MADE GROUND: Dark brown slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick. | |
| | | | | | 0.70 | 74.25 | | Dense brown slightly gravelly clayey fine to coarse SAND intermittently interbedded with thin to thick clay bands. Gravel is angular to subangular fine to coarse of sandstone. | 1 |
| | | 1.20 | | N=6 (1,1/1,2,1,2) | | | | | |
| | | 1.20 - 1.65 | D | | | | | | |
| | | 2.00 | B | | | | | | 2 |
| | | 2.00 | | N=13 (2,3/3,3,4,3) | | | | | |
| | | 2.00 - 2.45 | D | | | | | | |
| | | 3.00 | B | | | | | *From 3.00 to 4.00m slightly sandy gravelly clay.* | 3 |
| | | 3.00 | | N=15 (2,3/3,4,4,4) | | | | | |
| | | 3.00 - 3.45 | D | | | | | | |
| | | 4.00 | | N=20 (3,4/5,4,6,5) | | | | | 4 |
| | | 4.00 - 4.45 | D | | | | | | |
| | | 5.00 | B | | | | | | 5 |
| | | 5.00 | | 9 (3,3/9 for 225mm) | | | | | |
| | | 5.00 - 5.45 | U | Ublow=67 | | | | | |
| | | 5.50 | D | | | | | *From 5.50 to 7.00m thinly to thickly spaced thin laminations of black sand.* | |
| | | 6.00 | | N=14 (3,4/3,4,3,4) | | | | | 6 |
| | | 6.50 - 6.95 | D | | | | | | |
| | | | | | | | | | 7 |
| | | 7.50 | | N=16 (3,3/6,4,3,3) | | | | | |
| | | 8.00 - 8.45 | D | | | | | | 8 |
| | | 9.00 | | N=15 (3,3/4,3,4,4) | | | | | 9 |
| | | 9.50 - 9.95 | D | | | | | | |
| | | | | | | | | | 10 |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 18.80m.

AGS

# Borehole Log

Borehole No. **BH03**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384886.26 - 402160.40 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 74.95 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 14/08/2020 - 18/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | 10.50 | | N=11 (1,1/1,3,3,4) | | | | | |
| | | 11.00 - 11.45 | D | | | | | | 11 |
| | | 12.00 | | N=10 (1,2/2,2,3,3) | | | | | 12 |
| | | 12.50 | D | | | | | | |
| | | | | | | | | | 13 |
| | | 13.50 | | N=10 (1,2/3,2,3,2) | | | | | |
| | | 14.00 - 14.45 | D | | | | | | 14 |
| | | 15.00 | | N=12 (2,3/2,3,3,4) | | | | | 15 |
| | | 15.50 - 15.95 | D | | | | | | |
| | | | | | | | | | 16 |
| | | 16.50 | | N=44 (6,7/9,11,11,13) | | | | | |
| | | 17.00 - 17.45 | U | | | | | | 17 |
| | | 17.50 | D | | | | | | |
| | | | | | 17.80 | 57.15 | | Firm brownish grey sandy SILT. Sand is fine to coarse. | |
| | | 18.00 | | N=49 (7,9/10,12,12,15) | | | | | 18 |
| | | 18.50 - 18.95 | D | | | | | | |
| | | | | | | | | | 19 |
| | | 19.50 | | N=43 (7,7/7,10,12,14) | | | | | |
| | | 20.00 - 20.45 | U | | 20.00 | 54.95 | | | 20 |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 18.80m.

# Borehole Log

Borehole No.
**BH03**
Sheet 3 of 3

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384886.26 - 402160.40 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 74.95 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 14/08/2020 - 18/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing | | | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | | |
| [redacted] | | 20.50 | D | | | | | Very stiff brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone. | |
| | | 21.00 | | N=50 (8,10/50 for 290mm) | | | | | 21 |
| | | 21.50 - 21.95 | D | | | | | | |
| | | | | | | | | | 22 |
| | | 22.50 | | N=50 (10,10/50 for 265mm) | | | | | 23 |
| | | 24.00 | | N=48 (8,10/10,12,12,14) | 24.00 | 50.95 | | End of borehole at 24.00 m | 24 |
| | | | | | | | | | 25 |
| | | | | | | | | | 26 |
| | | | | | | | | | 27 |
| | | | | | | | | | 28 |
| | | | | | | | | | 29 |
| | | | | | | | | | 30 |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 18.80m.

AGS

# Borehole Log

Borehole No. **BH04**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384932.21 - 402071.46 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 78.63 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 14/08/2020 - 18/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0.10 | 78.53 | | MADE GROUND: Black tarmacadam. |
| | | 0.40 - 0.50 | ES | | 0.35 | 78.28 | | MADE GROUND: Dark grey very sandy angular to subrounded fine to coarse gravel of brick and dolomite hardcore. Sand is fine to coarse. |
| | | | | | 0.70 | 77.93 | | MADE GROUND: Brown mottled black slightly sandy gravelly clay with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick and dolomite hardcore. Cobbles are angular of brick. |
| | | 1.00 - 1.10 | ES | | | | | |
| | | 1.20 | | N=16 (1,/3,4,4,5) | | | | |
| | | 1.40 | D | | | | | Medium dense brown slightly gravelly fine to coarse SAND. Gravel is subangular fine of sandstone. |
| | | | | | | | | *From 0.70 to 0.80m very clayey.* |
| | | 2.00 | | N=16 (2,2/2,4,5,5) | | | | *From 1.20 to 1.40m firm slightly sandy slightly gravelly clay.* |
| | | | | | | | | *From 1.40 to 2.00m no recovery.* |
| | | | | | | | | *From 2.00 to 2.10m firm slightly sandy slightly gravelly clay.* |
| | | | | | | | | *From 2.10 to 3.50m no recovery.* |
| | | 3.50 | | N=19 (2,3/5,2,3,9) | | | | *From 2.50 to 4.50m firm slightly sandy slightly gravelly clay.* |
| | | 4.50 | D | | | | | *From 4.50 to 5.00m no recovery.* |
| | | 5.00 | | N=20 (2,1/4,4,4,8) | | | | *From 5.00 to 5.20m firm slightly sandy slightly gravelly clay.* |
| | | | | | | | | *From 5.20 to 7.00m no recovery.* |
| | | 6.50 | | N=45 (2,4/6,11,14,14) | | | | *From 6.50 to 8.00m very dense.* |
| | | | | | | | | *From 7.00 to 8.00m stiff slightly sandy slightly gravelly clay.* |
| | | 7.80 | D | | | | | |
| | | 8.00 | | N=50 (3,3/50 for 235mm) | 8.00 | 70.63 | | Very stiff grey slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to medium of mudstone. |
| | | 9.50 | D | | 9.50 | 69.13 | | Dense slightly silty fine to coarse SAND. |
| | | 9.50 | | N=41 (1,3/5,7,13,16) | | | | *From 9.50 to 9.70m no recovery.* |
| | | | | | | | | *From 9.70 to 9.85m firm brown sandy clay.* |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl. Open hole from 17.00m. Groundwater unable to be recorded.

# Borehole Log

Borehole No.
**BH04**
Sheet 2 of 2

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | New Park House | Project No. 075856 | Co-ords: | 384932.21 - 402071.46 | Hole Type CP |
| Location: | North Manchester General Hospital | | Level: | 78.63 | Scale 1:50 |
| Client: | North Manchester General Hospital | | Dates: | 14/08/2020 - 18/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *From 9.85 to 11.00m no recovery.* | |
| | | 11.00<br>11.00 | D | N=52 (4,9/52 for 190mm) | | | | *From 11.00 to 20.00m interbedded sand (no recovery) with thin clay bands.* | 11 |
| | | | | | | | | | 12 |
| | | 12.50 | | N=31 (2,5/6,7,8,10) | | | | | |
| | | | | | | | | | 13 |
| | | 14.00 | | N=32 (2,4/6,6,10,10) | | | | | 14 |
| | | | | | | | | | 15 |
| | | 15.50 | | N=32 (2,2/7,7,8,10) | | | | | |
| | | | | | | | | | 16 |
| | | 17.00 | | N=28 (3,5/9,9,4,6) | | | | | 17 |
| | | | | | | | | | 18 |
| | | 18.50 | | N=29 (3,5/7,7,7,8) | | | | | |
| | | | | | | | | | 19 |
| | | 20.00 | | N=49 (3,4/7,9,13,20) | 20.00 | 58.63 | | End of borehole at 20.00 m | 20 |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Open hole from 17.00m. Groundwater unable to be recorded.

# Borehole Log

Borehole No. **BH05**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384851.68 - 402084.88 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 76.51 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 12/08/2020 - 14/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.30 - 0.40 | ES | | 0.20 | 76.31 | | MADE GROUND: Black tarmacadam with decorative gravel. |
| | | | | | 0.70 | 75.81 | | MADE GROUND: Light grey mottled brown very gravelly fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete and dolomite hardcore. |
| | | 1.20<br>1.20 - 1.65 | D | N=11 (2,3/2,2,3,4) | | | | Firm brown mottled grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to medium of sandstone. |
| | | | | | 1.65 | 74.86 | | Medium dense brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone. |
| | | 2.00<br>2.00<br>2.00 - 2.45 | B<br><br>D | N=18 (3,3/4,4,4,6) | | | | |
| | | 2.50 | B | | | | | |
| | | 3.00<br>3.00 - 3.45 | D | N=16 (3,4/4,3,4,5) | | | | |
| | | 4.00 - 4.45 | B | Ublow=56 | | | | |
| | | 4.50 | D | | | | | |
| | | 5.00<br>5.00 - 5.45 | D | N=19 (4,4/5,5,4,5) | | | | |
| | | 6.50<br>6.50 - 6.95 | D | N=35 (5,10/35 for 235mm) | | | | *From 6.50 to 8.00m dense.* |
| | | 8.00<br>8.00 - 8.45 | D | N=21 (4,4/5,5,5,6) | | | | |
| | | 9.50<br>9.50 - 9.95 | D | N=20 (4,5/5,4,5,6) | | | | |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 18.00m.

# Borehole Log

Borehole No. **BH05**



| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384851.68 - 402084.88 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 76.51 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 12/08/2020 - 14/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description | |
|---|---|---|---|---|---|---|---|---|---|
| | | 11.00<br>11.00 - 11.45 | D | N=18 (3,3/4,4,5,5) | | | | | 11 |
| | | | | | | | | | 12 |
| | | 12.50<br>12.50 - 12.95 | D | N=15 (4,4/3,4,4,4) | | | | | 13 |
| | | 14.00<br>14.00 | D | N=15 (3,3/4,4,3,4) | | | | | 14 |
| | | | | | 14.50 | 62.00 | | Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone. | 15 |
| | | 15.50<br>15.50 - 15.95 | D | N=19 (4,4/5,4,5,5) | | | | | 16 |
| | | 17.00 - 17.45 | B | Ublow=46 | | | | | 17 |
| | | 17.50 | D | | | | | | 18 |
| | ▼ | 18.50<br>18.50 - 18.95 | D | N=51<br>(7,9/12,12,12,15) | | | | *From 18.50 to 21.50m very stiff.* | 19 |
| | | 20.00 - 20.50 | B | Ublow=100 | | | | | 20 |

Continued on next sheet

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 18.00m.

AGS

# Borehole Log

Borehole No.
**BH05**
Sheet 3 of 3

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384851.68 - 402084.88 | Hole Type CP |
| Location: North Manchester General Hospital | | Level: 76.51 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 12/08/2020 - 14/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 20.50 | D | | | | | |
| | | 21.50 | | N=60 (10,15/60 for 105mm) | | | | |
| | | 21.50 - 21.95 | D | | | | | |
| | | 23.00 - 23.45 | B | Ublow=100 | | | | |
| | | 23.50 | D | | | | | |
| | | 24.50 | | N=60 (10,12/60 for 95mm) | | | | |
| | | 24.50 - 24.95 | D | | | | | |
| | | | | | 25.00 | 51.50 | | End of borehole at 25.00 m |

21
22
23
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Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Groundwater encountered at 18.00m.

# Borehole Log

Borehole No.
**WS01**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 385005.67 - 402230.60 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 75.74 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 18/08/2020 - 18/08/2020 | Logged By MH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.40 | ES | | 0.32 | 75.42 | | Grass over TOPSOIL: Dark brown slightly silty fine and medium sand. Frequent rootlets, occasional roots. |
| | | | | | 0.60 | 75.14 | | MADE GROUND: Brown sandy slightly gravelly clay and clayey slightly gravelly sand. Gravel is fine and medium angular to subangular brick. (Reworked) |
| | | 1.20<br>1.20 - 2.00 | B | N=15 (2,2/3,3,4,5) | | | | Medium dense light brown fine and medium SAND. Pockets of silty fine and medium sand. |
| | ▼ | 2.00 | | N=15 (3,3/5,4,4,2) | | | | |
| | | | | | 2.60 | 73.14 | | Soft brown sandy SILT. Rare gravel of fine, angular to subangular sandstone and coal. |
| | | 3.00 | | N=8 (3,1/2,2,2,2) | | | | |
| | | | | | 3.20 | 72.54 | | Medium dense brown silty slightly gravelly fine and medium SAND. Gravel is fine angular to subangular sandstone and coal. |
| | | 4.00 | | N=19 (4,4/4,5,5,5) | 4.00 | 71.74 | | Medium dense light brown fine and medium SAND. |
| | | 5.00 | | N=20 (5,5/5,6,5,4) | | | | |
| | | | | | 5.45 | 70.28 | | End of borehole at 5.45 m |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.

AGS

# Borehole Log

Borehole No.
**WS02**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384957.30 - 402201.91 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 74.93 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 18/08/2020 - 18/08/2020 | Logged By MH |

| Samples and In Situ Testing | | | | | | |
|---|---|---|---|---|---|---|
| Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
| | | | 0.12 | 74.81 | | MADE GROUND: Black tarmacadam. |
| | | | 0.25 | 74.68 | | MADE GROUND: Yellowish grey sandy gravel. Gravel is fine to coarse angular to subangular concrete. Rare cobbles of concrete. |
| 0.45 | ES | | 0.30 | 74.63 | | |
| | | | 0.50 | 74.43 | | MADE GROUND: Black tarmacadam. |
| | | | 0.90 | 74.03 | | MADE GROUND: Reddish brown gravelly fine to coarse sand. Gravel is fine to coarse angular to subangular brick, concrete and rare rebar. |
| 1.20 | | N=12 (3,3/2,3,4,3) | | | | Medium dense brown/light brown fine to coarse SAND. |
| | | | | | | Medium dense light brown fine to coarse SAND. |
| 2.00 | | N=13 (2,3/2,4,4,3) | | | | |
| | | | 2.20 | 72.73 | | Loose brown silty fine and medium SAND. Rare black sand and fine black gravel of coal. |
| 2.40 - 3.00 | B | | | | | |
| 3.00 | | N=4 (1,2/1,1,1,1) | | | | |
| | | | 3.50 | 71.43 | | Soft brown silty slightly sandy CLAY. |
| 4.00 | D | | | | | |
| 4.00 | | N=8 (3,2/1,3,2,2) | | | | |
| | | | 4.80 | 70.13 | | Medium dense brown clayey fine and medium SAND. |
| 5.00 | | N=26 (6,7/7,7,6,6) | | | | |
| | | | 5.45 | 69.48 | | End of borehole at 5.45 m |

Well: 1 2 3 4 5 6 7 8 9 10

Water Strikes: ▼ 2.00

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.

AGS

# Borehole Log

Borehole No.
**WS03**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384918.90 - 402148.01 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 77.96 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 17/08/2020 - 17/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.30 - 0.40 | ES | | 0.40 | 77.56 | | Grass over TOPSOIL: Dark grey gravelly fine to coarse sand with frequent rootlets. Gravel is subangular fine to coarse of brick. |
| | | 1.20<br>1.40 | D | N=8 (2,2/2,1,2,3) | 1.30 | 76.66 | | Firm brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and mudstone. |
| | | 2.00 | | N=13 (2,2/2,3,4,4) | 2.00 | 75.96 | | Soft grey slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mudstone. |
| | | 3.00 | | N=51 (8,10/10,12,13,16) | 3.00 | 74.96 | | Firm to stiff brownish grey sandy CLAY. Sand is fine to medium. |
| | | 4.00 | | N=37 (10,12/8,9,10,10) | | | | Dense brown fine to coarse SAND with occasional very closely spaced thin laminations of dark grey coaly sand. |
| | | 5.00 | | N=70 (8,10/13,19,18,20) | | | | |
| | | | | | 5.45 | 72.51 | | End of borehole at 5.45 m |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.

AGS

# Borehole Log

Borehole No.
**WS04**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384974.24 - 402118.08 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 77.91 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 17/08/2020 - 17/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0.15 | 77.76 | | MADE GROUND: Paving slab. |
| | | 0.40 - 0.50 | ES | | | | | MADE GROUND: Brown slightly gravelly slightly clayey fine to coarse sand. Gravel is angular to subrounded fine to coarse of slate ad brick. *From 0.70 to 1.20m very clayey.* |
| | | 1.20 | | N=20 (5,4/5,5,5,5) | 1.10 | 76.81 | | Dense brown fine to coarse SAND. |
| | | 2.00<br>2.00 - 2.50 | B | N=7 (1,1/2,1,2,2) | 2.00 | 75.90 | | Firm grey sandy CLAY. Sand is fine to coarse. *From 2.70 to 3.00m very sandy.* |
| | | 3.00 | | N=65 (8,13/15,16,16,18) | 3.00 | 74.90 | | Very dense brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium of mudstone. |
| | | | | | 3.50 | 74.40 | | End of borehole at 3.50 m |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl.
Refusal at 3.00m, unable to advance past 3.50m.

AGS

# Borehole Log

Borehole No. **WS05**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384972.87 - 402159.96 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 78.56 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 17/08/2020 - 17/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0.10 | 78.46 | | MADE GROUND: Black tarmacadam. |
| | | 0.25 - 0.30 | ES | | 0.25 | 78.31 | | MADE GROUND: Dark grey gravelly fine to coarse sand., Gravel is angular to subangular fine to coarse of brick and tarmacadam. |
| | | | | | 1.00 | 77.56 | | MADE GROUND: Brown slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, slate and dolomite hardcore. Slight hydrocarbon odour noted. |
| | | 1.20<br>1.20 | D | N=12 (2,2/2,3,3,4) | | | | Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone. Slight hydrocarbon odour noted. |
| | | 2.00 | | N=26 (5,5/6,6,7,7) | 2.00 | 76.56 | | Dense brown fine to coarse SAND with occasional very closely spaced thin laminations of dark grey coaly sand. |
| | | 3.00 | | N=42 (6,5/6,11,13,12) | | | | |
| | | 3.50 | B | | | | | |
| | | 4.00 | | N=79 (7,10/12,15,20,32) | | | | |
| | | | | | 4.45 | 74.11 | | End of borehole at 4.45 m |

Remarks

GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl. Terminated at 4.00m due to refusal, unable to advance.

# Borehole Log

Borehole No.
**WS06**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384910.29 - 402120.75 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 77.80 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 14/08/2020 - 14/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0.30 | 77.50 | | MADE GROUND: Concrete slab with rebar. |
| | | 0.50 - 0.60 | ES | | | | | MADE GROUND: Brown and black gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of concrete, brick and dolomite hardcore. |
| | | | | | 1.00 | 76.80 | | Medium dense brown slightly clayey fine to coarse SAND. |
| | | 1.20 | | N=11 (1,2/3,3,3,2) | | | | |
| | | 2.00 | | N=6 (1,1/1,2,1,2) | | | | |
| | | | | | 2.50 | 75.30 | | Firm dark grey sandy CLAY. Sand is fine to coarse. |
| | | 2.70 | D | | | | | |
| | | 3.00 | | N=20 (3,4/5,4,6,5) | | | | |
| | | 4.00 | | N=22 (4,7/6,7,5,4) | | | | |
| | | | | | 4.45 | 73.35 | | End of borehole at 4.45 m |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl. No SPT at 5.00m due to collapse of hole to 3.40m.

# Borehole Log

Borehole No.
**WS07**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384893.84 - 402062.25 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 77.05 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 14/08/2020 - 14/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0.30 | 76.74 | | MADE GROUND: Black tarmacadam with decorative gravel. |
| | | 0.80 - 0.90 | ES | | 0.70 | 76.34 | | MADE GROUND: Light grey mottled brown very gravelly fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete and dolomite hardcore. |
| | | 1.20 | | N=19 (3,3/5,4,5,5) | 1.10 | 75.94 | | Stiff brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone. |
| | | 2.00 | | N=22 (3,4/5,5,6,6) | | | | Medium dense brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone. |
| | | 3.00 | | N=13 (3,3/4,4,2,3) | | | | *From 3.00 to 3.30m slightly clayey.* |
| | | 4.00 | | N=14 (3,2/3,4,3,4) | | | | |
| | | 4.50 - 5.00 | B | | | | | |
| | | | | | 5.00 | 72.04 | | End of borehole at 5.00 m |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl. No SPT at 5.00m due to collapse of hole to 3.40m.

# Borehole Log

Borehole No.
**WS08**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384844.57 - 402044.95 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 76.60 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 14/08/2020 - 14/08/2020 | Logged By ZH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0.30 | 76.30 | | MADE GROUND: Black tarmacadam with decorative gravel. |
| | | 0.50 - 0.55 | ES | | 0.60 | 76.00 | | MADE GROUND: Light grey mottled brown very gravelly fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete and dolomite hardcore. |
| | | | | | 0.90 | 75.70 | | Stiff brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone. |
| | | 1.20 | | N=20 (2,3/4,4,5,7) | | | | |
| | | 2.00 | B | | | | | Medium dense brown slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone. |
| | | 2.00 | | N=20 (2,2/4,6,4,6) | | | | *From 1.20 to 1.40m clayey.* |
| | | | | | | | | *From 2.75 to 2.90m clayey.* |
| | | 3.00 | | N=15 (3,4/3,2,6,4) | | | | |
| | | | | | 3.30 | 73.30 | | Soft brownish grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone. |
| | | 3.50 | D | | | | | |
| | | | | | 4.00 | 72.60 | | End of borehole at 4.00 m |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl. No SPT at 4 or 5m due to continuous collapse of hole.

# Borehole Log

Borehole No.
**WS09**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384903.64 - 402193.24 | Hole Type WS |
| Location: North Manchester General Hospital | | Level: 74.07 | Scale 1:50 |
| Client: North Manchester General Hospital | | Dates: 18/08/2020 - 18/08/2020 | Logged By MH |

| Well | Water Strikes | Samples and In Situ Testing: Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|
| | | 0.20 | ES | | 0.10 | 73.97 | | MADE GROUND: Black tarmacadam. |
| | | | | | 0.47 | 73.60 | | MADE GROUND: Light brown gravelly fine to coarse SAND. Gravel is fine to coarse angular to subrounded concrete, brick and sandstone. Rare brick cobbles. |
| | | | | | 0.60 | 73.47 | | MADE GROUND: Layered brick cobbles. Top of possibly disused tunnel. |
| | | | | | | | | VOID. |
| | | | | | 1.60 | 72.47 | | End of borehole at 1.60 m |

Remarks
GPR service clearance prior to progression of exploratory hole. Service clearance pit hand excavated to 1.20m bgl. Void encountered at 0.60m - hole terminated.

# Trial Pit Log

Trialpit No **TP01**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384946.79 - 402254.71<br>Level: 73.40 | Date 24/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.2 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 0.40 | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | | | | MADE GROUND: Black tarmacadam. |
| | | | | 0.15 | 73.25 | | MADE GROUND: Dark brownish grey sandy angular to subangular fine to coarse gravel of dolomite hardcore and tarmacadam. Sand is fine to coarse. |
| | | | | 0.25 | 73.15 | | MADE GROUND: Concrete slab. |
| | | | | 0.40 | 73.00 | | End of pit at 0.40 m |

1
2
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4

Remarks: GPR service clearance prior to progression of exploratory hole. Terminated at 0.40m due to concrete slab.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No
**TP02**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384911.79 - 402226.51<br>Level: 73.40 | Date 24/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.25 × 0.25<br>Depth 1.20 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.15 | 73.24 | | MADE GROUND: Black tarmacadam. |
| | 0.35 | ES | | 0.60 | 72.80 | | MADE GROUND: Brown mottled grey gravelly slightly clayey fine to coarse sand with medium cobble content. Gravel is angular to subangular fine to coarse of brick, concrete and dolomite hardcore. Cobbles are angular to subangular of brick and concrete. [Base is presumed sub-level of car park]. |
| | | | | 1.20 | 72.19 | | Loose brown slightly clayey fine to coarse SAND.<br>End of pit at 1.20 m |

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4

Remarks: GPR service clearance prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No
**TP03**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384960.92 - 402223.79<br>Level: 74.93 | Date 24/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.3<br>Depth 0.75 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.10 | 74.83 | | MADE GROUND: Black tarmacadam. |
| | 0.50 | ES | | 0.60 | 74.33 | | MADE GROUND: Grey very sandy angular to subangular fine to coarse gravel of concrete and dolomite hardcore with low cobble content. Sand is fine to coarse. Cobbles are angular to subangular of concrete. [Base is presumed sub-level of car park]. |
| | | | | 0.75 | 74.18 | | MADE GROUND: Dark brown slightly gravelly slightly clayey fine to coarse sand. Gravel is angular to subangular fine to coarse of dolomite hardcore, brick and concrete. |

End of pit at 0.75 m

1
2
3
4

Remarks: GPR service clearance prior to progression of exploratory hole.

Stability: Stable.

# Trial Pit Log

Trialpit No **TP04**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384949.99 - 402085.89<br>Level: 78.81 | Date 24/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.3<br>Depth 1.00 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.10 | 78.71 | | MADE GROUND: Black tarmacadam. |
| | | | | 0.30 | 78.51 | | MADE GROUND: Dark grey mottled brown sandy slightly clayey angular to subangular fine to coarse gravel of brick and tarmacadam with low cobble content. Sand is fine to coarse. Cobbles are angular to subangular of brick. |
| | 0.55 | ES | | 0.60 | 78.21 | | MADE GROUND: Dark brown mottled grey sandy gravelly clay with medium cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of brick, concrete and tarmacadam. Cobbles are subangular of concrete and brick. [Base is presumed sub-level of car park]. |
| | | | | 1.00 | 77.81 | | Loose brown slightly gravelly fine to coarse SAND. Gravel is subangular fine of sandstone.<br>End of pit at 1.00 m |

Remarks: GPR service clearance prior to progression of exploratory hole.

Stability: Stable.

# Trial Pit Log

Trialpit No **TP05**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: 384882.01 - 402093.72<br>Level: 77.03 | Date 24/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.25 × 0.3<br>Depth 1.20 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | | | | MADE GROUND: Decorative gravel over tarmacadam. |
| | | | | 0.30 | 76.73 | | MADE GROUND: Grey very gravelly slightly clayey fine to coarse sand with medium cobble content. Gravel is angular to subangular fine to coarse of dolomite hardcore and concrete. Cobbles are subangular of concrete and dolomite hardcore. [Base is presumed sub-level of car park]. |
| | 0.40 | ES | | | | | |
| | | | | 0.55 | 76.48 | | Loose brown slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium of sandstone. |
| | | | | 1.20 | 75.83 | | End of pit at 1.20 m |

Remarks: GPR service clearance prior to progression of exploratory hole.

Stability: Stable.

# Trial Pit Log

Trialpit No
**HP01**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 74.55 | Date 18/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.6 × 0.5 <br> Depth 1.30 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged MH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.06 | 74.49 | | MADE GROUND: Black tarmacadam. |
| | | | | 0.23 | 74.32 | | MADE GROUND: Yellowish grey sandy gravel. Gravel is fine to coarse angular to subangular concrete. |
| | | | | 0.55 | 74.00 | | MADE GROUND: Brown gravelly fine to coarse sand. Gravel is fine to coarse angular to subrounded concrete, brick and rare coal. |
| | | | | 1.30 | 73.25 | | Medium dense light brown slightly gravelly fine to coarse SAND. Gravel is fine angular coal. Occasional pockets of black medium and coarse sand of coal. |
| | | | | | | | End of pit at 1.30 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No **HP02**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 74.79 | Date 18/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.5 × 0.32 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 1.30 | Logged MH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | | | | MADE GROUND: Black tarmacadam. |
| | | | | 0.17 | 74.62 | | |
| | | | | 0.20 | 74.59 | | MADE GROUND: Grey sand and gravel. Gravel is fine and medium angular to subangular concrete. |
| | | | | | | | MADE GROUND: Layered brick cobbles. |
| | | | | 0.40 | 74.39 | | Medium dense light brown fine and medium SAND with pockets of sand and fine angular gravel of coal. |
| | | | | 1.30 | 73.49 | | End of pit at 1.30 m |

1 2 3 4

Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No
**HP02A**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 75.14 | Date 18/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 1.2 × 0.55 <br> Depth 1.30 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged MH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.06 | 75.08 | | MADE GROUND: Black tarmacadam. |
| | | | | | | | MADE GROUND: Grey sand and gravel. Gravel is fine and medium angular to subangular concrete. |
| | | | | 0.21 | 74.93 | | MADE GROUND: Black tarmacadam. |
| | | | | 0.33 | 74.81 | | MADE GROUND: Layered brick cobbles. |
| | | | | 0.40 | 74.74 | | Medium dense light brown fine to coarse SAND. Rare pockets of fine angular gravel of coal. |
| | | | | 1.30 | 73.84 | | End of pit at 1.30 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No **HP04**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 78.00 | Date 18/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.5 × 0.5 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 1.35 | Logged MH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.10 | 77.90 | | MADE GROUND: Black tarmacadam. |
| | | | | 0.32 | 77.68 | | MADE GROUND: Dark brown gravelly fine to coarse sand. Gravel is fine and medium angular to subangular brick, clinker, ash and concrete. |
| | | | | 1.10 | 76.90 | | MADE GROUND: Brown gravelly fine to coarse sand. Gravel is fine to coarse angular to subrounded brick, concrete and wood fragments. Occasional rootlets. |
| | | | | 1.35 | 76.65 | | Medium dense light brown fine to coarse SAND. |
| | | | | | | | End of pit at 1.35 m |

1 2 3 4

Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No
**HP05**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 77.08 | Date 18/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.52 × 0.37 <br> Depth 1.10 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged MH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.05 | 77.03 | | MADE GROUND: Black tarmacadam. |
| | | | | | | | MADE GROUND: Brown gravelly fine to coarse sand. Gravel is fine to coarse angular to subangular brick, concrete, slate and clinker. Frequent brick cobbles. |
| | | | | 0.60 | 76.48 | | Medium dense light brown fine to coarse SAND. |
| | | | | 1.10 | 75.98 | | End of pit at 1.10 m |

Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

# Trial Pit Log

Trialpit No
**HP06**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 78.00 | Date 19/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.25 × 0.3 <br> Depth 1.40 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.10 | 77.90 | | MADE GROUND: Black tarmacadam. |
| | | | | | | | MADE GROUND: Brown slightly gravelly fine to coarse sand with frequent roots and rootlets. Gravel is angular to subangular fine to coarse of brick. *From 0.10 to 0.20m brownish black.* *At 1.00m subangular cobbles of brick.* |
| | | | | 1.40 | 76.60 | | End of pit at 1.40 m |

Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

# Trial Pit Log

Trialpit No
**HP07**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 77.48 | Date 19/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.2 × 0.35 <br> Depth 1.60 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.10 | 77.38 | | MADE GROUND: Black tarmacadam. |
| | | | | | | | MADE GROUND: Brown slightly gravelly fine to coarse sand with frequent roots and rootlets. Gravel is angular to subangular fine to coarse of brick. |
| | | | | 1.60 | 75.88 | | End of pit at 1.60 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No **HP08**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 78.47 | Date 19/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.35 × 0.4 <br> Depth 1.20 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | | | | MADE GROUND: Black tarmacadam. |
| | | | | 0.15 | 78.32 | | MADE GROUND: Black mottled brown slightly gravelly slightly clayey fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick and tarmacadam. Cobbles are angular of brick. *From 0.15 to 0.30m rootlets frequent.* |
| | | | | 0.80 | 77.67 | | MADE GROUND: Brown gravelly fine to coarse sand with low cobble content. Gravel is angular to subrounded fine to coarse of brick. Cobbles are angular of brick. |
| | | | | 1.20 | 77.27 | | End of pit at 1.20 m |

1 2 3 4

Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

# Trial Pit Log

Trialpit No
**HP09**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 78.79 | Date 19/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.4 × 0.3 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 1.30 | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.10 | 78.69 | | MADE GROUND: Black tarmacadam. |
| | | | | 1.10 | 77.69 | | MADE GROUND: Black mottled brown slightly gravelly slightly clayey fine to coarse sand with low cobble content. Gravel is angular to subangular fine to coarse of brick and tarmacadam. Cobbles are subangular of brick. |
| | | | | 1.30 | 77.49 | | Firm brown mottled grey sandy CLAY. Sand is fine to coarse. |
| | | | | | | | End of pit at 1.30 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No
**HP10**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 78.09 | Date 19/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.35 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 1.20 | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.05 | 78.04 | | MADE GROUND: Paving slab. |
| | | | | | | | MADE GROUND: Grey sandy angular to subangular fine to coarse gravel of dolomite hardcore. Sand is fine to coarse. |
| | | | | 1.00 | 77.09 | | Firm brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone. |
| | | | | 1.20 | 76.89 | | End of pit at 1.20 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No
**HP11**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 74.81 | Date 20/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.35 <br> Depth 0.70 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.05 | 74.76 | | MADE GROUND: Black slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of pea gravel and dolomite hardcore. |
| | | | | | | | MADE GROUND: Black subangular fine to medium pea gravel. |
| | | | | | | | *From 0.30 to 0.40m subangular gravel of dolomite hardcore.* |
| | | | | 0.60 | 74.21 | | MADE GROUND: Brown mottled grey slightly clayey fine to coarse sand. |
| | | | | 0.70 | 74.11 | | End of pit at 0.70 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

| | | | |
|---|---|---|---|
| Trial Pit Log | | | Trialpit No **HP13** Sheet 1 of 1 |
| Project Name: New Park House | Project No. 075856 | Co-ords: - Level: 74.65 | Date 20/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.3 Depth 1.30 | Scale 1:20 |
| Client: North Manchester General Hospital | | | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.05 | 74.60 | | MADE GROUND: Paving slab. |
| | | | | | | | MADE GROUND: Brown slightly gravelly fine to coarse sand. Gravel is angular to subangular fine to medium of brick. *From 0.05 to 0.30m subangular cobbles of brick.* |
| | | | | 1.30 | 73.35 | | End of pit at 1.30 m |

Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

# Trial Pit Log

Trialpit No
**HP14**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 74.28 | Date 20/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.4 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 1.30 | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.10 | 74.18 | | MADE GROUND: Black tarmacadam. |
| | | | | 0.25 | 74.03 | | MADE GROUND: Concrete slab. |
| | | | | 0.50 | 73.78 | | MADE GROUND: Brown mottled dark grey slightly gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of brick and concrete. |
| | | | | 1.30 | 72.98 | | MADE GROUND: Brown fine to coarse SAND with low cobble content. Cobbles are subangular of brick. |
| | | | | | | | End of pit at 1.30 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No
**HP15**
Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 74.29 | Date 20/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.4 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 1.30 | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | | | | MADE GROUND: Decorative gravel over tarmacadam. |
| | | | | 0.15 | 74.14 | | MADE GROUND: Dark greyish brown sandy slightly clayey angular to subangular fine to coarse gravel of brick, porcelain and concrete with low cobble content. Sand is fine to coarse. Cobbles are angular of brick and concrete. |
| | | | | 1.30 | 72.99 | | End of pit at 1.30 m |

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Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Trial Pit Log

Trialpit No **HP17**

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Project Name: New Park House | Project No. 075856 | Co-ords: - <br> Level: 75.44 | Date 20/08/2020 |
| Location: North Manchester General Hospital | | Dimensions (m): 0.3 × 0.35 | Scale 1:20 |
| Client: North Manchester General Hospital | | Depth 1.20 | Logged ZH |

| Water Strike | Samples and In Situ Testing: Depth | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|
| | | | | 0.20 | 75.24 | | Grass over TOPSOIL: Dark grey slightly gravelly very sandy clay with frequent rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to medium of stone. |
| | | | | 1.10 | 74.34 | | MADE GROUND: Dark grey slightly gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of brick, terracotta and chalk. |
| | | | | 1.20 | 74.24 | | Loose brown slightly gravelly slightly clayey fine to coarse SAND. Gravel is angular to subangular fine to medium of sandstone. |

End of pit at 1.20 m

1 2 3 4

Remarks: Service clearance with CAT Scanner prior to progression of exploratory hole.

Stability: Stable.

AGS

# Appendix C – Chemical Laboratory Testing Results

- Envirolab, Environmental Chemistry Analysis Results, Soils
    - Final Analytical Test Report Ref. 20/06681-2
    - Final Analytical Test Report Ref. 20/06773-3

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envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

# FINAL ANALYTICAL TEST REPORT
## SUPPLEMENT TO TEST REPORT 20/06681/1

**Amendments:** Request for split report

**Envirolab Job Number:** 20/06681
**Issue Number:** 2 **Date:** 03 September, 2020

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

**Project Manager:** Rob Allen/Zoe Henderson
**Project Name:** Decant Village
**Project Ref:** B075805
**Order No:** EBMA2484
**Date Samples Received:** 12/08/20
**Date Instructions Received:** 13/08/20
**Date Analysis Completed:** 21/08/20

**Prepared by:**

MMarshall

Melanie Marshall
Laboratory Coordinator

**Approved by:**

Hollyneary-King

Holly Neary-King
Client Services Supervisor

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING 1247

envirolab

**Envirolab Job Number: 20/06681**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| % Stones >10mm$_{A}$ | 5.4 | 0.4 | | | | | | % w/w | 0.1 | A-T-044 |
| pH$_{D}^{M\#}$ | 7.37 | 7.17 | | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_{D}^{M\#}$ | 0.05 | 0.08 | | | | | | 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$_{D}^{M\#}$ | 14.4 | 3.5 | | | | | | % w/w | 0.1 | A-T-032 OM |
| Arsenic$_{D}^{M\#}$ | 26 | 8 | | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_{D}$ | 1.4 | <1.0 | | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_{D}^{M\#}$ | 1.7 | 0.9 | | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_{D}^{M\#}$ | 131 | 32 | | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_{D}^{M\#}$ | 19 | 17 | | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_{D}$ | <1 | <1 | | | | | | mg/kg | 1 | A-T-040s |
| Lead$_{D}^{M\#}$ | 155 | 55 | | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_{D}$ | 0.39 | <0.17 | | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_{D}^{M\#}$ | 53 | 21 | | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_{D}^{M\#}$ | <1 | <1 | | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_{D}^{M\#}$ | 134 | 58 | | | | | | mg/kg | 5 | A-T-024s |

Envirolab Job Number: 20/06681

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | | | | | | | | A-T-045 |

Envirolab Job Number: 20/06681

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| **PAH-16MS** | | | | | | | | | | |
| Acenaphthene$_{A}^{M\#}$ | 0.08 | <0.01 | | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_{A}^{M\#}$ | 0.02 | <0.01 | | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_{A}^{M\#}$ | 0.19 | <0.02 | | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_{A}^{M\#}$ | 0.93 | <0.04 | | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_{A}^{M\#}$ | 0.96 | <0.04 | | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_{A}^{M\#}$ | 1.25 | <0.05 | | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_{A}^{M\#}$ | 0.62 | <0.05 | | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_{A}^{M\#}$ | 0.39 | <0.07 | | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_{A}^{M\#}$ | 1.04 | <0.06 | | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_{A}^{M\#}$ | 0.14 | <0.04 | | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_{A}^{M\#}$ | 1.78 | <0.08 | | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_{A}^{M\#}$ | 0.07 | <0.01 | | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_{A}^{M\#}$ | 0.70 | <0.03 | | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_{A}^{M\#}$ | 0.05 | <0.03 | | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_{A}^{M\#}$ | 0.82 | <0.03 | | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_{A}^{M\#}$ | 1.72 | <0.07 | | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_{A}^{M\#}$ | 10.8 | <0.08 | | | | | | mg/kg | 0.01 | A-T-019s |

Envirolab Job Number: 20/06681

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| **Speciated PCB-EC7 & WHO12** | | | | | | | | | | |
| PCB BZ 28$_{A}$ | <0.002 | - | | | | | | mg/kg | 0.002 | A-T-004s |
| PCB BZ 52$_{A}^{M\#}$ | <0.002 | - | | | | | | mg/kg | 0.002 | A-T-004s |
| PCB BZ 81$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 101$_{A}^{M\#}$ | <0.004 | - | | | | | | mg/kg | 0.004 | A-T-004s |
| PCB BZ 105$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 114$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 118$_{A}^{M\#}$ | <0.007 | - | | | | | | mg/kg | 0.007 | A-T-004s |
| PCB BZ 123$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 126$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 138$_{A}^{M\#}$ | <0.006 | - | | | | | | mg/kg | 0.006 | A-T-004s |
| PCB BZ 153$_{A}^{M\#}$ | <0.004 | - | | | | | | mg/kg | 0.004 | A-T-004s |
| PCB BZ 156$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 157$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 167$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 169$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 180$_{A}^{M\#}$ | <0.004 | - | | | | | | mg/kg | 0.004 | A-T-004s |
| PCB BZ 189$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 77$_{A}$ | <0.005 | - | | | | | | mg/kg | 0.005 | A-T-004s |
| Total Speciated PCB-EC7 & WHO12$_{A}$ | <0.007 | - | | | | | | mg/kg | 0.002 | A-T-004s |

envirolab

**Envirolab Job Number: 20/06681**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| **TPH CWG** | | | | | | | | | | |
| 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$_{A}$ | 2 | <1 | | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_{A}^{M\#}$ | 1 | <1 | | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_{A}^{M\#}$ | 2 | <1 | | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_{A}^{M\#}$ | 4 | <1 | | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_{A}$ | 13 | 5 | | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_{A}$ | 23 | 5 | | | | | | 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$_{A}$ | 4 | <1 | | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_{A}^{M\#}$ | 2 | <1 | | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_{A}$ | 8 | <1 | | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_{A}^{M\#}$ | 19 | 4 | | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_{A}^{M\#}$ | 67 | 7 | | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_{A}$ | 100 | 11 | | | | | | mg/kg | 1 | A-T-055s |
| TPH (Ali & Aro >C5-C35)$_{A}$ | 123 | 16 | | | | | | 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 |

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**Envirolab Job Number: 20/06681**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| **SVOC** | | | | | | | | | | |
| 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 (SVOC)$_A$ | <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$_A$ | <100 | - | | | | | | µg/kg | 100 | A-T-052s |
| Nitrobenzene$_A$ | <100 | - | | | | | | µg/kg | 100 | A-T-052s |
| Isophorone$_A$ | <100 | - | | | | | | µg/kg | 100 | A-T-052s |
| Hexachloroethane$_A$ | <100 | - | | | | | | µg/kg | 100 | A-T-052s |

Envirolab Job Number: 20/06681

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| Hexachlorocyclopentadiene$_A$ | <100 | - | | | | | | µg/kg | 100 | A-T-052s |
| Perylene$_A$ | 303 | - | | | | | | µg/kg | 100 | A-T-052s |

Envirolab Job Number: 20/06681

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| **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$_{A}$ | <10 | - | | | | | | 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: 20/06681

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06681/1 | 20/06681/2 | | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES4 | | | | | | | | |
| Client Sample ID | BH101 | BH101 | | | | | | | | |
| Depth to Top | 0.55 | 2.00 | | | | | | | | |
| Depth To Bottom | 0.60 | 2.10 | | | | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | | | | | | | | |
| Sample Type | Soil - ES | Soil - ES | | | | | | | | |
| Sample Matrix Code | 6ABE | 5A | | | | | | | | |
| 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.
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

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:** Decant Village

**Clients Project No:** B075805

**Project No:** 20/06681

**Date Received:** 13/08/2020 (am)

**Cool Box Temperatures (°C):** 29.4

NO DEVIATIONS IDENTIFIED

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, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

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Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

# FINAL ANALYTICAL TEST REPORT
## SUPPLEMENT TO TEST REPORT 20/06773/2

**Amendments:** Request for split report

**Envirolab Job Number:** 20/06773
**Issue Number:** 3 **Date:** 03 September, 2020

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

**Project Manager:** Rob Allen/Zoe Henderson
**Project Name:** Decant Village
**Project Ref:** B075805
**Order No:** EBMA2484
**Date Samples Received:** 14/07/20
**Date Instructions Received:** 17/08/20
**Date Analysis Completed:** 26/08/20

**Prepared by:**

MMarshall

Melanie Marshall
Laboratory Coordinator

**Approved by:**

Hollyneary-King

Holly Neary-King
Client Services Supervisor

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

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**Envirolab Job Number: 20/06773**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| % Stones >10mm$_{A}$ | 0.9 | 17.5 | 16.5 | <0.1 | <0.1 | | | % w/w | 0.1 | A-T-044 |
| pH$_{D}^{M\#}$ | 7.59 | 7.45 | 7.13 | 6.56 | 7.77 | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_{D}^{M\#}$ | <0.01 | <0.01 | 0.03 | <0.01 | 0.02 | | | g/l | 0.01 | A-T-026s |
| Cyanide (total)$_{A}^{M\#}$ | <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 | | | mg/kg | 0.2 | A-T-050s |
| Organic matter$_{D}^{M\#}$ | 2.0 | 2.8 | 4.7 | 4.5 | 6.6 | | | % w/w | 0.1 | A-T-032 OM |
| Arsenic$_{D}^{M\#}$ | 6 | 9 | 17 | 5 | 9 | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_{D}$ | <1.0 | <1.0 | <1.0 | 1.4 | 2.6 | | | mg/kg | 1 | A-T-027s |
| Cadmium$_{D}^{M\#}$ | 0.9 | 0.7 | 0.9 | 0.7 | 1.0 | | | mg/kg | 0.5 | A-T-024s |
| Copper$_{D}^{M\#}$ | 24 | 25 | 50 | 23 | 117 | | | mg/kg | 1 | A-T-024s |
| Chromium$_{D}^{M\#}$ | 17 | 10 | 15 | 20 | 18 | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_{D}$ | <1 | <1 | <1 | <1 | <1 | | | mg/kg | 1 | A-T-040s |
| Lead$_{D}^{M\#}$ | 36 | 48 | 104 | 44 | 81 | | | mg/kg | 1 | A-T-024s |
| Mercury$_{D}$ | 0.31 | 0.21 | 0.20 | <0.17 | 0.94 | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_{D}^{M\#}$ | 20 | 15 | 26 | 19 | 39 | | | mg/kg | 1 | A-T-024s |
| Selenium$_{D}^{M\#}$ | <1 | <1 | <1 | <1 | 1 | | | mg/kg | 1 | A-T-024s |
| Zinc$_{D}^{M\#}$ | 51 | 52 | 89 | 46 | 86 | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 20/06773**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | NAD | NAD | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | N/A | N/A | | | | | A-T-045 |

Envirolab Job Number: 20/06773

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| **PAH-16MS** | | | | | | | | | | |
| Acenaphthene$_{A}^{M\#}$ | <0.01 | <0.01 | 0.03 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_{A}^{M\#}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_{A}^{M\#}$ | <0.02 | <0.02 | 0.05 | <0.02 | <0.02 | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_{A}^{M\#}$ | <0.04 | <0.04 | 0.14 | <0.04 | <0.04 | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_{A}^{M\#}$ | <0.04 | <0.04 | 0.13 | <0.04 | <0.04 | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_{A}^{M\#}$ | <0.05 | <0.05 | 0.08 | <0.05 | <0.05 | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_{A}^{M\#}$ | <0.05 | <0.05 | 0.07 | <0.05 | <0.05 | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_{A}^{M\#}$ | <0.07 | <0.07 | <0.07 | <0.07 | <0.07 | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_{A}^{M\#}$ | <0.06 | <0.06 | 0.19 | <0.06 | <0.06 | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_{A}^{M\#}$ | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_{A}^{M\#}$ | <0.08 | <0.08 | 0.29 | <0.08 | <0.08 | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_{A}^{M\#}$ | <0.01 | <0.01 | 0.03 | <0.01 | <0.01 | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_{A}^{M\#}$ | <0.03 | <0.03 | 0.09 | <0.03 | <0.03 | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_{A}^{M\#}$ | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_{A}^{M\#}$ | 0.08 | <0.03 | 0.28 | <0.03 | <0.03 | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_{A}^{M\#}$ | 0.08 | <0.07 | 0.31 | <0.07 | <0.07 | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_{A}^{M\#}$ | 0.16 | <0.08 | 1.69 | <0.08 | <0.08 | | | mg/kg | 0.01 | A-T-019s |

Envirolab Job Number: 20/06773

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| **Speciated PCB-EC7 & WHO12** | | | | | | | | | | |
| PCB BZ 28$_{A}$ | - | - | - | <0.002 | - | | | mg/kg | 0.002 | A-T-004s |
| PCB BZ 52$_{A}^{M\#}$ | - | - | - | <0.002 | - | | | mg/kg | 0.002 | A-T-004s |
| PCB BZ 81$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 101$_{A}^{M\#}$ | - | - | - | <0.004 | - | | | mg/kg | 0.004 | A-T-004s |
| PCB BZ 105$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 114$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 118$_{A}^{M\#}$ | - | - | - | <0.007 | - | | | mg/kg | 0.007 | A-T-004s |
| PCB BZ 123$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 126$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 138$_{A}^{M\#}$ | - | - | - | <0.006 | - | | | mg/kg | 0.006 | A-T-004s |
| PCB BZ 153$_{A}^{M\#}$ | - | - | - | <0.004 | - | | | mg/kg | 0.004 | A-T-004s |
| PCB BZ 156$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 157$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 167$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 169$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 180$_{A}^{M\#}$ | - | - | - | <0.004 | - | | | mg/kg | 0.004 | A-T-004s |
| PCB BZ 189$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| PCB BZ 77$_{A}$ | - | - | - | <0.005 | - | | | mg/kg | 0.005 | A-T-004s |
| Total Speciated PCB-EC7 & WHO12$_{A}$ | - | - | - | <0.007 | - | | | mg/kg | 0.002 | A-T-004s |

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**Envirolab Job Number: 20/06773**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| **TPH CWG** | | | | | | | | | | |
| Ali >C5-C6$_{A}^{\#}$ | <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 | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_{A}$ | <1 | <1 | <1 | 1 | <1 | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_{A}^{M\#}$ | <1 | <1 | <1 | 4 | <1 | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_{A}^{M\#}$ | <1 | <1 | <1 | <1 | <1 | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_{A}^{M\#}$ | <1 | <1 | <1 | 3 | <1 | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_{A}$ | 5 | <1 | 2 | 21 | 5 | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_{A}$ | 5 | <1 | 2 | 29 | 5 | | | mg/kg | 1 | A-T-055s |
| Aro >C5-C7$_{A}^{\#}$ | <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 | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_{A}$ | 2 | <1 | <1 | 3 | <1 | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_{A}^{M\#}$ | 2 | <1 | <1 | 4 | <1 | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_{A}$ | 2 | <1 | 2 | 3 | 1 | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_{A}^{M\#}$ | 6 | <1 | 4 | 3 | 1 | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_{A}^{M\#}$ | 20 | 3 | 13 | 60 | 6 | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_{A}$ | 33 | 3 | 19 | 72 | 9 | | | mg/kg | 1 | A-T-055s |
| TPH (Ali & Aro >C5-C35)$_{A}$ | 37 | 3 | 21 | 101 | 13 | | | mg/kg | 1 | A-T-055s |
| BTEX - Benzene$_{A}^{\#}$ | <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 | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_{A}^{\#}$ | <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 | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_{A}^{\#}$ | <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 | | | mg/kg | 0.01 | A-T-022s |

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**Envirolab Job Number: 20/06773**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| **SVOC** | | | | | | | | | | |
| 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 (SVOC)$_A$ | - | - | - | <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$_A$ | - | - | - | <100 | - | | | µg/kg | 100 | A-T-052s |
| Nitrobenzene$_A$ | - | - | - | <100 | - | | | µg/kg | 100 | A-T-052s |
| Isophorone$_A$ | - | - | - | <100 | - | | | µg/kg | 100 | A-T-052s |
| Hexachloroethane$_A$ | - | - | - | <100 | - | | | µg/kg | 100 | A-T-052s |

Envirolab Job Number: 20/06773

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| Hexachlorocyclopentadiene$_A$ | - | - | - | <100 | - | | | µg/kg | 100 | A-T-052s |
| Perylene$_A$ | - | - | - | <100 | - | | | µg/kg | 100 | A-T-052s |

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**Envirolab Job Number: 20/06773**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| **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: 20/06773

Client Project Name: Decant Village

Client Project Ref: B075805

| Lab Sample ID | 20/06773/1 | 20/06773/2 | 20/06773/3 | 20/06773/4 | 20/06773/5 | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | ES1 | ES1 | ES1 | ES1 | ES2 | | | | | |
| Client Sample ID | WS103 | WS102 | WS104 | WS101 | WS101 | | | | | |
| Depth to Top | 0.50 | 0.60 | 0.70 | 0.80 | 1.80 | | | | | |
| Depth To Bottom | 0.60 | 0.70 | 0.80 | 0.90 | 1.90 | | | | | |
| Date Sampled | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | 13-Aug-20 | | | | | |
| Sample Type | Soil - ES | Soil - ES | Soil - ES | Soil - ES | Soil - ES | | | | | |
| Sample Matrix Code | 6AE | 4A | 6AE | 5AE | 5AE | | | | | |
| 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.
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

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:** Decant Village

**Clients Project No:** B075805

**Project No:** 20/06773

**Date Received:** 17/08/2020 (am)

**Cool Box Temperatures (°C):** 20.0

NO DEVIATIONS IDENTIFIED

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, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Appendix D – Geotechnical Laboratory Testing Results

- Envirolab, Environmental Geotechnical Analysis Results
    - Final Analytical Test Report Ref. 20/07369-1
    - Final Analytical Test Report Ref. 20/07369-2
- Structural Soils, Geotechnical Analysis Results
    - Test Report No. 784635 R1
    - Test Report No. 784671 R1

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Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 20/07369
**Issue Number:** 1 **Date:** 24 September, 2020

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

**Project Manager:** Rob Allen/Zoe Henderson
**Project Name:** Decant Village
**Project Ref:** B075805
**Order No:** EBMA2485
**Date Samples Received:** 12/08/20
**Date Instructions Received:** 03/09/20
**Date Analysis Completed:** 24/09/20

**Prepared by:**

Danielle Brierley
Client Manager

**Approved by:**

Richard Wong
Client Manager

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**Envirolab Job Number: 20/07369**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/07369/2 | 20/07369/3 | 20/07369/6 | 20/07369/7 | 20/07369/10 | 20/07369/13 | 20/07369/14 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | B3 | U5 | D8 | B9 | D12 | B15 | D16 | | | |
| Client Sample ID | BH101 | BH101 | BH101 | BH101 | BH101 | BH101 | BH101 | | | |
| Depth to Top | 2.00 | 2.00 | 3.00 | 4.00 | 6.50 | 10.50 | 13.80 | | | |
| Depth To Bottom | | | 3.50 | | 6.95 | | | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 11-Aug-20 | | | |
| Sample Type | Soil | Soil | Soil | Soil | Soil | Soil | Soil | | | |
| Sample Matrix Code | 5A | | 5AE | | 4A | | 5A | | | |
| % Stones >10mm$_{A}$ | <0.1 | - | <0.1 | - | <0.1 | - | <0.1 | % w/w | 0.1 | A-T-044 |
| pH$_{D}^{M\#}$ | 7.66 | - | 7.09 | - | 7.52 | - | 8.36 | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_{D}^{M\#}$ | 0.12 | - | 0.03 | - | <0.01 | - | 0.09 | g/l | 0.01 | A-T-026s |
| 1.10a PSD (Grading/63um/sand fraction/wet sieve) BS1377 pt 2 1990 cl 9.2$_{A}^{\#}$ | Appended | - | - | Appended | - | Appended | - | % | 0.1 | Subcon SS |
| 5.02c QUT Multistage (100mm) BS1377 1990 pt7 cl9 (Undrained Shear Strength)$_{A}^{\#}$ | - | Appended | - | - | - | - | - | N/A | | Subcon SS |

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**Envirolab Job Number: 20/07369**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/07369/15 | 20/07369/19 | 20/07369/25 | 20/07369/26 | 20/07369/27 | 20/07369/28 | 20/07369/29 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | U17 | D21 | D3 | B2 | B2 | D3 | B2 | | | |
| Client Sample ID | BH101 | BH101 | WS101 | WS102 | WS103 | WS103 | WS104 | | | |
| Depth to Top | 14.00 | 17.50 | 2.50 | 3.50 | 1.50 | 4.00 | 3.50 | | | |
| Depth To Bottom | 14.45 | | | 4.00 | 2.00 | | 4.00 | | | |
| Date Sampled | 11-Aug-20 | 11-Aug-20 | | | | | | | | |
| Sample Type | Soil | Soil | Soil | Soil | Soil | Soil | Soil | | | |
| Sample Matrix Code | | 5A | 5A | | | 4A | | | | |
| % Stones >10mm$_{A}$ | - | 2.1 | <0.1 | - | - | <0.1 | - | % w/w | 0.1 | A-T-044 |
| pH$_{D}^{M\#}$ | - | 8.38 | 6.75 | - | - | 8.23 | - | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_{D}^{M\#}$ | - | 0.08 | 0.05 | - | - | <0.01 | - | g/l | 0.01 | A-T-026s |
| 1.10a PSD (Grading/63um/sand fraction/wet sieve) BS1377 pt 2 1990 cl 9.2$_{A}^{\#}$ | - | - | - | Appended | Appended | - | Appended | % | 0.1 | Subcon SS |
| 5.02c QUT Multistage (100mm) BS1377 1990 pt7 cl9 (Undrained Shear Strength)$_{A}^{\#}$ | Appended | - | - | - | - | - | - | N/A | | Subcon SS |

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**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.
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

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:** Decant Village

**Clients Project No:** B075805

**Project No:** 20/07369

**Date Received:** 03/09/2020 (am)

**Cool Box Temperatures (°C):** 15.3

| **Lab Sample ID** | 20/07369/25 | 20/07369/26 | 20/07369/27 | 20/07369/28 | 20/07369/29 |
|---|---|---|---|---|---|
| **Client Sample No** | D3 | B2 | B2 | D3 | B2 |
| **Client Sample ID/Depth** | WS101 2.50m | WS102 3.50-4.00m | WS103 1.50-2.00m | WS103 4.00m | WS104 3.50-4.00m |
| **Date Sampled** | | | | | |
| **Deviation Code** | | | | | |
| E (no date) | ✓ | ✓ | ✓ | ✓ | ✓ |

*Key*
*E (no date)* *No sampling date provided (all results affected if not provided)*

*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, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.*

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Mottram Road, Hyde, Cheshire, SK14 3AR

# FINAL ANALYTICAL TEST REPORT
## SUPPLEMENT TO TEST REPORT 20/07369/1

**Amendments:** Request for Additional Analysis

**Envirolab Job Number:** 20/07369
**Issue Number:** 2 **Date:** 12 October, 2020

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

**Project Manager:** Rob Allen/Zoe Henderson
**Project Name:** Decant Village
**Project Ref:** B075805
**Order No:** EBMA2485 & 2518
**Date Samples Received:** 12/08/20
**Date Instructions Received:** 03/09/20
**Date Analysis Completed:** 12/10/20

**Prepared by:**

Melanie Marshall
Laboratory Coordinator

**Approved by:**

Richard Wong
Client Manager

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**Envirolab Job Number: 20/07369**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/07369/1 | 20/07369/2 | 20/07369/3 | 20/07369/6 | 20/07369/7 | 20/07369/10 | 20/07369/12 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | D2 | B3 | U5 | D8 | B9 | D12 | D14 | | | |
| Client Sample ID | BH101 | BH101 | BH101 | BH101 | BH101 | BH101 | BH101 | | | |
| Depth to Top | 1.20 | 2.00 | 2.00 | 3.00 | 4.00 | 6.50 | 9.50 | | | |
| Depth To Bottom | 1.65 | | | 3.50 | | 6.95 | 9.95 | | | |
| Date Sampled | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | 10-Aug-20 | | | |
| Sample Type | Soil | Soil | Soil | Soil | Soil | Soil | Soil | | | |
| Sample Matrix Code | | 5A | | 5AE | | 4A | | | | |
| % Stones >10mm$_{A}$ | - | <0.1 | - | <0.1 | - | <0.1 | - | % w/w | 0.1 | A-T-044 |
| pH$_{D}^{M\#}$ | - | 7.66 | - | 7.09 | - | 7.52 | - | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_{D}^{M\#}$ | - | 0.12 | - | 0.03 | - | <0.01 | - | g/l | 0.01 | A-T-026s |
| 1.10a PSD (Grading/63um/sand fraction/wet sieve) BS1377 pt 2 1990 cl 9.2$_{A}^{\#}$ | - | Appended | - | - | Appended | - | - | % | 0.1 | Subcon SS |
| 1.02 Atterburg 4Pt BS1377 1990 pt2 cl4.4,5.3+5.4$_{A}^{\#}$ | Appended | - | - | Appended | - | - | Appended | % | 1 | Subcon SS |
| 1.01 % Moisture BS1377 1990 pt2 cl3.2$_{A}^{\#}$ | Appended | - | - | Appended | - | - | Appended | % | 0.1 | Subcon SS |
| 5.02c QUT Multistage (100mm) BS1377 1990 pt7 cl9 (Undrained Shear Strength)$_{A}^{\#}$ | - | - | Appended | - | - | - | - | N/A | | Subcon SS |

envirolab

**Envirolab Job Number: 20/07369**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/07369/13 | 20/07369/14 | 20/07369/15 | 20/07369/17 | 20/07369/19 | 20/07369/22 | 20/07369/25 | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | B15 | D16 | U17 | D19 | D21 | D2 | D3 | | | |
| Client Sample ID | BH101 | BH101 | BH101 | BH101 | BH101 | BH101A | WS101 | | | |
| Depth to Top | 10.50 | 13.80 | 14.00 | 15.50 | 17.50 | 21.00 | 2.50 | | | |
| Depth To Bottom | | | 14.45 | 15.95 | | | | | | |
| Date Sampled | 10-Aug-20 | 11-Aug-20 | 11-Aug-20 | 11-Aug-20 | 11-Aug-20 | | | | | |
| Sample Type | Soil | Soil | Soil | Soil | Soil | Soil | Soil | | | |
| Sample Matrix Code | | 5A | | | 5A | | 5A | | | |
| % Stones >10mm$_{A}$ | - | <0.1 | - | - | 2.1 | - | <0.1 | % w/w | 0.1 | A-T-044 |
| pH$_{D}^{M\#}$ | - | 8.36 | - | - | 8.38 | - | 6.75 | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_{D}^{M\#}$ | - | 0.09 | - | - | 0.08 | - | 0.05 | g/l | 0.01 | A-T-026s |
| 1.10a PSD (Grading/63um/sand fraction/wet sieve) BS1377 pt 2 1990 cl 9.2$_{A}^{\#}$ | Appended | - | - | - | - | - | - | % | 0.1 | Subcon SS |
| 1.02 Atterburg 4Pt BS1377 1990 pt2 cl4.4,5.3+5.4$_{A}^{\#}$ | - | - | - | Appended | - | Appended | - | % | 1 | Subcon SS |
| 1.01 % Moisture BS1377 1990 pt2 cl3.2$_{A}^{\#}$ | - | - | - | Appended | - | Appended | - | % | 0.1 | Subcon SS |
| 5.02c QUT Multistage (100mm) BS1377 1990 pt7 cl9 (Undrained Shear Strength)$_{A}^{\#}$ | - | - | Appended | - | - | - | - | N/A | | Subcon SS |

**Envirolab Job Number: 20/07369**

**Client Project Name: Decant Village**

**Client Project Ref: B075805**

| Lab Sample ID | 20/07369/26 | 20/07369/27 | 20/07369/28 | 20/07369/29 | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | B2 | B2 | D3 | B2 | | | | | | |
| Client Sample ID | WS102 | WS103 | WS103 | WS104 | | | | | | |
| Depth to Top | 3.50 | 1.50 | 4.00 | 3.50 | | | | | | |
| Depth To Bottom | 4.00 | 2.00 | | 4.00 | | | | | | |
| Date Sampled | | | | | | | | | | |
| Sample Type | Soil | Soil | Soil | Soil | | | | | | |
| Sample Matrix Code | | | 4A | | | | | | | |
| % Stones >10mm$_{A}$ | - | - | <0.1 | - | | | | % w/w | 0.1 | A-T-044 |
| pH$_{D}^{M\#}$ | - | - | 8.23 | - | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_{D}^{M\#}$ | - | - | <0.01 | - | | | | g/l | 0.01 | A-T-026s |
| 1.10a PSD (Grading/63um/sand fraction/wet sieve) BS1377 pt 2 1990 cl 9.2$_{A}^{\#}$ | Appended | Appended | - | Appended | | | | % | 0.1 | Subcon SS |

## 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℃).
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℃ / 11550µS/cm @ 20℃ 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.
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

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:** Decant Village

**Clients Project No:** B075805

**Project No:** 20/07369

**Date Received:** 03/09/2020 (am)

**Cool Box Temperatures (°C):** 15.3

| **Lab Sample ID** | 20/07369/22 | 20/07369/25 | 20/07369/26 | 20/07369/27 | 20/07369/28 | 20/07369/29 |
|---|---|---|---|---|---|---|
| **Client Sample No** | D2 | D3 | B2 | B2 | D3 | B2 |
| **Client Sample ID/Depth** | BH101A 21.00m | WS101 2.50m | WS102 3.50-4.00m | WS103 1.50-2.00m | WS103 4.00m | WS104 3.50-4.00m |
| **Date Sampled** | | | | | | |
| **Deviation Code** | | | | | | |
| E (no date) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Key*
*E (no date)* *No sampling date provided (all results affected if not provided)*

*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, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.*

# STRUCTURAL SOILS LTD

## TEST REPORT

Report No. 784635 R1

1774

| | | | |
|---|---|---|---|
| Date | 22-September-2020 | Contract | 20/07369 |

Client Envirolab Ltd
Address Units 7 & 8 Sandpits Business Park
Mottram Road
Hyde
SK14 3AR

For the Attention of Holly Neary-King

| | | | |
|---|---|---|---|
| Samples submitted by client | 04/09/2020 | Client Reference | 20/07369 |
| Testing Started | 07/09/2020 | Client Order No. | |
| Testing Completed | 22/09/2020 | Instruction Type | Written |

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests Undertaken

Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
Undrained shear strength triaxial compression without pore pressure measurement (multistage loading) BS1377:Part 7:1990,clause 8.5

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

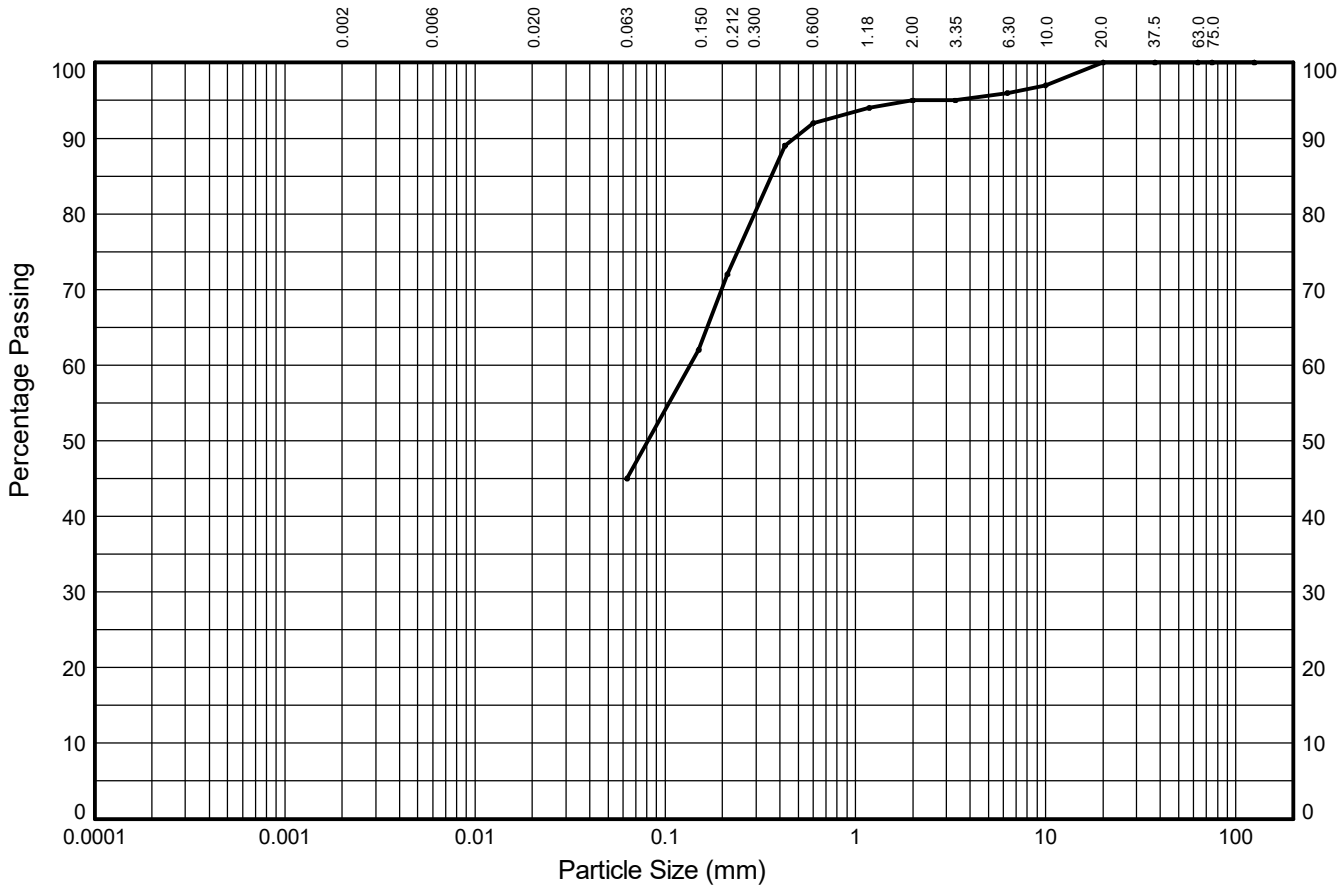
Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail luke.fisher@soils.co.uk

# PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Borehole: **BH101** Sample Ref: **20/07369/2** Sample Type: **B** Depth (m): **2.00**




| CLAY | fine | medium | coarse | fine | medium | coarse | fine | medium | coarse | COBBLES |
|---|---|---|---|---|---|---|---|---|---|---|
| | - | - | - | 25% | 22% | 3% | 1% | 4% | 0% | |
| | SILT | | | SAND | | | GRAVEL | | | |
| 45% | | | | 50% | | | 5% | | | 0% |

| Test Sieve (mm) | Percent Passing (%) |
|---|---|
| 125.0 | **100** |
| 75.0 | **100** |
| 63.0 | **100** |
| 37.5 | **100** |
| 20.0 | **100** |
| 10.0 | **97** |
| 6.30 | **96** |
| 3.35 | **95** |
| 2.00 | **95** |
| 1.18 | **94** |
| 0.600 | **92** |
| 0.425 | **89** |
| 0.212 | **72** |
| 0.150 | **62** |
| 0.063 | **45** |

| Particle Diameter (mm) | Percent Passing (%) |
|---|---|
| | |

Sedimentation sample was not pre-treated

| Coefficients | |
|---|---|
| $D_{10}$ (mm) | **NA** |
| $D_{15}$ (mm) | **NA** |
| $D_{30}$ (mm) | **NA** |
| $D_{50}$ (mm) | **0.081** |
| $D_{60}$ (mm) | **0.135** |
| $D_{85}$ (mm) | **0.361** |
| $D_{90}$ (mm) | **0.477** |
| $C_U$ | **NA** |
| $C_C$ | **NA** |

Soil Description:

**Grey slightly gravelly very clayey SAND**

Key: $C_U$ = Uniformity coefficient. $C_C$ = Coefficient of curvature as defined in BS EN ISO 14688-2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| Compiled By | Date |
|---|---|
| LORNA WHITWORTH | 22/09/20 |

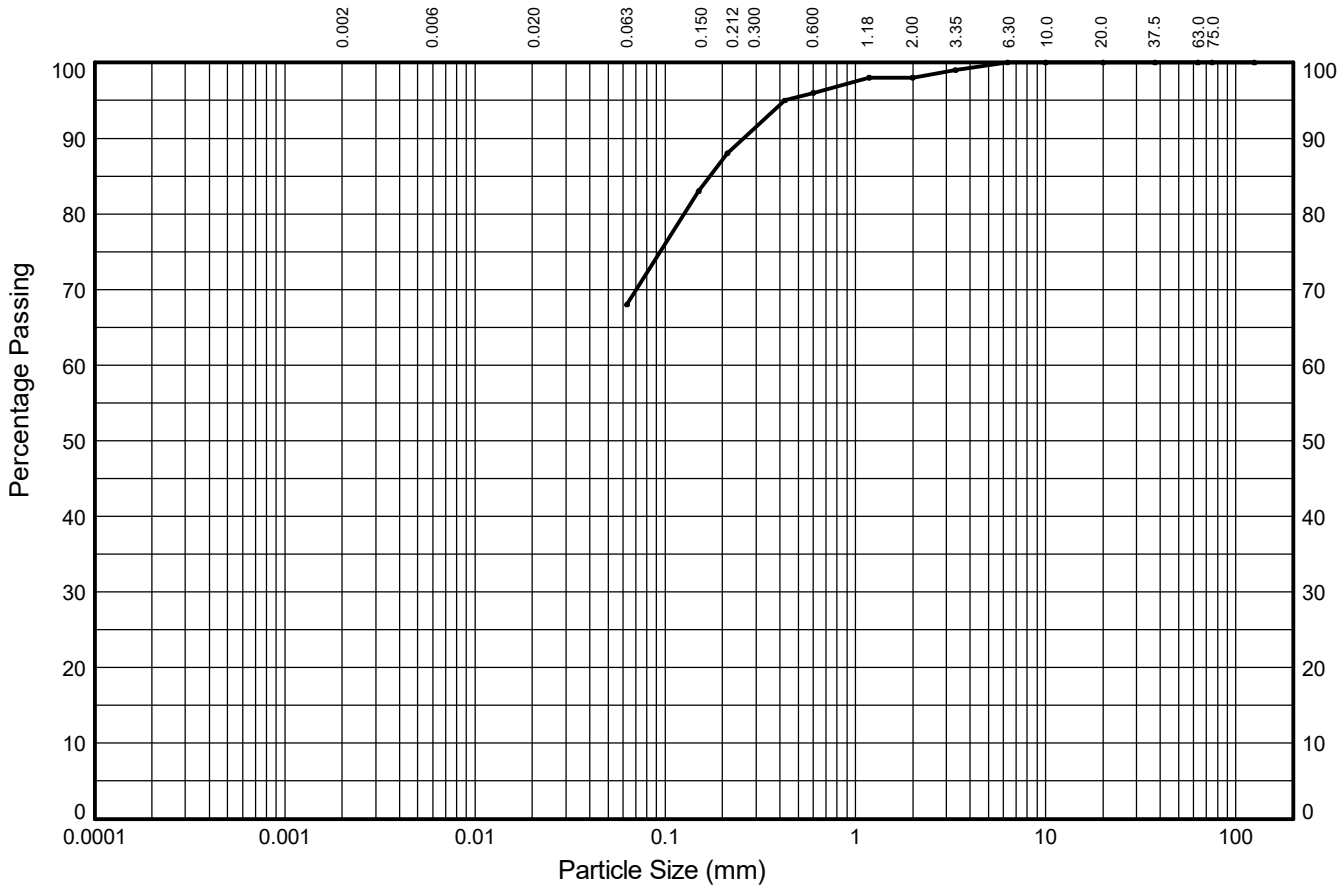
| Contract | Contract Ref: |
|---|---|
| 20/07369 | 784635 |


GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 784635-20-07369.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 22/09/20 - 17:21 | LW5 |

# PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Borehole: **BH101** Sample Ref: **20/07369/7** Sample Type: **B** Depth (m): **4.00**




| CLAY | fine | medium | coarse | fine | medium | coarse | fine | medium | coarse | COBBLES |
|---|---|---|---|---|---|---|---|---|---|---|
| | - | - | - | 19% | 9% | 2% | 2% | 0% | 0% | |
| | SILT | | | SAND | | | GRAVEL | | | |
| 68% | | | | 30% | | | 2% | | | 0% |

| Test Sieve (mm) | Percent Passing (%) |
|---|---|
| 125.0 | **100** |
| 75.0 | **100** |
| 63.0 | **100** |
| 37.5 | **100** |
| 20.0 | **100** |
| 10.0 | **100** |
| 6.30 | **100** |
| 3.35 | **99** |
| 2.00 | **98** |
| 1.18 | **98** |
| 0.600 | **96** |
| 0.425 | **95** |
| 0.212 | **88** |
| 0.150 | **83** |
| 0.063 | **68** |

| Particle Diameter (mm) | Percent Passing (%) |
|---|---|
| | |

Sedimentation sample was not pre-treated

| Coefficients | |
|---|---|
| $D_{10}$ (mm) | **NA** |
| $D_{15}$ (mm) | **NA** |
| $D_{30}$ (mm) | **NA** |
| $D_{50}$ (mm) | **NA** |
| $D_{60}$ (mm) | **NA** |
| $D_{85}$ (mm) | **0.172** |
| $D_{90}$ (mm) | **0.259** |
| $C_U$ | **NA** |
| $C_C$ | **NA** |

Soil Description:

**Grey slightly gravelly slightly sandy CLAY**

Key: $C_U$ = Uniformity coefficient. $C_C$ = Coefficient of curvature as defined in BS EN ISO 14688-2

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W. Yorkshire WF10 1NJ

| Compiled By | Date |
|---|---|
| **LORNA WHITWORTH** | **22/09/20** |

| Contract | Contract Ref: |
|---|---|
| **20/07369** | **784635** |

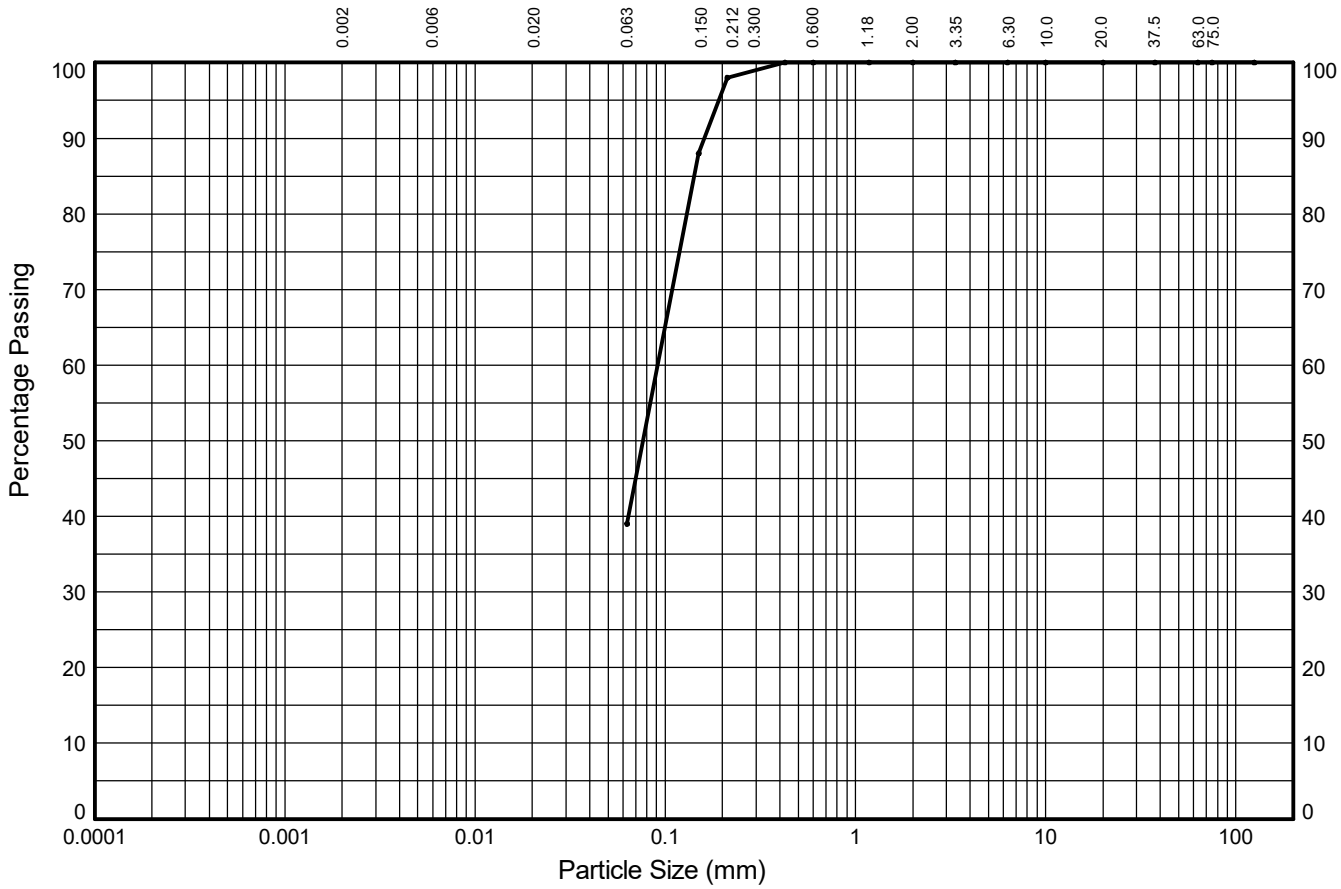
AGS

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 784635-20-07369.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 22/09/20 - 17:21 | LW5 |

# PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Borehole: **BH101** Sample Ref: **20/07369/13** Sample Type: **B** Depth (m): **10.50**




| CLAY | fine | medium | coarse | fine | medium | coarse | fine | medium | coarse | COBBLES |
|---|---|---|---|---|---|---|---|---|---|---|
| | - | - | - | 57% | 4% | 0% | 0% | 0% | 0% | |
| | SILT | | | SAND | | | GRAVEL | | | |
| 39% | | | | 61% | | | 0% | | | 0% |

| Test Sieve (mm) | Percent Passing (%) |
|---|---|
| 125.0 | **100** |
| 75.0 | **100** |
| 63.0 | **100** |
| 37.5 | **100** |
| 20.0 | **100** |
| 10.0 | **100** |
| 6.30 | **100** |
| 3.35 | **100** |
| 2.00 | **100** |
| 1.18 | **100** |
| 0.600 | **100** |
| 0.425 | **100** |
| 0.212 | **98** |
| 0.150 | **88** |
| 0.063 | **39** |

| Particle Diameter (mm) | Percent Passing (%) |
|---|---|
| | |

Sedimentation sample was not pre-treated

| Coefficients | |
|---|---|
| $D_{10}$ (mm) | **NA** |
| $D_{15}$ (mm) | **NA** |
| $D_{30}$ (mm) | **NA** |
| $D_{50}$ (mm) | **0.077** |
| $D_{60}$ (mm) | **0.091** |
| $D_{85}$ (mm) | **0.142** |
| $D_{90}$ (mm) | **0.161** |
| $C_U$ | **NA** |
| $C_C$ | **NA** |

Soil Description:

**Brown very clayey SAND**

Key: $C_U$ = Uniformity coefficient. $C_C$ = Coefficient of curvature as defined in BS EN ISO 14688-2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Castleford
W. Yorkshire WF10 1NJ


| Compiled By | Date |
|---|---|
| **LORNA WHITWORTH** | **22/09/20** |

| Contract | Contract Ref: |
|---|---|
| **20/07369** | **784635** |

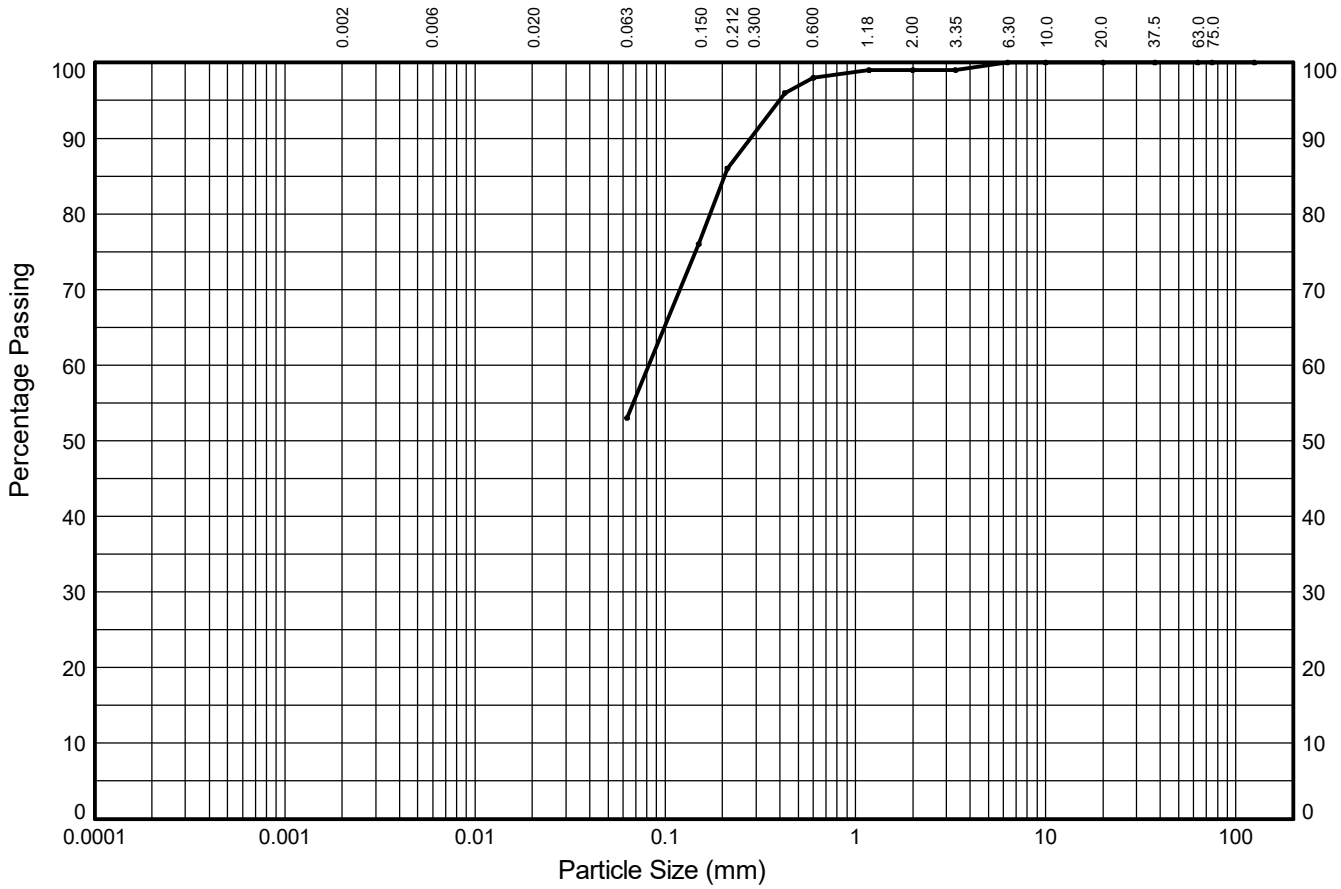
AGS


GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 784635-20-07369.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 22/09/20 - 17:21 | LW5 |

# PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Window Sample: **WS102** Sample Ref: **20/07369/26** Sample Type: **B** Depth (m): **3.50**




| CLAY | fine | medium | coarse | fine | medium | coarse | fine | medium | coarse | COBBLES |
|---|---|---|---|---|---|---|---|---|---|---|
| | - | - | - | 31% | 14% | 1% | 1% | 0% | 0% | |
| | SILT | | | SAND | | | GRAVEL | | | |
| 53% | | | | 46% | | | 1% | | | 0% |

| Test Sieve (mm) | Percent Passing (%) |
|---|---|
| 125.0 | **100** |
| 75.0 | **100** |
| 63.0 | **100** |
| 37.5 | **100** |
| 20.0 | **100** |
| 10.0 | **100** |
| 6.30 | **100** |
| 3.35 | **99** |
| 2.00 | **99** |
| 1.18 | **99** |
| 0.600 | **98** |
| 0.425 | **96** |
| 0.212 | **86** |
| 0.150 | **76** |
| 0.063 | **53** |

| Particle Diameter (mm) | Percent Passing (%) |
|---|---|
| | |

Sedimentation sample was not pre-treated

| Coefficients | |
|---|---|
| $D_{10}$ (mm) | **NA** |
| $D_{15}$ (mm) | **NA** |
| $D_{30}$ (mm) | **NA** |
| $D_{50}$ (mm) | **NA** |
| $D_{60}$ (mm) | **0.082** |
| $D_{85}$ (mm) | **0.205** |
| $D_{90}$ (mm) | **0.280** |
| $C_U$ | **NA** |
| $C_C$ | **NA** |

Soil Description:
**Brown slightly gravelly sandy CLAY**

Key: $C_U$ = Uniformity coefficient. $C_C$ = Coefficient of curvature as defined in BS EN ISO 14688-2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W. Yorkshire WF10 1NJ

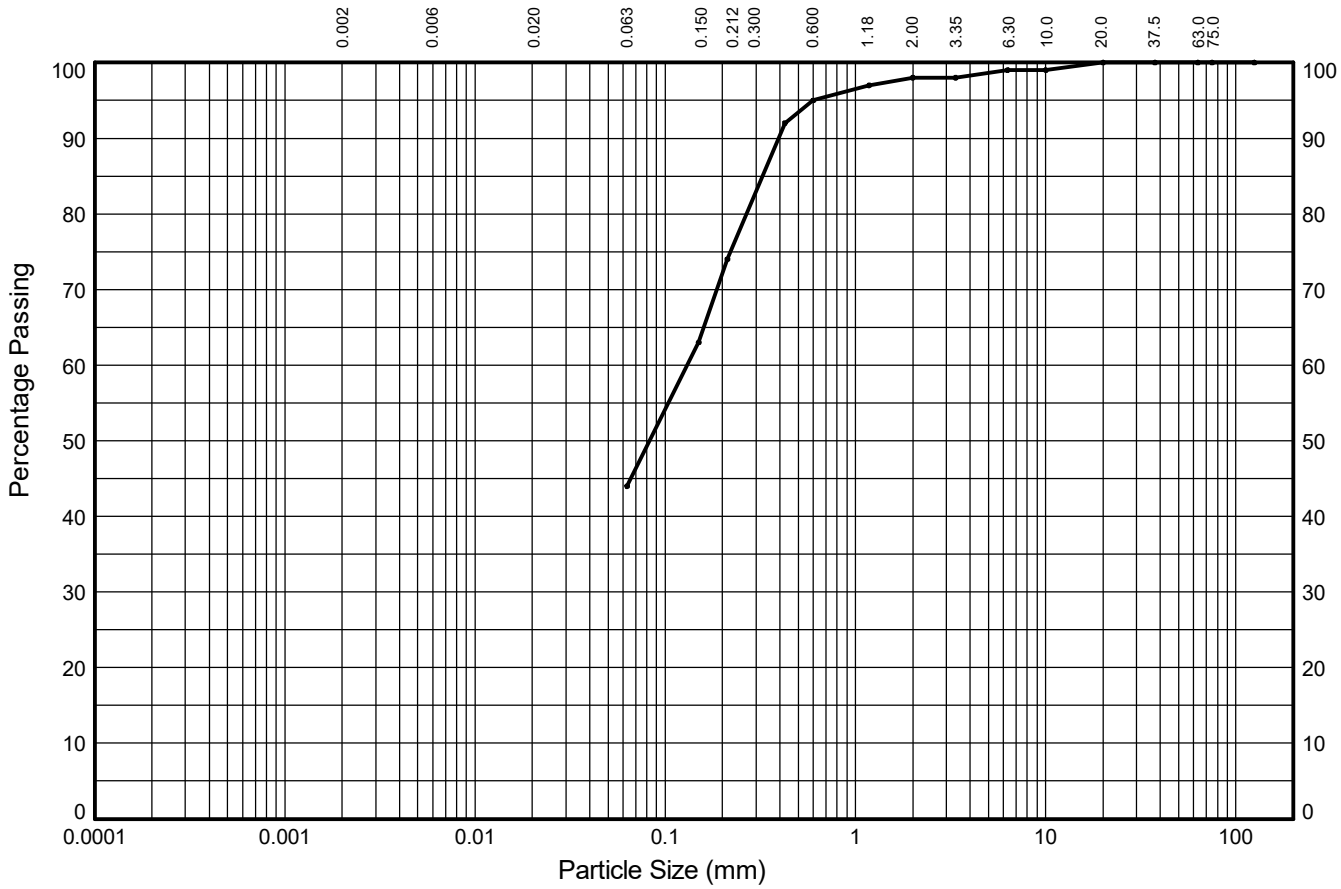

| Compiled By | | Date |
|---|---|---|
| | **LUKE FISHER** | **22/09/20** |
| Contract **20/07369** | Contract Ref: **784635** | |


GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 784635-20-07369.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 22/09/20 - 17:21 | LW5 |

# PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Window Sample: **WS103** Sample Ref: **20/07369/27** Sample Type: **B** Depth (m): **1.50**




| CLAY | fine | medium | coarse | fine | medium | coarse | fine | medium | coarse | COBBLES |
|---|---|---|---|---|---|---|---|---|---|---|
| | - | - | - | 28% | 23% | 3% | 1% | 1% | 0% | |
| | SILT | | | SAND | | | GRAVEL | | | |
| 44% | | | | 54% | | | 2% | | | 0% |

| Test Sieve (mm) | Percent Passing (%) |
|---|---|
| 125.0 | **100** |
| 75.0 | **100** |
| 63.0 | **100** |
| 37.5 | **100** |
| 20.0 | **100** |
| 10.0 | **99** |
| 6.30 | **99** |
| 3.35 | **98** |
| 2.00 | **98** |
| 1.18 | **97** |
| 0.600 | **95** |
| 0.425 | **92** |
| 0.212 | **74** |
| 0.150 | **63** |
| 0.063 | **44** |

| Particle Diameter (mm) | Percent Passing (%) |
|---|---|
| | |

Sedimentation sample was not pre-treated

| Coefficients | |
|---|---|
| $D_{10}$ (mm) | **NA** |
| $D_{15}$ (mm) | **NA** |
| $D_{30}$ (mm) | **NA** |
| $D_{50}$ (mm) | **0.083** |
| $D_{60}$ (mm) | **0.131** |
| $D_{85}$ (mm) | **0.324** |
| $D_{90}$ (mm) | **0.393** |
| $C_U$ | **NA** |
| $C_C$ | **NA** |

Soil Description:

**Brown slightly gravelly very clayey SAND**

Key: $C_U$ = Uniformity coefficient. $C_C$ = Coefficient of curvature as defined in BS EN ISO 14688-2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Pottery Street
Castleford
W. Yorkshire WF10 1NJ


| Compiled By | | Date |
|---|---|---|
| | **LORNA WHITWORTH** | **22/09/20** |
| Contract **20/07369** | Contract Ref: **784635** | |


GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 784635-20-07369.GPJ - v10_01.
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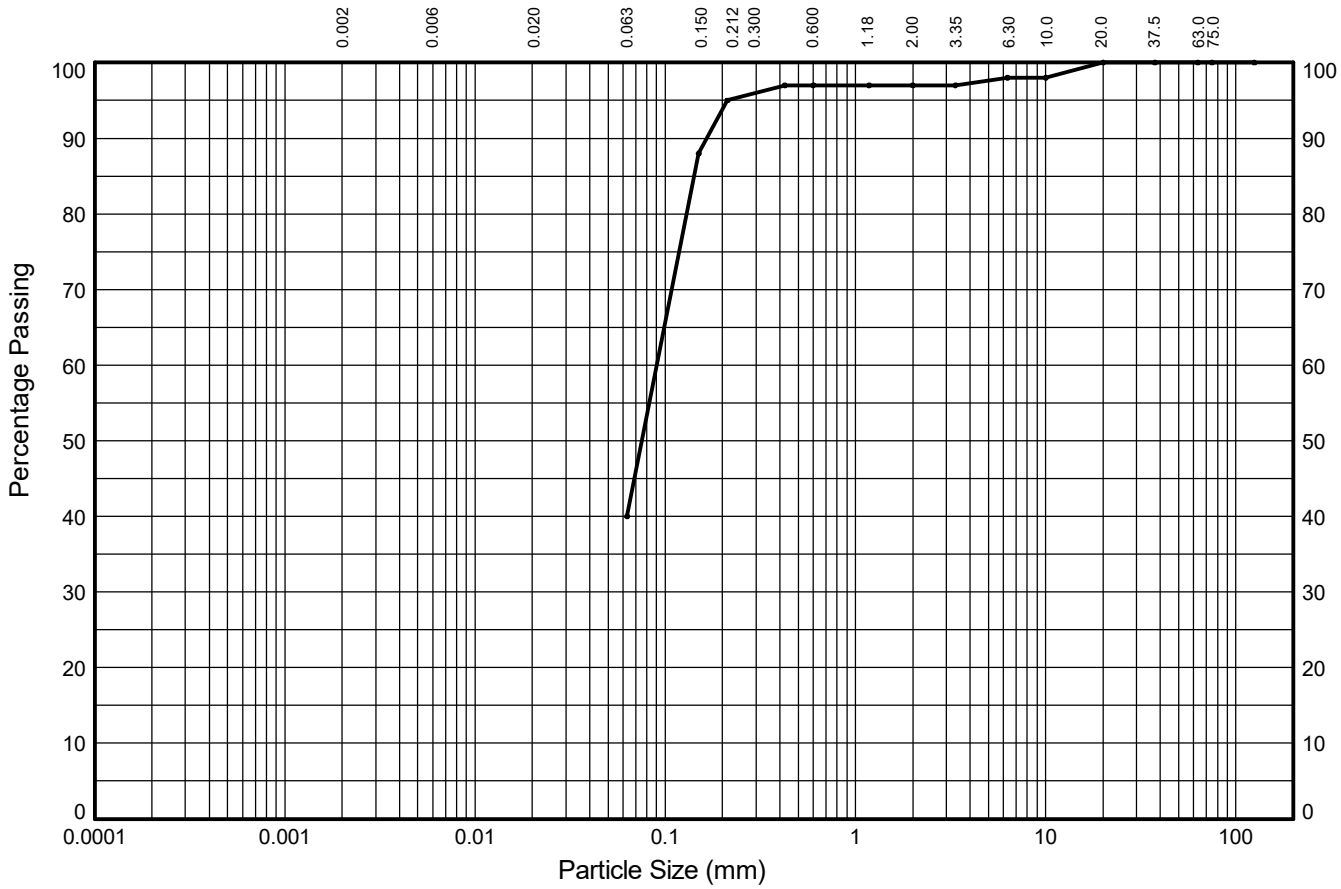
# PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Window Sample: **WS104** Sample Ref: **20/07369/29** Sample Type: **B** Depth (m): **3.50**




| CLAY | fine | medium | coarse | fine | medium | coarse | fine | medium | coarse | COBBLES |
|---|---|---|---|---|---|---|---|---|---|---|
| | - | - | - | 54% | 3% | 0% | 1% | 2% | 0% | |
| | SILT | | | SAND | | | GRAVEL | | | |
| 40% | | | | 57% | | | 3% | | | 0% |

| Test Sieve (mm) | Percent Passing (%) |
|---|---|
| 125.0 | **100** |
| 75.0 | **100** |
| 63.0 | **100** |
| 37.5 | **100** |
| 20.0 | **100** |
| 10.0 | **98** |
| 6.30 | **98** |
| 3.35 | **97** |
| 2.00 | **97** |
| 1.18 | **97** |
| 0.600 | **97** |
| 0.425 | **97** |
| 0.212 | **95** |
| 0.150 | **88** |
| 0.063 | **40** |

| Particle Diameter (mm) | Percent Passing (%) |
|---|---|
| | |

Sedimentation sample was not pre-treated

| Coefficients | |
|---|---|
| $D_{10}$ (mm) | **NA** |
| $D_{15}$ (mm) | **NA** |
| $D_{30}$ (mm) | **NA** |
| $D_{50}$ (mm) | **0.075** |
| $D_{60}$ (mm) | **0.090** |
| $D_{85}$ (mm) | **0.142** |
| $D_{90}$ (mm) | **0.166** |
| $C_U$ | **NA** |
| $C_C$ | **NA** |

Soil Description:

**Brown slightly gravelly very clayey SAND**

Key: $C_U$ = Uniformity coefficient. $C_C$ = Coefficient of curvature as defined in BS EN ISO 14688-2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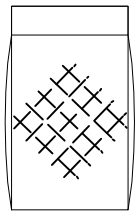
# UNCONSOLIDATED QUICK UNDRAINED (MULTI-STAGE) TRIAXIAL COMPRESSION TEST

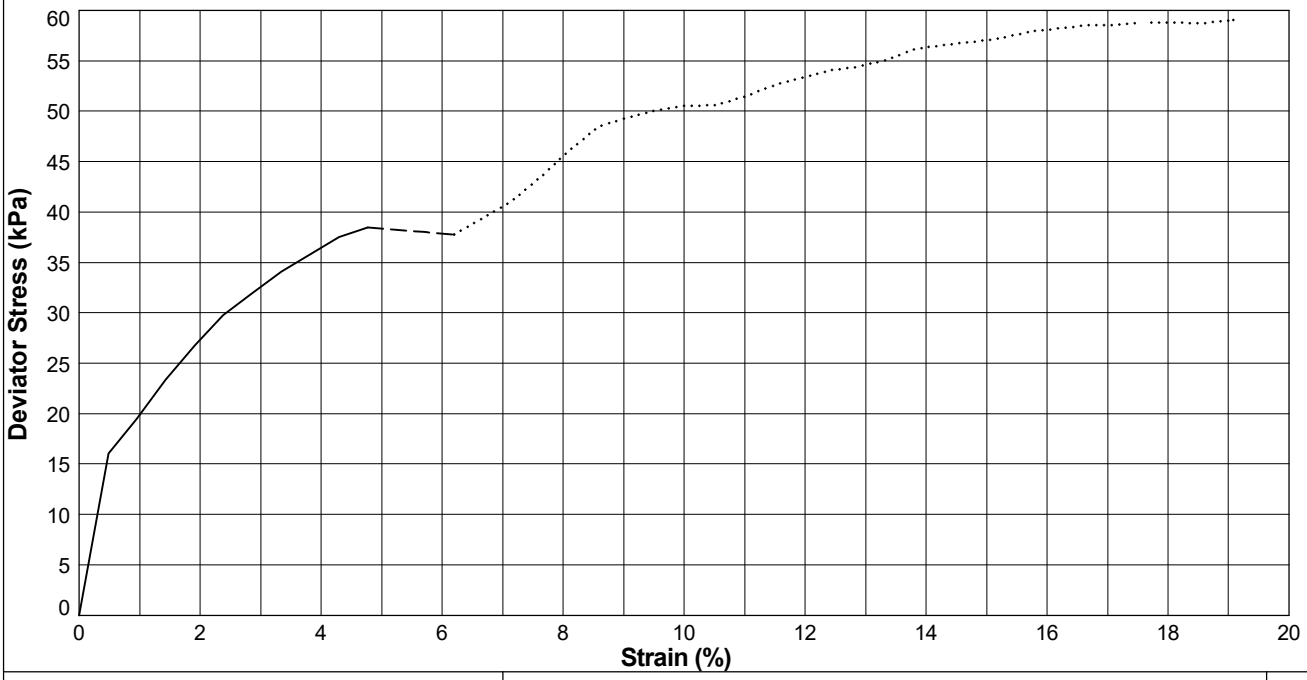
In accordance with BS1377 Part 7 Clause 9

Borehole: **BH101** Sample Ref: **20/07369/3** Sample Type: **B** Depth (m): **2.00**

Description : **Brown slightly gravelly sandy CLAY**

| STAGE NUMBER | | | 1 | 2 | 3 |
|---|---|---|---|---|---|
| SAMPLE DETAILS | Sample Condition | | Undisturbed | | |
| | Orientation of sample | | Vertical | | |
| | Diameter | (mm) | 102.83 | | |
| | Height | (mm) | 209.67 | | |
| | Moisture Content | (%) | 24 | | |
| | Bulk Density | ($Mg/m^3$) | 2.00 | | |
| | Dry Density | ($Mg/m^3$) | 1.62 | | |
| TEST DETAILS | Membrane Type | | Rubber | Rubber | Rubber |
| | Membrane Thickness | (mm) | 0.30 | 0.30 | 0.30 |
| | Rate of Axial Displacement | (%/min) | 2.00 | 2.00 | 2.00 |
| | Cell Pressure | (kPa) | 20 | 40 | 80 |
| | Membrane Correction | (kPa) | 0.38 | 0.38 | 1.07 |
| | Corrected Deviator Stress | (kPa) | 38 | 38 | 59 |
| | Undrained Shear Strength | (kPa) | 19 | 19 | 30 |
| FAILURE DETAILS | Strain at Failure | (%) | 4.8 | 4.8 | 19.1 |
| | Mode of Failure<br>**Semi-plastic (intermediate)** | | | |  |

**Key:** Stage 1 Stage 2 Stage 3

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| Compiled By | Date |
|---|---|
| LORNA WHITWORTH | 22/09/20 |

| Contract | Contract Ref: |
|---|---|
| 20/07369 | 784635 |

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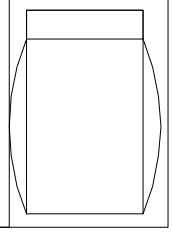
# UNCONSOLIDATED QUICK UNDRAINED (MULTI-STAGE) TRIAXIAL COMPRESSION TEST

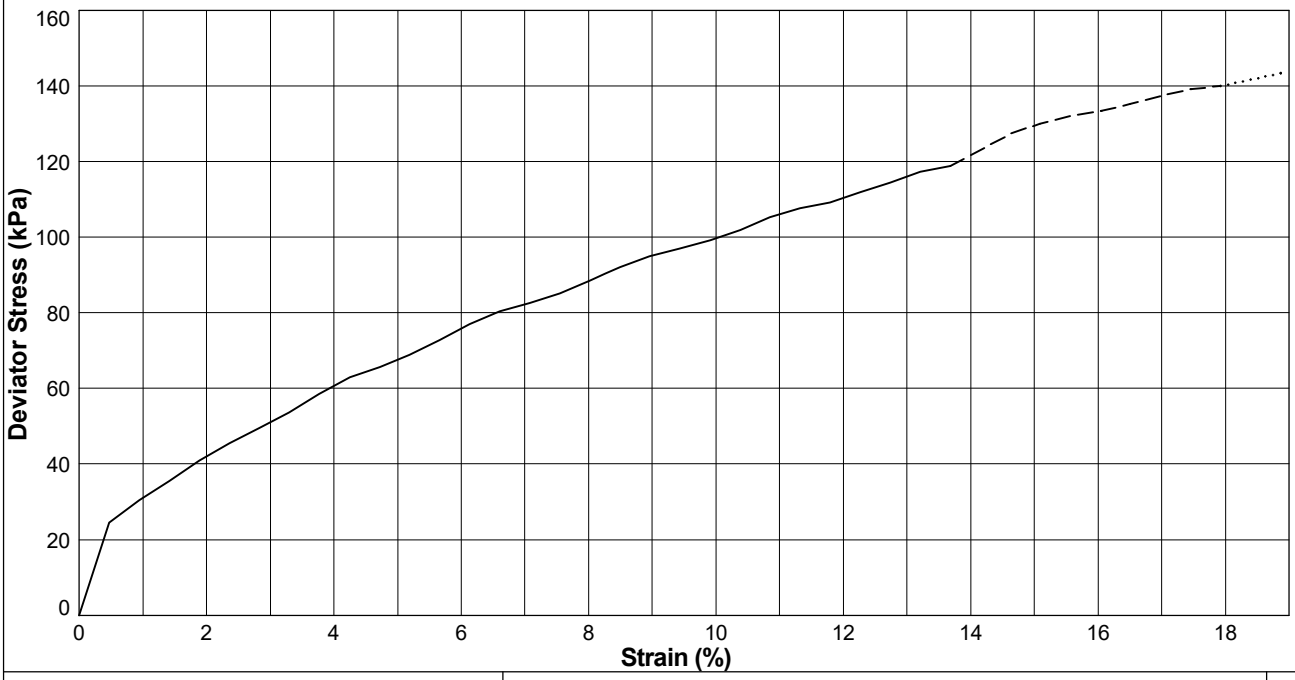
In accordance with BS1377 Part 7 Clause 9

Borehole: **BH101** Sample Ref: **20/07369/15** Sample Type: **B** Depth (m): **14.00**

Description : **Brown slightly gravelly slightly sandy CLAY**

| STAGE NUMBER | | | 1 | 2 | 3 |
|---|---|---|---|---|---|
| SAMPLE DETAILS | Sample Condition | | Undisturbed | | |
| | Orientation of sample | | Vertical | | |
| | Diameter | (mm) | 102.00 | | |
| | Height | (mm) | 212.00 | | |
| | Moisture Content | (%) | 16 | | |
| | Bulk Density | ($Mg/m^3$) | 2.16 | | |
| | Dry Density | ($Mg/m^3$) | 1.86 | | |
| TEST DETAILS | Membrane Type | | Rubber | Rubber | Rubber |
| | Membrane Thickness | (mm) | 0.30 | 0.30 | 0.30 |
| | Rate of Axial Displacement | (%/min) | 2.00 | 2.00 | 2.00 |
| | Cell Pressure | (kPa) | 140 | 280 | 560 |
| | Membrane Correction | (kPa) | 0.84 | 1.03 | 1.07 |
| | Corrected Deviator Stress | (kPa) | 119 | 140 | 143 |
| | Undrained Shear Strength | (kPa) | 59 | 70 | 72 |
| FAILURE DETAILS | Strain at Failure | (%) | 13.7 | 17.9 | 18.9 |
| | Mode of Failure<br>**Plastic (Barrelling)** | | | |  |

**Key:** Stage 1 Stage 2 Stage 3

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W. Yorkshire WF10 1NJ

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| LORNA WHITWORTH | 22/09/20 |

| Contract | Contract Ref: |
|---|---|
| 20/07369 | 784635 |

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# TESTING VERIFICATION CERTIFICATE

UKAS TESTING
1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **24/09/2020 07:35:30**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
**Luke Fisher (Laboratory Manager)**

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU

| | Contract: | Job No: |
|---|---|---|
| **STRUCTURAL SOILS LTD** | **20/07369** | **784635** |

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GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | GrfcText L - LAB VERIFICATION REPORT - V02 - A4P | 784635-20-07369.GPJ - v10_01
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# STRUCTURAL SOILS LTD

## TEST REPORT

Report No. 784671 R1

1774

| | | | |
|---|---|---|---|
| Date | 12-October-2020 | Contract | 20/07369 |

Client Envirolab Ltd
Address Units 7 & 8 Sandpits Business Park
Mottram Road
Hyde
SK14 3AR

For the Attention of Holly Neary-King

| | | | |
|---|---|---|---|
| Samples submitted by client | 29/09/2020 | Client Reference | 20/07369 |
| Testing Started | 01/10/2020 | Client Order No. | |
| Testing Completed | 12/10/2020 | Instruction Type | Written |

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests Undertaken

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2 (superseded) **
Liquid Limit (one point method) BS1377:Part 2:1990,clause 4.4
Liquid Limit (definitive method) BS1377:Part 2:1990,clause 4.3
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail luke.fisher@soils.co.uk

# SUMMARY OF MOISTURE CONTENT TESTS

**In accordance with clause 3.2 of BS1377:Part 2**

| Exploratory Position ID | Sample Ref | Depth (m) | Sample Type | Moisture Content % | Lab |
|---|---|---|---|---|---|
| **BH101** | **20/07369/1** | **1.20** | **D** | **27** | **C** |

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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W. Yorkshire WF10 1NJ

| Compiled By | | Date |
|---|---|---|
| | **LORNA WHITWORTH** | **12/10/20** |
| Contract: **20/07369** | Contract Ref: **784671** | |

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | GrfcTbl L - SUMMARY OF STANDALONE MC - A4P | 784671-20-07369.GPJ - v10_01.
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# SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

| Exploratory Position ID | Sample Ref | Sample Type | Depth (m) | Moisture Content % | Liquid Limit % | Plastic Limit % | Plasticity Index | % <425µm | Description of Sample |
|---|---|---|---|---|---|---|---|---|---|
| BH101 | 20/07369/6 | D | 3.00 | 21 | 24 | 17 | 7 | 99 | Brown sandy CLAY |
| | | | | | | | | | |
| BH101 | 20/07369/12 | D | 9.50 | 20 | NP | NP | NP | 100 | Brown silty SAND |
| | | | | | | | | | |
| BH101 | 20/07369/17 | D | 15.50 | 17 | 30 | 17 | 13 | 92 | Dark brown slightly sandy CLAY |

**STRUCTURAL SOILS LTD**

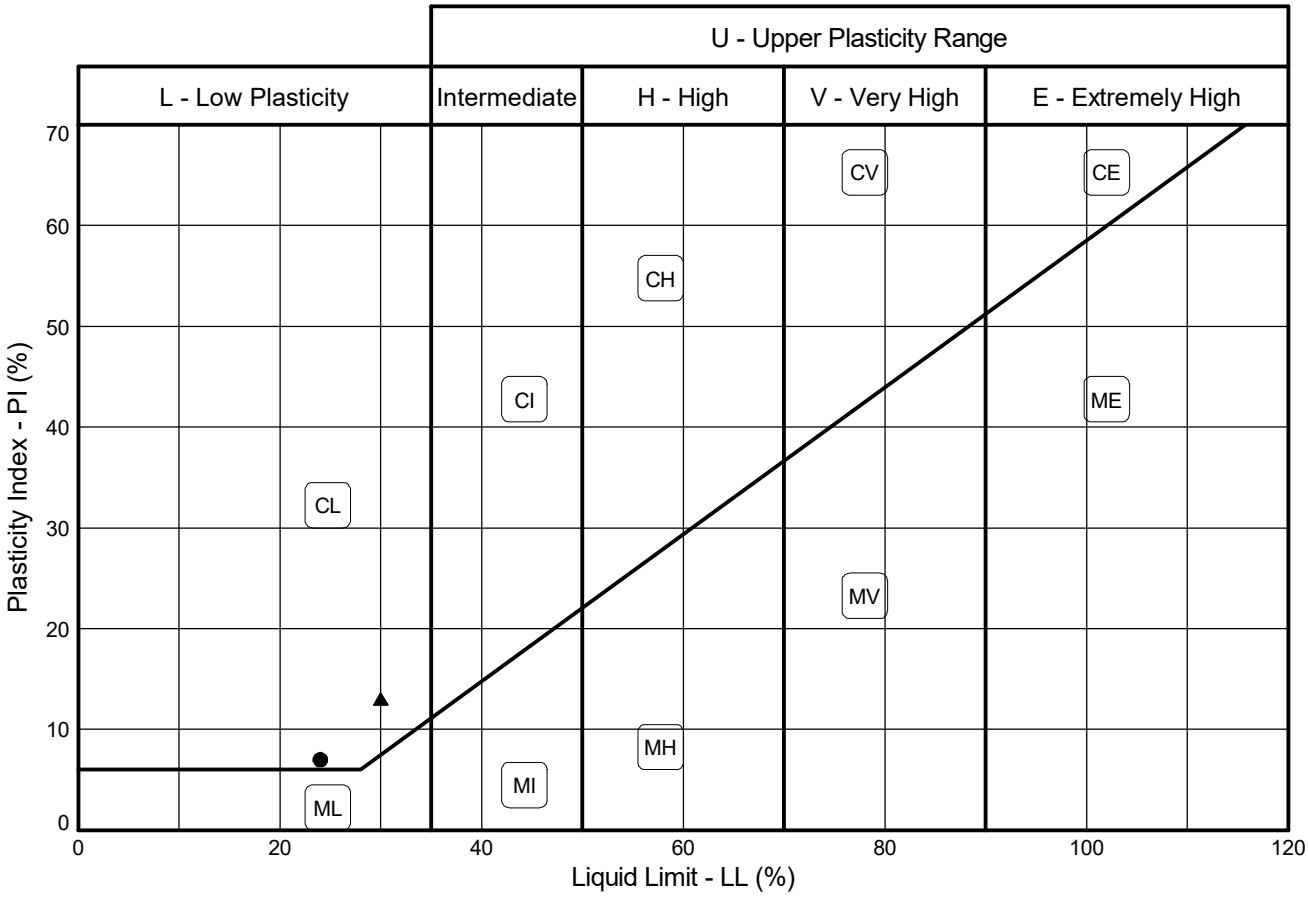
Contract: **20/07369**

Contract Ref: **784671**

AGS

# PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990




| | Sample Identification | | | BS Test Method # | Preparation Method + | MC % | LL % | PL % | PI % | <425µm % | Lab location | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exploratory Position ID | Sample | Depth (m) | | | | | | | | | |
| ● | BH101 | 20/07369/6D | 3.00 | 3.2/4.3/5.3/5.4 | 4.2.4 | 21 | 24 | 17 | 7 | 99 | C | |
| | BH101 | 20/07369/12D | 9.50 | 3.2/4.3/5.3/5.4 | 4.2.4 | 20 | NP | NP | NP | 100 | C | |
| ▲ | BH101 | 20/07369/17D | 15.50 | 3.2/4.3/5.3/5.4 | 4.2.4 | 17 | 30 | 17 | 13 | 92 | C | |

# Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)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W. Yorkshire WF10 1NJ


| Compiled By | | Date |
|---|---|---|
| | LORNA WHITWORTH | 12/10/20 |
| Contract: 20/07369 | Contract Ref: 784671 | |


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This testing verification certificate covers all testing compiled on or before the following datetime: **12/10/2020 16:58:08**.

Testing reported after this date is not covered by this Verification Certificate.

D. Smith

Approved Signatory
**Daniel Smith (Contract Manager)**

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
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Castleford Laboratory
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Hemel Laboratory
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HP3 9RT

Tonbridge Laboratory
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Hildenborough
Tonbridge
TN11 9HU

| | Contract: | Job No: |
|---|---|---|
| **STRUCTURAL SOILS LTD** | **20/07369** | **784671** |

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# Appendix E – Ground Gas Monitoring Results

- Gas Monitoring Visits 1 – 6

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**Curtins**
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

# GAS MONITORING LOG SHEET

| | | | |
|---|---|---|---|
| **Project:** | Decant Village | **Date:** | 01/09/2020 |
| **Job Number:** | B075805 | **Visit:** | 1 |
| **Client:** | Hive Land and Planning | **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 | | | | | | |
| WS101 | 1013 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 20.7 | 3 | 1 | 1.73 | 2.29 | |
| WS102 | 1013 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.8 | 3 | 5 | 1.06 | 4.05 | |
| WS103 | 1014 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.8 | 3 | 5 | 1.00 | 3.50 | |
| BH101 | 1014 | -1.1 | 0.0 | 0.0 | 0.0 | 0.6 | 0.5 | 19.7 | 5 | 7 | 8.55 | 11.65 | |

**Notes**

**Logged by**
MH

*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:** | Decant Village | **Date:** | 08/09/2020 |
| **Job Number:** | B075805 | **Visit:** | 2 |
| **Client:** | Hive Land and Planning | **Weather:** | Raining |
| **Barometric State:** | Steady | **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 | | | | | | |
| WS101 | 1015 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 21.40 | 0 | 1 | 0.81 | 2.09 | |
| WS102 | 1014 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 21.40 | 1 | 1 | 0.89 | 4.02 | |
| WS103 | 1016 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.60 | 1 | 1 | 0.74 | 3.34 | |
| BH101 | 1015 | -7.2 | -0.1 | 0.0 | 0.0 | 0.3 | 0.0 | 20.90 | 0 | 0 | 8.54 | 11.59 | **1** |

**Notes**

**1** Steady state flow was reached after 3 minutes.

**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**
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# GAS MONITORING LOG SHEET

| | | | |
|---|---|---|---|
| **Project:** | Decant Village | **Date:** | 17/09/2020 |
| **Job Number:** | B075805 | **Visit:** | 3 |
| **Client:** | Hive Land and Planning | **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 | | | | | | |
| WS101 | 1025 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 2 | 1 | 1.42 | 2.25 | |
| WS102 | 1025 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.7 | 1 | 0 | 1.08 | 4.08 | |
| WS103 | 1025 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 2 | 1 | 1.00 | 3.48 | |
| BH101 | 1025 | -1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 2 | 1 | 8.60 | 11.60 | |

**Notes**

**Logged by**
SH

*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**
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# GAS MONITORING LOG SHEET

| | | | |
|---|---|---|---|
| **Project:** | Decant Village | **Date:** | 24/09/2020 |
| **Job Number:** | B075805 | **Visit:** | 4 |
| **Client:** | Hive Land and Planning | **Weather:** | Overcast |
| **Barometric State:** | Falling | **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 | | | | | | |
| WS101 | 983 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 2 | 3 | 1.52 | 2.27 | |
| WS102 | 985 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.8 | 2 | 1 | 1.07 | 4.07 | |
| WS103 | 983 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 2 | 3 | - | - | 1 |
| BH101 | 985 | 0.6 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 20.5 | 2 | 3 | 8.65 | 11.70 | |

**Notes**

**1** Car parked over borehole, could not dip water level

**Logged by**

SH

*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*

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# GAS MONITORING LOG SHEET

| | | | |
|---|---|---|---|
| **Project:** | Decant Village | **Date:** | 01/10/2020 |
| **Job Number:** | B075805 | **Visit:** | 5 |
| **Client:** | Hive Land and Planning | **Weather:** | Sunny |
| **Barometric State:** | Steady | **Ground Conditions:** | Damp |

| 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 | | | | | | |
| WS101 | 987 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 0 | 0 | 1.10 | 2.27 | |
| WS102 | 987 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 19.4 | 0 | 0 | 1.07 | 4.07 | |
| WS103 | 987 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.8 | 1 | 2 | 1.00 | 3.46 | |
| BH101 | 987 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 0 | 5 | 8.51 | 11.71 | **1** |

**Notes**

**1** Flow not measured due to flooded borehole cover

**Logged by**

PN

*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**
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Tel: 0161 236 2394
Fax: 0161 228 7902

# GAS MONITORING LOG SHEET

| | | | |
|---|---|---|---|
| **Project:** | Decant Village | **Date:** | 05/10/2020 |
| **Job Number:** | B075805 | **Visit:** | 6 |
| **Client:** | Hive Land and Planning | **Weather:** | Rain |
| **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 | | | | | | |
| WS101 | 984 | 13.8 | 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 20.3 | 0 | 0 | 1.14 | 2.25 | |
| WS102 | - | - | - | - | - | - | - | - | - | - | - | - | **1** |
| WS103 | - | - | - | - | - | - | - | - | - | - | - | - | **1** |
| BH101 | 985 | -6.7 | 0.0 | 0.0 | 0.0 | 0.8 | 0.8 | 18.5 | 2 | 1 | 8.49 | 11.63 | **2** |

**Notes**

**1 - Vehicle parked over borehole location, unable to monitor.**
**2 - Steady state flow rate achieved after 70 seconds.**

**Logged by**

MH

*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 Commercial Thresholds for 1.0% SOM.
- Curtins GAC Commercial Thresholds for 2.5% SOM.

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# Adopted Soil Generic Assessment Criteria
## Sandy loam with 1% SOM

| Contaminants | Residential with home grown produce | Residential without 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 *(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* 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* | | | | | | |
| $EC_{>5}$ - $EC_6$ | *42* | *42* | *730* | *3200* | *570000* | *95000* |
| $EC_{>6}$ - $EC_8$ | *100* | *100* | *2300* | *7800* | *600000* | *150000* |
| $EC_{>8}$ - $EC_{10}$ | *27* | *27* | *320* | *2000* | *13000* | *14000* |
| $EC_{10}$-$EC_{12}$ | *130* | *130* | *2200* | *9700* | *13000* | *21000* |
| $EC_{12}$-$EC_{16}$ | *1100* | *1100* | *11000* | *59000* | *13000* | *25000* |
| $EC_{>16}$ - $EC_{35}$ | *65000* | *65000* | *260000* | *1600000* | *250000* | *450000* |
| $EC>_{35}$ - $EC_{44}$ | *65000* | *65000* | *260000* | *1600000* | *250000* | *450000* |
| *Aromatic risk banded hydrocarbons - TPHCWG method* | | | | | | |
| $EC>_5$ - $EC_7$ | *70* | *370* | *13* | *26000* | *56000* | *76000* |
| $EC>_7$ - $EC_8$ | *130* | *860* | *22* | *56000* | *56000* | *87000* |
| $EC_{>8}$ - $EC_{10}$ | *34* | *47* | *8.6* | *3500* | *5000* | *7200* |
| $EC_{10}$ - $EC_{12}$ | *74* | *250* | *13* | *16000* | *5000* | *9200* |
| $EC_{12}$ - $EC_{16}$ | *140* | *1800* | *23* | *36000* | *5100* | *10000* |
| $EC_{>16}$ - $EC_{21}$ | *260* | *1900* | *46* | *28000* | *3800* | *7600* |
| $EC_{>21}$ - $EC_{35}$ | *1100* | *1900* | *370* | *28000* | *3800* | *7800* |
| $EC>_{35}$ - $EC_{44}$ | *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* |
| Tetrachlorethene (PCE) | *0.18* | *0.18* | *0.65* | *19* | *1400* | *810* |
| 1,1,1 Trichlorethane | *8.8* | *9* | *48* | *660* | *140000* | *57000* |

**Notes**

1. All values above are in mg/kg
2. **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
3. Soil organic matter (SOM) is assumed to be 1% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. 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
6. 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
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg $m^{-3}$
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. 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)
15. NA: Not applicable

## Adopted Soil Generic Assessment Criteria
## Sandy loam with 2.5% SOM

| Contaminants | Residential with home grown produce | Residential without 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 *(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* 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* | | | | | | |
| $EC_{>5}$ - $EC_6$ | *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* |
| *Aromatic risk banded hydrocarbons - TPHCWG method* | | | | | | |
| $EC>_5$ - $EC_7$ | *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 |
| *Aromatic* | | | | | | |
| 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*) |
| *Polycyclic Aromatic Hydrocarbons (PAH)* | | | | | | |
| 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* |
| Tetrachlorethene (PCE) | *0.39* | *0.4* | *1.5* | *42* | *1400* | *1100* |
| 1,1,1 Trichlorethane | *18* | *18* | *110* | *1300* | *140000* | *76000* |

**Notes**

1. All values above are in mg/kg
2. **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
3. Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. 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
6. 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
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg $m^{-3}$
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. 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)
15. 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 |

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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.<br><br>Major spillage of contaminants from site into controlled water.<br><br>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.<br><br>Leaching of contaminants from a site to a Principal or Secondary A aquifer.<br><br>Death of a species within a designated nature reserve.<br><br>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).<br><br>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.<br><br>The loss of plants in a landscaping scheme. Discoloration of concrete. |

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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 *high probability* that *severe harm* could arise to a designated receptor from an identified hazard at the site without appropriate further action. |
| **High Risk** | *Harm* is *likely to arise* to a designated receptor from an identified hazard at the site without appropriate further action. |
| **Moderate Risk** | *It is possible* that without appropriate further action *harm could arise* to a designated receptor. It is relatively *unlikely* that any such harm would be *severe,* and if any harm were to occur it is *more likely* that such harm would be *relatively mild.* |
| **Low Risk** | *It is possible* that *harm could arise* to a designated receptor from an identified hazard. It is *likely* that, at worst, if any harm was realised any effects would be *mild.* |
| **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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