

Swan House

Ground Investigation

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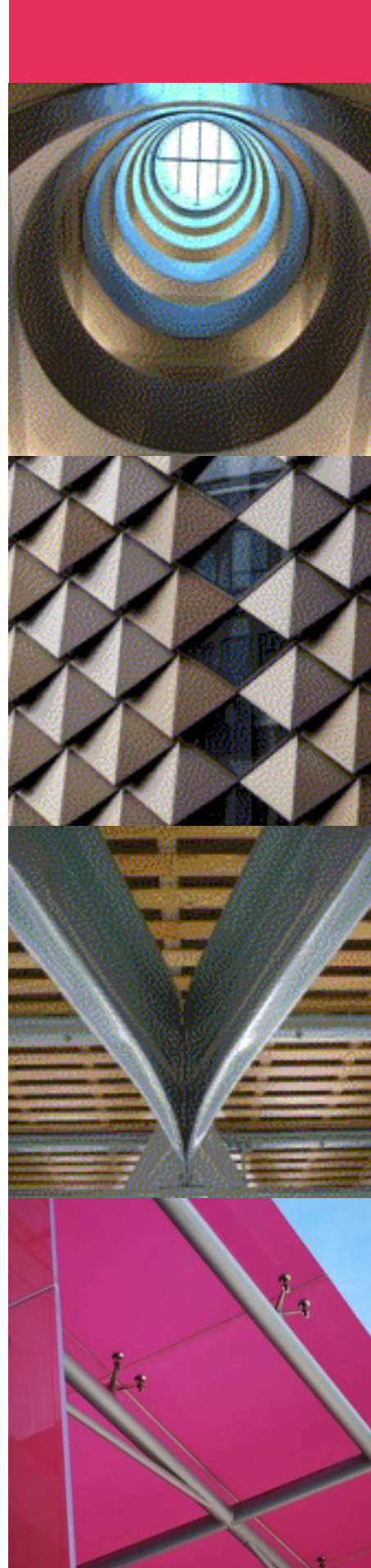
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Executive Summary

Appointment	In June 2018, Curtins were instructed by Cable Swan Ltd undertake a pre-demolition ground investigation (Stage 1) at the Swan House site, off Cable Street, Manchester, M4 5DF. A second phase of pre-demolition investigation (Stage 2) was instructed in December 2020 by RG Group to mainly inform pile design. In July 2021, Curtins were instructed by RG Group Ltd to undertake a Post-Demolition ground investigation. The site is centred on NGR SD 84510 98850 and covers an area of approximately 0.25Ha. The aim of the ground investigation is to characterise the geo-environmental and geotechnical conditions prior to the construction of a multistorey structure of thirty one, thirteen and five stories to provide 373no. residential apartments, 12no. service apartments and a ground floor commercial unit with associated car parking.
Current Site Status	The site is currently occupied by a three-storey building with ground level loading bays and a basement thought to extend beneath most of the site. The basement has a surface cover of concrete. The ground floor units comprise a varying thickness of concrete, including raised levels surrounding and extending beyond loading abys in the main warehouse facilities.
Summary of Phase 1	The earliest mapping (1848) shows the site is fully developed, occupied by Cable Street Mill with residential properties in the northwest of the site. During WWII, ruins are noted in the vicinity of the site with building no longer recorded potentially due to bomb strike. In 1948, the site is noted as a warehouse with an extension recorded in western corner in 1951. The site remains unchanged to present day. Based on the site's historical land use, made ground is anticipated. BGS mapping indicates superficial deposits comprised glacial till underlain by bedrock noted as the Chester Pebble Bed Formation. The site is underlain by a Principal Aquifer within the bedrock formation and a Secondary Undifferentiated Aquifer within the superficial deposits. The nearest surface water feature is the River Irk located 304m west of the site. There are no water abstractions points recorded within 500m of the site. Primary potential risks to be investigated during this report, as well as establishing ground conditions for geotechnical design, included; potential for land gas and risks to human health from Made Ground soils.
Unexploded Ordnance	A Preliminary UXO risk assessment undertaken by Curtins to assess risk to ground investigation identified a Medium risk to construction workers from unexploded ordnance in soils underlying the existing building. Consequently, downhole magnetometry was undertaken alongside all exploratory holes during the 2018 and 2021 Pre-Demolition ground investigations. A Detailed UXO Risk Assessment report has since been commissioned on behalf of the client with respect to the proposed construction works on site from a UXO Specialist and a Low risk rating is confirmed for the site with respect to unexploded ordnance.
Fieldworks Undertaken	The Stage 1 ground investigations works were undertaken between 10th – 14th September 2018 and comprised seven window sample boreholes; four at ground level and three within the existing basement. Ground gas and groundwater monitoring standpipes were installed within six of the boreholes. Selected soil samples were subject to chemical and geotechnical analysis and six ground gas monitoring visits were undertaken. The Stage 2 ground investigation works were undertaken between 19th – 29th January 2021 and comprised three sonic boreholes. Ground gas and groundwater monitoring standpipes were installed within all the boreholes. Selected soil and rock samples were subject to chemical and geotechnical analysis and four ground gas monitoring visits undertaken. The Stage 3 ground investigation works were undertaken between 23rd – 27th August 2021 comprising one cable percussive borehole with rotary follow on. Selected soil samples were subject to chemical and geotechnical analysis.
Encountered Ground Conditions	Made ground deposits were encountered in all ground level exploratory holes, ranging in thickness between 0.25m to 3.00m bgl. Made ground comprised a surface covering of concrete overlying predominantly granular made ground. Concrete was encountered to depths between 0.25m and 1.17m bgl. In WS06, WS07 and BH201 in the basement recorded concrete underlain directly by natural cohesive glacial till. Made ground was underlain by glacial till comprising predominantly cohesive material. Cohesive deposits were encountered as firm to stiff brown slightly sandy slightly gravelly clay. Within BH101-BH103 and BH201, granular deposits were encountered as dense to very dense brown slightly gravelly medium to coarse sand or very dense brown slightly silty, sandy gravel. Weathered bedrock was recovered as very dense reddish brown slightly gravelly medium to coarse sand. Weathered bedrock was underlain by intact bedrock of the Chester Formation described as very weak to medium

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Environmental Laboratory Testing and Ground Gas Monitoring Results	strong reddish brown fine to coarse sandstone. The base of the sandstone was not encountered, with the boreholes terminated at a maximum depth of 41.00m bgl (<7.04m AOD). Post investigation groundwater monitoring has shown perched groundwater at depths of 2.70-4.61m bgl (48.40-46.39m AOD) in the made ground and top of the cohesive Glacial Till; groundwater within the granular Glacial Till at depths of 14.25-14.33m bgl (35.62-35.70m AOD) and groundwater within the solid bedrock strata at depths of 24.29-24.63m bgl (25.47-25.81m AOD). With respect to the proposed '<i>Commercial</i>' end-use of the ground floor, Tier 1 thresholds for human health have not been exceeded. When compared against Drinking Water Standards (DWS), no exceedances have been noted within groundwater samples collected and tested. A maximum carbon dioxide concentration of 5.4% v/v and methane concentration of 2.2% v/v have been recorded in separate boreholes, on single occasions. No other elevated occurrences of carbon dioxide or methane have been recorded above the 5% v/v and 1% v/v respective thresholds over the ten monitoring visits.
Ground Contamination and Ground Gas Assessment	A Low risk rating is identified to end-users from direct contact, inhalation and ingestion of contaminants within Made Ground soils on site. A Low risk is identified to the underlying Principal Aquifer, as no exceedances have been noted with respect to nominated DWS criteria. Additionally, a layer between 7.50m and 12.20m of low permeability soils acting to limit downward migration of contamination to deeper groundwater bearing units is present overlying the Principal Aquifer. A Low risk is identified to site end-users from ground gas migration and inhalation from soils, corresponding to BS8485 CS1 gas regime requiring no gas protection measures.
Geotechnical Assessment	Due to the likely loads of the proposed development, it is considered that a shallow spread foundation in the superficial deposits are unlikely to be suitable at the site. The ground conditions on site are considered to potentially be amenable to CFA or bored piles into the bedrock. Based on observations on site combined with laboratory tests, it is recommended that consideration be given to a suspended ground floor slab. As piled foundations are anticipated, a suspended slab is recommended to bear on the pile caps by a network of beams which will minimise any differential settlement between the floor and the piled structure. The following geotechnical consideration should also be considered: • Presence of existing services; • Obstructions and relict foundations; • Variable made ground; • Soft superficial deposits; and • Earthworks. Laboratory test results indicate a Design Sulphate Class for concrete may be taken as DS-2 and ACEC class of AC-2 for the made, decreasing to DS-1 SC-1s in natural geologies.
Recommendations	Based on the findings of the ground investigation, the following recommendations are made: 1) The engineering recommendations contained within the report should be reviewed once the final development proposals and site levels are confirmed; 2) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results. 3) With respect to the risk from Unexploded Ordnance, the following steps are recommended: • UXO Risk Management Plan; • Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

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- Appendix B - Exploratory Hole Logs
- Appendix C - Chemical Laboratory Testing Results
- Appendix D - Geotechnical Laboratory Testing Results
- Appendix E - Ground Gas Monitoring Results
- Appendix F - GAC Screening Thresholds
- Appendix G - Detailed Unexploded Ordnance (UXO) Risk Assessment Report
- Appendix H - Risk Assessment Methodology

1.0 Introduction

1.1 Project Background

Curtins have carried out the following investigations at the Swan House site, off Cable Street, M4 5DF:

- In 2018 Curtins undertook a Phase 1 Preliminary Risk Assessment desk study (Ref. 1), followed by an initial (shallow) Pre-Demolition investigation, herein after referred to as Stage 1, of the Swan House site in September 2018. Access constraints and tenant/owners' permissions determined that only shallow intrusive investigation namely window sample boreholes, could be undertaken at the time
- In December 2020 Curtins were instructed by RG Group to undertake a Pre-Demolition ground investigation, herein after referred to as Stage 2 Investigation, at the Swan House site, off Cable Street, M4 5DF. The site is centred on National Grid Reference SJ 84510 98850 and covers an area of approximately 0.25Ha.
- In July 2021, Curtins were instructed by RG Group Ltd to undertake a Post-Demolition ground investigation, herein referred to as the Stage 3 investigation.

The proposed development comprises the demolition of the existing structure on site and construction of a multistorey structure of thirty-one, thirteen and five storeys to provide 373no. residential apartments, 12no. serviced apartments and a ground floor commercial unit with associated car parking.

Proposed development plans are enclosed in *Appendix A*.

1.2 Scope of Services

This aim of the investigation is to characterise the geo-environmental and geotechnical conditions for the proposed construction works.

Specifically, the Phase 2 report is intended to determine:

- a) If there is a risk of the proposed end user being adversely impacted upon 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 of groundwater and/or surface water being adversely impacted upon by potential contamination that may be present on the site due to its known current, recent and historical use;
- c) If there is a risk to the end user from soil gases including methane, carbon dioxide, carbon monoxide and hydrogen sulphide; and

- d) Likelihood of the proposed works being adversely impacted by potential geo-hazards across the site.

In addition, recommendations on foundation solutions for the proposed structures are provided.

Detailed flood risk assessment, ecology and archaeological studies are outside of the scope of this report.

2.0 Phase 1 Preliminary Site Assessment Summary

This section presents a summary of the current site setting, history, geology and hydrogeology/hydrology, as presented in the Curtins Phase 1 report (Ref.1). It is not the intention of this report to duplicate the Phase 1, with the information below providing the background information to support the revised post Phase 2 siteworks Conceptual Site Model (CSM), as presented in *Section 8.0*.

2.1 Current Setting

The development site is in Manchester City Centre. It is surrounded by residential and commercial properties and is bound by Cable Street to the northeast; Mason Street to the southeast; Swan Street and properties on Swan Street to the southwest; and Rochdale Road to the northwest.

The site is currently occupied by a three-storey building comprising warehouse and commercial premises on the ground and first floors, with a basement currently used as a storage facility thought to extend beneath most of the site. Topography slopes gently westwards from around 50.6m AOD to 49.1m AOD.

The basement has a surface cover of concrete. The surface cover of the ground floor warehouse units comprises varying thicknesses of concrete, including raised levels surrounding, and extending beyond, loading bays into the main warehouse facilities.

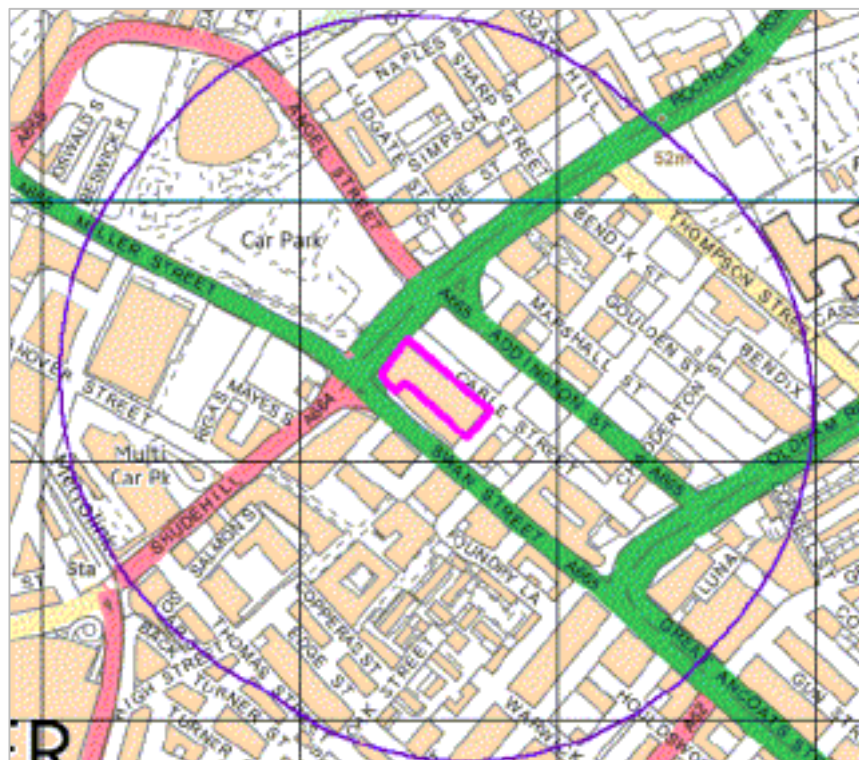


Figure 2.1 – Site Location Plan, approximate site boundary outlined in pink and 250m buffer in purple.
(Landmark Information Group)

2.2 Previous Site Use

The earliest mapping (1848) shows the site is fully developed, occupied by Cable Street Mill with residential properties in the northwest of the site. During WWII, ruins are noted in the vicinity of the site with building no longer recorded potentially due to bomb strike. In 1948, the site is noted as a warehouse with an extension recorded in western corner in 1951. The site remains unchanged to present day.

2.3 Published Geology

A review of British Geological Survey (BGS) map, 1:50,000 Scale, Solid and Drift Editions, Manchester, Sheet 85, 2011, indicates the following geological sequence:

- Glacial Till; and
- Chester Formation (formerly Chester Pebble Beds) .

There are no BGS faults recorded on site. The nearest BGS recorded available borehole is located 20m northwest, details of which are presented in *Table 2.3* below.

Table 2.3 – Historical Borehole Record from Surrounding Area

Borehole Ref.	Location (Easting, Northing)	Details (depth to top of strata/lithology/thickness)	
SJ89NW28	20m north west (384457,398885)	0.00m bgl	MADE GROUND (1.83m)
		1.83m bgl	Silty CLAY (3.66)
		5.49m bgl	CLAY (3.65m)
		9.14m bgl	Fine SAND (5.34m)
		14.48m bgl	GRAVEL & SAND (0.46m)
		14.94m bgl	CLAY (2.05m)
		16.99m bgl	Red SAND (0.92m)
		17.91m bgl	Red SANDSTONE (8.00m)
		25.91m bgl borehole termination	

2.3.1 Made Ground Deposits

The BGS maps do not indicate made ground on site, however given the historic land use made ground is anticipated. Given the site setting, it is considered likely that a thickness of made ground is present beneath the site.

2.3.2 Superficial Deposits

Glacial Till deposits comprising sandy, silty clay with gravels and pebbles and laminated sand layers. Local boreholes indicate cohesive superficial deposits to 9.14m bgl underlain by granular soils.

2.3.3 Bedrock Deposits

Bedrock deposits are present as Chester Formation (formerly Chester Pebble Beds) of *Early Triassic Age*, comprising sandstone. Local boreholes indicate bedrock from approximately 17.91m bgl.

There are no BGS fault lines located beneath the site.

2.3.4 Mining and Quarrying

The site is located within a Coal Mining Reporting Area, however the site is approximately 1km southwest of a coal outcrop and the nearest mine entry is located over 1km to the northeast. The site is not within an area that has been influenced by past or probable shallow coal mine workings.

There are no recorded Mineral Sites within 500m of the site.

It is considered unlikely that relic mining features are present on site and as such, have not been considered further.

2.3.5 Other Pertinent Geological Existing Geological Records

The previous reports identified a low risk to no hazard from the following ground stability hazards on and around the site; running sands, collapsible ground, landslides, shrinking or swelling clay, compressible ground and ground dissolution.

UK Radon Mapping confirms the site is situated in an area where less than 1% of homes are above the radon action level. If the new development incorporates a basement the advice of a specialist Radon assessor must be obtained.

2.4 Hydrogeology and Hydrology

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

Table 2.4 – Geological/Hydrogeological Succession

Geology	Associated Hydrogeological Classification
Made Ground 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 fracture permeability meaning they usually provide a high level of water storage*

The nearest surface water feature is the River Irk located 304m west of the site flowing from northeast to southwest. The site is not located within a Source Protection Zone (SPZ).

There are no water abstractions located within 500m of the site.

2.5 Landfill

There are no licenced or historical landfill sites within 500m of the site.

2.6 Unexploded Ordnance (UXO) Risk Assessment

Risk mapping for UXO's has placed the site in a moderate risk area. Moderate risk areas are those that show a density of bombing hits of 11-50 bombs per 1000 acres and may contain potential WWII targets. Further action may be required to mitigate UXO risk is essential in moderate risk areas.

From the historic mapping, the building currently onsite has been there since before WWII, however it also records ruins surrounding the site and many other buildings disappear during this period.

Analysis of online historical mapping shows fire bomb strikes (80m east, 100m southwest and 120m south) and demolished/damaged buildings and ruins (from 20m southeast, from 50m northwest, 70m northwest, 80m west and northeast and 100m south) surrounding the site, as shown in *Figure 2.6* below.



Figure 2.6 – Map of bomb damage in Manchester from WWII (red line shows site boundary, red circles show locations of fire bombs, red shading shows locations of demolished buildings).
Copyright 2016 The University of Manchester.

A Detailed Unexploded Ordnance (UXO) Risk Assessment report for the site was recently obtained on behalf of the Client with reference to the proposed construction works and is included within *Appendix G*. The report concludes a **Low** risk to construction workers from unexploded ordnance within the site's soils.

The following is recommended for all intrusive works:

- UXO Risk Management Plan;
- Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

2.7 Summary of Phase 1 PCSM

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

Table 2.7 – Preliminary Conceptual Site Model

Source	Pathway	Receptor	Risk
Made Ground of unknown composition from: • Uncontrolled deposition of construction/ demolition onsite; and • Potential contamination associated with historic site use as a Mill.	Direct contact/ ingestion and inhalation	Site End Users	Moderate
	Horizontal and vertical migration of contaminants through superficial soils	Groundwater (Principal Aquifer)	Moderate/ Low
		Groundwater (Secondary Undifferentiated Aquifer)	
		Surface Water (River Irwell)	Very Low
Production of ground generating gases from Made Ground deposits containing organic/ putrescible content.	Vertical and horizontal migration through existing service corridors and the underlying superficial deposits	Site End Users	Moderate/ Low

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

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

The qualitative risk assessment determined the above risks associated with the proposed development of the site warrant further investigation. However, risks to surface waters is Very Low and therefore do not warrant further investigation.

3.0 Phase 2 Investigation Scope of Works

The Stage 1 Pre-Demolition ground investigations works were undertaken between 10th – 14th September 2018 and comprised four window sample boreholes at ground level and three window samples within the existing basement; the Stage 2 Pre-Demolition ground investigations works were undertaken between 19th – 29th January 2021 and the Stage 3 Post-Demolition ground investigation works were undertaken between 23rd – 27th August 2021.

The scope of the ground investigation was designed in general accordance with current UK guidance including Land Contamination Risk Management (LCRM) (Ref. 2), BS10175:2011+A2:2017 (Ref. 3), BS5930:2015+2020 (Ref. 4) and BSEN1997: Part 2:2007 Eurocode 7 (Ref. 5).

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

Table 3.0 – Scope and Rationale of Fieldwork Undertaken

	Exploratory Hole Type	Exploratory Hole Reference	Ground Level (m AOD)	Exploratory Hole Depth (m bgl)	Rationale
Stage 1 GI	Window Sample Boreholes continued with Dynamic Probing	WS01	50.90	5.00	Confirm shallow ground conditions. Collect soil samples for chemical and geotechnical testing. Undertake in-situ testing. Gas and groundwater monitoring in 6 No. boreholes.
		WS02	51.00	5.00	
		WS03	51.10	5.00	
		WS04	51.10	3.00	
		WS05	– ¹	1.17	
		WS06	– ¹	5.00	
		WS07	– ¹	5.00	
Stage 2 GI	Sonic Boreholes	BH101	49.95	1.50	Confirm deeper ground conditions. Collect soil, rock and water samples for chemical and geotechnical analysis. Undertake in-situ testing. Gas and groundwater monitoring in 3 No. boreholes
		BH101A		40.00	
		BH102		40.00	
		BH103		40.00	
Stage 3 GI	Cable Percussive Borehole with Rotary Cored Follow On	BH201	48.04	41.00	Confirm deeper ground conditions. Collect soil and rock samples for chemical and geotechnical analysis. Undertaken in-situ testing.
	Machine Excavated Trial Pits	WS2A	– ¹	0.35	Collect soil samples for chemical testing.
		WS2B	– ¹	0.35	
		TPA	– ¹	2.00	
		TPB	– ¹	0.30	
		TPC	– ¹	1.00	

–¹ exploratory hole locations do not have estimated ground levels.

Exploratory holes, in Stage 1 and Stage 2, were advanced alongside down-hole magnetometry surveying, undertaken by an unexploded ordnance specialist, 1st Line Defence.

For information regarding the location of the exploratory hole locations, refer to Curtins drawing ref. 077409-CUR-00-XX-DR-GE-80002-P01, Curtins drawing ref. 077409-CUR-00-XX-DR-GE-80003-P01 and Curtins drawing ref. 077409-CUR-00-XX-DR-GE-80004-P01 contained within *Appendix A*. Ground levels for Stage 1 and Stage 2 exploratory holes were estimated from the available survey drawings and the Stage 3 exploratory hole surveyed and added to the exploratory hole logs.

3.1 Soil Logging and Sampling

Exploratory borehole arisings were logged on site by a qualified Engineer. All exploratory holes were logged in accordance with the requirements of BS5930:2020 (Ref. 4) including recording observed visual and olfactory indications of contamination.

Exploratory hole logs are provided in *Appendix B*.

3.2 Monitoring Well Installations

Ground gas and groundwater monitoring slotted 50mm diameter pipes were installed within 6 no. window sample boreholes and within 3 no. sonic boreholes. No installations were installed as part of the Stage 3 works.

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

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

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

Table 3.2 – Monitoring Well Response Zones

	Borehole Ref.	Response Zone(s) m bgl (m AOD)	Strata Description(s)
Stage 1	WS01	1.00 – 4.00 (49.90 – 46.90)	Cohesive glacial till
	WS02	2.00 – 5.00 (49.00 – 46.00)	Cohesive glacial till
	WS03	0.50 – 3.50 (50.60 – 47.60)	Made ground and cohesive glacial till
	WS04	1.00 – 2.00 (50.10 – 49.10)	Made ground
	WS06	1.50 – 2.00	Cohesive glacial till

	Borehole Ref.	Response Zone(s) m bgl (m AOD)	Strata Description(s)
	WS07	5.00 – 10.00	Cohesive glacial till
Stage 2	BH101A	5.00 – 15.00 (44.95 – 34.95)	Cohesive and granular glacial till
	BH102	22.00 – 32.00 (28.10 – 18.10)	Chester Formation (formerly Chester Pebble Beds) (sandstone)
	BH103	1.00 – 5.00 (49.42 – 45.42)	Made ground and cohesive glacial till

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

3.3 Post-Investigation Monitoring

3.3.1 Ground Gas and Groundwater Monitoring

For the Stage 1 works, six ground gas and groundwater monitoring visits were completed between 25/09/2018 and 31/01/2019 and for the Stage 2 works, four ground gas and groundwater monitoring visits have been completed between 05/02/2021 and 05/03/2021 to assess the groundwater and ground gas conditions as identified in the Preliminary Conceptual Site Model in *Section 2.0*.

4.0 Laboratory Analysis

Representative soil samples were selected for laboratory geotechnical and chemical testing, based on field observations, to inform the proposed works. Representative groundwater and rock samples were selected for laboratory chemical and geotechnical testing respectively.

Selected environmental soil, water and rock samples were placed in laboratory provided containers and stored in cool boxes prior to being transported to the nominated laboratory under the laboratory's chain of custody documentation. The laboratory selected by Curtins for chemical analysis was Envirolab (UKAS and MCERTS accredited) and for geotechnical analysis was Structural Soils (UKAS accredited).

Given the potential site wide source of contamination (Made Ground) the sampling positions were generally located in a non-targeted, systematic array to give adequate and representative coverage of the site's proposed end use and the immediate environmental setting, concentrating in the made ground.

4.1 Environmental Chemistry Analysis

The contaminants of concern potentially present on the site were considered to include, amongst others; organic matter, fill, hydrocarbons (e.g. fuel/oils) the extent of which is captured by the broad environmental testing suite listed in *Table 4.1*.

Table 4.1 – Environmental Chemistry Analysis Suite: Soils

Suite Ref.	Analyte	LOD
Soils Suite A	Asbestos Screen, pH and Soil Organic Matter (SOM)	-
	Arsenic, Chromium, Chromium VI, Copper, Lead, Selenium, Zinc, Nickel	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.1 mg/kg
	Cyanide (total)	10 mg/kg
	Sulphate (total)	200 mg/kg
	Sulphide	2 mg/kg
	Sulphur (elemental)	20 mg/kg
	Phenols (screen)	1 mg/kg
	PAHs (USEPA 16)	0.1 mg/kg
	TPH (Aro/Alk Split)	0.01 to 0.1 mg/kg
WAC E	Inert, SNRHW + Hazardous Landfills (2 Stage)	

In the Stage 1 SI, 8no. samples were taken from made ground soils beneath the loading bays in addition to 5no. samples taken from superficial soils directly below made ground. The soil samples were tested for Curtins Suite A as detailed in Table 4.1.

In the Stage 2 SI, a total of 2no. made ground soil samples were taken on site and tested for Curtins Soils Suite A and Waste Acceptance Criteria (WAC) testing.

In the Stage 3 SI, 7No. made ground soil samples and 1 No. natural soil sample was taken on site and tested for Curtins Suite A and Waste Acceptance Criteria (WAC) testing.

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

4.2 Groundwater Analysis

The source material of the contaminants of concern potentially present on the site was considered to include, amongst others; organic matter, ash and fill, hydrocarbons (e.g. fuel/oils) and heavy metals the extent of which is captured by the broad environmental testing suite listed in *Table 4.2* below.

Table 4.2 – Environmental Chemistry Analysis Suite: Waters

Suite Ref.	Analyte	LOD
Water Suite A	pH	-
	Total Hardness	1 mg/l
	Arsenic, Lead, Nickel, Selenium, Zinc	1 µg/l
	Boron (water soluble), Chromium, Copper, Mercury, Phenols (screen)	0.1 µg/l
	Cadmium	0.5 µg/l
	Cyanide, Sulphide	0.2 mg/l
	Sulphate	10 mg/l
	PAHs (USEPA16)	0.01 µg/l
	TPH (Aro/Alk Split)	10 µg/l

No groundwater samples were obtained from the shallow Stage 1 shallow exploratory hole locations. Groundwater samples were obtained from BH102 and BH103 following the Stage 2 investigation, representing deeper groundwater and shallow (perched) groundwater respectively; and tested for the above suite.

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

4.3 Geotechnical Analysis

Soil samples for testing were prepared in accordance with BS1377: Part 1:2016 (Ref. 6). Rock samples for geotechnical testing were prepared and tested in accordance with ISRM Suggested Methods (Ref. 7). The geotechnical testing undertaken as part of the Stage 1, Stage 2 and Stage 3 investigations are summarised in *Table 4.3*.

Table 4.3 – Geotechnical Testing

	Test Type	Quantity	Standard
Stage 1	Moisture Content	5	BS1377 1990, Part 2 (clause 3.2)
	Atterberg Limit	5	BS1377 1990, Part 2 (clause 4.5, 5.3 & 5.4)
	pH	10	BS1377 1990, Part 3 (clause 9.4 & 9.5)
	Water Soluble Sulphate 2:1 SO ₄	10	BS1377 1990, Part 3 (clause 5.3 & 5.5)
Stage 2	Moisture Content	9	BS1377 1990, Part 2 (clause 3.2)
	Atterberg Limit	8	BS1377 1990, Part 2 (clause 4.5, 5.3 & 5.4)
	pH	13	BS1377 1990, Part 3 (clause 9.4 & 9.5)
	Water Soluble Sulphate 2:1 SO ₄	13	BS1377 1990, Part 3 (clause 5.3 & 5.5)
	Particle Size Distribution Testing	1	BS1377 1990, Part 2 (clause 9.2)
	Quick Undrained Triaxial Multistage	4	BS1377 1990, Part 7 (clause 9.0)
	Oedometer	2	BS 1377 1990, Part 5
	Point Load Index Test	12	ISRM 1974-206
	Unconfined Compressive Strength	11	ISRM 1974-206
Stage 3	Moisture Content	4	BS1377 1990, Part 2 (clause 3.2)
	Atterberg Limit	4	BS1377 1990, Part 2 (clause 4.5, 5.3 & 5.4)
	pH	10	BS1377 1990, Part 3 (clause 9.4 & 9.5)
	Water Soluble Sulphate 2:1 SO ₄	10	BS1377 1990, Part 3 (clause 9.4 & 9.5)
	Particle Size Distribution Testing	2	BS1377 1990, Part 2 (clause 9.2)
	Quick Undrained Triaxial Multistage	2	BS1377 1990, Part 7 (clause 9.0)
	Point Load Index Test	15	ISRM 1974-206
	Unconfined Compressive Strength	7	ISRM 1974-206

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*.

4.4 Quality Assurance and Quality Control

Soil and water chemical analysis was conducted by Envirolab, a UKAS and MCERTS accredited laboratory. Stage 1 and Stage 2 geotechnical testing was conducted by Structural Soils, a UKAS accredited laboratory and Stage 3 geotechnical testing was conducted by Ian Farmers, a UKAS accredited laboratory. All samples were delivered in appropriate containers for the suites tested and analysed within the recommended holding times. No deviations were recorded at the time of analysis.

5.0 Encountered Ground Conditions

The ground conditions across the site, determined during the Stage 1 (2018), Stage 2 and Stage 3 (2021) ground investigation works generally comprised concrete overlying granular and cohesive made ground. Cohesive glacial till was recorded beneath the made ground, itself underlain by granular glacial till. Superficial deposits were underlain by the Chester Formation.

5.1 General

A summary of the ground conditions encountered during the ground investigation works is presented in *Table 5.1*, with detailed information presented in the exploratory hole logs included in *Appendix B*.

Table 5.1 – Summary of Ground Conditions Encountered

Strata	Depth to Top of Strata		Depth to Bottom of Strata		Thickness	
	Min m bgl (m AOD)	Max m bgl (m AOD)	Min m bgl (m AOD)	Max m bgl (m AOD)	Min m bgl (m AOD)	Max m bgl (m AOD)
Made Ground	0.00 (49.95)	0.00 (51.10)	0.25 (48.30)	3.00 (50.43)	0.28	1.40
Glacial Till (Cohesive)	0.25 (48.30)	3.00 (50.43)	10.00 ¹ (37.10)	13.00 ¹ (40.42)	8.20 ¹	12.80 ¹
Glacial Till (Granular)¹	10.00 (37.10)	13.00 (40.42)	15.00 (32.95)	17.00 (35.10)	2.00	6.00
Weathered Bedrock¹	15.00 (32.95)	17.00 (35.10)	20.00 (26.22)	24.20 (29.95)	3.00	8.20
Chester Formation¹	20.00 (26.22)	24.20 (29.95)	40.00 ² (<9.95)	- ²	16.00	- ²

¹ – Data taken from BH101A, BH102, BH103 and BH201

² – Thickness not proved

5.2 Made Ground

Concrete was encountered in the window samples boreholes in the basement (WS05 – WS07) ranging in thickness from 0.25m to 1.17m.

The window samples (WS01-WS04) undertaken in the loading bays encountered concrete, between 0.13m and 0.31m thick, underlain by a granular made ground and a second layer of concrete between 0.13m and 0.15m.

The sonic boreholes (BH101A-BH103) also encountered concrete from ground level to depths between 0.40m and 0.60m. The concrete was typically encountered in the following sequence; concrete slab, concrete block, concrete slab and reinforced concrete.

WS04 recorded 0.11m of light brownish grey and black Gravel of concrete and asphalt, below the initial layer of Concrete. The Sand sub-base within WS02 was discoloured (dark greyish-brown) with a slight hydrocarbon odour, possibly indicative of a fuel oil spillage.

In WS02, WS03, WS04, BH101A, BH102 and BH103, made ground soils were recorded underlying the concrete. The base of the concrete in WS05, also located in the basement, was not encountered.

No made ground soils were encountered underlying the concrete in WS06, WS07 and BH201 located within the basement.

5.2.1 Granular Made Ground

Granular made ground was encountered in WS02-WS04 and BH102-BH103. WS02 recorded black slightly silty fine to medium sand with rare cobbles of brick to 1/05m bgl. WS03 and WS04 recorded brown/black gravelly fine to coarse sand to depths between 1.13m and 1.30m bgl and gravelly typically comprised brick, concrete, clinker and slate. Additional granular layers were recorded in WS04 recorded as light red medium grained sandstone masonry below gravelly Sand, underlain by limestone gravel and gravels of brick, concrete and slate, to a recorded depth of 2.25m bgl.

The granular made ground soils encountered in BH102 and BH103, to depths between 0.45m and 1.00m bgl, comprised reddish brown angular to subangular, fine to coarse gravel of brick.

5.2.2 Cohesive Made Ground

Cohesive made ground was typically encountered underlying granular made ground in WS02-WS04 and BH101A-BH103. It typically comprised brown/dark brown sandy slightly gravelly clay to depths between 0.65m (BH101A) and 2.80m bgl (WS03). Gravel typically comprised sandstone, brick, concrete and coal.

In WS04, between 2.70m and 3.00m bgl, and BH103, between 1.80m and 2.50m bgl, a soft brown grey clay was encountered. In WS04 rare plant/wood fragments and a slight organic odour was noted. Dynamic probing in WS04 suggests the base of the soft clay was encountered at approximately 4.10m bgl.

5.3 Glacial Till

5.3.1 Cohesive Glacial Till

Superficial deposits comprising glacial till deposits were encountered underlying the made ground in all exploratory holes, except WS04 and WS05, which were terminated in made ground and in concrete, respectively.

In WS06, WS07 and BH201 located within the basement level, natural clay deposits were encountered directly underlying the concrete floor slab.

The glacial till deposits were generally cohesive to maximum depths between 10m (37.10m AOD) and 13m bgl (40.42m AOD). The deposits are typically described as stiff to very stiff brown with rare to occasional light brown/grey mottling slightly sandy slightly gravelly clay. Localised firm sandy slightly gravelly clay was encountered in WS03 (2.80m – 3.20m bgl), WS06 (3.50m – 3.80m bgl) and WS07 (3.90m and 5.00m bgl). Gravel typically comprises angular to subrounded, fine to medium of sandstone and coal.

5.3.2 Granular Glacial Till

Granular glacial till deposits were recorded underlying cohesive deposits in BH101A-BH103 and BH201 to depths between 15m (32.95m AOD) and 17m bgl (35.10m AOD).

Deposits typically comprised dense to very dense brown slightly gravelly medium to coarse sand. Gravel is typically subrounded to well-rounded of sandstone.

In BH201, very dense brown slightly silty, sandy gravel was encountered between 12.30m – 15.60m bgl (35.74m – 32.44m AOD).

5.4 Weathered Bedrock

Deposits indicative of heavily weathered bedrock was encountered in BH101A, BH102, BH103 and BH201 at depths between 15.00m – 17.00m bgl (32.95m – 35.10m AOD) with a thickness between 2.90m (BH201) and 8.20m (BH103).

Weathered bedrock was typically recorded as very dense red brown slightly gravelly medium to coarse sand. Gravel is subangular to subrounded, fine to medium of sandstone. The residual soils were distinguished from the granular glacial till by the reddish colour of the weathered bedrock.

5.5 Chester Formation

Intact bedrock of the Chester Formation was encountered in BH101A (29.95m AOD), BH102 (28.10m AOD), BH103 (26.22m AOD) and BH201 (29.54m AOD). The base of the deposit was not encountered as borehole were terminated at 40.00m – 41.00m bgl (7.04m AOD – 10.42m AOD).

The bedrock was encountered as very weak to medium strong reddish brown fine to coarse sandstone. Shallow bedrock encountered was noted to be highly weathered. Fracture spacing was variable ranging from very closely spaced to medium spaced.

Details of the bedrock and a photographic log of the rock cores obtained can be referred to in the exploratory hole logs in *Appendix B*.

5.6 Observed Potential Contamination

A slight hydrocarbon odour was recorded in WS02 between 0.31m and 0.35m bgl, associated with a possible fuel oil spill onto a sand sub-base. It should be noted WS02 was adjacent to an inspection pit possibly used as a garage.

A similar sub-base was encountered in WS01, WS03 and WS04 though no evidence of contaminations was identified in these exploratory holes.

5.7 Obstructions Encountered

The following obstructions were encountered during site works detailed in *Table 5.7* on the following page.

Table 5.7 – Obstructions Encountered

Borehole Ref.	Obstruction	Depth (m bgl)
WS05	Hand pit terminated due to concrete possibly associated with existing foundations/basement wall	1.17
WS04	Deviation of drilling rig's sampler due to medium sized obstructions (bricks, concrete etc.) within made ground	0.00 – 2.25
BH101	Borehole terminated due to concrete slab at 1.50m.	1.50

5.8 Groundwater

A summary of the groundwater levels recorded during the siteworks is presented in *Table 5.8a*. Boreholes that did not record groundwater strikes during the investigations have not been referenced.

Table 5.8a – Groundwater Noted During Ground Investigation

	Borehole Ref.	Water Strikes			
		Strike Depth m bgl (m AOD)	Water Depth after 20 mins m bgl (m AOD)	Strata	Notes
Stage 1 GI	WS03	2.80 (48.30)	2.80 (48.30)	Made ground	Rising
Stage 2 GI	BH101A	14.00 (35.95)	12.90 (37.05)	Granular glacial till	Rising
	BH102	15.00 (35.10)	12.00 (38.10)	Granular glacial till	Rising
	BH103	16.00 (34.42)	12.40 (38.02)	Granular glacial till	Rising

Six groundwater level monitoring visits, associated with Stage 1 GI, were undertaken between 25th September 2018 and 31st January 2019. Four groundwater level monitoring visits, associated with Stage 2 GI, were undertaken between 5th February and 5th March 2021. The results of which are presented in *Table 5.8b* below.

Table 5.8b – Groundwater Monitoring Results

	Borehole Ref.	Installation Strata	Depth m bgl (m AOD)					
			25/09/2018	10/10/2018	23/10/2018	13/11/2018	23/01/2019	31/01/2019
Stage 1 GI	WS01	Clay	Dry	Dry	Dry	Dry	Dry	-. ¹
	WS02	Clay	Dry	4.61 (46.39)	4.55 (46.45)	4.52 (46.48)	4.45 (46.55)	4.31 (46.69)
	WS03	Made Ground/Clay	2.73 (48.37)	2.70 (48.40)	2.70 (48.40)	2.75 (48.35)	2.75 (48.35)	2.75 (48.35)
	WS04	Made Ground	Dry	Dry	Dry	Dry	Dry	Dry
	WS06 ²	Clay	2.73	2.46	-. ¹	2.60	3.00	-. ¹
	WS07 ²	Clay	1.23	1.19	-. ¹	1.24	1.20	-. ¹
Stage 2 GI	Borehole Ref.	Installation Strata	05/02/2021	11/02/2021	18/02/2021	05/03/2021		
	BH101A	Clay/Sand	14.25 (35.70)	14.30 (35.65)	14.33 (35.62)	-. ¹		
	BH102	Sandstone	24.46 (25.65)	24.63 (25.47)	24.29 (25.81)	24.57 (25.53)		
	BH103	Made Ground/Clay	2.80 (47.62)	3.59 (46.83)	3.34 (47.08)	3.53 (46.89)		

1) Borehole inaccessible

2) Located in the basement, no estimated ground level available.

The groundwater level monitoring has shown that the site is underlain by both perched water and deeper groundwater. The perched water is located within the Made Ground and top of the cohesive glacial till recorded between 2.70m – 4.61m bgl (48.40-46.39m AOD), while deeper groundwater is recorded at circa 14.30m bgl (35.65m AOD) in BH101A within the granular glacial till; and at circa 24.3-24.6m bgl (25.5-25.8m AOD) within the bedrock in BH102.

6.0 Ground Model

6.1 Made Ground

Concrete was encountered within all exploratory hole locations from ground level to depths between 0.25m and 1.17m bgl. Made ground was encountered underlying the concrete in WS02-WS04 and BH101A-BH103 encountered as granular and cohesive soils.

Due to the variable nature of Made Ground in terms of strength and composition, this layer is not deemed to be a suitable founding stratum. As such, parameters have not been derived for the Made Ground.

Table 6.1 – Summary of geotechnical test results – Made Ground

Parameter	No. of tests	Minimum	Maximum
pH	10	7.45	9.53
Water Soluble Sulphate (mg/l)	10	60	1480
SPT 'N' Value	6	2	30

6.2 Glacial Till

Glacial till was recorded underlying the made ground. It was typically encountered as cohesive deposits underlain by granular deposits to a maximum depth of 15.60m bgl (32.44m AOD)

6.2.1 Cohesive Glacial Till Deposits

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

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

Parameter	No. of tests	Minimum	Maximum
Moisture Content (%)	17	15	34
Liquid Limit (%)	17	21	54
Plastic Limit (%)	17	12	25
Plasticity Index (%)	17	9	29
Modified Plasticity Index (%) ⁽¹⁾	17	8.1	29
pH	23	8.05	9.24
Water Soluble Sulphate (mg/l)	23	36	240
Undrained Shear Strength from Undrained Triaxial Test (kPa)	6	86	142
SPT 'N' Value ⁽²⁾	44	10	49

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

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

The Atterberg Tests results indicate a low to intermediate plasticity and low to medium volume change potential. The Plasticity Indices were generally between 16% and 23%. A high moisture content, liquid limit and plasticity index were recorded in BH101A at 1.00m bgl. The results of the Atterberg Limits are presented on *Figure 6.2.1b* and *Casagrande graphs* are presented in *Appendix D*.

A moderately conservative unit weight of 19kN/m³ is deemed suitable for firm to very stiff cohesive soils in accordance with BS8002:2015 (Ref. 8).

The Undrained Shear Strength (C_u) of the Glacial Till Deposits (Cohesive) has been determined from the relationship between SPT N values and the Plasticity Indices (PI), after Stroud, 1975, (Ref. 9) as presented in *Equation 1*:

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

Where:

C_u is the Undrained Shear Strength

f_1 is the Stroud Factor determined from *Figure 1.5* (Ref. 9)

A f_1 value of 5.5 is deemed suitable for the average PI of 20%, determined from Atterberg test results and in line with the recommendations given in CIRIA C504 for a site specific approach with regards to f_1 values in tills. On this basis, C_u values of between 55.0 kPa to 269.5 kPa are calculated, corresponding with medium to very high strength material (BS 5930, 2015+2020). The C_u values, shown in *Figure 6.2.1c*, indicate lateral and vertical variability, particularly in shallow soils. Four Unconsolidated Quick Undrained Triaxial Compression Tests were taken on U100 samples recording C_u values between 86kPa and 143kPa correlating with calculated values, *Figure 6.2.1c* and indicative of High Strength material (BS 5930, 2015+2020).

It should be noted that the Unconsolidated Quick Undrained Triaxial Compression Test in BH101A at 12mbgl does not correlate well with those calculated by the Stroud formula for other boreholes at the same depth. Inspection of the logs at this depth does not indicate an obvious reason for the difference nor is an issue in the laboratory reported. It is recommended that the estimated values are used with caution.

A moderately conservative Coefficient of Consolidation, M_v , of the cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 9) described by Equation 2:

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

Where:

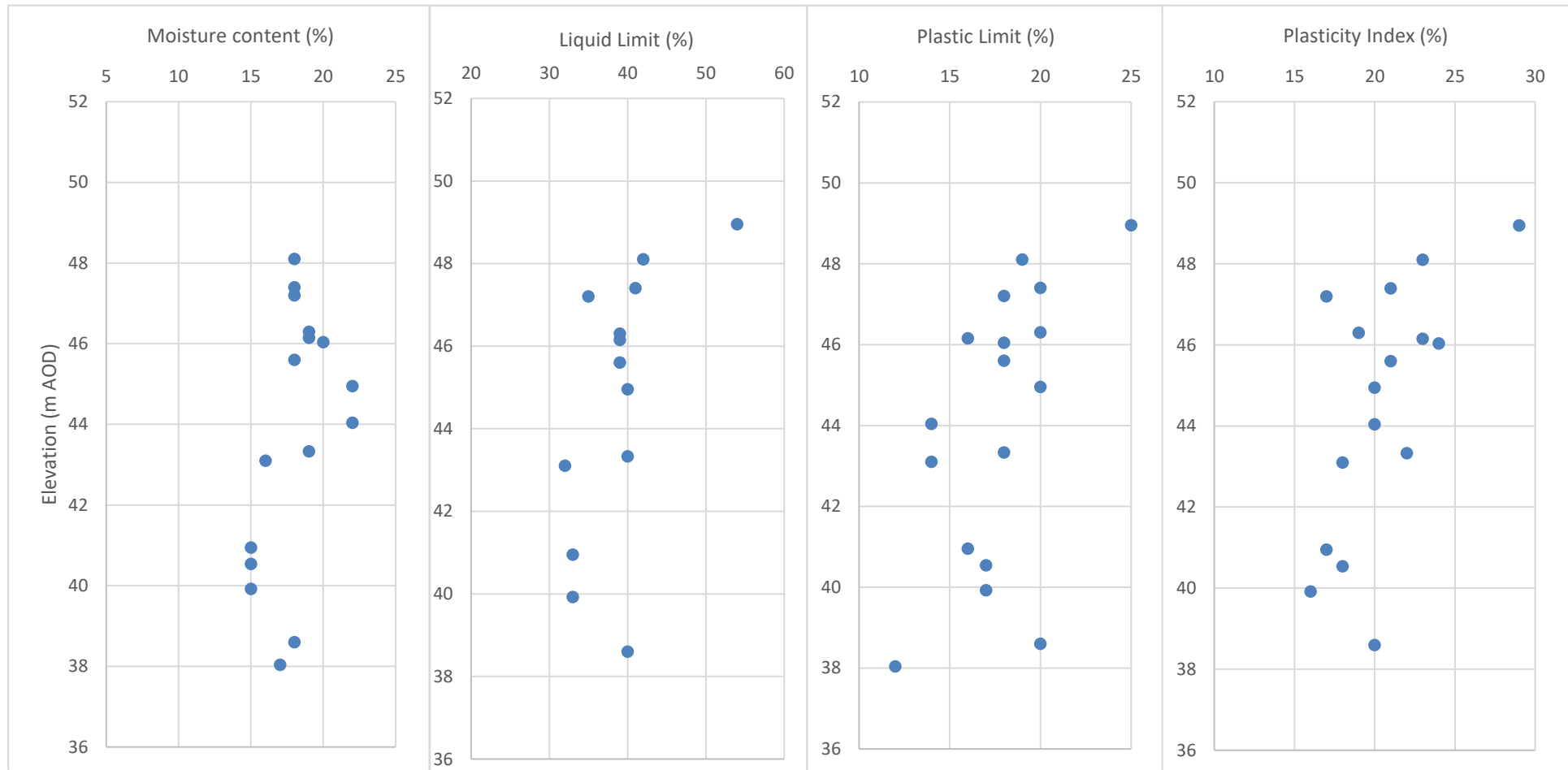
M_v is the coefficient of consolidation

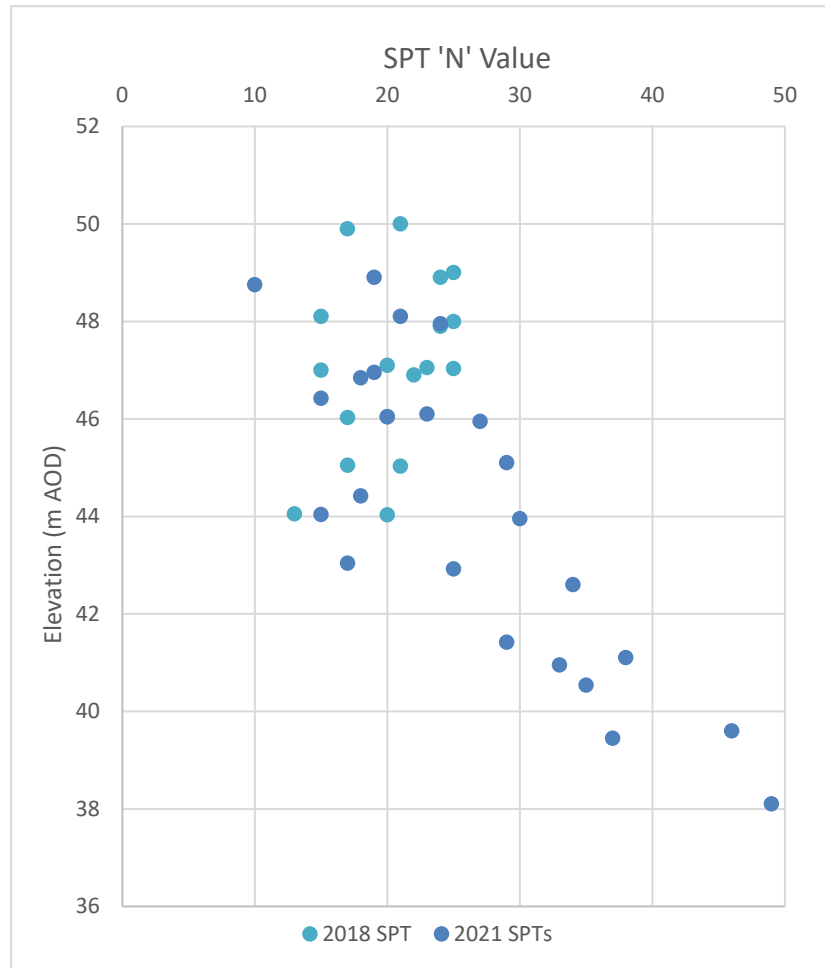
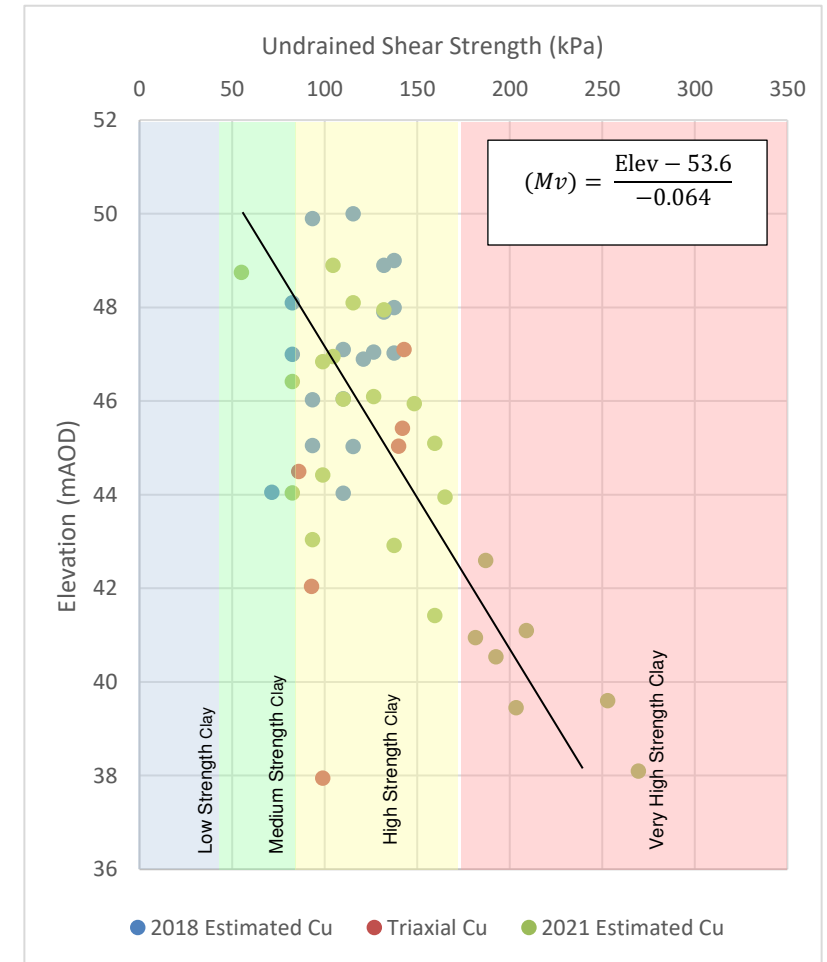
f_2 is the Stroud Factor determined from Figure 1.5 (Ref. 9)

SPT N is Characteristic Standard Penetration Test Result

Using an f_2 factor of 0.55 for an average plasticity index of 20%, M_v values typically range between 0.037 and 0.18 m^2/MN indicating very low to medium compressibility. The compressibility generally decreases with depth. Two Dimensional Consolidation Tests were taken on U100 samples recording M_v values between 0.0067 m^2/MN and 0.16 m^2/MN correlating with calculated values, shown in *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. 10). The values are shown in *Figure 6.2.1e*.

**Figure 6.2.1a – Summary of Atterberg Test Results**

**Figure 6.2.1b** – Standard Penetration Test vs. Elevation**Figure 6. 2.1c** – Estimated Undrained Shear Strength vs Elevation

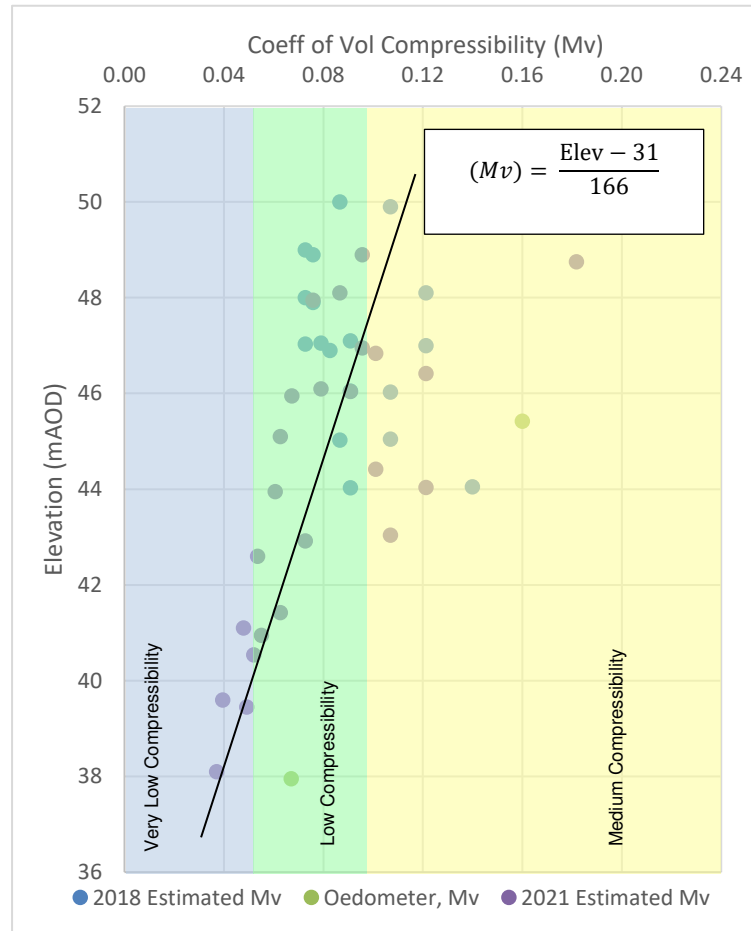


Figure 6.2.1d – Estimated Volume Compressibility Coefficients (M_v) vs Elevation

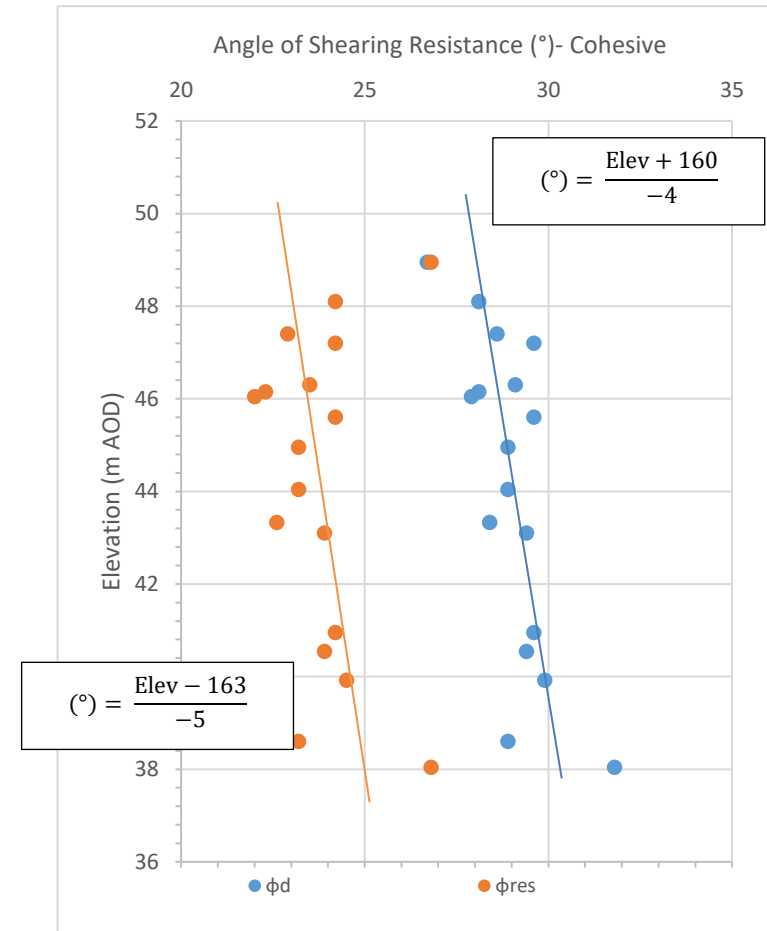


Figure 6.2.1e – Angle Shearing Resistance (Cohesive) vs Elevation

6.2.2 Granular Glacial Till Deposits

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

Table 6.2.2 – Summary of granular geotechnical test results

Parameter	No. of tests	Minimum	Maximum
pH	2	8.57	9.19
Water Soluble Sulphate (mg/l)	2	10	-
SPT 'N' Value Granular ⁽¹⁾	5	31	48
PSD% Cobbles Gravel Sand Silt/Clay	1	0 58 37 5	-

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

Five SPT 'N' values were recorded in the granular strata, ranging between 31 and 48. Seven SPT 'N' values were 50 indicating refusal. The SPT 'N' values indicate dense to very dense deposits. The results are shown in *Figure 6.2.2a*.

A moderately conservative characteristic unit weight between 17kN/m³ and 20kN/m³ above the water table and of 20kN/m³ and 23kN/m³ below the water table is deemed suitable for dense to very dense granular deposits in accordance with BS8002:2015 (Ref. 8)

A moderately conservative characteristic Angle of Shearing Resistance (ϕ') has been derived from correlation with SPT N values (Peck et al, 1967, Ref 11) and a review of published values. The results are shown in *Figure 6.2.2b*.

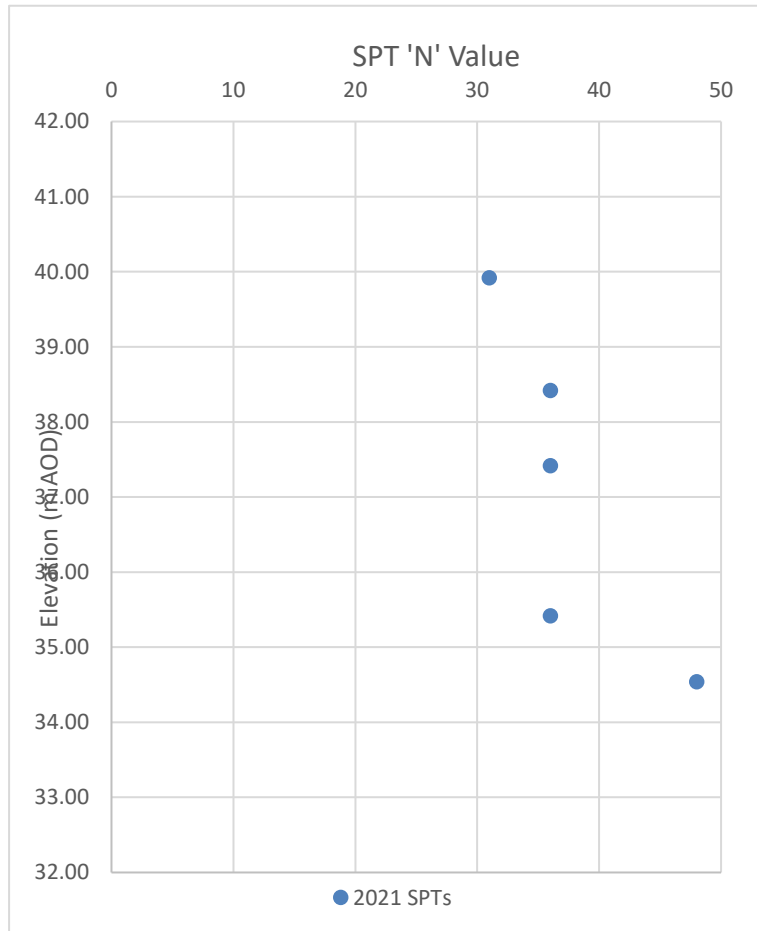


Figure 6.2.2a – Standard Penetration Test vs. Elevation

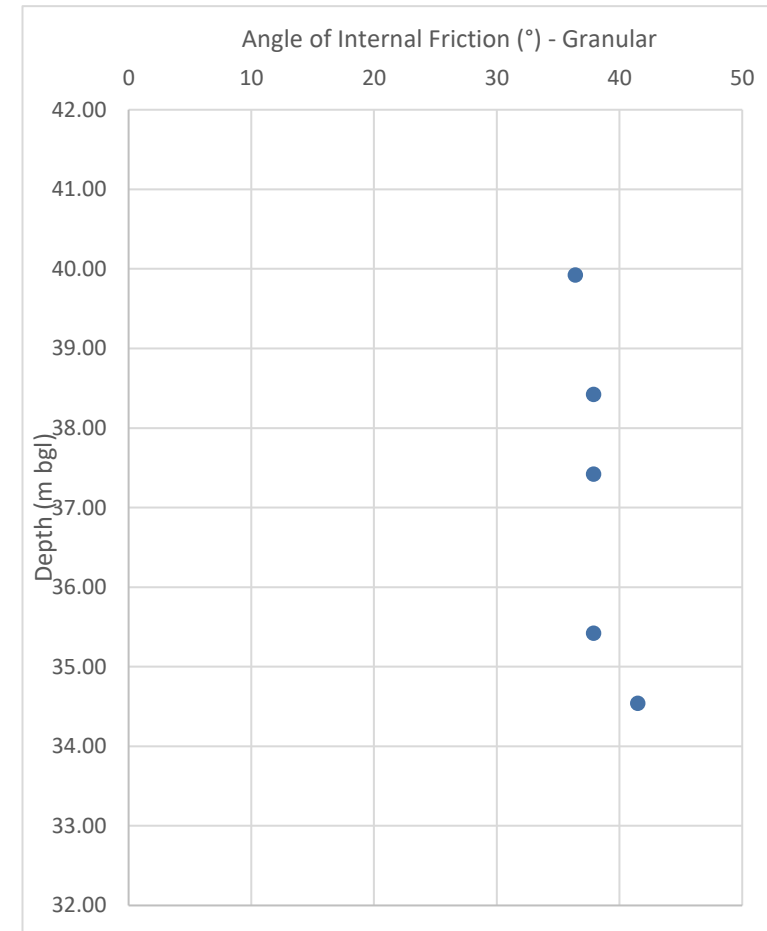


Figure 6.2.2b – Angle of Internal Friction (Granular) vs Depth

6.3 Chester Formation

The Chester Formation was encountered in four exploratory holes, BH101 – BH103 and BH201, in the 2021 Pre-Demolition and 2021 Post Demolition Investigation. It was encountered as weathered bedrock at depths between 15.00m – 17.00m bgl (32.44m – 35.10m AOD) underlain by intact bedrock. Intact deposits were encountered at 18.50m bgl – 24.20m bgl (26.22m – 29.95m AOD).

6.3.1 Weathered Bedrock

The geotechnical test results recorded within the weathered bedrock deposits are summarised in *Table 6.3.1*.

Table 6.3.1 – Summary of granular geotechnical test results

Parameter	No. of tests	Minimum	Maximum
pH	3	8.95	9.38
Water Soluble Sulphate (mg/l)	3	10	-
PSD% Cobbles Gravel Sand Silt/Clay	2	0 0 85 11	0 1 89 14
SPT 'N' Value Granular ⁽¹⁾	1	46	-

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

Eight SPT tests were undertaken within the weathered bedrock deposits recording one value of N=46 and nine values >50 (refusal) indicating very dense deposits.

A moderately conservative characteristic unit weight between 18kN/m³ and 20kN/m³ above the water table and between 20kN/m³ and 23kN/m³ below the water table is deemed suitable for very dense granular deposits in accordance with BS8002:2015 (Ref. 8)

A moderately conservative characteristic Angle of Shearing Resistance (ϕ') of 42° has been derived from correlation with SPT N values (Peck et al, 1967, Ref 11) and a review of published values.

6.3.2 Chester Formation

The intact bedrock of the Chester Formation was encountered below the weathered deposits at depths between 18.50m bgl in BH201 and 24.20m bgl in BH103.

The bedrock comprised very weak to medium strong reddish-brown fine to coarse sandstone. Shallow bedrock encountered was noted to be highly weathered. Fracture spacing was variable ranging from very closely spaced to medium spaced.

Some assumed zones of core loss were recorded likely due to high degree of local weathering of the strata and are summarised in *Table 6.3.2a*. There were zones of non-intact core recorded in the exploratory holes, details of which can be referred to in exploratory hole logs in *Appendix B*.

Table 6.3.2a – Summary of Zones of Core Loss

Exploratory Hole ID	Core Loss Depth (m bgl)	Core Loss Depth (m AOD)
BH101A	20.00 – 20.65	29.95 – 29.30
	21.50 – 21.73	28.45 – 28.22
	22.95 – 23.35	27.00 – 26.60
	24.50 – 25.50	25.45 – 24.45
	25.90 – 26.00	24.05 – 23.95
	28.67 – 29.50	21.28 – 20.45
	31.82 – 32.00	18.13 – 17.95
	33.40 – 33.50	16.55 – 16.45
	35.05 – 35.50	14.90 – 14.45
	37.83 – 38.00	12.12 – 11.95
	39.40 – 39.50	10.55 – 10.45
BH102	23.20 – 24.15	26.90 – 25.95
	26.00 – 26.50	24.10 – 23.60
	29.35 – 30.12	20.75 – 19.98
	32.28 – 32.50	17.82 – 17.60
	36.83 – 37.10	13.27 – 13.00
	39.88 – 40.00	10.22 – 10.10
BH103	26.40 – 26.83	24.02 – 23.59
	30.65 – 31.00	19.77 – 19.42
	33.90 – 34.00	16.52 – 16.42
	35.43 – 35.50	14.99 – 14.92
	38.28 – 38.50	12.14 – 11.92
BH201	18.97 – 20.00	29.07 – 29.04
	21.14 – 21.50	26.90 – 26.54

Exploratory Hole ID	Core Loss Depth (m bgl)	Core Loss Depth (m AOD)
	24.41 – 24.50	23.63 – 23.54
	30.47 – 30.50	17.57 – 17.54
	31.68 – 32.00	16.36 – 16.04
	33.40 – 33.50	14.64 – 14.54
	34.84 – 35.00	13.20 – 13.04

Rock Quality Designation (RQD) recorded in the sandstone cored samples ranged from 0 to 100% (averaging 52%) which classifies it as of very poor to excellent rock mass quality, generally increasing with depth. Total Core Recovery (TCR) and Solid Core Recovery (SCR) vary between core runs but overall show a general increase with depth. The Rock Quality Parameters are presented in *Figure 6.3.2a*.

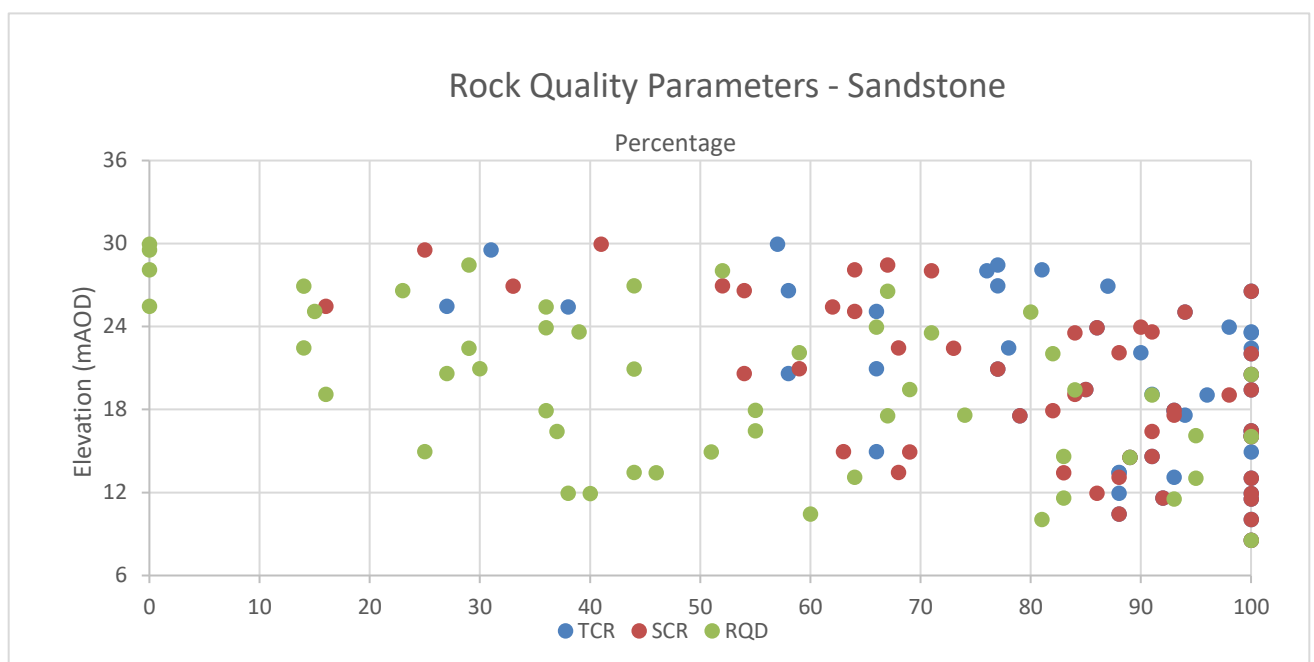


Figure 6.3.2a – Summary of Rock Quality Parameters v. Elevation for Sandstone

A summary of the geotechnical testing results for the sandstone bedrock are presented in *Table 6.3.2b*. Full details of geotechnical testing are included in *Appendix D*.

Table 6.3.2b – Summary of geotechnical test results

	Parameter		No. of Tests	Summary of Results	
				Min	Max
Laboratory Test Results	Point Load Indices (Is50) (MPa)	Axial Plane	27	0.07	0.36
		Diametral Plane	27	0.01	0.29
	Unconfined Compressive Strength, UCS (Mpa)		18	3.50	19.40
	pH values		12	7.48	9.07
	Water Soluble Sulphate (mg/l)		12	10	20
Derived Parameters	Estimated UCS from Point Load Indices	Axial Plane	27	1.68	8.64
		Diametral Plane	27	0.24	6.96

Overall, 27No. axial and 27No. diametral Point Load Tests (PLT) were undertaken on selected samples of sandstone from rotary cores. Axial plane PLT (Is(50)) results ranged from 0.07MPa and 0.36MPa and diametral plane PLT (Is(50)) results ranged between 0.01MPa and 0.29MPa.

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

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

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

A significant variability in the correlation factor, ranging from 26 to 138, was derived from the correlation between PLT (Is(50)) results and UCS test results. In consideration of the correlation between Is(50) and UCS values reported from laboratory testing and of published literature (Tomlinson et al), a factor of 24 has been considered suitable.

Based on this relationship, estimated UCS values were sandstone range between 1.68MPa and 8.64MPa for axial tests and 0.24MPa and 6.96MPa for diametral tests, indicating the rock tested is highly variable with the strength index indicating very weak to weak. The findings show lower strengths than indicated during field descriptions, typically recorded as very weak to medium strength. This is likely due to localised areas of weaker strength sandstone chosen for laboratory analysis.

The estimated UCS values were generally consistent with the UCS test results which ranged between 3.50MPa and 19.40MPa. The test termination reasons varied from single shear, multiple shear and axial cleavage. The UCS testing results indicate the intact rock is generally weak. The results show a lower strength than indicated during field descriptions, similarly, like

due to a localised area of low strength material chosen for laboratory analysis. The results are shown in *Figure 6.3.2b*.

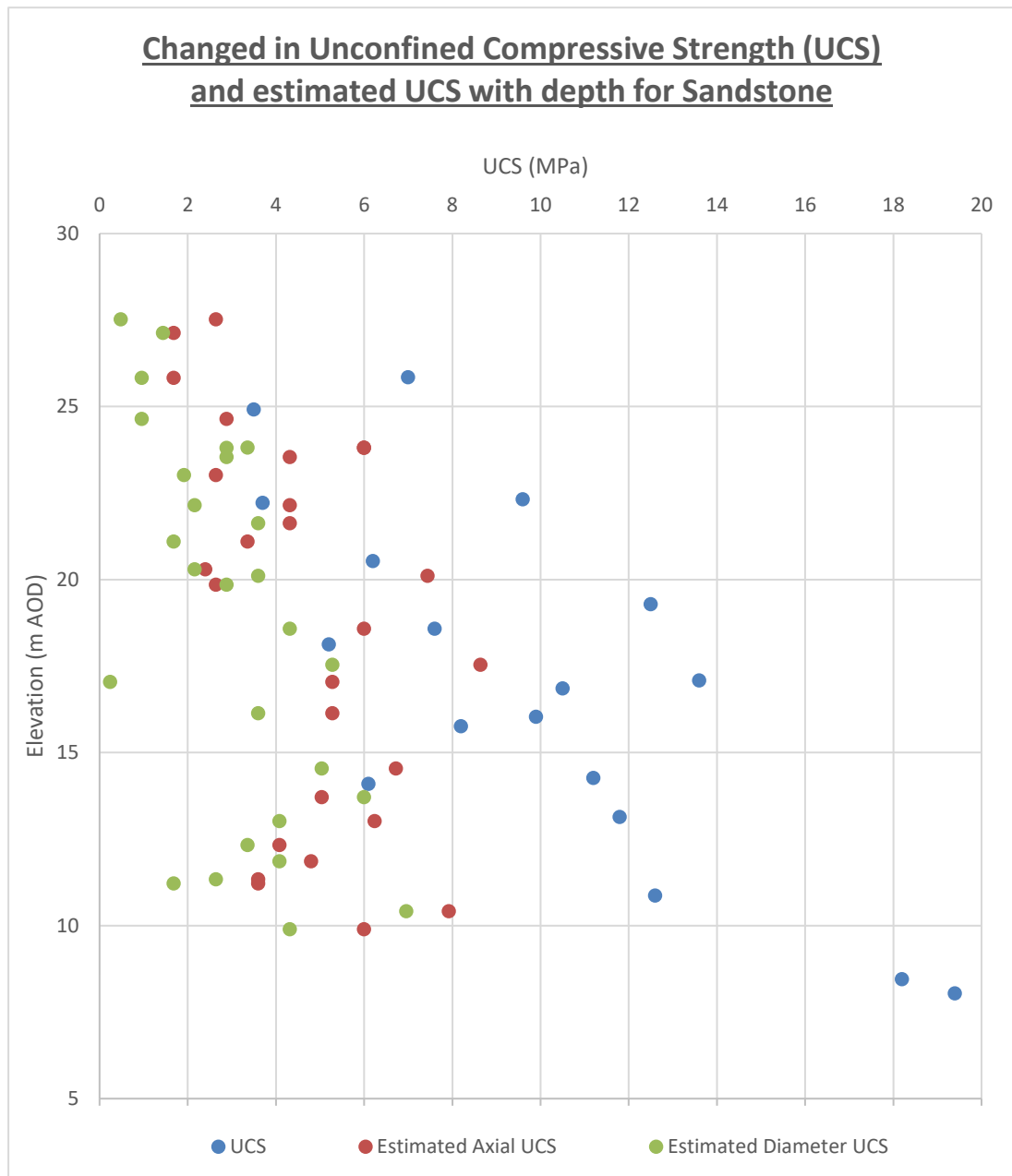


Figure 6.3.2b – Variation of UCS Test and Estimated UCS Results

6.4 Aggressive Ground Conditions

The classification of the site (Sites 1 and 2) 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.13). A summary of the results obtained are summarised in *Table 6.4a*, and *Table 6.4b* details the classification.

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

Stratum	Test Type	Range
Made Ground	pH	7.45 – 9.53
	Water Soluble Sulphate (mg/l)	60 - 1480
Glacial Till	pH	8.18 – 9.24
	Water Soluble Sulphate (mg/l)	30 - 120
Weathered Bedrock	pH	9.14 – 9.38
	Water Soluble Sulphate (mg/l)	10
Chester Formation	pH	7.48 – 9.07
	Water Soluble Sulphate (mg/l)	10 - 20

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

Stratum	Design Sulphate Class	ACEC Class ⁽¹⁾
Made Ground	DS-2	AC-2
Glacial Till	DS-1	AC-1
Residual Soils	DS-1	AC-1
Chester Pebble Bed Formation	DS-1	AC-1

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

7.0 Ground and Groundwater Contamination Assessment

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

In guidance published by the Environment Agency, the risk to human health or controlled waters is determined through an assessment of pollutant linkages between a source of contamination (within the ground or groundwater either on or off site) and a sensitive receptor such as end users of the site, building materials, edible plants grown in gardens or groundwater abstracted for drinking. This is termed a source-pathway-receptor relationship. The same model is applied to the assessment of risk arising from ground gases as detailed within BS8576:2013 (Ref. 14).

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

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

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

7.1 Human Health GQRA

Detailed guidance on human health risk assessment is available within several documents, published by both the Environment Agency and Defra. Guidance includes Contaminated Land Exposure Assessment (CLEA) v1.071 model (Ref. 15) Report SC050021/SR2: Human Health Toxicological Assessment of Contaminants in Soil (Ref. 16) and Report SC059921/SR3: Updated Technical Background to the CLEA Model (Ref. 17).

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

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

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

- ii) **Supplementary Screening Values (SSVs):** In addition to the SGVs developed by the EA, other third-party organisations have derived SSVs for a wider range of contaminants and land uses using the CLEA Model. Curtins have adopted these numbers where applicable, including those developed by Atkins AtriskSoil™, the LQM/CIEH Suitable for Use Levels (S4UL) and EIC/AGS/CL:AIRE published thresholds;
- iii) **Category 4 Screening Levels (C4SLs):** In March 2014 Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, hexavalent chromium and lead. These values were derived to support the revised Part 2A Statutory Guidance issued in 2012 (Ref. 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 use of the site, noted a multistorey structure of thirty one, thirteen and five stories comprising 373no. residential apartments, 12 no. serviced apartments and a ground floor commercial unit, is most analogous with a *Commercial* end use scenario and so the assessment has been undertaken against the following GACs, in order of preference for the development:

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

The soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e. the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for the Made Ground site soils ranged from 0.8% to 11.6% and natural site soils ranged between 1.1% and 3.2%. The high concentration of SOM was encountered in cohesive Made Ground at 1.70m bgl in WS03.

With consideration for a calculated geometric average, made ground soils determine a SOM of 2.35% while natural soils determine a SOM of 1.82%. As such, a comparison against Tier 1 Thresholds for a conservative SOM of 1% for a Commercial end-use.

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

7.1.2 Generic Assessment Criteria Screening of Soil Laboratory Results

The results of the environmental testing can be referred to in *Appendix C*, with testing undertaken on a total of thirteen soil samples obtained in 2018 and two soil samples in 2020.

With respect to the proposed end use of the site, no exceedances were recorded with respect to *Commercial* end-use.

Selected soil samples were screened for asbestos. No suspected asbestos containing materials (ACMs) were identified in the exploratory hole logs or during laboratory screening.

7.2 Controlled Waters GQRA

A model for assessing the potential for pollution of controlled waters and for deriving a safe concentration in ground and groundwater is the Environment Agency's publication 'Remedial Targets Methodology - Hydrogeological Risk Assessment for Land Contamination' (Ref. 19).

In relation to the standards for controlled waters, there are currently no generic groundwater standards or surface water standards that are necessarily applicable to all sites.

However, dependant on the receptor identified as being at risk, the EU Drinking Water Standards (Ref. 20) and/or Water Framework Directive Ecology Quality Standards (WFD EQS) (Ref. 21) can be utilised as primary screening values in a Tier 1 assessment. These can also be supplemented by World Health Organisation (WHO) guidelines (Ref. 22), where WFD or DWS do not exist.

7.2.1 Adopted Controlled Waters Tier 1 Screening Values and Methodology

The results of laboratory analysis of the groundwater samples taken from BH102 and BH103 been assessed against UK/EU Drinking Water Standards (DWS) due to the underlying Principal aquifer within the bedrock, albeit it is overlain by a Secondary Undifferentiated aquifer within the superficial deposits.

Granular Glacial Till was encountered from depths of 10-13m bgl, underlain by granular residual soils at 15-17m bgl and sandstone bedrock at 20-24.20m bgl. Natural soil of limited permeability thus overlies the secondary aquifer with thickness varying from 7.5m to 12.3m.

The adopted Tier 1 Screening Values are listed in *Appendix F*.

7.2.2 Tier 1 Screening of Groundwater Laboratory Results

The groundwater sample from BH102 was collected from the groundwater bearing unit located within the sandstone and as detailed in *Table 3.2* and the logs within *Appendix B*, with the monitoring installation sealed off at rockhead. The slotted pipework was installed 22-32m bgl

(28.10-18.10m AOD), with groundwater levels recorded between 24.29-24.63m bgl (25.81-25.47m AOD) during the four monitoring visits.

The groundwater sample from BH103 was collected from perched groundwater within Made Ground deposits, as detailed in *Table 3.2* and borehole logs within *Appendix B*. The response zone is sealed in the cohesive Made Ground and underlying cohesive Glacial Till to a depth of 5m bgl. Perched groundwater levels were recorded between 2.80-3.59m bgl (47.62-46.83m AOD) during the four monitoring visits.

The results of the environmental testing can be referred to in *Appendix C*.

The two groundwater samples collected and tested in line with *Table 4.2* significantly reduced levels of hydrocarbon concentrations within the deeper samples collected. The differences in water quality shown in *Table 7.2.2*.

Table 7.2.2 – Summary of Groundwater Quality Differences

Contaminant	Concentration (µg/l)	
	BH102 (24.29 – 25.23m bgl)	BH103 (3.34 – 4.91m bgl)
Aliphatic C6-C8	<5	172
Aliphatic C8-C10	<5	564
Aliphatic C10-12	<5	1236
Aliphatic C12-C16	<5	1236
Aliphatic C21-C35	172	14173
Aromatic C12-C16	17	445
Aromatic C16-C21	19	818
Aromatic C21-C35	40	1012

It is further noted that the more mobile/volatile lower fraction TPHs, are recorded as below the laboratories LOD, suggesting that downward migration is being inhibited by the underlying cohesive deposits.

It is also noted that the Secondary and Principal Aquifers are overlain by between 7.50m and 12.20m thick layer of low permeability soils that are acting to limit downward migration of contamination to deeper groundwater bearing units. Furthermore, there is no evidence of significant contamination in the made ground soils on site that would constitute as a continuing source of contamination posing a risk to controlled waters.

Elevated concentrations of heavy fraction TPHs within the bedrock aquifer are considered to be representative of a city centre/former industrial setting, rather than from a source arising from the site.

Neither water sample shows significant impact by metals or inorganic compounds when compared with the UK Drinking Water Standards (DWS) contained within *Appendix F*.

There are some elevations against WHO thresholds in the lower to mid-range fractions of the sample from BH103.

As highlighted within the Phase 1 PRA, considering the distance to the nearest surface water feature (04m west), risks to surface water features are considered to be Low.,

With consideration of the above there is no indication of a significant contamination risk, arising from the development site, to groundwater and or evidence of existing significant contamination of ground water underlying the development site.

7.3 Re-use of Soils and Waste Classification

7.3.1 Re-use of Site Soils

Based on the geochemical testing results presented, it is considered that there is currently no requirement to remove soils on site.

The re-use of site won soils may therefore be undertaken if the following principles are met:

- i) the geotechnical suitability of the material needs to be confirmed
- ii) the re-use of the material needs to be covered as part of the planning approval, e.g. site levels maintained within agreed limits
- iii) the volume of the material being re-used needs to be confirmed and traceable; and
- iv) regulatory approval from the relevant authorities has been sought.

These principles are outlined within the CL;AIRE Definition of Waste Code of Practice (version 2) (Ref.15) and if and where the re-use of site-won soils is proposed as part of the development works it is recommended that a Materials Management Plan is produced in line with the Definition of Waste Code of Practice to detail and document the process.

7.3.2 Initial Material Classification

Where any site soils are to be disposed of off-site guidance on the disposal of contaminated soils is provided within the following document published by the Environment Agency, the Guidance on the classification and Assessment of Waste Technical Guidance WM3 (1st Edition 2015) (Ref.16).

Guidance states that the principal contractor (or any other sub-contractor undertaking excavations) should, in conjunction with the proposed disposal facility, use where possible the relevant environmental chemistry analyses results to classify any surplus material identified for off-site disposal. However, it should be noted that this information is for guidance only and material identified for disposal should be tested and assessed in accordance with WM3 to enable classification during the works.

An initial assessment for the waste classification of the shallow Made Ground and shallow superficial soils encountered on site has been carried out through a comparison of the soil testing results against the Tier 1 Thresholds and using the Waste Soils Characterisation Assessment Tool, Cat-WasteSoil, developed by McArdle and Atkins. This online tool gives a rapid assessment of contaminated soils and their classification as either hazardous or non-hazardous (stable non-reactive hazardous waste) waste, it should be noted that this tool does not classify inert waste. Persistent Organic Pollutants (POP's) were not tested for as part of the investigation, however based on the Conceptual Site Model the risk of these being present on the site is considered low.

The initial classification of ten made ground soil samples collected and analysed during the Stage 1 and Stage 2 investigations indicates that nine samples may be classed as non-hazardous with respect to Environmental Agency waste classes, using guidance given in WM3.

The initial classification classed two made ground sample as hazardous waste for off-site disposal, WS02 at 0.35m from the Stage 1 investigation in 2018 and TPA at 0.30m from the Stage 3 investigation in 2021. The result from WS02 is due to the moderately elevated hydrocarbons determine when assessed by CatWaste as Unknown Oils and TPA is due to pH.

Landfill operators are not obliged to accept waste and, if they were to do so, may have specific requirements beyond those outlined above prior to acceptance. Landfill operators should be contacted to confirm the above classifications or otherwise.

Additional analysis of soils being removed from site may be required to confirm waste materials are compliant with the descriptions above.

7.3.3 Waste Acceptance Criteria (WAC) Testing

Two made ground soil samples were obtained in the Stage 2 investigation and three made ground soil samples obtained in the Stage 3 investigation for Waste Acceptance Criteria (WAC) testing. The results can be referred to in Appendix C.

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. 23), BSI Publication Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings BS8485:2015 (Ref. 24) and other broadly accepted references such as the Ground Gas Handbook 2009 (Ref. 25).

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

8.1 Ground Gas Monitoring Results

To characterise the site's ground gas regime and validate the qualitative assessment of ground gas risk standpipe installations were incorporated within six window sample borehole locations from the Stage 1 investigation and three borehole locations from the Stage 2 investigations. The details of the response zone of each monitoring installation are outlined in *Section 3.2*.

The Phase 1 highlighted a **Moderate/Low** risk from ground gases potentially arising from organic/putrescible content in Made Ground soils.

The result logs sheets are contained within *Appendix E* and summarised in *Table 8.1a* and *Table 8.1b*.

8.1.1 2018, Stage 1 Investigation

The Stage 1 investigation proposed an initial programme of six monitoring visits over three months. Six gas monitoring visits were undertaken between 25th September 2018 and 31st January 2019 with barometric pressure recorded between 983mb and 1029mb and the monitoring period included at least one monitoring visit during falling barometric pressure.

On the third and sixth monitoring visits, it was not possible to monitor WS06, WS07 and WS01 due to them being inaccessible.

Methane (CH₄) was recorded at or below the instrument's detection limit within in all the monitoring wells. A maximum hydrogen sulphide (H₂S) concentration of 7ppm was recorded in WS04 on the fifth monitoring visit and a maximum carbon monoxide (CO) concentration of 7ppm was recorded in WS04 on the fifth monitoring visit.

Elevated concentrations of carbon dioxide above 5% were recorded in WS02 on the fifth and sixth visit. Maximum gas flow rates ranged between <0.1l/hr and 0.7l/hr. The greatest flow rate was recorded in WS04 on the fourth monitoring visit.

Table 8.1a – Summary of Ground Gas Monitoring Results for Stage 1 2018 Investigation

Exploratory Hole ID	Maximum Methane Concentration (% v/v)	Maximum Carbon Dioxide Concentration (% v/v)	Minimum Steady Oxygen Concentration (% v/v)	Maximum Gas Flow (l/hr)	Steady State Gas Flow (l/hr)
WS01	<0.1	2.1	17.0	-0.6	-0.6
WS02	<0.1	5.4	13.1	-0.6	-0.6
WS03	<0.1	0.3	20.5	-0.6	-0.6
WS04	<0.1	2.0	20.3	0.7	-0.6
WS06	<0.1	1.4	17.0	-0.6	-0.6
WS07	<0.1	0.7	18.3	-0.6	-0.6

8.1.2 2021, Stage 2 Investigation

The Stage 2 investigation proposed a programme of four monitoring visits over two months. Four monitoring visits were undertaken between 5th February and 5th March 2021 with barometric pressure recorded between 991mb and 1029mb.

Methane was recorded in BH103 on the second and the third monitoring visit, with a maximum concentration recorded at 2.2% on the second visit.

A maximum hydrogen sulphide (H₂S) concentration of 3ppm were recorded in BH101A and BH102 on the first monitoring visit. A maximum carbon monoxide (CO) concentration of 4ppm was recorded in BH102 on the second monitoring visit.

No elevated carbon dioxide concentrations above 5% were recorded, with a maximum concentration recorded at 0.6% in BH102 on the second monitoring visit.

Gas flow was recorded at a maximum peak flow rate of -1.0l/hr in BH101A on the second and third monitoring visit. The greatest steady state gas flow rate of -0.8l/hr in BH101A on the second monitoring visit.

Table 8.1b – Summary of Ground Gas Monitoring Results for Stage 2 2021 Investigation

Exploratory Hole ID	Maximum Methane Concentration (% v/v)	Maximum Carbon Dioxide Concentration (% v/v)	Minimum Steady Oxygen Concentration (% v/v)	Maximum Gas Flow (l/hr)	Steady State Gas Flow (l/hr)
BH101A	<0.1	<0.1	20.9	-1.0	-1.0
BH102	<0.1	0.6	20.4	<0.1	<0.1
BH103	2.2	1.2	0.3	0.4	<0.1

8.2 Ground Gas Assessment

The Conceptual Site Model presented within the Phase I Preliminary Risk Assessment identified 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. 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.

The ground investigations revealed a ground model generally consistent with the preliminary conceptual site model. Made ground soils were encountered to depths between 0.25m and 3.00m bgl with limited putrescible content generally. Natural deposits comprised glacial till, cohesive and granular, to a maximum depth of 17.00m bgl. Residual soils of the Chester Pebble Bed Formation were encountered to depths of 20.00m and 24.20m bgl and bedrock to the maximum depth of the investigation.

The proposed development is noted as a multistorey structure of thirty one, thirteen and five stories comprising 373no. residential apartments, 12 no. serviced apartments and a ground floor commercial unit.

As a result, this assessment has been undertaken in accordance with guidance within BS8485:2019 (Ref. 24)

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.

In accordance with BS8485:2015 (Ref.24), consideration of the recorded soil gas flow rates, presented above, 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.

A total of ten monitoring visits have been undertaken, six in 2018 and four in 2021. It is considered that the gas monitoring results recorded represent the site's ground gas regime and so the 'worst case' scenario has not been assessed further.

For a 'representative' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) steady state flow rates and peak 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 0.324 l/hr for carbon dioxide corresponding to elevated carbon dioxide of 5.4% v/v recorded during visit no. 5. In WS02.

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 methane with the highest concentration of methane recorded in BH103 at 2.2% v/v .

Typical concentrations of carbon dioxide are below 5% v/v with only one reading, in one borehole on one occasion, recorded above (WS02 5.4% v/v). Similarly, typical concentrations of methane are below 1% v/v , with only one reading, in one borehole on one occasion recording about the 1% v/v threshold (BH103, 2.2% v/v).

It is considered that adoption of a higher Characteristic Situation gas regime due to one carbon dioxide and one methane reading over 5% v/v and 1% v/v respectively would result in unnecessarily conservative protection measures given the low flow rates identified and typically low concentrations of hazardous gases.

Consequently, the sites Gas Screening Value (GSV) has been adopted and in accordance with an assessment by CIRIA C665 the GSV indicates a Characteristic Situation 1 (CS1) gas regime which does not require any gas protection measures.

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

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

The CSM follows the framework outlined within CIRIA C552 (Ref. 26) which is summarised within *Appendix H*.

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

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

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

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 (Ref. 27) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk.

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

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

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

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

Conceptual Site Model			Generic Qualitative Risk Assessment			Comments	Action
Identified Source	Pathway(s)	Receptor(s)	Consequence	Likelihood of Occurrence	Risk Rating		
Organic and inorganic contaminations within made ground soils across the site.	Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation	Site end-users Commercial at ground level	Medium	Unlikely	Low	Environmental chemical analysis did not record any exceedances with respect to a 'Commercial' end use scenario.	No further action required. Construction and maintenance works should be provided with suitable PPE with respect to environmental chemical results presented herein. Standard Health & Safety precautions likely to be used by workers.
	Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation	Construction and maintenance workers	Mild Standard Health & Safety precautions likely to be used by workers	Unlikely	Very Low	No significant visual evidence of contamination was identified in site soils. Olfactory evidence was encountered in WS02 recorded as a slight hydrocarbon odour.	
	Soil dust ingestion/inhalation produced during construction	Adjacent residents	Medium	Unlikely	Low	No suspected asbestos containing materials (ACMs) were identified in exploratory hole logs and laboratory screening.	
	Vertical and horizontal migration through superficial deposits	Controlled Waters (Principal Aquifer)	Medium	Unlikely	Low	No exceedances of nominated thresholds have been recorded. The Secondary and Principal Aquifers are overlain by between 7.50m and 12.20m of low permeability soils acting to limit downward migration of contamination. Furthermore, the risk to the underlying Principal Aquifer from proposed piling techniques is considered to be Low	No further action required.
Organic matter and/or contamination as source material for the generation of ground gas.	Ground gas & vapour migration and inhalation	Site end-users Commercial	Medium	Unlikely	Low	While a single elevated carbon dioxide concentration and a single methane concentration above the threshold levels were recorded in separate boreholes; due to the low flow rates and typically low concentrations of hazardous ground gases recorded, a Characteristic Situation 1 (CS1) gas regime has been assigned.	No ground gas protection measures required.
		Construction and maintenance workers	Mild Standard Health & Safety precautions likely to be used by workers)	Unlikely	Very Low		The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction

10.0 Engineering Assessment and Recommendations

10.1 Introduction

This section will assess the relevant geotechnical issues for the proposed development comprising the construction of a multistorey structure of thirty one, thirteen and five stories providing 373 no. residential apartments, 12 no. serviced apartments and a ground floor commercial unit with associated car parking. The proposed development plan is contained within *Appendix A*.

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

10.2 Summary of Ground Conditions

The ground conditions on site generally comprised concrete overlying predominantly granular made ground to depths between 0.25m – 3.00m bgl. Made ground was underlain by cohesive glacial till comprising stiff to very stiff slightly sandy slightly gravelly clay to depths between 40.42m AOD and 37.10m AOD. Deeper granular glacial till deposits, encountered in BH101A-BH103 and BH201 comprised dense to very dense slightly gravelly medium to coarse sand and very dense slightly silty sandy gravel to depths between 32.95m AOD to 35.10m AOD.

Glacial till is underlain by the Chester Formation encountered as weathered bedrock to depths between 29.95m AOD and 26.22m AOD and intact bedrock to the terminated depths of the boreholes (<7.04m AOD). Weathered bedrock was encountered as very dense reddish brown slightly gravelly medium to coarse sand and bedrock described as very weak to medium strong reddish-brown fine to coarse sandstone.

Groundwater level monitoring has shown the site is underlain by both perched and deeper groundwater. The perched groundwater is located within the made ground and top of the cohesive glacial till, recorded at depths between 2.70m and 4.61m bgl (48.40m – 46.39m AOD). Deeper groundwater was recorded at 14.30m bgl (35.65m AOD) in BH101A within the granular glacial till and at 24.30m – 24.60m bgl (25.50 – 25.80m AOD) within bedrock in BH102.

10.3 Geotechnical Considerations

10.3.1 Presence of Existing Services

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

10.3.2 Obstructions and Relict Foundations

As detailed in *Table 5.7* and within the logs (*Appendix B*), obstructions were recorded during the ground investigation in WS04 (1.17m bgl), WS05 (2.25m bgl) and BH101 (1.50m bgl) possibly related to existing concrete foundations whilst structures/further foundations will be present associated with the current warehouse building, neighbouring buildings and in un-investigated areas of the site.

Detailed design of the foundations over these areas will be required following determination of the final development layout, at which time a specialist demolition contractor should be consulted. Where demolition works are to be undertaken of the existing structures, it should be ensured that all obstructions within influencing depth of the proposed development are safely removed as required. Existing foundations should be removed to avoid forming hard spots and backfilled in accordance with an engineering specification to avoid soft spots.

Consideration should be given, in liaison with the Principal Contractor, to re-use of former foundations/concrete obstructions via crushing, appropriate testing (environmental and geotechnical), screening and re-use on site as capping or fill to structures in accordance with Series 600 of the Specification for Highways Works (SHW) to reduce export/import costs.

Movement monitoring of adjacent buildings is likely to be required during demolition and construction works.

10.3.3 Variable Made Ground

Made Ground was encountered in all the exploratory hole locations from ground level to depths of between 0.25m and 3.00m bgl across the site. The Made Ground should not be considered as a suitable founding stratum.

10.3.4 Soft Superficial Deposits

There were no very soft silt or clay superficial drift deposits encountered in the near surface soils during the ground investigation. The contractor should however be aware that these soils

are recorded within proximity to the site and should very soft cohesive deposits be encountered they are to be removed and replaced with a suitable well compacted granular fill.

10.3.5 Earthworks

When considering earthworks and potential for re-use materials should be tested to show that they are chemically and geotechnically suitable for re-use at their proposed locations and to ensure that there are no unacceptable risks to identified receptors, which should be outlined in a site specific earthworks specification and strategy.

It is currently unknown whether site levels will need to be changed at the site. Any arisings and cut levels will predominantly comprise the Glacial Till which would likely classify in accordance with the Specification for Highways Works (SHW) Series 600 as Class 2 materials, subject to specific classification testing and environmental suitability.

As an increased performance of materials placed below structures will be required over and above those defined for a general fill, soils that are to be used below structures would be reclassified and replaced to an appropriate Class (6N or 6P) as defined in the Specification for Highway Works (Highways Agency 2014). The formation strata shall be proof rolled and inspected for any soft/loose materials. Any soft/loose materials should be replaced with Engineered Fill or granular capping materials.

10.4 Foundation Options

10.4.1 Shallow Foundations

It is understood that the proposed development is to comprise a multistorey structure of thirty one, thirteen and five stories providing 373 no. residential apartments, 12 no. serviced apartments and a ground floor commercial unit with associated car parking.

The shallow ground conditions on site comprises made ground overlying cohesive and granular glacial till underlain by the Chester Formation which was encountered at depths of 20.00-24.20m bgl.

Due to the likely loads of the proposed development, it is considered that a shallow spread foundation in the superficial deposits are unlikely to be suitable at the site.

10.4.2 Piled Foundations

The advice of reputable piling specialists, experienced in the ground conditions considered here, should be sought. They should be responsible for the selection of appropriate piling equipment and the final design of the piles. Given below are some preliminary comments.

The ground conditions on site are considered to potentially be amenable to CFA or bored piles, taking into account the following comments.

CFA piles are generally limited to 25m for smaller diameter piles (<400mm) and 30m for larger diameter piles (>600mm), which should be taken into account when determining the number of piles under heavily loaded areas. CFA piles require good workmanship to ensure they are adequately constructed and may struggle to penetrate the rock encountered on site (subject to rig utilised).

Bored piles should be able to penetrate rock bands and bedrock encountered on site.

The presence of shallow and variable groundwater levels should be considered during pile design whilst the presence of existing buildings surrounding the site should also be taken into account to ensure ground movements are limited.

The use of casing or bentonite slurry or other suitable support fluid may be required to support the pile bore through the Made Ground and weathered water bearing granular bedrock materials. It should be noted that the possibility of groundwater strikes additional to those encountered during the ground investigation works cannot be ruled out.

The risk of over-fighting should be considered during pile construction due to the presence of loose / soft soils at the of intact rock bands / bedrock.

Due to Low to Medium volume change potential of some on site soils at a shallow depth, the specialist pile designer should consider the potential for desiccation, shrink / swell clays and the requirements for void formers below ground beams and pile caps and against the inside faces of external ground beams and piles caps where clay soils are present, so as to provide a suitable minimum void dimension as per NHBC guidelines.

10.5 Floor Slabs

Based on observations onsite together with the results of laboratory tests, it is recommended that consideration is given to a suspended ground floor slab. As piled foundations are anticipated, a suspended slab is recommended to bear on the pile caps by a network of beams which will minimise any differential settlement between the floor and the piled structure.

The void dimensions associated with any suspended floor slabs should be determined in accordance with Chapter 4.2 of the NHBC Standards

10.6 Excavations

Based on observations on site, together with the results of in-situ and laboratory tests, it is considered that excavations to <1.20m bgl should stand unsupported in the short term. Side support for safety

purposes should of course be provided to all excavations which appear unstable, and those >1.20m deep, in accordance with Health and Safety Regulations.

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

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

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

10.7 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest (Ref. 7) and laboratory testing undertaken accordingly in *Section 6.3*.

In the consideration of sulphate attack on buried concrete, reference has been made to BRE SD1 (2005 Ed), which classifies the site as a brownfield site with a mobile groundwater conditions.

The results of the concrete classification tests received have indicated a DS-2, AC-2 classification for the Made Ground, decreasing to DS-1, AC-1s in natural soils.

11.0 Conclusions & Recommendations

11.1 Conclusions

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

11.1.1 Ground Contamination

With respect to the proposed end use of the site, no exceedances were recorded with respect to Commercial end-use.

A **Low** risk rating is therefore identified to proposed site end-users from direct contact, inhalation and ingestion of contaminants within Made Ground soils.

11.1.2 Controlled Waters

No exceedances of nominated screening criteria have been noted within groundwater samples collected.

The Secondary and Principal Aquifer are overlain by a 7.50m to 12.20m thick layer of low permeability soils that are acting to limit downward migration of contamination to deeper groundwater bearing units.

Furthermore, the risk to the underlying Principal Aquifer from proposed piling techniques is considered to be **Low**.

11.1.3 Ground Gas Assessment

While a single elevated carbon dioxide concentration and a single methane concentration above the threshold levels were recorded in separate boreholes; due to the low flow rates and typically low concentrations of hazardous ground gases recorded, a Characteristic Situation 1 (CS1) gas regime has been assigned to the site.

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

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

If the new development incorporates a basement the advice of a specialist Radon assessor must be obtained.

11.2 Recommendations

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

- 1) The engineering recommendations contained within the report should be reviewed once the final development proposals and site levels are confirmed;
- 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) With respect to the risk from Unexploded Ordnance during construction, the following steps are recommended:
 - a) UXO Risk Management Plan;
 - b) Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

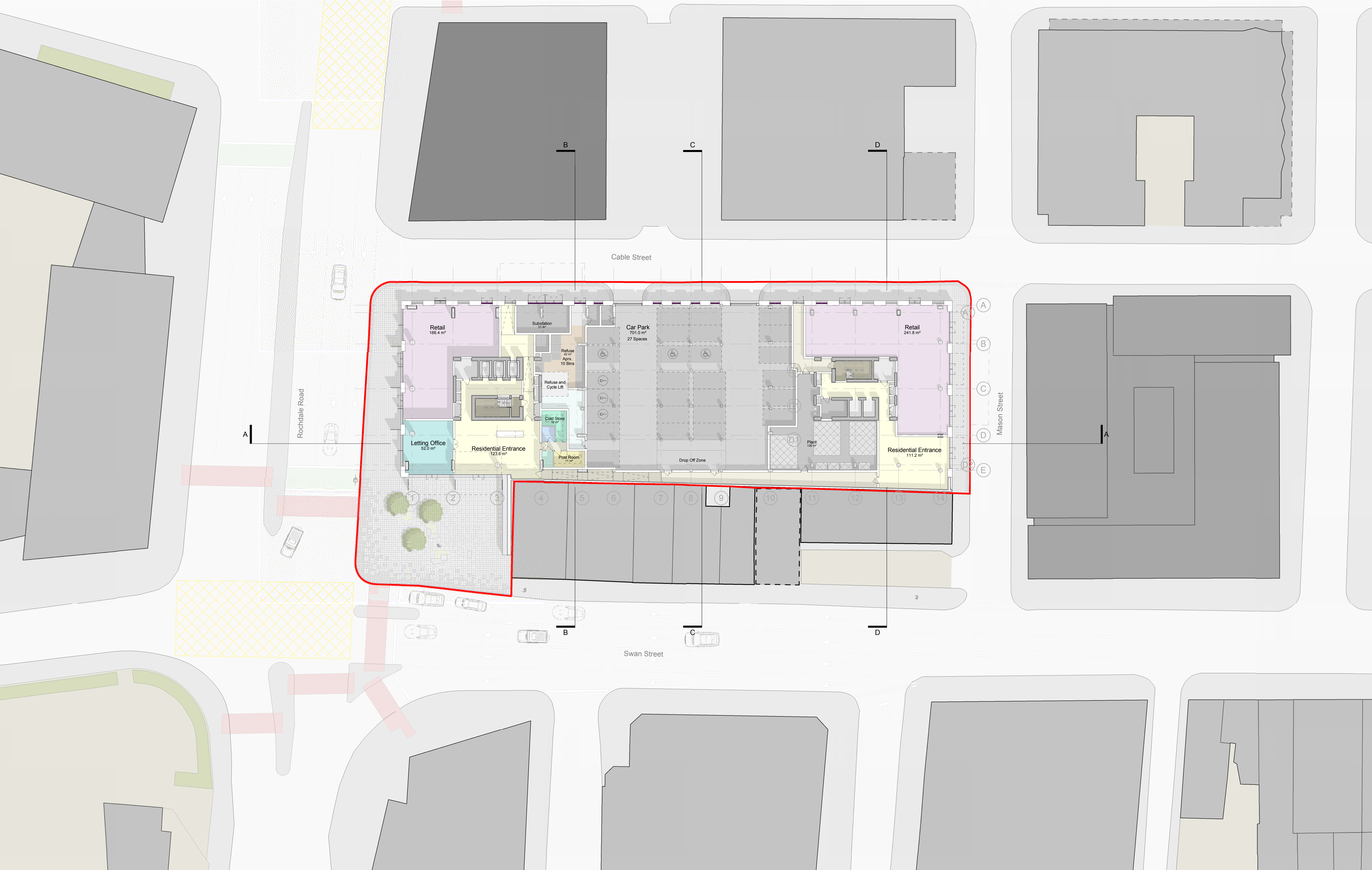
12.0 References

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- 27. **CITB.** (2015) Construction (Design and Management) Regulations.

Appendix A – Drawings

- Simpson Haugh (2018) *General Arrangement Plan Ground Level 00 for Swan House*, ref. 10133-Z1-00-PL-A-B5D8-G200-0001 Rev 1
- Curtins (2021) *Exploratory Hole Location Plan for Swan House*, ref. 077409-CUR-00-XX-DR-GE-80002-P01
- Curtins (2021) *Post Demolition Exploratory Hole Location Plan for Swan House*, ref. 077409-CUR-00-XX-DR-GE-80003-P01.



This drawing is copyright.
Do not scale off dimensions.

All dimensions to be checked on site by contractor.

Contractor to report any dimensional discrepancies, errors or omissions prior to commencing on site.

Scale Bar 1:250 @ A1

NORTH

Rev	Date	Description
00	2018-07-06	Issued for Planning
01	2018-07-25	Updated landscaping proposals

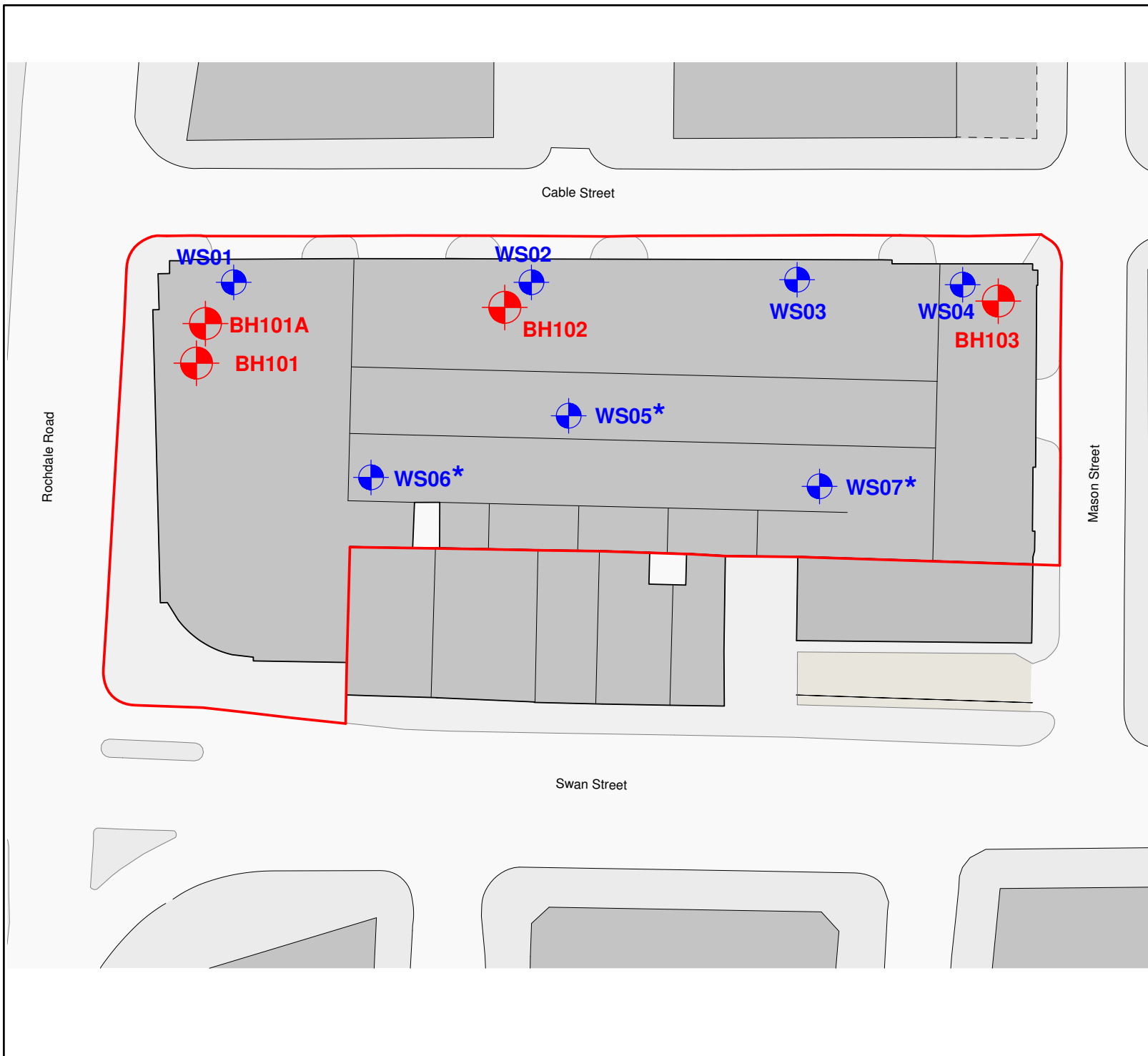
Project Title
Swan House
2 Rochdale Road
Manchester

Status
Planning Issue

Drawing Title	
General Arrangement Plan Ground Level 00	
Job No	Scale 1:500 @ A3 Date
10133	1 : 250@ A1 Jun 2018
SHP Drawing Code	Revision
10133-Z1- 00 -PL- A- B5D8- G200-0001	01

simpsonhaugh

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2019 Investigation



Window Sample Borehole Location



Denotes borehole drilled in basement

All boreholes were followed on by dynamic probing with the exception of WS05.

All boreholes were installed with the exception of WS06.

2021 Investigation



Sonic Borehole Location

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

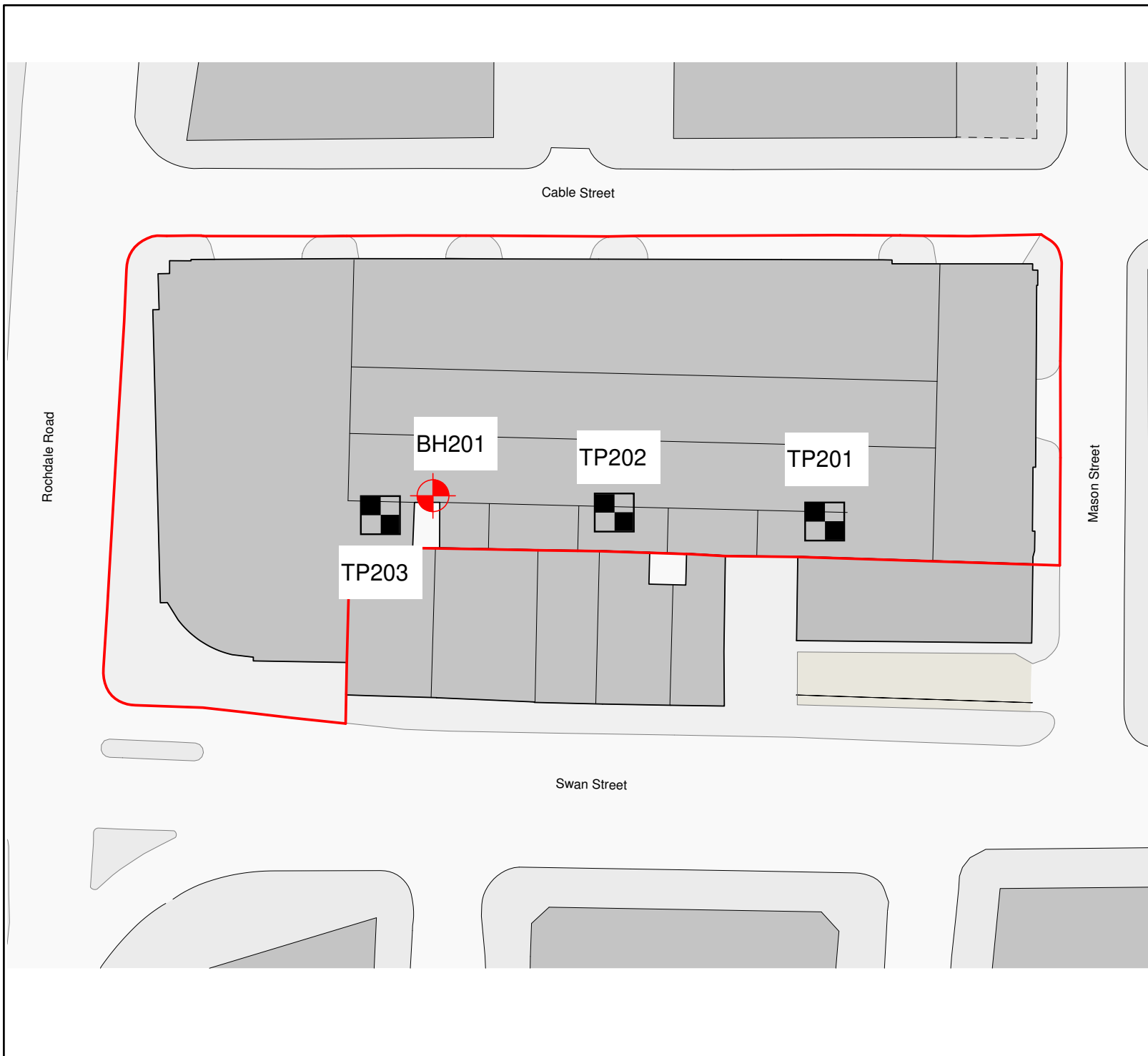


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Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status:	INFORMATION			
Project:	Swan House			
Drg Title:	Exploratory Hole Location Plan			
Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	02/02/21	PN	SH
Drg No:	077409-CUR-00-XX-DR-GE-80002-P01			Rev:
				/
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Cable Percussive Borehole with
Rotary Follow-on Location



Trial Pit

Rev:	Description:	Date:	By:	Chkd:
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Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status:

INFORMATION

Project:

Swan House

Drg Title:

Exploratory Hole Location Plan

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	21/08/21	PN	SH

Drg No:	Rev:
077409-CUR-00-XX-DR-GE-80003-P01	/

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Appendix B – Exploratory Hole Logs

- 2018 Exploratory Borehole logs.
 - Window Sample Boreholes with Dynamic Probing
- 2021 Pre Demolition Exploratory Borehole logs.
 - Sonic Boreholes with Rock Coring
 - Photographic Log, Rock Cores
- 2021 Post Demolition Exploratory Borehole logs
 - Cable Percussive Borehole Logs with Rock Coring
 - Photographic Log, Rock Cores



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Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
WS

Location: Cable Street, Manchester

Level: 50.90

Scale
1:50

Client: Foundation Real Estate

Dates: 13/09/2018 - 13/09/2018

Logged By
MH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.28 0.34 0.47	50.62 50.56 50.43		MADE GROUND: CONCRETE.	
		0.55 - 0.65	ES					MADE GROUND: Reddish brown medium SAND.	
		1.00		N=17 (2,2/4,4,4,5)				MADE GROUND: CONCRETE.	1
		1.70 - 2.00	D					Stiff brown mottled grey sandy slightly gravelly CLAY. Gravel is fine, angular to subrounded sandstone and coal. Rare medium gravel of sandstone and coal.	
		2.00		N=24 (2,3/5,5,7,7)					2
		3.00		N=24 (2,4/4,6,7,7)					3
		3.50	D					Rare grey mottling from 3.40m bgl.	
		4.00		N=22 (2,3/4,5,6,7)					4
		4.70 - 5.00	D		4.60 5.00	46.30 45.90		Stiff brown sandy CLAY. Rare gravel of fine and medium subangular to subrounded sandstone.	
								End of borehole at 5.00 m	5

Remarks

Borehole undertaken in loading bay from existing ground level. Ground level estimated from previous GPR survey. Hand dug service clearance pit to 1.20m bgl. No groundwater encountered. Dynamic Probe follow on to 7.00m bgl. Downhole magnetometry conducted by UXO specialist. Borehole cleared for UXO to a maximum depth of 7.00m bgl.





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Probe Log

Borehole No.

WS01(DP)

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
DP

Location: Cable Street, Manchester

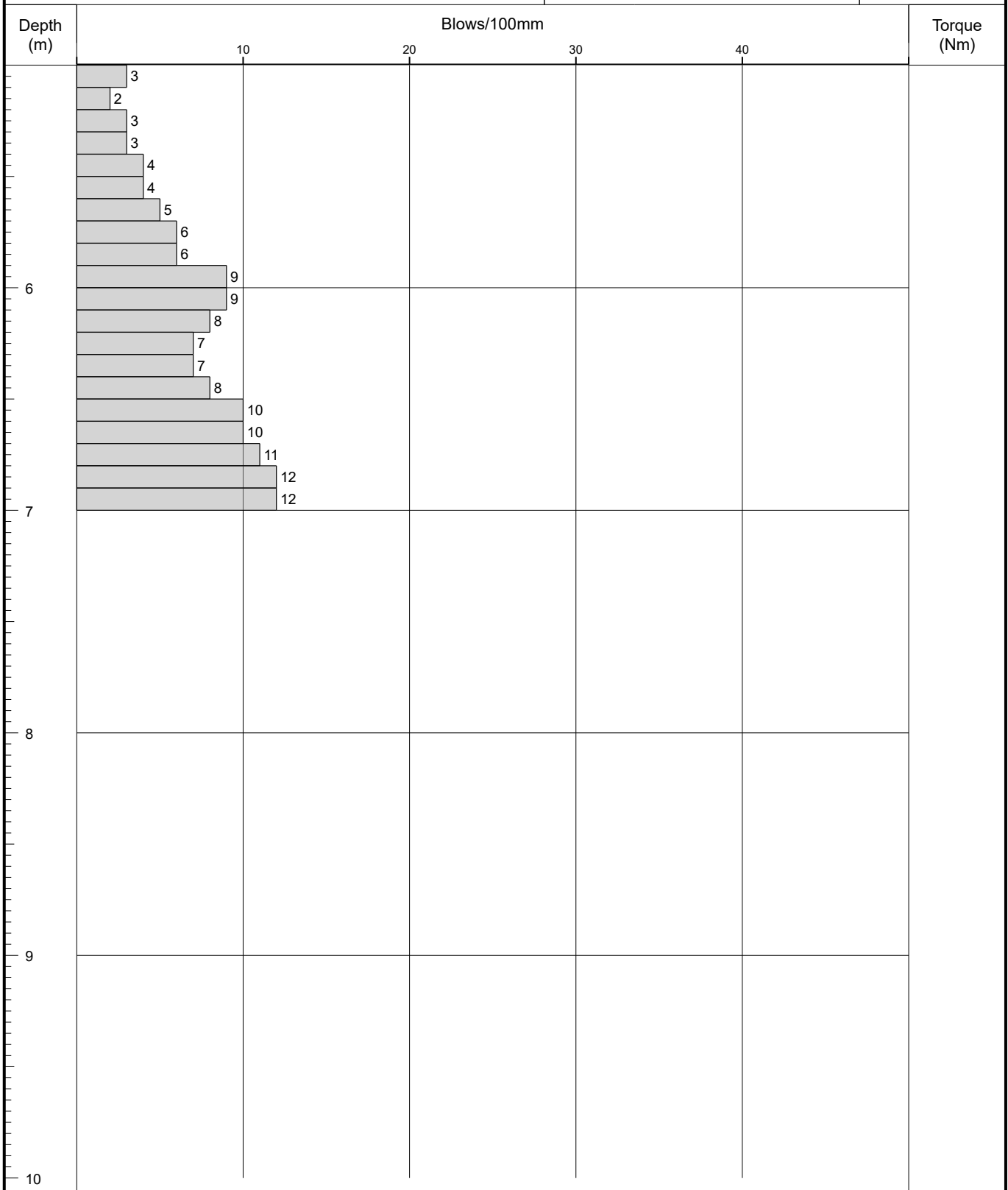
Level: 50.90

Scale
1:25

Client: Foundation Real Estate

Dates: 13/09/2018 - 13/09/2018

Logged By



Remarks

Dynamic Probing terminated at 7.00m bgl. Base of testing in accordance with limit of UXO clearance. Ground level estimated from previous GPR survey.

Fall Height

Hammer Wt

Probe Type DPSH- A

Cone Base Diameter

Final Depth 7.00

Log Scale 1:25





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M1 5WG

Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
WS

Location: Cable Street, Manchester

Level: 51.00

Scale
1:50

Client: Foundation Real Estate

Dates: 14/09/2018 - 14/09/2018

Logged By
MH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.35	ES		0.31	50.69		MADE GROUND: CONCRETE.	
		0.70	ES		0.35	50.65		MADE GROUND: Very loose dark greyish brown slightly clayey fine SAND. Slight hydrocarbon odour (Possible fuel oil).	
		1.00		N=21 (2,4/4,5,6,6)	0.49	50.51		MADE GROUND: CONCRETE.	
		1.05 - 1.30	ES		1.05	49.95		MADE GROUND: Loose black slightly silty fine and medium SAND. Rare subangular to subrounded cobble of brick.	1
		1.80 - 2.00	D					<i>Rare pockets of red sand (Weathered brick).</i> Stiff brown with grey mottling slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular to subrounded sandstone and coal.	2
		2.00		N=25 (2,4/5,6,7,7)					
		3.00		N=25 (2,4/5,6,7,7)	3.00	48.00			3
		3.80 - 4.00	D					Stiff brown with occasional light brown and grey mottling sandy slightly gravelly CLAY. Gravel is fine, subangular to subrounded sandstone and coal.	4
		4.00		N=15 (2,2/3,3,4,5)				<i>Rare gravel from 3.50m bgl.</i>	
					5.00	46.00		End of borehole at 5.00 m	5

Remarks

Borehole undertaken in loading bay from existing ground level. Ground level estimated from previous GPR survey. Hand dug service clearance pit to 1.20m bgl. No groundwater encountered. Dynamic Probe follow on to 7.00m bgl. Downhole magnetometry conducted by UXO specialist. Borehole cleared for UXO to a maximum depth of 7.00m bgl.





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Probe Log

Borehole No.
WS02 (DP)

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
DP

Location: Cable Street, Manchester

Level: 51.00

Scale
1:25

Client: Foundation Real Estate

Dates: 14/09/2018 - 14/09/2018

Logged By

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
6	2 2 2 4 5 5 5 6 6 6 6				
7	7 7 8 8 9 9 9 10 11				
8					
9					
10					

Remarks

Dynamic Probing terminated at 7.00m bgl. Base of testing in accordance with limit of UXO clearance. Ground level estimated from previous GPR survey.

Fall Height

Hammer Wt

Probe Type DPSH- A

Cone Base Diameter

Final Depth 7.00

Log Scale 1:25





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Manchester
M1 5WG

Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
WS

Location: Cable Street, Manchester

Level: 51.10

Scale
1:50

Client: Foundation Real Estate

Dates: 13/09/2018 - 14/09/2018

Logged By
MH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15			0.15	50.95		MADE GROUND: CONCRETE.	
		0.19			0.19	50.91		MADE GROUND: Reddish brown medium SAND.	
		0.34			0.34	50.76		MADE GROUND: CONCRETE.	
		1.00	ES	N=4 (0,0/0,1,2,1)	1.30	49.80		MADE GROUND: Loose black gravelly fine to coarse SAND. Gravel is fine to coarse angular to subrounded brick, concrete, ash, clinker, slate, rare coal, and sandstone.	
		1.70	ES					MADE GROUND: Very soft brown slightly sandy slightly gravelly CLAY. Gravel is fine angular to subrounded brick, coal and sandstone.	
		2.00		N=2 (0,0/0,0,1,1)					
		3.00	ES	N=15 (3,3/3,3,4,5)	2.80	48.30		Firm brown sandy slightly gravelly CLAY. Gravel is fine and medium subangular to rounded sandstone.	
		3.00			3.20	47.90		Stiff brown with grey mottling sandy slightly gravelly CLAY. Gravel is fine sandstone and coal.	
		4.00		N=20 (2,3/3,4,6,7)					
		4.80 - 5.00	D		5.00	46.10		End of borehole at 5.00 m	

Remarks

Borehole undertaken in loading bay from existing ground level. Ground level estimated from previous GPR survey.
Hand dug service clearance pit to 1.20m bgl. Groundwater encountered at 2.80m bgl. Dynamic Probe follow on to 7.00m bgl.
Downhole magnetometry conducted by UXO specialist. Borehole cleared for UXO to a maximum depth of 7.00m bgl.





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M1 5WG

Probe Log

Borehole No.
WS03 (DP)

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
DP

Location: Cable Street, Manchester

Level: 51.10

Scale
1:25

Client: Foundation Real Estate

Dates: 13/09/2018 - 13/09/2018

Logged By

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
6	3 3 3 3 3 4 5 6 5 6				
7	7 7 8 9 9 10 10 9 10 9				
8					
9					
10					

Remarks

Dynamic Probing terminated at 7.00m bgl. Base of testing in accordance with limit of UXO clearance. Ground level estimated from previous GPR survey.

Fall Height

Hammer Wt

Probe Type DPSH- A

Cone Base Diameter

Final Depth 7.00

Log Scale 1:25





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

Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
WS

Location: Cable Street, Manchester

Level: 51.10

Scale
1:50

Client: Foundation Real Estate

Dates: 13/09/2018 - 13/09/2018

Logged By
MH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.13	ES		0.13	50.97		MADE GROUND: CONCRETE.	
		0.24			0.24	50.86		MADE GROUND: Light brownish grey and black GRAVEL of concrete and tarmac.	
		0.31			0.31	50.79		MADE GROUND: Reddish brown medium SAND.	
		0.47			0.47	50.63		MADE GROUND: CONCRETE.	
		0.70	ES		0.85	50.25		MADE GROUND: Brown and black gravelly medium and coarse SAND. Gravel is fine to coarse angular to subangular brick, concrete and clinker. rare metal fragments. Localised clay pockets.	
		1.13			1.13	49.97		MADE GROUND: Light red medium grained SANDSTONE.	
		1.35	ES	N=30 (1,5/9,7,7,7)	1.35	49.75		MADE GROUND: Limestone GRAVEL (Drillers Description).	
		1.40 - 1.70						MADE GROUND: Red sandy GRAVEL. Gravel is fine to coarse angular to subrounded brick, concrete and slate.	
		2.00						MADE GROUND: Very soft brown sandy slightly gravelly CLAY. Gravel is fine to medium sandstone and coal. (Reworked).	
		2.40 - 2.70	ES		2.25	48.85		MADE GROUND: Very soft dark greyish brown sandy slightly gravelly CLAY. Rare blackened plant/wood fragments. Slight organic odour. (Reworked).	
		2.70 - 3.00	ES		2.70	48.40		End of borehole at 3.00 m	
					3.00	48.10			

Remarks

Borehole undertaken in loading bay from existing ground level. Ground level estimated from previous GPR survey. Hand dug service clearance pit to 1.20m bgl. Possible brick wall encountered between 1.35m - 2.25m bgl. Deviation of window sampler within Made Ground deposits prevented progression of borehole. Borehole terminated at 3.00m bgl. No groundwater encountered. Dynamic Probe follow on to 4.50m bgl. Downhole magnetometry conducted by UXO specialist. Borehole cleared for UXO to a maximum depth of 4.50m bgl.







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

Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
WS

Location: Cable Street, Manchester

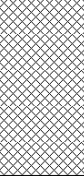
Level:

Scale
1:50

Client: Foundation Real Estate

Dates: 10/09/2018 - 10/09/2018

Logged By
SH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					1.17			MADE GROUND: CONCRETE.	1
								End of borehole at 1.17 m	2
									3
									4
									5
									6
									7
									8
									9
									10

Remarks

Borehole undertaken within basement.

Hand dug service clearance pit to 1.20m bgl. Possible pad foundation identified. Borehole terminated at 1.17m bgl. No groundwater encountered.





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

Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
WS

Location: Cable Street, Manchester

Level:

Scale
1:50

Client: Foundation Real Estate

Dates: 10/09/2018 - 11/09/2018

Logged By
SH/MH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.25			MADE GROUND: CONCRETE.	
		1.00		N=25 (3,4/5,6,6,8)				Stiff brown with grey mottling sandy slightly gravelly CLAY.	1
		2.00		N=17 (3,3/3,4,4,6)					2
		3.00 3.00 - 3.25	D	N=21 (3,3/4,5,6,6)					3
		4.00		N=20 (3,4/4,5,5,6)	3.50 3.80 4.20			Firm brown sandy CLAY. Slightly damp.	
		4.70 - 4.90	D					Stiff brown sandy CLAY.	4
								Stiff brown sandy CLAY. Rare gravel of fine sandstone and coal.	
					5.00				5
								End of borehole at 5.00 m	6
									7
									8
									9
									10

Remarks

Borehole undertaken within basement.

Hand dug service clearance pit to 1.20m bgl. No groundwater encountered. Dynamic Probe follow on to 7.00m bgl.





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

Probe Log

Borehole No.

WS06 (DP)

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
DP

Location: Cable Street, Manchester

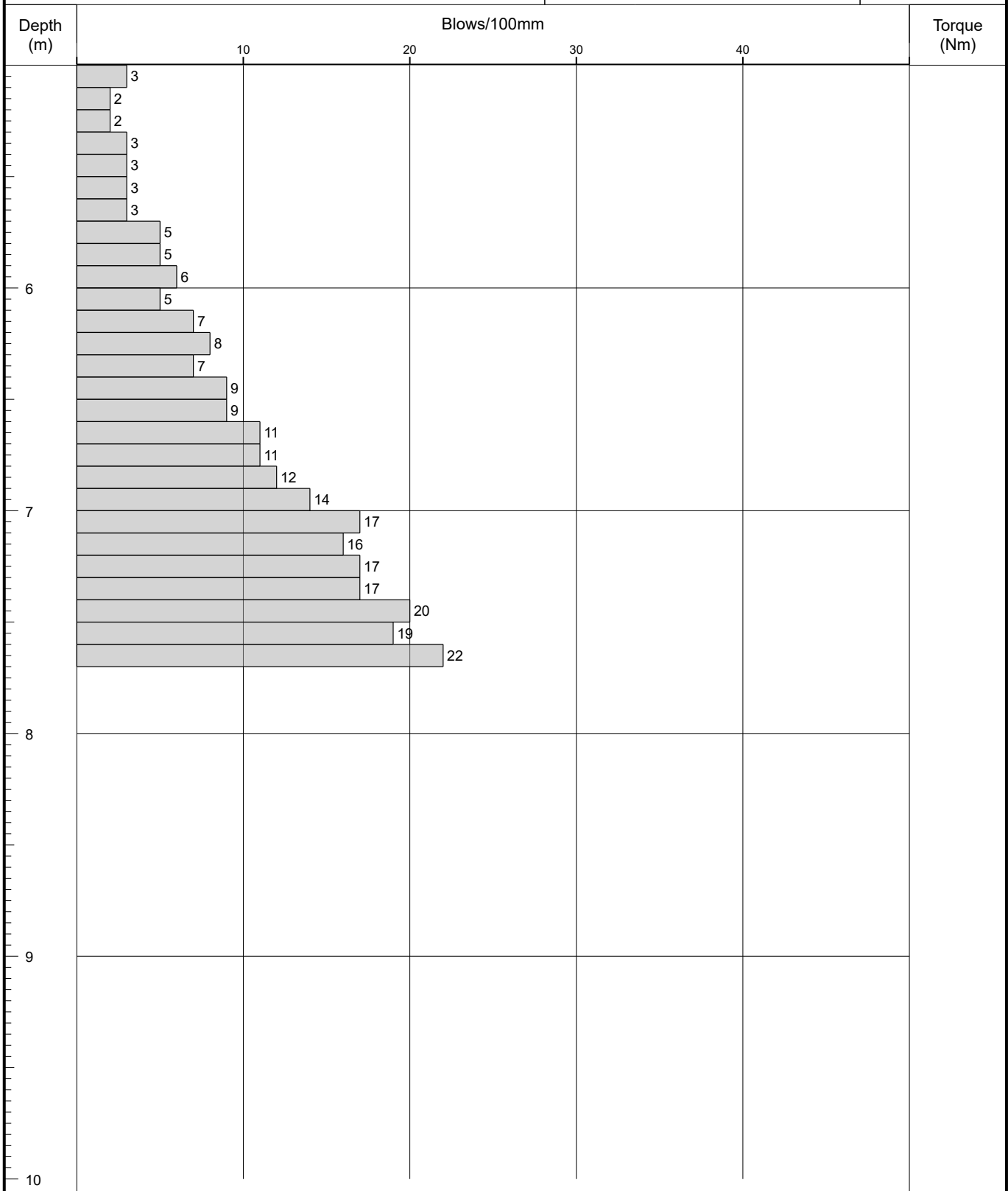
Level:

Scale
1:25

Client: Foundation Real Estate

Dates: 11/09/2018 - 11/09/2018

Logged By



Remarks

Dynamic Probing terminated at 7.60m bgl due to refusal.

Fall Height

Hammer Wt

Probe Type DPSH- A

Cone Base Diameter

Final Depth 7.70

Log Scale 1:25





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

Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
WS

Location: Cable Street, Manchester

Level:

Scale
1:50

Client: Foundation Real Estate

Dates: 11/09/2018 - 12/09/2018

Logged By
MH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40 - 0.50	ES		0.31			MADE GROUND: CONCRETE.	
		1.00		N=23 (2,3/5,5,6,7)				Stiff dark brown with occasional dark grey mottling slightly sandy slightly gravelly CLAY. Gravel is fine, angular to rounded sandstone and coal.	1
		1.90 - 2.00 2.00	D	N=20 (2,3/4,5,5,6)					2
		3.00		N=17 (2,3/4,4,4,5)					3
		3.80 - 4.00 4.00	D	N=13 (2,1/2,3,4,4)	3.90			Firm dark brown with rare light brown mottling sandy slightly gravelly CLAY. Rare light brown mottling. Gravel is fine subangular sandstone.	4
					5.00			Deposits recorded as wet between 4.60m - 4.80m bgl.	5
								End of borehole at 5.00 m	5
									6
									7
									8
									9
									10

Remarks

Borehole undertaken within basement.

Hand dug service clearance pit to 1.20m bgl. No groundwater encountered. Dynamic Probe follow on to 7.00m bgl.





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

Probe Log

Borehole No.
WS07 (DP)

Sheet 1 of 1

Project Name: Swan House, Manchester

Project No.
B067266.201

Co-ords: -

Hole Type
DP

Location: Cable Street, Manchester

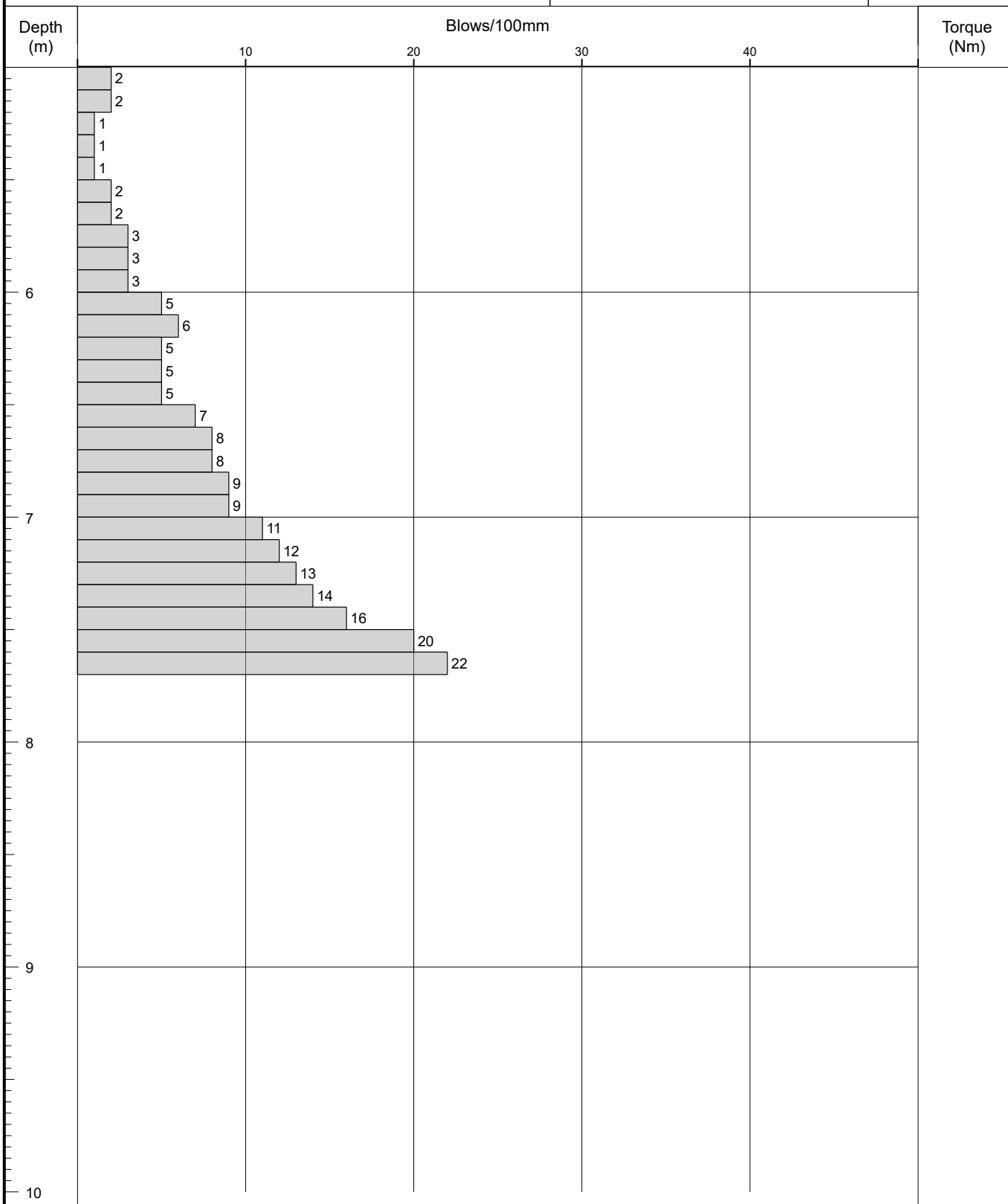
Level:

Scale
1:25

Client: Foundation Real Estate

Dates: 12/09/2018 - 12/09/2018

Logged By



Remarks

Dynamic Probing terminated at 7.60m bgl due to refusal.

Fall Height

Hammer Wt

Probe Type DPSH- A

Cone Base Diameter

Final Depth 7.70

Log Scale 1:25





Borehole Log

Borehole No.

BH101

Sheet 1 of 1

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level:

Scale
1:50

Client: RGCM Ltd

Dates: 19/01/2021 - 19/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			MADE GROUND: Tarmac	
					0.30			MADE GROUND: Concrete block	
					0.50			MADE GROUND: Concrete slab	
					0.80			MADE GROUND: Reddish brown slightly clayey angular to subangular fine to coarse gravel of brick and concrete.	
								MADE GROUND: Dark brown slightly silty gravelly clay with low cobble content. Gravel is angular to subrounded, fine to coarse of brick.	1
					1.50			MADE GROUND: Concrete slab	
					1.55			End of borehole at 1.55 m	2
									3
									4
									5
									6
									7
									8
									9
									10

Remarks

Service inspection pit hand excavated from GL to 1.20m. Borehole terminated at 1.50m bgl due to possible slab encountered. Position reviewed in relation to services and decision made to relocate to BH101A.





Borehole Log

Borehole No.

BH101A

Sheet 1 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 49.95

Scale
1:50

Client: RGCM Ltd

Dates: 19/01/2021 - 22/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.04			0.04	49.91		MADE GROUND: Tarmac	
		0.24			0.24	49.71		MADE GROUND: Concrete slab	
		0.40			0.40	49.55		MADE GROUND: Concrete block	
		0.60			0.60	49.35		MADE GROUND: Concrete slab	
		0.65			0.65	49.30		MADE GROUND: Dark brown slightly gravelly clay. Gravel is angular to subrounded, fine to coarse including brick.	1
		0.66 - 0.70	D					Firm to very stiff brown occasional orange mottling slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse including sandstone and mudstone.	
		1.00 - 1.10	D						
		1.20	D						
		1.20		N=10 (0,3/2,3,1,4)					
		1.70 - 1.80	D						
		2.00							
		2.00 - 2.45	D						2
		2.50 - 2.60	D						
		3.00							
		3.00 - 3.45	D						3
		3.50 - 3.60	D						
		4.00							
		4.00 - 4.45	D						4
		4.50 - 4.60	D						
		5.00 - 5.45	U						5
		5.50 - 5.60	D						
		6.00							
		6.00 - 6.45	D						6
		7.00 - 7.10	D						7
		7.50 - 7.95	U						8
		8.50 - 8.60	D						
		9.00							
		9.00 - 9.45	D						9
		10.00 - 10.10	D						10
								Continued on next sheet	

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 14.00m bgl rising to 12.90m bgl. Refer to BH101A RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH101A

Sheet 2 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 49.95

Scale
1:50

Client: RGCM Ltd

Dates: 19/01/2021 - 22/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50		N=37 (10,9/10,8,9,10)					
		10.50 - 10.95	D						11
		11.50 - 11.60	D						
		12.00 - 12.45	U	Ublow=100					12
		12.60 - 12.70	D		12.55	37.40		Very dense brown slightly gravelly fine to coarse SAND. Gravel is subrounded to well rounded including sandstone, mudstone and siltstone.	13
		13.50		50 (25 for 15mm/50 for 150mm)					14
		14.50 - 14.60	D						
		15.00 15.00	D	50 (19,6/50 for 170mm)					15
		16.00 - 16.10	D						16
					17.00	32.95		Very dense reddish brown slightly gravelly medium to coarse SAND. Gravel is subangular to subrounded, fine to medium of sandstone.	17
									18
									19
					20.00	29.95		Continued on next sheet	20

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 14.00m bgl rising to 12.90m bgl. Refer to BH101A RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH101A

Sheet 3 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 49.95

Scale
1:50

Client: RGCM Ltd

Dates: 19/01/2021 - 22/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Weak reddish brown fine to medium grained SANDSTONE. From 20.00 to 20.65m no recovery.	
								From 20.65 to 20.85m recovered as non-intact core of sandy gravel. 20.85 to 21.50m 0 - 10 degrees very closely spaced to closely spaced, planar rough	21
								From 21.50 to 21.73m no recovery.	
								21.73 to 21.79m 0 - 10 degrees extremely closely spaced to very closely spaced, planar rough From 21.79 to 21.83m recovered as non-intact core of fine to medium sand.	22
								21.85 to 21.90m 0 - 10 degrees extremely closely to very closely spaced, planar rough From 21.90 to 22.00m recovered as non-intact core of fine to medium sand.	
								22.00 to 22.95m 0 - 10 degrees extremely closely spaced to very closely spaced, planar rough From 22.95 to 23.35m no recovery	23
								From 23.35 to 23.50m recovered as non-intact core of gravelly fine to medium sand. From 23.50 to 23.65m highly weathered.	
		24.10 - 24.32	C		23.65	26.30		Medium strong reddish brown fine to medium grained SANDSTONE. 23.65 to 24.50m 0-10 degrees closely spaced to medium spaced locally extremely closely spaced, planar rough	24
								From 24.50 to 25.50m no recovery.	
								From 25.50 to 25.70m highly weathered.	25
								25.70 to 25.90m 0-10 degrees extremely closely spaced to very closely spaced, planar rough From 25.90 to 26.0m no recovery.	
		26.14 - 26.27	C					26.00 to 27.5m 0 - 10 degrees closely spaced to medium spaced locally very closely spaced, planar rough	26
		26.93 - 27.17	C						27
								27.50 to 28.67m 0 - 10 degrees extremely closely spaced to very closely spaced, planar rough	
									28
								From 28.67 to 29.50m no recovery.	
									29
								From 29.50 to 29.60m recovered as non-intact core of slightly sandy subrounded fine to coarse gravel of sandstone.	
		29.84 - 30.00	C						30

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 14.00m bgl rising to 12.90m bgl. Refer to BH101A RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH101A

Sheet 4 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 49.95

Scale
1:50

Client: RGCM Ltd

Dates: 19/01/2021 - 22/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		30.66 - 31.01	C					29.60 to 31.82m 0 - 10 degrees closely spaced to medium spaced locally extremely closely spaced, planar rough	31
								From 31.82 to 32.00m no recovery.	32
		32.86 - 33.27	C		33.90	16.05		32.00 to 33.40m 0 - 10 degrees medium spaced locally extremely closely spaced, planar rough	33
								From 33.40 to 33.50m no recovery.	34
								33.50 to 35.05m 0 - 10 degrees very closely spaced to closely spaced, planar rough	35
		35.85 - 35.99	C					Medium strong reddish brown medium to coarse grained SANDSTONE.	36
								From 35.05 to 35.50m no recovery.	37
		36.93 - 37.15	C		36.50	13.45		From 36.34 to 36.40m recovered as non-intact core of sandy subangular to well rounded, fine to coarse gravel of sandstone.	38
								36.40 to 36.50m 0 - 10 degrees closely spaced to medium spaced, planar rough	39
								Medium strong reddish brown fine to medium grained SANDSTONE.	40
								From 36.50 to 36.77m recovered as non-intact core of angular to subangular fine to coarse gravel and cobbles.	
					37.85	12.10		36.71 to 37.83m 0 - 10 degrees closely spaced to medium spaced, planar rough	
								From 37.83 to 38.00m no recovery.	
		38.83 - 38.97	C					Medium strong reddish brown coarse SANDSTONE.	
								From 39.20 to 39.25m recovered as non-intact core of sandy subangular coarse gravel of sandstone.	
								From 39.40 to 39.50m no recovery.	
					40.00	9.95		39.50 to 40.00m 0 - 10 degrees very closely spaced to closely spaced, planar rough	
								End of borehole at 40.00 m	

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 14.00m bgl rising to 12.90m bgl. Refer to BH101A RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH102

Sheet 1 of 5

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.10

Scale
1:50

Client: RGCM Ltd

Dates: 21/01/2021 - 26/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10	50.00		MADE GROUND: Concrete slab	
					0.30	49.80		MADE GROUND: Concete block	
		0.45 - 0.60	ES		0.40	49.70		MADE GROUND: Reinforced concrete	
					0.45	49.65		MADE GROUND: Reddish brown angular to subangular, fine to coarse gravel of brick.	
		0.90 - 1.00	D		0.80	49.30		MADE GROUND: Brown/orange slightly sandy slightly gravelly clay with low cobble content. Sand is medium to coarse. Gravel is angular to subrounded, fine to coarse including brick and concrete. Cobbles are angular of brick.	1
		1.20	D	N=19 (5,6/4,5,5,5)					
		1.20							
		1.70 - 1.80	D					Stiff to very stiff brown with occasional light brown mottling slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to rounded, fine to coarse of sandstone and mudstone.	2
		2.00	D	N=21 (6,5/6,5,4,6)					
		2.00							
		2.50 - 2.60	D						
		3.00 - 3.45	D	Ublow=100					3
		3.50 - 3.60	D						
		4.00	D	N=23 (8,4/4,6,6,7)					4
		4.00							
		4.50 - 4.60	D						
		5.00	D	N=29 (8,7/7,6,8,8)					5
		5.00							
		5.50 - 5.60	D						
		6.00 - 6.45	U	Ublow=100					6
		7.00 - 7.10	D						7
		7.50	D	N=34 (8,9/10,8,8,8)					8
		7.50							
		8.50 - 8.60	D						
		9.00	D	N=38 (11,10/10,10,8,10)					9
		9.00							
		10.00 - 10.10	D						10

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 15.00m bgl to 12.00m bgl. Refer for BH102 RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH102

Sheet 2 of 5

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.10

Scale
1:50

Client: RGCM Ltd

Dates: 21/01/2021 - 26/01/2021

Logged By
PN

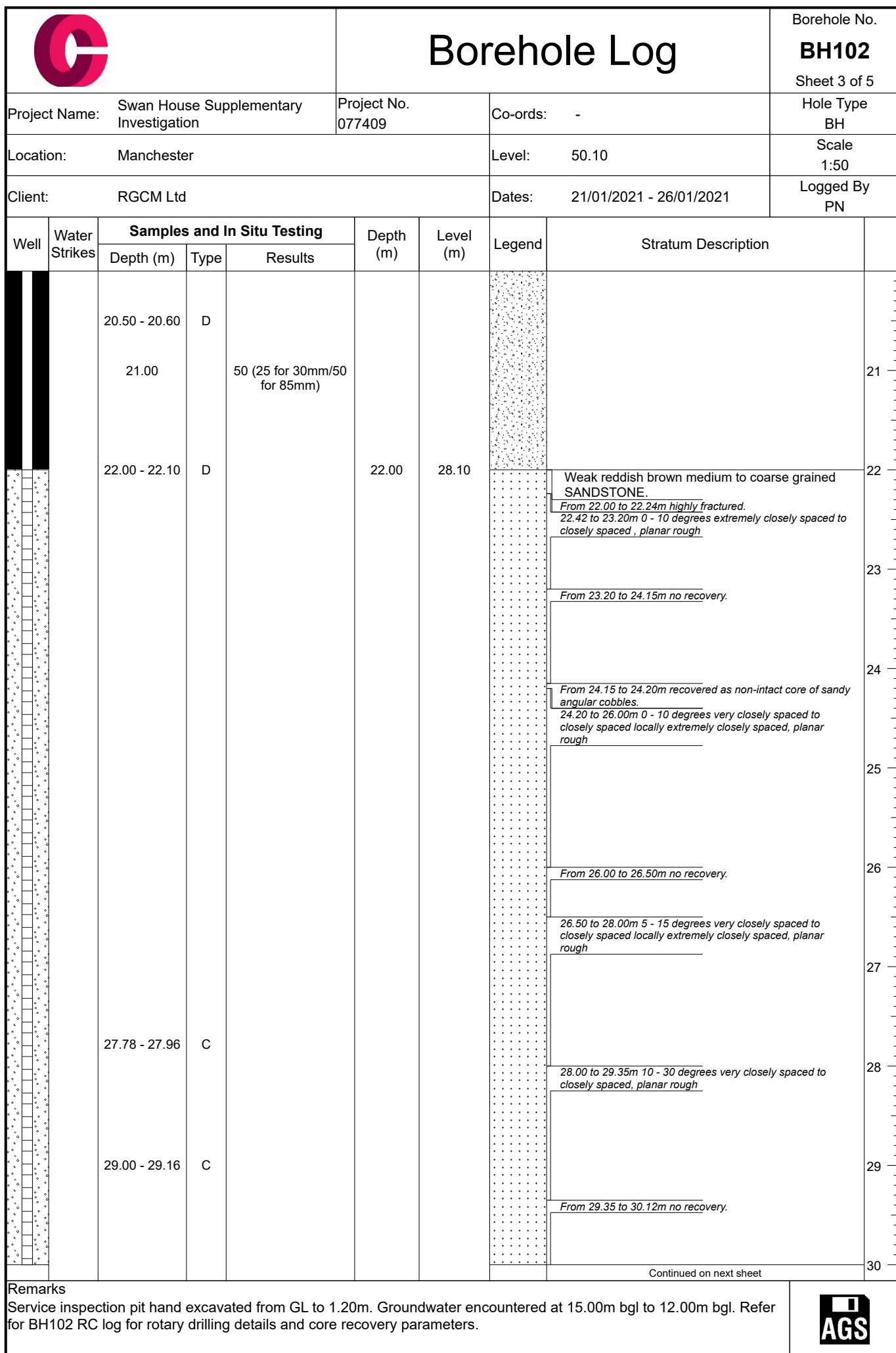
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
1	▼	10.50 10.50	D	N=46 (12,11/12,12,11,11)	13.00	37.10		Very dense brown slightly gravelly fine to coarse SAND. Gravel is subrounded to well rounded of sandstone, mudstone and siltstone.	11
		11.50 - 11.60	D						12
		12.00 12.00	D	N=49 (13,12/13,13,11,12)					13
		13.00 - 13.10	D						14
		13.50 13.50	D	N=50 (14,11/14,14,13,9)	15.00	35.10		Very dense reddish brown slightly gravelly medium to coarse SAND. Gravel is subangular to subrounded, fine to medium of sandstone.	15
		14.50 - 14.60	D						16
		15.00 15.00	D	50 (20,5/50 for 165mm)					17
		16.00 - 16.10	D						18
		16.50 16.50	D	50 (19,6/50 for 170mm)					19
		17.50 - 17.60	D						20
		18.00 18.00	D	50 (25 for 50mm/50 for 152mm)					21
		19.00 - 19.10	D						22
		19.50 19.50	D	50 (25 for 40mm/50 for 145mm)					23
									24
									25

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 15.00m bgl to 12.00m bgl. Refer for BH102 RC log for rotary drilling details and core recovery parameters.







Borehole Log

Borehole No.

BH102

Sheet 4 of 5

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.10

Scale
1:50

Client: RGCM Ltd

Dates: 21/01/2021 - 26/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		31.52 - 31.77	C		32.50	17.60		30.12 to 30.24m 0 - 10 degrees very closely spaced, planar rough From 30.24 to 30.30m recovered as non-intact core of sandy subangular coarse gravel of sandstone. 30.30 to 32.28m 5 - 15 degrees closely spaced to medium spaced locally very closely spaced, planar rough	31
		33.06 - 33.44	C					From 32.28 to 32.5m no recovery.	32
		34.34 - 34.50	C		34.00	16.10		Medium strong reddish brown fine to medium grained SANDSTONE. 32.50 to 34.00m 0 - 5 degrees medium spaced locally very closely spaced, planar rough	33
		35.83 - 36.09	C					Medium strong reddish brown medium to coarse grained SANDSTONE. 34.00 to 36.83m 0 - 10 degrees closely spaced to medium spaced locally very closely spaced, planar rough	34
		39.68 - 39.88	C		40.00	10.10		From 36.83 to 37.10m no recovery. 37.10 to 37.17m 0 - 10 degrees very closely spaced, planar rough From 37.17 to 37.28m recovered as non-intact core of angular to subangular fine to coarse gravel and cobbles. 37.28 to 37.69m 5 - 10 degrees medium spaced, planar rough From 37.69 to 37.83m highly weathered. 37.83 to 39.88m 5 - 25 degrees closely spaced to medium spaced locally very closely spaced, planar rough	35 36 37 38
								Continued on next sheet	39 40

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 15.00m bgl to 12.00m bgl. Refer for BH102 RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH102

Sheet 5 of 5

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.10

Scale
1:50

Client: RGCM Ltd

Dates: 21/01/2021 - 26/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								From 39.88 to 40.00m no recovery. End of borehole at 40.00 m	
									41
									42
									43
									44
									45
									46
									47
									48
									49
									50

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 15.00m bgl to 12.00m bgl. Refer for BH102 RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH103

Sheet 1 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.42

Scale
1:50

Client: RGCM Ltd

Dates: 25/01/2021 - 28/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	50.32		MADE GROUND: Concrete slab	
		0.30			0.30	50.12		MADE GROUND: Concrete block	
		0.40			0.40	50.02		MADE GROUND: Concrete slab	
		0.50			0.50	49.92		MADE GROUND: Reinforced concrete	
		1.00			1.00	49.42		MADE GROUND: Reddish brown angular to subangular, fine to coarse gravel of brick.	
		1.20	D		1.20			MADE GROUND: Dark brown sandy gravelly clay with low ash content. Sand is medium to coarse. Gravel is angular to subrounded, fine to coarse including brick and concrete.	
		1.20		N=7 (2,1/3,1,2,1)					
		1.40 - 1.60	ES						
		1.70 - 1.80	D					Soft brown mottled light brown/orange CLAY.	
		2.00		N=7 (2,2/3,1,1,2)					
		2.00 - 2.45	D						
		2.50 - 2.60	D		2.50	47.92			
		3.00 - 3.45	U	Ublow=100					
		3.50 - 3.60	D						
		4.00		N=15 (2,3/4,3,4,4)					
		4.00 - 4.45	D						
		5.00 - 5.45	U	Ublow=100					
		5.50 - 5.60	D						
		6.00		N=18 (5,4/4,5,3,6)					
		6.00 - 6.45	D						
		7.00 - 7.10	D						
		7.50		N=25 (5,6/5,7,6,7)					
		7.50 - 7.95	D						
		8.50 - 8.60	D						
		9.00		N=29 (7,8/7,6,8,8)					
		9.00 - 9.45	D						
		10.00 - 10.10	D		10.00	40.42		Continued on next sheet	

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 16.00m bgl to 12.40m bgl. Refer to BH103 RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH103

Sheet 2 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.42

Scale
1:50

Client: RGCM Ltd

Dates: 25/01/2021 - 28/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50 10.50 - 10.95	D	N=31 (9,10/9,7,8,7)	16.00	34.42		Dense brown slightly gravelly medium to coarse SAND. Gravel is subangular to rounded, fine to coarse of sandstone, siltstone and mudstone.	11
		11.50 - 11.60	D						12
		12.00 12.00 - 12.45	D	N=36 (10,9/10,8,10,8)					13
		13.00 - 13.10 13.10	D	N=36 (8,7/9,8,9,10)					14
		15.00 15.00 - 15.45	D	N=36 (9,9/10,9,8,9)					15
		16.00	D						16
		16.50		N=46 (11,12/12,13,10,11)				Dense to very dense reddish brown slightly gravelly medium to coarse SAND. Gravel is subangular to rounded, fine to coarse of sandstone.	17
		17.50 - 17.60	D						18
		18.00 18.00	D	50 (20,5/50 for 170mm)					19
		19.00 - 19.10	D						20
		19.50 19.50	D	50 (23,2/50 for 157mm)					

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 16.00m bgl to 12.40m bgl. Refer to BH103 RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH103

Sheet 3 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.42

Scale
1:50

Client: RGCM Ltd

Dates: 25/01/2021 - 28/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.50 - 20.60	D	50 (25 for 75mm/50 for 160mm)	24.20	26.22			21
		21.00 21.00	D						22
		22.00 - 22.10	D						23
									24
		25.78 - 26.00	C		29.00	21.42		Weak reddish brown fine to medium grained SANDSTONE. <u>From 24.20 to 24.45m highly weathered.</u> <u>24.40 to 25.05m 0 - 10 degrees very closely spaced to closely space, planar rough</u> <u>From 25.05 to 25.12m recovered as non-intact core of sandy angular to subangular fine to coarse gravel and cobbles.</u> <u>25.12 to 25.17m 0 - 10 degrees very closely spaced, planar rough</u> <u>From 25.17 to 25.23m recovered as non-intact core of sandy angular to subangular fine to coarse gravel and cobbles.</u> <u>25.23 to 25.40m 0 - 10 degrees very closely spaced to closely spaced locally extremely closely spaced, planar rough</u> <u>From 25.40 to 25.55m recovered as non-intact core of gravelly medium to coarse sand.</u> <u>25.55 to 26.26 0 - 10 degrees extremely closely spaced to closely spaced, planar rough</u> <u>From 26.26 to 26.40 highly weathered.</u> <u>From 26.40 to 26.50m no recovery.</u> <u>From 26.50 to 26.83m no recovery.</u> <u>26.83 to 28.60m 0 - 10 degrees very closely spaced to closely spaced, planar rough</u>	25
									26
									27
									28
		28.20 - 28.38	C					Medium strong reddish brown fine to medium grained SANDSTONE. <u>29.00 to 30.65m 0 - 10 degrees closely spaced to medium sapced, locally extremely closely to very closely paced, planar rough</u>	29
									30

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 16.00m bgl to 12.40m bgl. Refer to BH103 RC log for rotary drilling details and core recovery parameters.





Borehole Log

Borehole No.

BH103

Sheet 4 of 4

Project Name: Swan House Supplementary Investigation

Project No.
077409

Co-ords: -

Hole Type
BH

Location: Manchester

Level: 50.42

Scale
1:50

Client: RGCM Ltd

Dates: 25/01/2021 - 28/01/2021

Logged By
PN

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		30.12 - 30.33	C					From 30.65 to 31.00m no recovery.	31
								31.00 to 33.90m 0 - 10 degrees closely spaced to medium spaced, planar rough	
								From 31.10 to 31.35m very weak.	
								From 31.73 to 31.82m very weak.	32
		32.29 - 32.46	C						33
								From 33.62 to 33.78m extremely closely spaces thin dark grey laminations	
								From 33.78 to 33.90 very weak.	34
								From 33.90 to 34.00m no recovery.	
		34.28 - 34.46	C					34.00 to 35.43m 0 - 10 degrees extremely closely spaced to closely spaced, planar rough	35
								From 35.43 to 35.50 no recovery.	
								35.50 to 35.57m 1 No. discontinuity 0 -10 degrees planar rough	36
								From 35.57 to 35.64m recovered as non-intact core of sandy angular to subangular fine to coarse gravel.	
								35.64 to 37.10m 10 - 20 degrees closely spaced to medium spaced locally very closely spaced, planar rough	37
								From 36.46 to 36.72m extremely to very closely spaced think dark grey laminations.	
								From 37.1 to 37.15m recovered as non-intact core of sandy angular to subangular fine to coarse gravel.	38
								37.15 to 37.28m 0 - 10 degrees very closely spaced to closely spaced, planar rough	
								From 37.28 to 37.31m recovered as non-intact core of sandy angular to subangular fine to coarse gravel.	
								37.31 to 38.28m 0 - 10 degrees closely spaced to medium spaced locally very closely spaced, planar rough	39
								From 38.28 to 38.50m no recovery	
		39.08 - 39.28	C					38.50 to 40.00m 0 - 10 degrees very closely spaced to closely spaced, planar rough	40
								End of borehole at 40.00 m	
					40.00	10.42			

Remarks

Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 16.00m bgl to 12.40m bgl. Refer to BH103 RC log for rotary drilling details and core recovery parameters.



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 1	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 20.50m to 24.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 2	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 24.50m to 28.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 3	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 28.50m to 32.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 4	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 32.50m to 36.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 5	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 36.50 to 40.50m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 6	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 22.00 to 26.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 8	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 30.00 to 34.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 9	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 34.00 to 38.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 10	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 38.00 to 40.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 11	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 24.00 to 28.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 12	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 28.00 to 32.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 13	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 32.00 to 36.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 14	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 36.00 to 40.00m	





Rotary Core Log

Borehole No.

BH201

Sheet 1 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		0.40	ES				0.34	47.70		MADE GROUND: Concrete slab	
										Stiff dark brown slightly gravelly silty CLAY.	
		1.20 - 1.65	D								1
		2.00 - 2.45	D								2
		3.00 - 3.45	U								3
		4.00 - 4.45	D								4
		5.00 - 5.45	D								5
		6.00 - 6.45	U								6
		7.00 - 7.45	D								7
		8.50	D								8
		10.00	D								9
											10

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.





Rotary Core Log

Borehole No.

BH201

Sheet 2 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		12.00 - 12.45	B				10.30	37.74		Very dense light brown/yellowish brown slightly gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of mudstone and sandstone.	11
		13.50 - 13.95	B				12.30	35.74		Very dense brown very gravelly fine to coarse SAND. Gravel is subrounded to well rounded of mudstone, sandstone and quartz.	12
		16.50 - 16.95	B				15.60	32.44		Very dense reddish brown slightly gravelly medium to coarse SAND. Gravel is subangular to subrounded, fine to medium of sandstone.	13
		18.50 - 20.00	22 NI NR				18.50	29.54		Very weak reddish brown fine to medium grained SANDSTONE. 18.50 to 18.87m 0 - 10 degrees very closely spaced, planar rough From 18.87 to 18.97m recovered as non-intact core of sandy angular gravel of sandstone. From 18.97 to 20.00m no recovery.	14
											15
										Continued on next sheet	20

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.







Rotary Core Log

Borehole No.

BH201

Sheet 4 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description			
				TCR	SCR	RQD							
							38.00	10.04		<u>spaced, planar rough.</u>			
		30.50 - 32.00	6	79	79	67				<u>From 30.47 to 30.50m no recovery.</u>		31	
			NR							<u>30.50 to 31.68 0 - 10 degrees closely spaced to medium spaced, planar rough.</u>			
											<u>From 31.03 to 31.13m mudstone band.</u>		
											<u>From 31.68 to 32.00m no recovery.</u>		
		32.00 - 33.50	5	100	100	100				<u>32.00 to 34.84m 0 - 10 degrees closely spaced to medium spaced, planar rough.</u>		32	
											<u>From 33.40 to 33.50m no recovery.</u>		33
											<u>From 33.50 to 33.79m coarse</u>		
33.50 - 35.00	NR	89	89	89				34					
35.00 - 36.50	6	100	100	95	<u>From 34.84 to 35.00m no recovery.</u>		35						
						<u>35.00 to 38.00m 0 - 10 degrees closely spaced to medium spaced, planar rough.</u>		36					
36.50 - 38.00		100	100	93				37					
38.00 - 39.50	7	100	100	81			<u>Weak reddish brown medium to coarse grained SANDSTONE.</u>	38					
							<u>38.00 to 39.50m 0 - 10 degrees closely spaced locally very closely spaced, planar rough.</u>						
								39					
									<u>From 39.34 to 39.42m very weak.</u>				
									<u>Medium strong reddish brown fine to medium grained SANDSTONE.</u>	40			
								<u>39.50 to 41.00m 0 - 10 degrees medium spaced to widely</u>					
Continued on next sheet													

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.





Rotary Core Log

Borehole No.

BH201

Sheet 5 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		39.50 - 41.00		100	100	100	41.00	7.04		<u>spaced, planar rough.</u>	
										End of borehole at 41.00 m	41
											42
											43
											44
											45
											46
											47
											48
											49
											50

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.





Rotary Core Log

Borehole No.

BH201

Sheet 1 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		0.40	ES				0.34	47.70		MADE GROUND: Concrete slab	
										Stiff dark brown slightly gravelly silty CLAY.	
		1.20 - 1.65	D								1
		2.00 - 2.45	D								2
		3.00 - 3.45	U								3
		4.00 - 4.45	D								4
		5.00 - 5.45	D								5
		6.00 - 6.45	U								6
		7.00 - 7.45	D								7
		8.50	D								8
		10.00	D								9
											10

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.





Rotary Core Log

Borehole No.

BH201

Sheet 2 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							10.30	37.74		Very dense light brown/yellowish brown slightly gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of mudstone and sandstone.	11
		12.00 - 12.45	B				12.30	35.74		Very dense brown very gravelly fine to coarse SAND. Gravel is subrounded to well rounded of mudstone, sandstone and quartz.	12
		13.50 - 13.95	B								13
							15.60	32.44		Very dense reddish brown slightly gravelly medium to coarse SAND. Gravel is subangular to subrounded, fine to medium of sandstone.	16
		16.50 - 16.95	B								17
		18.50 - 20.00	22 NI NR	31	25	0	18.50	29.54		Very weak reddish brown fine to medium grained SANDSTONE. 18.50 to 18.87m 0 - 10 degrees very closely spaced, planar rough From 18.87 to 18.97m recovered as non-intact core of sandy angular gravel of sandstone. From 18.97 to 20.00m no recovery.	19
										Continued on next sheet	20

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.





Rotary Core Log

Borehole No.

BH201

Sheet 3 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description																											
				TCR	SCR	RQD																															
		20.00 - 21.50	NI	76	71	52	20.46	27.58		From 20.00 to 20.08m recovered as non-intact core of gravelly medium to coarse sand. 20.08 to 20.46m 0 - 10 degrees very closely spaced to closely spaced, planar rough.	21																										
			18									Weak reddish brown fine to medium grained SANDSTONE. 20.46 to 21.14m 0 - 10 degrees very closely spaced to closely spaced, planar rough.																									
			9										From 21.14 to 21.50m no recovery.																								
			NR									21.50 to 24.41m 0 - 30 degrees very closely spaced to medium spaced, planar rough.																									
		21.50 - 23.00	9	100	100	67				22																											
													23.00 - 24.50	94	94	80	23																				
																		NR	12	100	84	71	24														
												8												From 24.41 to 24.50m no recovery. 24.50 to 24.91m 0 -10 degrees very closely spaced locally closely, planar rough.													
		NI	From 24.91 to 24.96m recovered as non-intact core of angular gravel of sandstone. 24.96 to 24.99m 0 degrees very closely spaced, planar rough. From 24.99 to 25.02m recovered as non-intact core of angular gravel of sandstone. 25.05 to 25.54m 0 - 10 degrees closely spaced, planar rough.																																		
		26.00 - 27.50		8	100	100						82	25																								
														27.50 - 29.00	7	100		100	100	26																	
																					29.00 - 30.50	16		98	98	91	27										
			29.00 - 30.50																									16	98	98	91	28					
		29.00 - 30.50		16	98	98						91																					29				
														29.00 - 30.50	16	98		98	91															30			
																					29.00 - 30.50	16		98	98	91									30		
			29.00 - 30.50																									16	98	98	91					30	
		29.00 - 30.50		16	98	98						91																									30
														29.00 - 30.50	16	98		98	91																		
																					29.00 - 30.50	16		98	98	91											
			29.00 - 30.50																									16	98	98	91						
		29.00 - 30.50		16	98	98						91																									
														29.00 - 30.50	16	98		98	91																		
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29.00 - 30.50	16		98				98	91	30																												
		29.00 - 30.50		16	98	98					91	30																									
														29.00 - 30.50	16	98		98	91									30									
																					29.00 - 30.50	16		98	98	91			30								
29.00 - 30.50	16		98				98	91		30																											
		29.00 - 30.50		16	98	98					91						30																				
														29.00 - 30.50	16	98		98	91				30														
																					29.00 - 30.50	16		98	98	91				30							
29.00 - 30.50	16		98				98	91																							30						
		29.00 - 30.50		16	98	98					91		30																								
														29.00 - 30.50	16	98		98	91	30																	
																					29.00 - 30.50	16		98	98	91	30										
29.00 - 30.50	16		98				98	91																								30					
		29.00 - 30.50		16	98	98					91																						30				
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																					29.00 - 30.50	16		98	98	91									30		
29.00 - 30.50	16		98				98	91																												30	
		29.00 - 30.50		16	98	98					91																										30
														29.00 - 30.50	16	98		98	91																		
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29.00 - 30.50	16		98				98	91																													
		29.00 - 30.50		16	98	98					91																										
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29.00 - 30.50	16		98				98	91	30																												
		29.00 - 30.50		16	98	98					91	30																									
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																					29.00 - 30.50	16		98	98	91			30								
29.00 - 30.50	16		98				98	91		30																											
		29.00 - 30.50		16	98	98					91						30																				
														29.00 - 30.50	16	98		98	91				30														
																					29.00 - 30.50	16		98	98	91				30							
29.00 - 30.50	16		98				98	91																							30						
		29.00 - 30.50		16	98	98					91		30																								
														29.00 - 30.50	16	98		98	91	30																	
																					29.00 - 30.50	16		98	98	91	30										
29.00 - 30.50	16		98				98	91																								30					
		29.00 - 30.50		16	98	98					91																						30				
														29.00 - 30.50	16	98		98	91															30			
																					29.00 - 30.50	16		98	98	91									30		
29.00 - 30.50	16		98				98	91																												30	
		29.00 - 30.50		16	98	98					91																										30
														29.00 - 30.50	16	98		98	91																		
																					29.00 - 30.50	16		98	98	91											
29.00 - 30.50	16		98				98	91																													
		29.00 - 30.50		16	98	98					91																										
														29.00 - 30.50	16	98		98	91																		
																					29.00 - 30.50	16		98	98	91											
29.00 - 30.50	16		98				98																														

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.





Rotary Core Log

Borehole No.

BH201

Sheet 4 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										spaced, planar rough.	
										From 30.47 to 30.50m no recovery.	
										30.50 to 31.68 0 - 10 degrees closely spaced to medium spaced, planar rough.	
		30.50 - 32.00	6	79	79	67				From 31.03 to 31.13m mudstone band.	31
			NR							From 31.68 to 32.00m no recovery.	
		32.00 - 33.50		100	100	100				32.00 to 34.84m 0 - 10 degrees closely spaced to medium spaced, planar rough.	32
			5								
		33.50 - 35.00		89	89	89				From 33.40 to 33.50m no recovery.	
			NR							From 33.50 to 33.79m coarse	34
		35.00 - 36.50		100	100	95				From 34.84 to 35.00m no recovery.	
			6							35.00 to 38.00m 0 - 10 degrees closely spaced to medium spaced, planar rough.	35
		36.50 - 38.00		100	100	93					
							38.00	10.04		Weak reddish brown medium to coarse grained SANDSTONE.	38
		38.00 - 39.50	7	100	100	81				38.00 to 39.50m 0 - 10 degrees closely spaced locally very closely spaced, planar rough.	
										From 39.34 to 39.42m very weak.	
			5				39.50	8.54		Medium strong reddish brown fine to medium grained SANDSTONE.	39
										39.50 to 41.00m 0 - 10 degrees medium spaced to widely	40

Continued on next sheet

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.





Rotary Core Log

Borehole No.

BH201

Sheet 5 of 5

Project Name: Swan House Post Demo SI

Project No.
077409.002

Co-ords: 384495.96 - 398859.93

Hole Type
RC

Location: Manchester

Level: 48.04

Scale
1:50

Client: RG Group Ltd

Dates: 23/08/2021 - 27/03/2021

Logged By
PN

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		39.50 - 41.00		100	100	100	41.00	7.04		<u>spaced, planar rough.</u>	
										End of borehole at 41.00 m	41
											42
											43
											44
											45
											46
											47
											48
											49
											50

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Water level recorded at 13.50m bgl overnight.



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 1	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 20.50m to 24.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 2	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 24.50m to 28.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 3	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 28.50m to 32.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 4	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 32.50m to 36.50m bgl	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 5	Date: 27/01/2021	Description: BH101A Rock Logging Photographs 36.50 to 40.50m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 6	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 22.00 to 26.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 7	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 26.00 to 30.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 8	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 30.00 to 34.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 9	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 34.00 to 38.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 10	Date: 01/02/2021	Description: BH102 Rock Logging Photographs 38.00 to 40.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 11	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 24.00 to 28.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 12	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 28.00 to 32.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 13	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 32.00 to 36.00m	



Client Name: RGCM Ltd		Project Name: Swan House	Project No: B077409
No. 14	Date: 27/01/2021	Description: BH103 Rock Logging Photographs 36.00 to 40.00m	



Appendix C – Chemical Laboratory Testing Results

- 2018 Investigation
 - Envirolab, Final Analytical Test Report 18-07339-1
 - Envirolab, Final Analytical Test Report 18-07504-1
- 2021 Pre-Demolition Investigation
 - Envirolab, Final Analytical Test Report 21/00959-1 WAC Testing
 - Envirolab, Final Analytical Test Report 21/00959-1
 - Envirolab, Final Analytical Test Report 21/01742-1 Groundwater
- 2021 Post Demolition Investigation
 - Envirolab, Final Analytical Test Report 21/07524-1
 - Envirolab, Final Analytical Test Report 21/07525-1 WAC Testing
 - Envirolab, Final Analytical Test Report 21/07583-1
 - Envirolab, Final Analytical Test Report 21/07583-1 WAC Testing

FINAL ANALYTICAL TEST REPORT

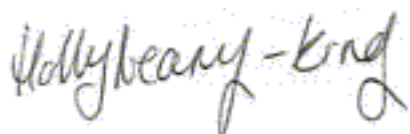
Envirolab Job Number: 18/07339
Issue Number: 1

Date: 19 September, 2018

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

Project Manager: Matthew Holroyd/Siobhán Hyde
Project Name: Swan House, Manchester
Project Ref: B067266.201
Order No: EBMA1393
Date Samples Received: 12/09/18
Date Instructions Received: 13/09/18
Date Analysis Completed: 19/09/18

Prepared by:



Holly Neary-King
Sales Executive

Approved by:



Danielle Brierley
Client Manager

Envirolab Job Number: 18/07339

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07339/1	18/07339/2							Units	Method ref
Client Sample No	ES1	ES1								
Client Sample ID	WS06	WS07								
Depth to Top	0.30	0.40								
Depth To Bottom		0.50								
Date Sampled	10-Sep-18	10-Sep-18								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	3	3								
% Stones >10mm _A	<0.1	<0.1							% w/w	A-T-044
pH _D ^{M#}	8.30	8.86							pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.09	0.07							g/l	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1							mg/kg	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2							mg/kg	A-T-050s
Organic matter _D ^{M#}	1.4	1.4							% w/w	A-T-032 OM
Arsenic _D ^{M#}	3	3							mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0							mg/kg	A-T-027s
Cadmium _D ^{M#}	1.5	1.5							mg/kg	A-T-024s
Copper _D ^{M#}	23	22							mg/kg	A-T-024s
Chromium _D ^{M#}	32	31							mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1							mg/kg	A-T-040s
Lead _D ^{M#}	14	12							mg/kg	A-T-024s
Mercury _D	<0.17	<0.17							mg/kg	A-T-024s
Nickel _D ^{M#}	39	38							mg/kg	A-T-024s
Selenium _D [#]	1	<1							mg/kg	A-T-024s
Zinc _D ^{M#}	62	60							mg/kg	A-T-024s

Envirolab Job Number: 18/07339

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07339/1	18/07339/2							Units	Method ref
Client Sample No	ES1	ES1								
Client Sample ID	WS06	WS07								
Depth to Top	0.30	0.40								
Depth To Bottom		0.50								
Date Sampled	10-Sep-18	10-Sep-18								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	3	3								
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD								A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A								

Envirolab Job Number: 18/07339

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07339/1	18/07339/2							Units	Method ref
Client Sample No	ES1	ES1								
Client Sample ID	WS06	WS07								
Depth to Top	0.30	0.40								
Depth To Bottom		0.50								
Date Sampled	10-Sep-18	10-Sep-18								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	3	3								
PAH-16MS										
Naphthalene _A ^{M#}	<0.03	<0.03							mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01							mg/kg	A-T-019s
Acenaphthene _A ^{M#}	<0.01	<0.01							mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01							mg/kg	A-T-019s
Phenanthrene _A ^{M#}	0.04	<0.03							mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02							mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08							mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07							mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04							mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06							mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05							mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07							mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04							mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03							mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04							mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05							mg/kg	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	<0.08							mg/kg	A-T-019s

Envirolab Job Number: 18/07339

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07339/1	18/07339/2							Units	Method ref
Client Sample No	ES1	ES1								
Client Sample ID	WS06	WS07								
Depth to Top	0.30	0.40								
Depth To Bottom		0.50								
Date Sampled	10-Sep-18	10-Sep-18								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	3	3								
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Ali >C8-C10 _A ^{M#}	<1	<1							mg/kg	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1							mg/kg	A-T-055s
Ali >C12-C16 _A ^{M#}	2	1							mg/kg	A-T-055s
Ali >C16-C21 _A ^{M#}	1	1							mg/kg	A-T-055s
Ali >C21-C35 _A	1	1							mg/kg	A-T-055s
Total Aliphatics >C5-C35 _A	5	5							mg/kg	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Aro >C8-C10 _A ^{M#}	<1	<1							mg/kg	A-T-055s
Aro >C10-C12 _A ^{M#}	<1	<1							mg/kg	A-T-055s
Aro >C12-C16 _A	1	1							mg/kg	A-T-055s
Aro >C16-C21 _A ^{M#}	1	1							mg/kg	A-T-055s
Aro >C21-C35 _A ^{M#}	8	7							mg/kg	A-T-055s
Total Aromatics >C5-C35 _A	12	9							mg/kg	A-T-055s
TPH (Ali & Aro >C5-C35) _A	16	14							mg/kg	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01							mg/kg	A-T-022s

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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 and there is insufficient sample to repeat the analysis. 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.

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.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07504
Issue Number: 1

Date: 24 September, 2018

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

Project Manager: Matthew Holroyd/Siobhán Hyde
Project Name: Swan House, Manchester
Project Ref: B067266.201
Order No: EBMA1404
Date Samples Received: 14/09/18
Date Instructions Received: 18/09/18
Date Analysis Completed: 24/09/18

Prepared by:



Danielle Brierley
Client Manager

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/2	18/07504/3	18/07504/4	18/07504/5	18/07504/6	18/07504/7	18/07504/8	18/07504/9	Units	Method ref
Client Sample No	2	3	4	5	1	1	2	3		
Client Sample ID	WS04	WS04	WS04	WS04	WS01	WS03	WS03	WS03		
Depth to Top	0.70	1.40	2.40	2.70	0.55	0.40	1.70	3.00		
Depth To Bottom		1.70	2.70	3.00	0.65					
Date Sampled	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5AB	4AB	6	3	6	4A	6A	6		
% Stones >10mm _A	5.5	15.9	<0.1	<0.1	<0.1	2.8	5.1	<0.1	% w/w	A-T-044
pH _D ^{M#}	8.14	9.53	8.25	7.52	8.53	8.40	7.45	8.25	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	1.48	0.40	0.06	0.36	0.24	0.18	0.29	0.07	g/l	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Organic matter _D ^{M#}	2.1	0.8	3.7	8.4	3.2	5.9	11.6	2.9	% w/w	A-T-032 OM
Arsenic _D ^{M#}	9	5	1	2	4	12	16	<1	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	1.1	1.0	<1.0	2.2	<1.0	1.4	1.5	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	0.9	0.7	0.5	<0.5	1.1	1.0	1.1	1.2	mg/kg	A-T-024s
Copper _D ^{M#}	26	11	9	8	20	84	69	20	mg/kg	A-T-024s
Chromium _D ^{M#}	16	19	17	23	27	10	21	39	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	69	18	21	12	36	412	335	23	mg/kg	A-T-024s
Mercury _D	0.31	<0.17	<0.17	<0.17	<0.17	0.37	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	20	16	10	12	20	17	28	34	mg/kg	A-T-024s
Selenium _D [#]	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-024s
Zinc _D ^{M#}	36	27	29	33	60	46	78	59	mg/kg	A-T-024s

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/2	18/07504/3	18/07504/4	18/07504/5	18/07504/6	18/07504/7	18/07504/8	18/07504/9	Units	Method ref
Client Sample No	2	3	4	5	1	1	2	3		
Client Sample ID	WS04	WS04	WS04	WS04	WS01	WS03	WS03	WS03		
Depth to Top	0.70	1.40	2.40	2.70	0.55	0.40	1.70	3.00		
Depth To Bottom		1.70	2.70	3.00	0.65					
Date Sampled	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5AB	4AB	6	3	6	4A	6A	6		
Asbestos in Soil (inc. matrix)										
Asbestos in soil _A #	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/2	18/07504/3	18/07504/4	18/07504/5	18/07504/6	18/07504/7	18/07504/8	18/07504/9	Units	Method ref
Client Sample No	2	3	4	5	1	1	2	3		
Client Sample ID	WS04	WS04	WS04	WS04	WS01	WS03	WS03	WS03		
Depth to Top	0.70	1.40	2.40	2.70	0.55	0.40	1.70	3.00		
Depth To Bottom		1.70	2.70	3.00	0.65					
Date Sampled	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5AB	4AB	6	3	6	4A	6A	6		
PAH-16MS										
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.02	mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	0.15	mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	<0.08	<0.08	<0.08	0.12	<0.08	0.25	mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	<0.07	0.10	<0.07	0.19	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	0.09	mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06	<0.06	<0.06	<0.06	0.08	<0.06	0.12	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	0.11	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	0.06	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	0.04	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	<0.08	<0.08	<0.08	<0.08	0.62	<0.08	1.08	mg/kg	A-T-019s

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/2	18/07504/3	18/07504/4	18/07504/5	18/07504/6	18/07504/7	18/07504/8	18/07504/9	Units	Method ref
Client Sample No	2	3	4	5	1	1	2	3		
Client Sample ID	WS04	WS04	WS04	WS04	WS01	WS03	WS03	WS03		
Depth to Top	0.70	1.40	2.40	2.70	0.55	0.40	1.70	3.00		
Depth To Bottom		1.70	2.70	3.00	0.65					
Date Sampled	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18	13-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5AB	4AB	6	3	6	4A	6A	6		
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	mg/kg	A-T-022s
Ali >C8-C10 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	<1	<1	1	<1	<1	<1	<1	mg/kg	A-T-055s
Ali >C21-C35 _A	1	<1	3	22	5	2	1	5	mg/kg	A-T-055s
Total Aliphatics >C5-C35 _A	1	<1	3	25	5	2	1	5	mg/kg	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C8-C10 _A ^{M#}	2	<1	1	3	1	2	1	2	mg/kg	A-T-055s
Aro >C10-C12 _A ^{M#}	1	<1	<1	1	<1	1	<1	1	mg/kg	A-T-055s
Aro >C12-C16 _A	2	<1	1	4	1	3	2	2	mg/kg	A-T-055s
Aro >C16-C21 _A ^{M#}	3	<1	1	4	1	3	2	2	mg/kg	A-T-055s
Aro >C21-C35 _A ^{M#}	12	<1	8	67	8	11	6	10	mg/kg	A-T-055s
Total Aromatics >C5-C35 _A	21	<1	13	80	11	21	12	19	mg/kg	A-T-055s
TPH (Ali & Aro >C5-C35) _A	23	<1	15	105	16	24	13	24	mg/kg	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/10	18/07504/11	18/07504/12						Units	Method ref
Client Sample No	1	2	3							
Client Sample ID	WS02	WS02	WS02							
Depth to Top	0.35	0.70	1.05							
Depth To Bottom			1.30							
Date Sampled	14-Sep-18	14-Sep-18	14-Sep-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4	4A	5							
% Stones >10mm _A	<0.1	<0.1	<0.1						% w/w	A-T-044
pH _D ^{M#}	8.95	8.77	8.05						pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.02	0.06	0.12						g/l	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1						mg/kg	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2						mg/kg	A-T-050s
Organic matter _D ^{M#}	3.5	2.7	1.1						% w/w	A-T-032 OM
Arsenic _D ^{M#}	2	2	4						mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	1.8	1.2	<1.0						mg/kg	A-T-027s
Cadmium _D ^{M#}	0.6	0.5	1.1						mg/kg	A-T-024s
Copper _D ^{M#}	13	7	21						mg/kg	A-T-024s
Chromium _D ^{M#}	7	9	31						mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1						mg/kg	A-T-040s
Lead _D ^{M#}	18	76	19						mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	<0.17						mg/kg	A-T-024s
Nickel _D ^{M#}	12	8	39						mg/kg	A-T-024s
Selenium _D [#]	<1	<1	<1						mg/kg	A-T-024s
Zinc _D ^{M#}	46	21	56						mg/kg	A-T-024s

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/10	18/07504/11	18/07504/12						Units	Method ref
Client Sample No	1	2	3							
Client Sample ID	WS02	WS02	WS02							
Depth to Top	0.35	0.70	1.05							
Depth To Bottom			1.30							
Date Sampled	14-Sep-18	14-Sep-18	14-Sep-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4	4A	5							
Asbestos in Soil (inc. matrix)										
Asbestos in soil _A #	NAD	NAD	NAD							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A							

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/10	18/07504/11	18/07504/12						Units	Method ref
Client Sample No	1	2	3							
Client Sample ID	WS02	WS02	WS02							
Depth to Top	0.35	0.70	1.05							
Depth To Bottom			1.30							
Date Sampled	14-Sep-18	14-Sep-18	14-Sep-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4	4A	5							
PAH-16MS										
Naphthalene _A ^{M#}	2.51	<0.03	<0.03						mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.10	<0.01	<0.01						mg/kg	A-T-019s
Acenaphthene _A ^{M#}	8.93	0.07	<0.01						mg/kg	A-T-019s
Fluorene _A ^{M#}	4.39	0.03	<0.01						mg/kg	A-T-019s
Phenanthrene _A ^{M#}	27.7	0.23	<0.03						mg/kg	A-T-019s
Anthracene _A ^{M#}	7.26	0.07	<0.02						mg/kg	A-T-019s
Fluoranthene _A ^{M#}	28.6	0.31	<0.08						mg/kg	A-T-019s
Pyrene _A ^{M#}	22.6	0.24	<0.07						mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	11.5	0.12	<0.04						mg/kg	A-T-019s
Chrysene _A ^{M#}	13.2	0.13	<0.06						mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	11.7	0.11	<0.05						mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	4.71	<0.07	<0.07						mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	9.05	0.10	<0.04						mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	4.62	0.07	<0.03						mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.98	<0.04	<0.04						mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	3.63	0.06	<0.05						mg/kg	A-T-019s
Total PAH-16MS _A ^{M#}	161	1.54	<0.08						mg/kg	A-T-019s

Envirolab Job Number: 18/07504

Client Project Name: Swan House, Manchester

Client Project Ref: B067266.201

Lab Sample ID	18/07504/10	18/07504/11	18/07504/12						Units	Method ref
Client Sample No	1	2	3							
Client Sample ID	WS02	WS02	WS02							
Depth to Top	0.35	0.70	1.05							
Depth To Bottom			1.30							
Date Sampled	14-Sep-18	14-Sep-18	14-Sep-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4	4A	5							
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Ali >C8-C10 _A ^{M#}	<1	<1	<1						mg/kg	A-T-055s
Ali >C10-C12 _A ^{M#}	1	<1	<1						mg/kg	A-T-055s
Ali >C12-C16 _A ^{M#}	2	<1	<1						mg/kg	A-T-055s
Ali >C16-C21 _A ^{M#}	6	<1	<1						mg/kg	A-T-055s
Ali >C21-C35 _A	411	2	<1						mg/kg	A-T-055s
Total Aliphatics >C5-C35 _A	420	2	<1						mg/kg	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Aro >C8-C10 _A ^{M#}	4	2	<1						mg/kg	A-T-055s
Aro >C10-C12 _A ^{M#}	10	1	<1						mg/kg	A-T-055s
Aro >C12-C16 _A	60	2	<1						mg/kg	A-T-055s
Aro >C16-C21 _A ^{M#}	126	3	<1						mg/kg	A-T-055s
Aro >C21-C35 _A ^{M#}	540	8	2						mg/kg	A-T-055s
Total Aromatics >C5-C35 _A	741	17	2						mg/kg	A-T-055s
TPH (Ali & Aro >C5-C35) _A	1160	19	2						mg/kg	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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.

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.

Final Test Report

Envirolab Job Number: 21/00959
Issue Number: 1

Date: 9-Feb-21

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

Project Manager: EBMA/Philippa Neesham/Siobhán Hyde
Project Name: Swan House
Project Ref: B077409
Order No: EBMA2678

Date Samples Received: 28-Jan-21
Date Instructions Received: 2-Feb-21
Date Analysis Completed: 9-Feb-21

Notes - Soil analysis

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

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

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

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be 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

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

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

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.

Please contact us if you need any further information.

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Danielle Brierley
Client Manager

Sample Details							Landfill Waste Acceptance Criteria Limits			
Lab Sample ID	Method	ISO17025	MCERTS	21/00959/1						
Client Sample Number				1			Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill	
Client Sample ID				BH102						
Depth to Top				0.45						
Depth to Bottom				0.60						
Date Sampled				22/01/2021						
Sample Type				Soil - ES						
Sample Matrix Code				6A						
Solid Waste Analysis										
pH (pH Units) _D	A-T-031	N	N	8.83				-	>6	-
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.02				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.02				-	to be evaluated	to be evaluated
Loss on Ignition (%) _D	A-T-030	N	N	4.5				-	-	10
Total Organic Carbon (%) _D	A-T-032	N	N	0.58				3	5	6
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N	2.02				100	-	-
Mineral Oil (mg/kg) _A	A-T-007	N	N	<10				500	-	-
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N	<0.007				1	-	-
Sum of BTEX (mg/kg) _A	A-T-022	N	N	<0.01				6	-	-
Eluate Analysis				2:1	8:1	2:1	Cumulative 10:1	Limit values for compliance leaching test using		
				mg/l		mg/kg		BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.5	2	25
Barium	A-T-025	N	N	0.014	0.029	0.032	0.280	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.04	1	5
Chromium	A-T-025	N	N	0.005	0.002	0.011	0.020	0.5	10	70
Copper	A-T-025	N	N	<0.001	0.002	<0.002	<0.01	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	<0.005	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.011	0.003	0.025	0.040	0.5	10	30
Nickel	A-T-025	N	N	0.001	<0.001	0.002	<0.01	0.4	10	40
Lead	A-T-025	N	N	<0.001	0.002	<0.002	<0.01	0.5	10	50
Antimony	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.06	0.7	5
Selenium	A-T-025	N	N	0.002	<0.001	0.005	<0.01	0.1	0.5	7
Zinc	A-T-025	N	N	0.002	0.003	0.005	0.030	4	50	200
Chloride	A-T-026	N	N	32	3	73	65	800	15000	25000
Fluoride	A-T-026	N	N	1.8	0.9	4.1	10.0	10	150	500
Sulphate as SO ₄	A-T-026	N	N	107	13	245	241	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	264	56	605	814	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	<0.1	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	<200	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	N	7.7	7.6					
Conductivity (µS/cm)	A-T-037	N	N	527	111					
Mass Sample (kg)				0.226						
Dry Matter (%)	A-T-044	N	N	77.4						
Stage 1										
Volume Leachant, L ₂ (l)	A-T-046			0.350						
Filtered Eluate Volume, VE ₁ (l)	A-T-046			0.200						
Stage 2										
Volume Leachant, L ₈ (l)	A-T-046			1.400						
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation										

*Landfill WAC analysis must not be used for hazardous waste classification purposes.
This analysis is only applicable for landfill acceptance and does not give any indication
as to whether a waste may be hazardous or non-hazardous.*

Sample Details							Landfill Waste Acceptance Criteria Limits			
Lab Sample ID	Method	ISO17025	MCERTS	21/00959/2						
Client Sample Number				1			Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill	
Client Sample ID				BH103						
Depth to Top				1.4						
Depth to Bottom				1.60						
Date Sampled				22/01/2021						
Sample Type				Soil - ES						
Sample Matrix Code				6A						
Solid Waste Analysis										
pH (pH Units) _D	A-T-031	N	N	8.82			-	>6	-	
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.07			-	to be evaluated	to be evaluated	
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.02			-	to be evaluated	to be evaluated	
Loss on Ignition (%) _D	A-T-030	N	N	5.2			-	-	10	
Total Organic Carbon (%) _D	A-T-032	N	N	2.32			3	5	6	
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N	0.11			100	-	-	
Mineral Oil (mg/kg) _A	A-T-007	N	N	<10			500	-	-	
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N	<0.007			1	-	-	
Sum of BTEX (mg/kg) _A	A-T-022	N	N	<0.01			6	-	-	
Eluate Analysis				2:1	8:1	2:1	Cumulative 10:1	Limit values for compliance leaching test using		
				mg/l		mg/kg		BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic	A-T-025	N	N	0.016	0.013	0.035	0.140	0.5	2	25
Barium	A-T-025	N	N	0.004	0.004	0.009	0.040	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.04	1	5
Chromium	A-T-025	N	N	0.004	0.001	0.009	0.010	0.5	10	70
Copper	A-T-025	N	N	0.010	0.006	0.022	0.070	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	<0.005	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.035	0.004	0.077	0.080	0.5	10	30
Nickel	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.4	10	40
Lead	A-T-025	N	N	<0.001	0.018	<0.002	<0.01	0.5	10	50
Antimony	A-T-025	N	N	0.002	<0.001	0.004	<0.01	0.06	0.7	5
Selenium	A-T-025	N	N	0.003	<0.001	0.007	<0.01	0.1	0.5	7
Zinc	A-T-025	N	N	<0.001	0.006	<0.002	<0.01	4	50	200
Chloride	A-T-026	N	N	19	2	43	36	800	15000	25000
Fluoride	A-T-026	N	N	1.2	0.4	2.7	5.0	10	150	500
Sulphate as SO ₄	A-T-026	N	N	147	15	324	301	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	253	55	559	788	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	<0.1	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	<200	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	N	8.1	8.1					
Conductivity (µS/cm)	A-T-037	N	N	506	109					
Mass Sample (kg)				0.212						
Dry Matter (%)	A-T-044	N	N	82.7						
Stage 1										
Volume Leachant, L ₂ (l)	A-T-046			0.350						
Filtered Eluate Volume, VE ₁ (l)	A-T-046			0.200						
Stage 2										
Volume Leachant, L ₈ (l)	A-T-046			1.400						
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation										

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/00959
Issue Number: 1

Date: 09 February, 2021

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

Project Manager: EBMA/Philippa Neesham/Siobhán Hyde
Project Name: Swan House
Project Ref: B077409
Order No: EBMA2678
Date Samples Received: 28/01/21
Date Instructions Received: 02/02/21
Date Analysis Completed: 09/02/21

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Danielle Brierley
Client Manager

Envirolab Job Number: 21/00959

Client Project Name: Swan House

Client Project Ref: B077409

Lab Sample ID	21/00959/1	21/00959/2						Units	Limit of Detection	Method ref
Client Sample No	1	1								
Client Sample ID	BH102	BH103								
Depth to Top	0.45	1.4								
Depth To Bottom	0.6	1.6								
Date Sampled	22-Jan-21	22-Jan-21								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6A	6A								
% Stones >10mm _A	2.7	20.0						% w/w	0.1	A-T-044
pH _D ^{M#}	8.83	8.82						pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.18	0.17						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#}	1.0	4.0						% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	<1	8						mg/kg	1	A-T-024s
Boron (water soluble) _D	1.4	<1.0						mg/kg	1	A-T-027s
Cadmium _D ^{M#}	1.3	0.9						mg/kg	0.5	A-T-024s
Copper _D ^{M#}	29	46						mg/kg	1	A-T-024s
Chromium _D ^{M#}	59	17						mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1						mg/kg	1	A-T-040s
Lead _D ^{M#}	18	268						mg/kg	1	A-T-024s
Mercury _D	<0.17	0.27						mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	37	20						mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	2						mg/kg	1	A-T-024s
Zinc _D ^{M#}	54	37						mg/kg	5	A-T-024s

Envirolab Job Number: 21/00959

Client Project Name: Swan House

Client Project Ref: B077409

Lab Sample ID	21/00959/1	21/00959/2						Units	Limit of Detection	Method ref
Client Sample No	1	1								
Client Sample ID	BH102	BH103								
Depth to Top	0.45	1.4								
Depth To Bottom	0.6	1.6								
Date Sampled	22-Jan-21	22-Jan-21								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6A	6A								
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD								A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A								A-T-045

Envirolab Job Number: 21/00959

Client Project Name: Swan House

Client Project Ref: B077409

Lab Sample ID	21/00959/1	21/00959/2								
Client Sample No	1	1								
Client Sample ID	BH102	BH103								
Depth to Top	0.45	1.4								
Depth To Bottom	0.6	1.6								
Date Sampled	22-Jan-21	22-Jan-21								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6A	6A								
PAH-16MS (MSD order)										
Naphthalene ^{MS}	0.16	<0.03						mg/kg	0.03	A-T-019s
Acenaphthylene ^{MS}	<0.01	<0.01						mg/kg	0.01	A-T-019s
Acenaphthene ^{MS}	0.13	0.02						mg/kg	0.01	A-T-019s
Fluorene ^{MS}	0.08	<0.01						mg/kg	0.01	A-T-019s
Phenanthrene ^{MS}	0.40	0.07						mg/kg	0.03	A-T-019s
Anthracene ^{MS}	0.08	<0.02						mg/kg	0.02	A-T-019s
Fluoranthene ^{MS}	0.35	<0.08						mg/kg	0.08	A-T-019s
Pyrene ^{MS}	0.26	<0.07						mg/kg	0.07	A-T-019s
Benzo(a)anthracene ^{MS}	0.13	<0.04						mg/kg	0.04	A-T-019s
Chrysene ^{MS}	0.14	<0.06						mg/kg	0.06	A-T-019s
Benzo(b)fluoranthene ^{MS}	0.12	<0.05						mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene ^{MS}	<0.07	<0.07						mg/kg	0.07	A-T-019s
Benzo(a)pyrene ^{MS}	0.11	<0.04						mg/kg	0.04	A-T-019s
Indeno(123-cd)pyrene ^{MS}	0.06	<0.03						mg/kg	0.03	A-T-019s
Dibenzo(ah)anthracene ^{MS}	<0.04	<0.04						mg/kg	0.04	A-T-019s
Benzo(ghi)perylene ^{MS}	<0.05	<0.05						mg/kg	0.05	A-T-019s
Total PAH-16MS (MSD order) ^{MS}	2.02	0.09						mg/kg	0.03	A-T-019s

Envirolab Job Number: 21/00959

Client Project Name: Swan House

Client Project Ref: B077409

Lab Sample ID	21/00959/1	21/00959/2								
Client Sample No	1	1								
Client Sample ID	BH102	BH103								
Depth to Top	0.45	1.4								
Depth To Bottom	0.6	1.6								
Date Sampled	22-Jan-21	22-Jan-21								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6A	6A								
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	<1	<1						mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1						mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1						mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	<1						mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	<1	<1						mg/kg	1	A-T-055s
Total Aliphatics _A	<1	<1						mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01						mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01						mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1						mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	<1						mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1	<1						mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1	<1						mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	1	4						mg/kg	1	A-T-055s
Total Aromatics _A	1	6						mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	1	7						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

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 No:	21/00959
Project:	Swan House	Date Received:	02/02/2021 (am)
Clients Project No:	B077409	Cool Box Temperatures (°C):	5.5

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.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/01742
Issue Number: 1
Date: 01 March, 2021

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

Project Manager: EBMA/Matthew Holroyd
Project Name: Swan House
Project Ref: B077409
Order No: EBMA2701
Date Samples Received: 19/02/21
Date Instructions Received: 22/02/21
Date Analysis Completed: 01/03/21

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Sophie France
Client Service Manager

Envirolab Job Number: 21/01742

Client Project Name: Swan House

Client Project Ref: B077409

Lab Sample ID	21/01742/1	21/01742/2						Units	Limit of Detection	Method ref
Client Sample No	1	1								
Client Sample ID	BH102	BH103								
Depth to Top	24.29	3.34								
Depth To Bottom	25.23	4.91								
Date Sampled	18-Feb-21	18-Feb-21								
Sample Type	Water - EW	Water - EW								
Sample Matrix Code	N/A	N/A								
pH (w) _A [#]	7.39	7.85						pH	0.01	A-T-031w
Hardness Total _A [#]	577	464						mg/l Ca CO ₃	2	A-T-049w
Sulphate (w) _A [#]	202	250						mg/l	1	A-T-026w
Cyanide (total) (w) _A [#]	<0.005	<0.005						mg/l	0.005	A-T-042wTCN
Phenols - Total by HPLC (w) _A	<0.01	<0.01						mg/l	0.01	A-T-050w
Sulphide (w) _A	0.8	<0.1						mg/l	0.1	A-T-S2-w
DOC (w) _A [#]	8.1	56.7						mg/l	0.2	A-T-032w
Arsenic (dissolved) _A [#]	<1	2						µg/l	1	A-T-025w
Boron (dissolved) _A [#]	128	134						µg/l	10	A-T-025w
Cadmium (dissolved) _A [#]	<0.2	<0.2						µg/l	0.2	A-T-025w
Calcium (dissolved) _A [#]	140	108						mg/l	1	A-T-049w
Copper (dissolved) _A [#]	3	5						µg/l	1	A-T-025w
Chromium (dissolved) _A [#]	<1	<1						µg/l	1	A-T-025w
Lead (dissolved) _A [#]	<1	<1						µg/l	1	A-T-025w
Mercury (dissolved) _A [#]	<0.1	<0.1						µg/l	0.1	A-T-025w
Nickel (dissolved) _A [#]	10	21						µg/l	1	A-T-025w
Selenium (dissolved) _A [#]	<1	<1						µg/l	1	A-T-025w
Zinc (dissolved) _A [#]	6	4						µg/l	1	A-T-025w

Envirolab Job Number: 21/01742

Client Project Name: Swan House

Client Project Ref: B077409

Lab Sample ID	21/01742/1	21/01742/2						Units	Limit of Detection	Method ref
Client Sample No	1	1								
Client Sample ID	BH102	BH103								
Depth to Top	24.29	3.34								
Depth To Bottom	25.23	4.91								
Date Sampled	18-Feb-21	18-Feb-21								
Sample Type	Water - EW	Water - EW								
Sample Matrix Code	N/A	N/A								
PAH 16MS (w)										
Acenaphthene (w) _A [#]	0.04	0.16						µg/l	0.01	A-T-019w
Acenaphthylene (w) _A [#]	<0.01	<0.01						µg/l	0.01	A-T-019w
Anthracene (w) _A [#]	0.01	0.02						µg/l	0.01	A-T-019w
Benzo(a)anthracene (w) _A [#]	0.02	<0.01						µg/l	0.01	A-T-019w
Benzo(a)pyrene (w) _A [#]	0.02	<0.01						µg/l	0.01	A-T-019w
Benzo(b)fluoranthene (w) _A [#]	0.04	<0.01						µg/l	0.01	A-T-019w
Benzo(ghi)perylene (w) _A [#]	0.01	<0.01						µg/l	0.01	A-T-019w
Benzo(k)fluoranthene (w) _A [#]	0.01	<0.01						µg/l	0.01	A-T-019w
Chrysene (w) _A [#]	0.02	<0.01						µg/l	0.01	A-T-019w
Dibenzo(ah)anthracene (w) _A [#]	<0.01	<0.01						µg/l	0.01	A-T-019w
Fluoranthene (w) _A [#]	0.11	0.04						µg/l	0.01	A-T-019w
Fluorene (w) _A [#]	0.02	0.04						µg/l	0.01	A-T-019w
Indeno(123-cd)pyrene (w) _A [#]	0.01	<0.01						µg/l	0.01	A-T-019w
Naphthalene (w) _A [#]	<0.01	0.32						µg/l	0.01	A-T-019w
Phenanthrene (w) _A [#]	0.05	0.06						µg/l	0.01	A-T-019w
Pyrene (w) _A [#]	0.12	0.04						µg/l	0.01	A-T-019w
Total PAH 16MS (w) _A [#]	0.48	0.68						µg/l	0.01	A-T-019w

Envirolab Job Number: 21/01742

Client Project Name: Swan House

Client Project Ref: B077409

Lab Sample ID	21/01742/1	21/01742/2						Units	Limit of Detection	Method ref
Client Sample No	1	1								
Client Sample ID	BH102	BH103								
Depth to Top	24.29	3.34								
Depth To Bottom	25.23	4.91								
Date Sampled	18-Feb-21	18-Feb-21								
Sample Type	Water - EW	Water - EW								
Sample Matrix Code	N/A	N/A								
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1	10						µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	19						µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	172						µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	564						µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	<5	1236						µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	7	1531						µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	172	14173						µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	179	17700						µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1	<1						µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	2						µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	8	<5						µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	<5	260						µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	17	445						µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	19	818						µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	40	1012						µg/l	10	A-T-055w
Total Aromatics (w) _A	84	2540						µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	263	20200						µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	2						µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1						µg/l	1	A-T-022w

REPORT NOTES

General

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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 No:	21/01742
Project:	Swan House	Date Received:	22/02/2021 (am)
Clients Project No:	B077409	Cool Box Temperatures (°C):	6.0

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.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/07524
Issue Number: 1

Date: 19 July, 2021

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

Project Manager: EBMA/Siobhán Hyde
Project Name: Swan House Post - Demo
Project Ref: 077409
Order No: EBMA2964
Date Samples Received: 09/07/21
Date Instructions Received: 12/07/21
Date Analysis Completed: 19/07/21

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Richard Wong
Client Manager

Envirolab Job Number: 21/07524

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07524/1	21/07524/2	21/07524/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP A	TP B	TP C							
Depth to Top	2.00	0.30	1.00							
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code										
% Stones >10mm _A	<0.1	18.5	1.0					% w/w	0.1	A-T-044
pH _D ^{M#}	8.60	12.40	9.36					pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.04	<0.01	0.06					g/l	0.01	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1					mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2					mg/kg	0.2	A-T-050s
Organic matter _D ^{M#}	0.8	1.0	0.8					% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	<1	2	3					mg/kg	1	A-T-024s
Boron (water soluble) _D	<1.0	1.4	<1.0					mg/kg	1	A-T-027s
Cadmium _D ^{M#}	0.9	<0.5	0.9					mg/kg	0.5	A-T-024s
Copper _D ^{M#}	23	6	23					mg/kg	1	A-T-024s
Chromium _D ^{M#}	28	13	33					mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1					mg/kg	1	A-T-040s
Lead _D ^{M#}	11	19	11					mg/kg	1	A-T-024s
Mercury _D	<0.17	0.78	<0.17					mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	36	11	37					mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	<1					mg/kg	1	A-T-024s
Zinc _D ^{M#}	59	18	60					mg/kg	5	A-T-024s

Envirolab Job Number: 21/07524

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07524/1	21/07524/2	21/07524/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP A	TP B	TP C							
Depth to Top	2.00	0.30	1.00							
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code										
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD							A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A							A-T-045

Envirolab Job Number: 21/07524

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07524/1	21/07524/2	21/07524/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP A	TP B	TP C							
Depth to Top	2.00	0.30	1.00							
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code										
PAH-16MS (MSD order)										
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03					mg/kg	0.03	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Phenanthrene _A ^{M#}	<0.03	0.04	<0.03					mg/kg	0.03	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02					mg/kg	0.02	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	<0.08					mg/kg	0.08	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	<0.07					mg/kg	0.07	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04					mg/kg	0.04	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06	<0.06					mg/kg	0.06	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05					mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07					mg/kg	0.07	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04					mg/kg	0.04	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03					mg/kg	0.03	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04					mg/kg	0.04	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05					mg/kg	0.05	A-T-019s
Total PAH-16MS (MSD order) _A ^{M#}	<0.08	<0.08	<0.08					mg/kg	0.03	A-T-019s

Envirolab Job Number: 21/07524

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07524/1	21/07524/2	21/07524/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP A	TP B	TP C							
Depth to Top	2.00	0.30	1.00							
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code										
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	1	<1	<1					mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	2	4	1					mg/kg	1	A-T-055s
Total Aliphatics _A	3	6	1					mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	37	<1					mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	<1	<1					mg/kg	1	A-T-055s
Aro >C12-C16 _A	1	<1	<1					mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	1	<1	1					mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	5	6	3					mg/kg	1	A-T-055s
Total Aromatics _A	7	43	5					mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	10	50	6					mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s

REPORT NOTES

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

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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 No:	21/07524
Project:	Swan House Post - Demo	Date Received:	12/07/2021 (am)
Clients Project No:	077409	Cool Box Temperatures (°C):	18.6

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

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples $5 \pm 3^{\circ}\text{C}$), ISO 18400-120:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	21/07524/1	21/07524/2	21/07524/3
Client Sample No			
Client Sample ID/Depth	TP A 2.00m	TP B 0.30m	TP C 1.00m
Date Sampled	08/07/21	08/07/21	08/07/21
A-T-019s	14/07/2021	14/07/2021	14/07/2021
A-T-022s	14/07/2021	14/07/2021	14/07/2021
A-T-024s	16/07/2021	16/07/2021	16/07/2021
A-T-026s	16/07/2021	16/07/2021	16/07/2021
A-T-027s	15/07/2021	15/07/2021	15/07/2021
A-T-031s	16/07/2021	16/07/2021	16/07/2021
A-T-032 OM	19/07/2021	19/07/2021	19/07/2021
A-T-040s	16/07/2021	16/07/2021	16/07/2021
A-T-042sTCN	13/07/2021	13/07/2021	13/07/2021
A-T-044	14/07/2021	14/07/2021	14/07/2021
A-T-045	13/07/2021	13/07/2021	13/07/2021
A-T-050s	13/07/2021	13/07/2021	13/07/2021
A-T-055s	14/07/2021	14/07/2021	14/07/2021

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

End of Report

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/07525
Issue Number: 1
Date: 21 July, 2021

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

Project Manager: EBMA/Siobhán Hyde
Project Name: Swan House Post - Demo
Project Ref: 077409
Order No: EBMA2965
Date Samples Received: 09/07/21
Date Instructions Received: 12/07/21
Date Analysis Completed: 21/07/21

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Holly Neary-King
Client Services Supervisor

Envirolab Job Number: 21/07525

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07525/1	21/07525/2	21/07525/3	21/07525/4				Units	Limit of Detection	Method ref
Client Sample No			WAC	WAC						
Client Sample ID	WS2-A	WS2-B	WS2-A	WA2-B						
Depth to Top	0.35	0.35	0.35	0.35						
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21	08-Jul-21						
Sample Type	Soil - ES	Soil - ES	Soil	Soil						
Sample Matrix Code	4A	4A	4AB	4A						
% Stones >10mm _A	17.5	20.2	45.6	29.2				% w/w	0.1	A-T-044
pH _D ^{M#}	9.73	9.82	-	-				pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.22	0.06	-	-				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#}	1.8	1.7	-	-				% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	9	9	-	-				mg/kg	1	A-T-024s
Boron (water soluble) _D	1.4	1.9	-	-				mg/kg	1	A-T-027s
Cadmium _D ^{M#}	0.8	0.9	-	-				mg/kg	0.5	A-T-024s
Copper _D ^{M#}	28	25	-	-				mg/kg	1	A-T-024s
Chromium _D ^{M#}	16	18	-	-				mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	-	-				mg/kg	1	A-T-040s
Lead _D ^{M#}	55	163	-	-				mg/kg	1	A-T-024s
Mercury _D	<0.17	0.60	-	-				mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	17	18	-	-				mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	-	-				mg/kg	1	A-T-024s
Zinc _D ^{M#}	106	139	-	-				mg/kg	5	A-T-024s
Coronene _A	2.39	2.21	-	-				mg/kg	0.01	A-T-019s

Envirolab Job Number: 21/07525

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07525/1	21/07525/2	21/07525/3	21/07525/4				Units	Limit of Detection	Method ref
Client Sample No			WAC	WAC						
Client Sample ID	WS2-A	WS2-B	WS2-A	WA2-B						
Depth to Top	0.35	0.35	0.35	0.35						
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21	08-Jul-21						
Sample Type	Soil - ES	Soil - ES	Soil	Soil						
Sample Matrix Code	4A	4A	4AB	4A						
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	-	-						A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	-	-						A-T-045

Envirolab Job Number: 21/07525

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07525/1	21/07525/2	21/07525/3	21/07525/4				Units	Limit of Detection	Method ref
Client Sample No			WAC	WAC						
Client Sample ID	WS2-A	WS2-B	WS2-A	WA2-B						
Depth to Top	0.35	0.35	0.35	0.35						
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21	08-Jul-21						
Sample Type	Soil - ES	Soil - ES	Soil	Soil						
Sample Matrix Code	4A	4A	4AB	4A						
PAH-16MS (MSD order)										
Naphthalene _A ^{M#}	30.5	15.3	-	-				mg/kg	0.03	A-T-019s
Acenaphthylene _A ^{M#}	0.48	0.32	-	-				mg/kg	0.01	A-T-019s
Acenaphthene _A ^{M#}	78.2	39	-	-				mg/kg	0.01	A-T-019s
Fluorene _A ^{M#}	32.1	17.2	-	-				mg/kg	0.01	A-T-019s
Phenanthrene _A ^{M#}	173	105	-	-				mg/kg	0.03	A-T-019s
Anthracene _A ^{M#}	36.3	22.3	-	-				mg/kg	0.02	A-T-019s
Fluoranthene _A ^{M#}	142	91.8	-	-				mg/kg	0.08	A-T-019s
Pyrene _A ^{M#}	99.4	65.8	-	-				mg/kg	0.07	A-T-019s
Benzo(a)anthracene _A ^{M#}	44.1	31.2	-	-				mg/kg	0.04	A-T-019s
Chrysene _A ^{M#}	62.1	39.4	-	-				mg/kg	0.06	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	43	28.2	-	-				mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	17.3	10.8	-	-				mg/kg	0.07	A-T-019s
Benzo(a)pyrene _A ^{M#}	29.3	20	-	-				mg/kg	0.04	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	17.8	12.4	-	-				mg/kg	0.03	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	3.56	2.45	-	-				mg/kg	0.04	A-T-019s
Benzo(ghi)perylene _A ^{M#}	13.7	9.80	-	-				mg/kg	0.05	A-T-019s
Total PAH-16MS (MSD order) _A ^{M#}	823	511	-	-				mg/kg	0.03	A-T-019s

Envirolab Job Number: 21/07525

Client Project Name: Swan House Post - Demo

Client Project Ref: 077409

Lab Sample ID	21/07525/1	21/07525/2	21/07525/3	21/07525/4				Units	Limit of Detection	Method ref
Client Sample No			WAC	WAC						
Client Sample ID	WS2-A	WS2-B	WS2-A	WA2-B						
Depth to Top	0.35	0.35	0.35	0.35						
Depth To Bottom										
Date Sampled	08-Jul-21	08-Jul-21	08-Jul-21	08-Jul-21						
Sample Type	Soil - ES	Soil - ES	Soil	Soil						
Sample Matrix Code	4A	4A	4AB	4A						
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	-	-				mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	0.58	<0.01	-	-				mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	61	<20	-	-				mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	55	61	-	-				mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	108	184	-	-				mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	117	165	-	-				mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	358	348	-	-				mg/kg	1	A-T-055s
Total Aliphatics _A	699	758	-	-				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	124	36	-	-				mg/kg	1	A-T-055s
Aro >C10-C12 _A	360	178	-	-				mg/kg	1	A-T-055s
Aro >C12-C16 _A	1770	1190	-	-				mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	3570	2600	-	-				mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	6560	5330	-	-				mg/kg	1	A-T-055s
Total Aromatics _A	12400	9360	-	-				mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	13100	10100	-	-				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 [#]	0.03	<0.01	-	-				mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	0.12	<0.01	-	-				mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	0.17	<0.01	-	-				mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	-	-				mg/kg	0.01	A-T-022s

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 No:	21/07525
Project:	Swan House Post - Demo	Date Received:	12/07/2021 (am)
Clients Project No:	077409	Cool Box Temperatures (°C):	18.6

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

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples $5 \pm 3^{\circ}\text{C}$), ISO 18400-120:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	21/07525/1	21/07525/2	21/07525/3	21/07525/4
Client Sample No			WAC	WAC
Client Sample ID/Depth	WS2-A 0.35m	WS2-B 0.35m	WS2-A 0.35m	WA2-B 0.35m
Date Sampled	08/07/21	08/07/21	08/07/21	08/07/21
A-T-019s	15/07/2021	15/07/2021		
A-T-022s	16/07/2021	16/07/2021		
A-T-024s	16/07/2021	16/07/2021		
A-T-025w			21/07/2021	21/07/2021
A-T-026s	16/07/2021	16/07/2021		
A-T-026w			21/07/2021	21/07/2021
A-T-027s	15/07/2021	15/07/2021		
A-T-030s			15/07/2021	15/07/2021
A-T-031s	16/07/2021	16/07/2021		
A-T-031w			21/07/2021	21/07/2021
A-T-032 OM	16/07/2021	16/07/2021		
A-T-032s			16/07/2021	16/07/2021
A-T-032w			21/07/2021	21/07/2021
A-T-037w			21/07/2021	21/07/2021
A-T-040s	16/07/2021	16/07/2021		
A-T-042sTCN	13/07/2021	13/07/2021		
A-T-044	14/07/2021	14/07/2021	14/07/2021	14/07/2021
A-T-045	13/07/2021	13/07/2021		
A-T-050s	13/07/2021	13/07/2021		
A-T-050w			21/07/2021	21/07/2021
A-T-055s	16/07/2021	16/07/2021		
A-T-ANCs			16/07/2021	16/07/2021
Calc-no stones			21/07/2021	21/07/2021
Probe (w)			21/07/2021	21/07/2021

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

End of Report

Final Test Report

Envirolab Job Number: 21/07525
Issue Number: 1

Date: 21-Jul-21

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

Project Manager: EBMA/Siobhán Hyde
Project Name: Swan House Post - Demo
Project Ref: 77409
Order No: EBMA2965

Date Samples Received: 9-Jul-21
Date Instructions Received: 12-Jul-21
Date Analysis Completed: 21-Jul-21

Notes - Soil analysis

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

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

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

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be 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

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

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

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.

Please contact us if you need any further information.

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Richard Wong
Client Manager

Sample Details							Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	21/07525/3					
Client Sample Number				WAC			Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample ID				WS2-A					
Depth to Top				0.35					
Depth to Bottom									
Date Sampled				08/07/2021					
Sample Type				Soil					
Sample Matrix Code				4AB					
Solid Waste Analysis									
pH (pH Units) _D	A-T-031	N	N				-	>6	-
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.03			-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.01			-	to be evaluated	to be evaluated
Loss on Ignition (%) _D	A-T-030	N	N	4.2			-	-	10
Total Organic Carbon (%) _D	A-T-032	N	N	1.35			3	5	6
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N				100	-	-
Mineral Oil (mg/kg) _A	A-T-007	N	N				500	-	-
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N				1	-	-
Sum of BTEX (mg/kg) _A	A-T-022	N	N				6	-	-
Eluate Analysis				2:1	8:1	2:1	Cumulative 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)	
				mg/l		mg/kg			
Arsenic	A-T-025	N	N	0.016	0.009	0.034	0.100	0.5	25
Barium	A-T-025	N	N	0.015	0.011	0.032	0.120	20	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.04	5
Chromium	A-T-025	N	N	0.013	0.003	0.028	0.040	0.5	70
Copper	A-T-025	N	N	0.038	0.015	0.081	0.180	2	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	<0.005	0.01	2
Molybdenum	A-T-025	N	N	0.009	<0.001	0.019	0.010	0.5	30
Nickel	A-T-025	N	N	0.003	0.002	0.006	0.020	0.4	40
Lead	A-T-025	N	N	0.073	0.099	0.156	0.970	0.5	50
Antimony	A-T-025	N	N	0.007	0.002	0.015	0.030	0.06	5
Selenium	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.1	7
Zinc	A-T-025	N	N	0.041	0.040	0.088	0.410	4	200
Chloride	A-T-026	N	N	24	<1.00	50	27	800	25000
Fluoride	A-T-026	N	N	0.4	0.6	0.9	6.0	10	500
Sulphate as SO ₄	A-T-026	N	N	189	12	406	322	1000	50000
Total Dissolved Solids	A-T-035	N	N	341	79	730	1100	4000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	<0.1	1	-
Dissolved Organic Carbon	A-T-032	N	N	27.7	<20.0	59	<200	500	1000
Leach Test Information									
pH (pH Units)	A-T-031	N	N	8.9	9.4				
Conductivity (µS/cm)	A-T-037	N	N	681	158				
Mass Sample (kg)				0.200					
Dry Matter (%)	A-T-044	N	N	87.5					
Stage 1									
Volume Leachant, L ₂ (l)	A-T-046			0.350					
Filtered Eluate Volume, VE ₁ (l)	A-T-046			0.200					
Stage 2									
Volume Leachant, L ₈ (l)	A-T-046			1.400					
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation									

*Landfill WAC analysis must not be used for hazardous waste classification purposes.
This analysis is only applicable for landfill acceptance and does not give any indication
as to whether a waste may be hazardous or non-hazardous.*

Sample Details							Landfill Waste Acceptance Criteria Limits			
Lab Sample ID	Method	ISO17025	MCERTS	21/07525/4						
Client Sample Number				WAC			Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill	
Client Sample ID				WA2-B						
Depth to Top				0.35						
Depth to Bottom										
Date Sampled				08/07/2021						
Sample Type				Soil						
Sample Matrix Code				4A						
Solid Waste Analysis										
pH (pH Units) _D	A-T-031	N	N				-	>6	-	
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.06			-	to be evaluated	to be evaluated	
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.01			-	to be evaluated	to be evaluated	
Loss on Ignition (%) _D	A-T-030	N	N	5.5			-	-	10	
Total Organic Carbon (%) _D	A-T-032	N	N	3.41			3	5	6	
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N				100	-	-	
Mineral Oil (mg/kg) _A	A-T-007	N	N				500	-	-	
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N				1	-	-	
Sum of BTEX (mg/kg) _A	A-T-022	N	N				6	-	-	
Eluate Analysis				2:1	8:1	2:1	Cumulative 10:1	Limit values for compliance leaching test using		
				mg/l		mg/kg		BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic	A-T-025	N	N	0.006	0.005	0.013	0.050	0.5	2	25
Barium	A-T-025	N	N	0.007	0.007	0.015	0.070	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.04	1	5
Chromium	A-T-025	N	N	0.018	0.004	0.038	0.060	0.5	10	70
Copper	A-T-025	N	N	0.022	0.006	0.046	0.080	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	<0.005	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.009	<0.001	0.019	0.010	0.5	10	30
Nickel	A-T-025	N	N	0.002	<0.001	0.004	<0.01	0.4	10	40
Lead	A-T-025	N	N	0.001	0.003	0.002	0.030	0.5	10	50
Antimony	A-T-025	N	N	0.007	0.002	0.015	0.030	0.06	0.7	5
Selenium	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.1	0.5	7
Zinc	A-T-025	N	N	0.004	0.008	0.008	0.080	4	50	200
Chloride	A-T-026	N	N	70	7	147	139	800	15000	25000
Fluoride	A-T-026	N	N	0.2	0.3	0.4	2.0	10	150	500
Sulphate as SO ₄	A-T-026	N	N	128	18	268	306	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	486	153	1018	1926	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	<0.1	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	20.3	<20.0	43	<200	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	N	10.9	10.2					
Conductivity (µS/cm)	A-T-037	N	N	971	306					
Mass Sample (kg)				0.191						
Dry Matter (%)	A-T-044	N	N	91.4						
Stage 1										
Volume Leachant, L ₂ (l)	A-T-046			0.350						
Filtered Eluate Volume, VE ₁ (l)	A-T-046			0.200						
Stage 2										
Volume Leachant, L ₈ (l)	A-T-046			1.400						
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation										

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/09483
Issue Number: 1

Date: 10 September, 2021

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

Project Manager: EBMA/Philippa Neesham
Project Name: Swan House
Project Ref: B077409.002
Order No: EBMA3034
Date Samples Received: 27/08/21
Date Instructions Received: 01/09/21
Date Analysis Completed: 10/09/21

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Richard Wong
Client Manager

Envirolab Job Number: 21/09483

Client Project Name: Swan House

Client Project Ref: B077409.002

Lab Sample ID	21/09483/1							Units	Limit of Detection	Method ref
Client Sample No	1									
Client Sample ID	BH201									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	23-Aug-21									
Sample Type	Soil - ES									
Sample Matrix Code	5A									
% Stones >10mm _A	<0.1							% w/w	0.1	A-T-044
pH _D ^{M#}	9.35							pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.05							g/l	0.01	A-T-026s
Cyanide (total) _A ^{M#}	<1							mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2							mg/kg	0.2	A-T-050s
Organic matter _D ^{M#}	1.3							% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	<1							mg/kg	1	A-T-024s
Boron (water soluble) _D	<1.0							mg/kg	1	A-T-027s
Cadmium _D ^{M#}	0.8							mg/kg	0.5	A-T-024s
Copper _D ^{M#}	20							mg/kg	1	A-T-024s
Chromium _D ^{M#}	25							mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1							mg/kg	1	A-T-040s
Lead _D ^{M#}	12							mg/kg	1	A-T-024s
Mercury _D	<0.17							mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	32							mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1							mg/kg	1	A-T-024s
Zinc _D ^{M#}	50							mg/kg	5	A-T-024s

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Client Sample No	1									
Client Sample ID	BH201									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	23-Aug-21									
Sample Type	Soil - ES									
Sample Matrix Code	5A									
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD									A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A									A-T-045

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Client Sample No	1									
Client Sample ID	BH201									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	23-Aug-21									
Sample Type	Soil - ES									
Sample Matrix Code	5A									
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02							mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05							mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05							mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07							mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06							mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08							mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07							mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08							mg/kg	0.01	A-T-019s

Envirolab Job Number: 21/09483

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Lab Sample ID	21/09483/1									
Client Sample No	1									
Client Sample ID	BH201									
Depth to Top	0.40									
Depth To Bottom										
Date Sampled	23-Aug-21									
Sample Type	Soil - ES									
Sample Matrix Code	5A									
TPH CWG										
Ali >C5-C6 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1							mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	2							mg/kg	1	A-T-055s
Total Aliphatics _A	2							mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1							mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1							mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1							mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1							mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	2							mg/kg	1	A-T-055s
Total Aromatics _A	2							mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	5							mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01							mg/kg	0.01	A-T-022s

REPORT NOTES

General

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

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

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

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

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

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

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

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

Soil chemical analysis:

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

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

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

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

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

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

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

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

Asbestos:

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

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

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

Predominant Matrix Codes:

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

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

Secondary Matrix Codes:

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

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

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

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

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: Swan House
Clients Project No: B077409.002
Project No: 21/09483
Date Received: 01/09/2021 (am)
Cool Box Temperatures (°C): 16.3

Lab Sample ID	21/09483/1
Client Sample No	1
Client Sample ID/Depth	BH201 0.40m
Date Sampled	23/08/21
Deviation Code	
F	✓

Key

F Maximum holding time exceeded between sampling date and analysis for analytes listed below

HOLDING TIME EXCEEDANCES

Lab Sample ID	21/09483/1
Client Sample No	1
Client Sample ID/Depth	BH201 0.40m
Date Sampled	23/08/21
Cyanide (total)	✓
VPHCWG	✓
BTEX (total)	✓

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

Envirolab Analysis Dates

Lab Sample ID	21/09483/1
Client Sample No	1
Client Sample ID/Depth	BH201 0.40m
Date Sampled	23/08/21
A-T-004s	07/09/2021
A-T-007s	07/09/2021
A-T-019s	08/09/2021
A-T-022s	10/09/2021
A-T-024s	08/09/2021
A-T-025w	10/09/2021
A-T-026s	08/09/2021
A-T-026w	10/09/2021
A-T-027s	07/09/2021
A-T-030s	07/09/2021
A-T-031s	07/09/2021
A-T-031w	10/09/2021
A-T-032 OM	07/09/2021
A-T-032s	07/09/2021
A-T-032w	10/09/2021
A-T-037w	10/09/2021
A-T-040s	08/09/2021
A-T-042sTCN	08/09/2021
A-T-044	06/09/2021
A-T-045	03/09/2021
A-T-050s	08/09/2021
A-T-050w	10/09/2021
A-T-055s	10/09/2021
A-T-ANCs	07/09/2021
Calc-no stones	10/09/2021
Probe (w)	10/09/2021

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

End of Report

Final Test Report

Envirolab Job Number: 21/09483
Issue Number: 1

Date: 10-Sep-21

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

Project Manager: EBMA/Philippa Neesham
Project Name: Swan House
Project Ref: B077409.002
Order No: EBMA3034

Date Samples Received: 27-Aug-21
Date Instructions Received: 1-Sep-21
Date Analysis Completed: 10-Sep-21

Notes - Soil analysis

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

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

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Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be 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

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

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

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.

Please contact us if you need any further information.

HWOL TPH Code: EH_CU_1D_AL: Extractable hydrocarbons - i.e. everything extracted by the solvent(s), Clean-up - e.g. by florisil, silica gel, GC - Single coil gas chromatography, Aliphatics only

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Richard Wong
Client Manager

Sample Details							Landfill Waste Acceptance Criteria Limits			
Lab Sample ID	Method	ISO17025	MCERTS	21/09483/1						
Client Sample Number				1			Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill	
Client Sample ID				BH201						
Depth to Top				0.4						
Depth to Bottom										
Date Sampled				23/08/2021						
Sample Type				Soil - ES						
Sample Matrix Code				5A						
Solid Waste Analysis										
pH (pH Units) _D	A-T-031	N	N	9.35				-	>6	-
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.6				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.12				-	to be evaluated	to be evaluated
Loss on Ignition (%) _D	A-T-030	N	N	4.3				-	-	10
Total Organic Carbon (%) _D	A-T-032	N	N	0.75				3	5	6
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N	<0.08				100	-	-
Mineral Oil (mg/kg) _{A EH_CU_1D_AL}	A-T-007	N	N	<10				500	-	-
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N	<0.007				1	-	-
Sum of BTEX (mg/kg) _A	A-T-022	N	N	<0.01				6	-	-
Eluate Analysis				2:1	8:1	2:1	Cumulative 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
				mg/l		mg/kg				
Arsenic	A-T-025	N	N	0.001	0.002	0.002	0.020	0.5	2	25
Barium	A-T-025	N	N	0.004	0.005	0.009	0.050	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.04	1	5
Chromium	A-T-025	N	N	0.002	<0.001	0.004	<0.01	0.5	10	70
Copper	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	<0.005	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.016	0.004	0.035	0.050	0.5	10	30
Nickel	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.4	10	40
Lead	A-T-025	N	N	<0.001	<0.001	<0.002	<0.01	0.5	10	50
Antimony	A-T-025	N	N	0.002	0.001	0.004	0.010	0.06	0.7	5
Selenium	A-T-025	N	N	0.010	0.002	0.022	0.030	0.1	0.5	7
Zinc	A-T-025	N	N	0.005	0.004	0.011	0.040	4	50	200
Chloride	A-T-026	N	N	6	<1.00	13	<10	800	15000	25000
Fluoride	A-T-026	N	N	1.3	0.5	2.8	6.0	10	150	500
Sulphate as SO ₄	A-T-026	N	N	82	5	177	142	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	167	48	363	624	4000	60000	100000
Phenol Index	A-T-050	N	N	0.01	0.02	0.02	0.20	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	<200	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	N	8.1	9.4					
Conductivity (µS/cm)	A-T-037	N	N	334	96					
Mass Sample (kg)				0.205						
Dry Matter (%)	A-T-044	N	N	85.4						
Stage 1										
Volume Leachant, L ₂ (l)	A-T-046			0.350						
Filtered Eluate Volume, VE ₁ (l)	A-T-046			0.200						
Stage 2										
Volume Leachant, L ₈ (l)	A-T-046			1.400						
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation										