Hydrock

Belle Vue Co-op Academy, Hyde Road, Manchester

Ground Investigation

Sir Robert McAlpine Ltd

Date: *30 April 2021*

Doc ref: *18170-HYD-XX-XX-RP-GE-0001*

DOCUMENT CONTROL SHEET

Issued by	Hydrock Consultants Limited 4 Lakeside Festival Park Stoke on Trent Staffordshire ST1 5RY	Tel: 01782 261919 E-mail: stoke@hydrock.com www.hydrock.com
Client	Sir Robert McAlpine Ltd	
Project name	Belle Vue Co-op Academy, Hyde Road, Manchester	
Title	Ground Investigation	
BIM reference	18170-HYD-XX-XX-RP-GE-0001	
Project reference	C-18170-C	
Date	30/04/2021	

Document Production Record		
Status and Revision	S2 P01	Name
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Document Revision Record			
Status	Revision	Date	Revision Details
S2	P1	30/04/2021	Final

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EXECUTIVE SUMMARY

SITE INFORMATION AND SETTING	
Objectives	The works have been commissioned to support the discharge of planning conditions and to assist with the design of the development.
Client	Sir Robert McAlpine Ltd
Site name and location	Former Showcase Cinema, Hyde Road, Manchester, M12 5AL.
Proposed development	The site development proposals are understood to comprise a High School (the Belle Vue Co-op Academy), associated playing fields, parking and infrastructure.
GROUND MODEL	
Desk study summary	The site is currently a former showcase cinema and associated car park, which is currently being demolished. The site is approximately 6.76 ha in area and is relatively flat, lying approximately 60-61m above Ordnance Datum (OD). Significant fly tipping/littering has occurred on site in the last few months. Areas of soft landscaping, comprising grass and trees surrounds the car park. Japanese Knotweed is known to be present within south and north west of the site. Review of historical Ordnance Survey mapping indicates: • the current site area comprised part of the Belle Vue Gardens, with lakes to the south west of the site from 1849. • By 1893 the site and surrounding land had been reconfigured as the Belle Vue Zoological Gardens, which included various buildings and a boating lake to the south of the site which was infilled in by 1968. • From 1892-1923 a Brewery is present 20m to the west. • A gas works is present 35m west of the site from 1908. • In 1985-89 the buildings and gardens on site have been demolished and the Showcase Cinema and associated car park was constructed in 1991. The geology at the site consists of Glacial Till over Chester Formation Sandstone. Made Ground is likely to be present as a result of previous phases of development. The superficial deposits comprise a Secondary undifferentiated Aquifer and the Sandstone is a Principal Aquifer. The site is not within a Source Protection Zone. Platt Brook is situated over 350m from the site to the south.
Ground and groundwater conditions encountered by investigation	The ground conditions as proven by the investigation undertaken at the site to comprise: • Made Ground – between 0.3m and 3.3m below ground level (bgl), comprising a mixture of sand, gravel and clay with a low to medium cobble content of brick and concrete. • Glacial Till was encountered underlying the Made Ground across the site. Glacial Till is between 13.30 and 15.90m thick, with an average thickness of 14.73m. • Weathered Chester Formation was encountered underlying the Glacial Till in the Hydrock Cable Percussive Boreholes drilled in the north of the site. However, it is also likely to underly the Glacial Till across the rest of the site as well. The formation is greater than 5.50m thick. This generally consisted of very stiff thinly interlaminated CLAY and fine SAND. In general, shallow groundwater was encountered within the Made Ground at a range of depths between 0.20-2.30m bgl. Subsequent monitoring indicates groundwater is occasionally present in the Glacial Till, likely to be associated with bands of sandy clay. There is visual and olfactory evidence of petroleum hydrocarbon contamination in soils at a number of locations (odours and black staining).

GEOTECHNICAL CONCLUSIONS	
Conclusions of geotechnical assessment	Obstructions associated with former/current development, including foundations, floor slabs and services, should be anticipated. Excavation to proposed founding depth generally should be readily achievable with standard excavation plant. Heavy duty excavation plant/breaking equipment may be required to excavate the existing construction. Excavations during investigation were generally stable, although slight spalling should be expected from the Made Ground and within the sands and gravels below the water table. Water seepages into excavations are likely to be adequately controlled by sump pumping. Shallow foundations within the firm to stiff Glacial Till are considered appropriate, with an allowable bearing pressure of 120kPa used for initial sizing of the foundations. In accordance with Eurocode 7 additional settlement analysis should be completed as part of the foundation design. In addition, the foundations may need to be deepened to below the depth of influence of trees from desiccation effects and roots. A working platform will be required prior to the arrival on site of tracked plant. This should be designed and installed in accordance with BR470 (BRE 2004) based on data on the specific plant in accordance with an FPS certificate for the tracked plant/rig loadings. As Made Ground is greater than 600mm thick and clay soils of medium volume change potential are present on site, it is recommended that either suspended floor slabs with a void be adopted or over excavation and reengineering of the made ground is undertaken. These earthworks should be undertaken in accordance with a suitable design and excavations may need to be deepened to remove potentially desiccated soils. Ground floor slabs should be designed to incorporate any gas mitigation measures that may be required, as discussed later within this report. Based on the presence of variable Made Ground, the test results, it is considered likely a CBR of <2.5% should be used for design, on the basis that some nominal ground improvements will be required. It is envisaged that this will take the form of some over excavation and replacement. This should identify any buried obstruction in the Made Ground that may adversely affect construction. Soakaway drainage is considered unsuitable for this site. Design Sulfate Class for the Made Ground - DS-1 and ACEC Class AC-1 and Glacial Till - DS-2 and ACEC Class AC-2. Equivalent to Design Chemical Class DC-1 and DC-2 respectively for a 50 year design life.
GEO-ENVIRONMENTAL CONCLUSIONS	
Conclusions of contamination Generic risk assessment	Human health: • Pervasive lead and PAH in the made Ground. • Asbestos detected in a number of Made Ground samples (quantification test results are awaited). Plant growth: • Nickel and zinc above assessment criteria have been detected, however an imported growing medium for any areas to be planted will be required. Controlled Waters: • Water samples detected concentrations of some contaminants above assessment criteria, however these are marginal and the risk to controlled waters is deemed negligible. Ground gases or vapours: • Low to moderate risk from ground gases (subject to additional and on-going monitoring) and CS2 conditions apply. Radon: • The site is not in a Radon Affected Area.

	Construction materials: • Plastic or bitumastic products should be suitable for use at the site. Water supply pipes: • Brownfield site with organic contamination and barrier pipe is considered suitable for this site. However, confirmation should be sought from the water supply company at the earliest opportunity.
Proposed mitigation measures	The mitigation measures proposed to remove unacceptable risks include: • The installation of a 450mm engineered cover system in areas of soft landscaping and grassed sports pitches comprising a geo membrane underlying a subsoil beneath a topsoil thickness of between 150mm and 300mm. • Installation of Protectaline pipework. • Installation of ground gas mitigation measures to comply with CS2 conditions. The methodology for the remediation should be presented in a Remediation Strategy, which will need to be submitted to the warranty provider and the regulatory authorities for approval. In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow reuse of suitable material at the site. A verification report by a competent independent geo-environmental specialist will be required following completion of any remedial works.
Waste management	Excavated soils to be disposed of as waste, are likely to be classed as follows: • The Made Ground soils are likely to be classified as 'Hazardous' waste and based on the WAC testing should be able to be disposed of at an hazardous waste landfill. • Any soils containing > 0.1% asbestos or visible asbestos containing materials would be considered as hazardous. • Screening and testing should be undertaken on bituminous bound pavement. If testing indicates that coal tars are not present, or below hazardous waste limits (0.1%), they will likely be classified as non-hazardous waste.
FUTURE CONSIDERATIONS	
Further work	Following the ground investigation works undertaken to date, the following further works will be required: • discussion with specialists with regard to the presence of Japanese Knotweed within or close to the site boundary; • completion and reporting of the ongoing gas monitoring, hence the conclusions in this report are provisional, subject to the completion of monitoring; • discussion and agreement with utility providers regarding the materials suitable for pipework; • discussions with regulatory bodies and the warranty provider regarding the conclusions of this report; • assessment of tree influence on foundations and design of foundations; • provision of geotechnical design for the Category 2 structures (floor slabs and foundations); • production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies and the warranty provider); • production of a Materials Management Plan relating to reuse of soils at the site and import of soils to the site; • remediation and mitigation works; and • verification of the earthworks, remediation and mitigation works.

This Executive Summary forms part of Hydrock Consultants Limited report number 18170-HYD-XX-XX-RP-GE-0001 and should not be used as a separate document.

1. INTRODUCTION

1.1 Terms of reference

In February 2021, Hydrock Consultants Limited (Hydrock) was commissioned by Sir Robert McAlpine Ltd (the Client) to complete a site investigation, comprising a Phase 2 supplementary ground investigation at the Former Showcase Cinema, Hyde Road, Manchester, M12 5AL.

The site is currently a former showcase cinema and associated car park, which is currently being demolished.

Hydrock understands that the proposed development is to comprise a High School (the Belle Vue Co-op Academy), associated playing fields, parking and infrastructure. A proposed development layout (Sir Robert McAlpine, Drawing: 009433-MDG-ZZ-ZZ-DR-V-0001) is included within the 'Site Investigation Scope- Hyde Road School' (BDP Ref. P3001502-BDP-RPT-S-002.).

The works have been undertaken in accordance with Hydrock's proposal referenced (C-18170-FP-GE-0001.REVA 19th January 2021) and the Client's instructions to proceed (email dated 2nd February 2021).

1.2 Objectives

The works have been commissioned to support the discharge of planning conditions and to assist with the design of the development.

The objective of the Phase 2 Supplementary Ground Investigation is to refine the Preliminary Conceptual Site Model and to quantify risks to identified receptors. In addition, it will provide a geotechnical assessment of the site.

1.3 Scope

The scope of the Phase 2 Ground Investigation comprises:

- A summary of the findings of the previous Desk Study and Ground Investigation including the Preliminary Conceptual Ground Model and Preliminary Risk Assessment;
- a supplementary ground investigation including trial pitting(to allow infiltration testing and plate load tests), windowless sampling, and cable percussive drilling to:
  - obtain data on the ground and groundwater conditions of the site;
  - allow collection of samples for geotechnical and chemical laboratory analysis;
  - allow geotechnical field tests to be undertaken;
  - install gas and groundwater wells;
- gas concentration and groundwater level monitoring;
- groundwater sampling;
- geotechnical and chemical laboratory analysis;
- updating of the preliminary Ground Model;
- preparation of a geotechnical risk register;
- presentation of an initial geotechnical design recommendations;

- formulation of an updated Conceptual Site Model (CM), including identification of plausible pollution linkages;
- completion of a generic quantitative risk assessment of potential chemical contaminants to establish 'suitability for use' under the current planning regime;
- discussion of potential environmental liabilities associated with land contamination (soil, water and gas); and
- identification of outline mitigation requirements to ensure the site is 'suitable for use'.

1.4 Available information

The following documents and reports have been provided to Hydrock by BDP for use in the preparation of this report:

- BDP. December 2020. 'Site Investigation Scope- Hyde Road School', Ref: P3001502-BDP-RPT-S-002; and
- Arcadis Consulting (UK) Limited (Arcadis). June 2020. 'Land of Hyde Road, Phase 1 Geo-Environmental Desk Study', Ref: 10041634-ARC-XX-XX-RP-ZZ-0002-01-P1DS;

It is assumed that the Client has commissioned or obtained assignment of the above documents and Hydrock is entitled to full reliance upon their contents.

The content of the provided desk study (Arcadis, 2020) is summarised in Section 2. This content has been used to formulate the preliminary Conceptual Site Model as the basis for preparing the preliminary geo-environmental exposure model and the preliminary geotechnical hazard identification presented in Section 3.

1.5 Regulatory context and guidance

The investigation work has been carried out in general compliance with recognised best practice, including (but not limited to) BS 5930:2015, BS 10175:2011+A2:2017 and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The geo-environmental section of this report is written in broad accordance with BS 10175:2011+ A2:2017, 'Land Contamination: Risk Management' (LCRM, 2019) and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The methods used follow a risk-based approach, the first stage of which is a Phase 1 desk study and field reconnaissance, with the potential geo-environmental risk assessed qualitatively using the 'source-pathway-receptor contaminant linkage' concept to assess risk as introduced in the Environmental Protection Act 1990 (EPA, 1990). Potential geotechnical risks are also assessed.

Phase 2 comprises intrusive ground investigation work and testing. The factual information from Phase 1 and Phase 2 are used to develop the Conceptual Model (CM). This CM is based on a ground model of the site physical conditions and an exposure model of the possible contaminant linkages. The CM forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines. This GQRA might lead to more Detailed Quantitative Risk Assessment (DQRA).

Professional judgement is then used to evaluate the findings of the risk assessments and to provide recommendations for the development.

The geotechnical section of this report is prepared in general accordance with BS EN 1997-1+A1: 2013, BS EN 1997-2:2007 and BS 8004:2015. This report constitutes a Ground Investigation Report (GIR) as described in Part 2 of Eurocode 7 (BS EN 1997-2) (EC7). However, it is not intended to fulfil the requirements of a Geotechnical Design Report (GDR) as specified in EC7.

The geo-environmental and geotechnical aspects are discussed in separate sections. Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. Designers should take all aspects of the investigation into account.

Remaining uncertainties and recommendations for further work are listed in Section 9 and Section 10.

Reference to the details of the approach and the methodologies adopted are provided in Appendix J.

2. PHASE 1 REVIEW (DESK STUDY AND FIELD RECONNAISSANCE)

Hydrock has been provided with a Desk Study for the site prepared by Arcadis (as detailed in Section 1). Hydrock generally agree with the findings of the Desk Study and the following section is a summary of the pertinent information presented in the Desk Study, supplemented by additional information as required. It should be noted that the provided Desk Study included the land to the north and east of the current site boundaries.

As part of the summary, a previous ground investigation completed following the desk study at the site and the land to the north and east, has been reviewed (see Section 1.4). Where suitable (see Section 2.16), the data from the previously referenced report is included within this Phase 1 review. Previous information includes:

- Arcadis Consulting (UK) Limited (Arcadis). August 2020, Ref: 10041634-ARC-XX-XX-RP-ZZ-0005-01-P2GIA:
  - 16 dynamic sample boreholes to a maximum depth of 4.00m bgl (eight within the current development area);
  - Seven cable percussive boreholes to a maximum depth of 15.00m bgl (five within the current development area);
  - chemical analysis of soils and water;
  - installation of gas monitoring standpipes to depths of up to 15m within selected boreholes; and
  - ground gas concentration and groundwater level monitoring (four visits, over a two-month period).

2.1 Site location

The site is located in the Belle Vue area of Greater Manchester, off the A57 Hyde Road , 4km southeast of Manchester City Centre. The nearest postcode is M12 5AL (National Grid Reference 387602E 396211N).

2.2 Site description

The site currently consists of a closed two-storey cinema in the north with the majority of the centre and south of the site comprising a large car park and associated infrastructure, including two electric substations. The site is approximately 6.76 ha in area and is relatively flat, lying approximately 60-61m above Ordnance Datum (OD). Significant fly tipping/littering has occurred on site in the last few months. Areas of soft landscaping, comprising grass and trees surrounds the car park. Japanese Knotweed is known to be present within south and north west of the site.

Vehicular access to the site is available from Hyde Road at the northern end of the site and Kirkmanshulme Lane to the south.

2.3 Site history

The historical maps included as part of the desk study indicate that the current site area comprised part of the Belle Vue Gardens, with lakes to the south west of the site from 1849. By 1893 the site and surrounding land had been reconfigured as the Belle Vue Zoological Gardens, which included various buildings and a boating lake to the south of the site which was infilled in by 1968. From 1892-1923 a Brewery is present 20m to the west.

A gas works is present 35m west of the site from 1908.

In 1985-89 the buildings and gardens on site have been demolished and the Showcase Cinema and associated car park was constructed in 1991.

2.4 Geology

The general geology of the site area is shown on the British Geological Survey (BGS) 1:50,000 geological map of Manchester (Sheet 85) and is summarised in Table 2.1. Extracts from the map are shown in Figure 2.1 and Figure 2.2.

Table 2.1: Geology

Ref. for Figures	Location	Stratigraphic Name	Description
Artificial Ground			
N/A	On site and immediately to the southwest	Made Ground	Infilled Ground relating to the historical lakes and other feature of the gardens such as the Bear Pits
			General Made Ground anticipated to be across the site associated with previous development of the site.
Superficial Deposits (Figure 2.1)			
1	On site	Glacial Till	Unsorted and unstratified mixture of clay, sand and gravel with boulders of various size and shape.
Solid Geology (Figure 2.2)			
1	On site	Chester Formation-Sandstone	Fine to coarse-grained, Triassic sandstone commonly pebbly, with conglomerates and sporadic siltstones; cross-stratified.
2 & 5	85m west	Halesowen Formation - Mudstone, Siltstone and Sandstone	Micaceous sandstone, and mudstone, with thin coals and limestone beds
4	85m west	Great Mine Limestone	Limestone

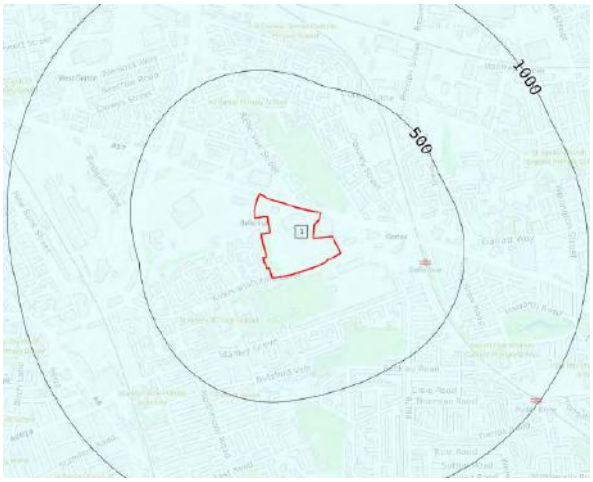


Figure 2.1: Superficial deposits.
(Reproduced with permission from Groundsure)

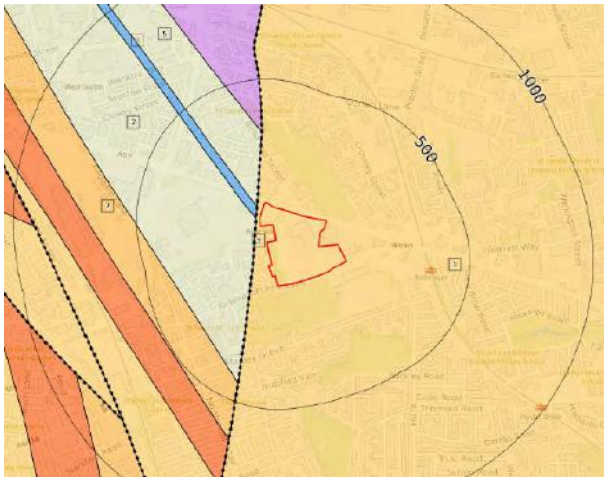


Figure 2.2: Solid geology.
(Reproduced with permission from Groundsure)

A normal fault, trending approximately north-south, with a downthrow to the east, is located approximately 85m to the west of the site.

BGS mapping also indicates that beneath the site there is a buried channel feature filled with superficial deposits 10-20m in the western half of the site and 20-30m thick in the eastern half.

A number of borehole logs from the BGS archive have been reviewed. Selected records are summarised below:

- SJ89NE646, BH1 located 200m to the northwest of the site at Hyde Road, Manchester (NGR 387400E, 396460N), drilled to a depth of 10.00m and recorded:
  - concrete between ground level and 0.10m below ground level (bgl);
  - Made Ground between 0.10m and 0.30m bgl; and
  - Very stiff brown slightly silty CLAY with occasional medium fine gravel 0.30m and 10.00m bgl (Glacial Till).
- SJ89NE647, located 220m to the northwest of the site at Hyde Road, Manchester (NGR 387360E,396480N), drilled to a depth of 10.00m and recorded:
  - Made Ground between ground level and 1.50m bgl; and
  - Stiff (becoming hard from 2.50m bgl) brown slightly silty CLAY with occasional medium fine gravel between 1.50m and 10.00m bgl (Glacial Till).
- SJ89NE1598, located 170m to the southeast of the site at Belle Vue Greyhound Stadium (NGR 387960 E, 396120 N), drilled to a depth of 70.19m and recorded:
  - Asphalt between ground level and 0.49m below ground level (bgl);
  - Black clay between 0.49 and 1.68m bgl (probable Glacial Till);
  - Brown sandy clay 1.68 and 4.91m bgl (Glacial Till);
  - Stiff brown clay with pebbles between 4.91m and 18.72m bgl (probable Glacial Till);
  - Light brown clay with small gravels between 18.72m and 26.22m bgl(probable Glacial Till);
  - Gravel between 26.22m and 30.27m bgl (probable Weathered Chester Pebble Beds);

- Weathered red sandstone between 30.27 and 32.19m bgl (Weathered Chester Pebble Beds); and
- Saturated red sandstone between 32.19 and 70.19m bgl (Chester Pebble Beds).

- SJ89NE1404, located 165m to the south of the site at Belle Vue Leisure Centre (NGR 387590E, 395900N), drilled to a depth of 70.00m and recorded:
  - Backfill between ground level and 3.00m bgl (Made Ground);
  - Light brown clay between 3.00m to 8.00m bgl (Glacial Till);
  - Sand (and water) between 8.00 to 8.25m bgl (probable Glacial Till);
  - Grey clay between 8.25 to 18.00m bgl (probable Glacial Till);
  - Red sandstone between 18.00-23.00m bgl (Weathered Chester Pebble Beds);
  - Yellow sandstone between 23.00 and 25.00m bgl (Weathered Chester Pebble Beds); and
  - Red sandstone and marl between 25.00m to 70.00m (Chester Pebble Beds).

The ground conditions proven by previous investigation (Arcadis 2020), comprise:

- Made Ground to between 0.60m and 3.00m bgl, comprising:
  - Bituminous hardstanding to between 0.10 and 0.20m bgl;
  - Gravel of limestone and brick to 0.20m bgl;
  - A 'general' Made Ground, to depths of between 0.60m and 3.30m, with an average thickness of 1.32m. Comprises a mixture of sand and gravel and clay with a low to medium cobble content of brick and concrete. Gravel is comprised of brick, concrete, slag, sandstone, mudstone, coal and occasional timber and clinker. Overlying a dark grey mottled black slightly sandy gravelly CLAY with a weak organic (humic) odour. Gravel includes brick concrete, mudstone, occasional slate and coal; over
- Firm to stiff, sandy, gravelly or silty clay to greater than 15.00mbgl (Glacial Till).

2.5 Hydrogeology

The Chester Formation is classified as a Principal Aquifer. However, there are no current recorded water wells in the vicinity of the site and the site is not in any Source Protection Zone. The Glacial Till is classed by the Environment Agency as a Secondary Undifferentiated Aquifer due to its variable nature and provides a low permeability cover to the sandstone aquifer. The vulnerability of the Principal Aquifer is generally low because of the presence of the low permeability Glacial Till cover.

The environmental data report indicates a moderate to high risk of groundwater flooding.

The previous ground investigation (Arcadis, 2020) recorded groundwater at between 0.50m and 1.00m bgl (59.94 and 60.15m OD), present within the Made Ground (in CP104 and WS111). Groundwater was also encountered between 3.00m and 8.00m bgl (52.65m and 57.90m OD) associated with a dense sand band present within the Glacial Till (in CP103, CP104 and CP106). Slightly seepage was also observed at 13.30m bgl (48.04m OD) within the Glacial Till (in CP103).

2.6 Hydrology

The desk study reported that the nearest surface water body is Platt Brook located 366m south.

There are no licensed surface water abstractions within 500m of the site boundary.

2.7 Flood risk

The desk study information indicates the proposed development is in Flood Zone 1 (with a low probability of flooding from rivers or the sea). The Desk Study states that there are is a low to high risk of surface water flooding around the northern perimeter of the cinema building and the access road along the west of the site. However, there are no records of historical flood events from rivers, groundwater or surface water.

No further consideration of flood risk is undertaken in this report. Specialist flood risk advice should be sought with regard to drainage and flooding.

2.8 Mining and mineral extraction

The Groundsure Insight report contained within the Desk Study states that the site is located within the specified search distance of an identified coal mining area. However, the Desk Study concluded following a review of interactive CA web map viewer that the indicates the site is not within a development high risk area. The CA map viewer also indicates there are no records of surface mining, past shallow coal mining, or mine entries within the vicinity of the site or underground working beneath the site.

The Desk Study also concludes there are no records of non-coal mining activities at the site and that the Glacial Till clay would be unlikely to have any potential value as a mineral resource. Furthermore, extraction of the underlying sandstone would not be viable due to the anticipated thickness of clay overburden.

2.9 Natural ground instability

Trees and shrubs are present around the site boundaries. Cohesive deposits of the Glacial Till may be affected by potential for shrink-swell ground movements in clays as a result of changes in moisture content from removal or growth of trees.

Under current conditions, and applicable only to natural strata, there is a very low or negligible risk associated with slope instability, soluble rocks, running sands, compressible deposits and landslides.

Infilled ground relating to the historical lakes and other feature of the gardens is present in the south of the site. This represents a geotechnical risk due to the presence of heterogeneous Made Ground. Foundations will need to be deepened to below the Made Ground.

2.10 Waste management

There are no current waste management sites recorded within 250m of the site.

There is one historic landfill, the Mount Road Plant, 238m southeast of the site identified in the Desk Study, that accepted household waste.

2.11 Regulatory Information

Information provided in the previous desk study indicate the following significant regulatory controls in the general area of the site:

- There are two records of licensed discharges to controlled waters within 500m of the site. The nearest is a license relating to sewer storm overflow to the Gore Brook approximately 376m south of the site at the Mount Road Combined Sewer Overflow.
- there are 17 potentially contaminative industrial sites within 250m of the study site.
- Two electrical sub stations are present on site. Other electrical features, tanks, etc are also recorded offsite.
- The nearest open petrol filling station is 419m east of the site. A closed petrol station was present 229m northwest of the site.
- The site is not designated as Contaminated Land under Part 2a of the Environmental Protection Act 1990.
- Four pollution incidents have been recorded within 500m of the site. All but one was recorded as having a minor to no impact to water, land or air. However, one incident 323m northeast of the site, involving vehicles and vehicle parts, is recorded as having a significant impact to the land.
- Five records of licensed pollutant release (Part A(2)/B) have been found within 500m of the site. The nearest is 232m northwest of the site relating to Belle Vue Filling Station permitted for unloading petrol into storage at service stations.

2.12 Natural soil chemistry

Information contained within the environmental report contained within the desk study gives indicative (estimated) concentration values for the natural soils at the site for a selection of Contaminants of Potential Concern (CoPC). These have been reproduced in Table 2.2.

Table 2.2: Natural soil chemistry

Element	Arsenic	Cadmium	Chromium	Lead	Nickel
Concentration (mg/kg)	15-25	1.80	60 - 90	100-200	30-45

2.13 Evidence of contamination

The previous ground investigation indicates site wide contamination, predominantly within the Made Ground. Including elevated metals (Lead and Mercury) and pervasive concentrations of polyaromatic hydrocarbons (PAH) are above the Generic Assessment Criteria (GAC). Asbestos fibres were also present in soil samples from the Made Ground. However, quantification found these to be at concentrations <0.001%.

Petroleum hydrocarbon concentrations above the GAC are recorded in soil samples from CP103 in the Made Ground. Petroleum hydrocarbon odours were noted, in the Made Ground, between 0.40m bgl and 1.30m bgl in southeast of the site (Boreholes CP103, CP106 and WS106).

PAHs have been encountered in groundwater in boreholes across the site screened within the Made Ground. As well as CP103 and WS110, which were screened within the Glacial Till Deposits.

2.14 Radon

The radon risk is reported in the environmental report. The guidance indicates that the site is not in a Radon Affected Area and no radon protection measures are required.

2.15 Unexploded ordnance (UXO)

A Pre-Desk Study UXO Assessment was requested from Zetica and is presented within the desk study. Zetica's recommendation is that whilst always prudent, a detailed desk study is not considered essential for this site.

2.16 Reliability of previous data

Data from the previous ground investigation reports listed in Section 1.4 have been considered during the preparation of this report were considered to be reliable. The section below provides comment as to the applicability of the various data available.

Geological data

The geological data from the previous investigation are consistent with the anticipated ground conditions from BGS sources and has been utilised in this report.

Chemical test data

The most recent previous investigations on the site containing chemical test data for soil were conducted in 2020 and is MCERTS accredited. This chemical test data for soil from previous report is able to be used as part of the current ground investigation.

Groundwater data

The groundwater data within the previous investigation again dates back to 2020. It is Hydrock's opinion that the groundwater data from the report is able to be used as part of the current ground investigation.

Ground gas data

Ground gas data are available for the site, which appear to have been collected in accordance with current standards and guidance. Whilst the number of monitoring visits does not meet the requirements of CIRIA C665 and additional monitoring is required, the available data are suitable for use as part of an updated assessment.

Geotechnical data

Whilst the available geotechnical information is sparse, it remains relevant as a guide to physical ground conditions.

3. OUTLINE CONCEPTUAL MODEL

3.1 Introduction

The outline Conceptual Model (oCM) incorporates evidence from the site walkover, the Desk Study and previous investigations carried out at the site. The formulation of an outline Conceptual Model is a key component of the LCRM methodology. The oCM incorporates a ground model of the site physical conditions and an exposure model of the possible contaminant linkages; it forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines.

3.2 Ground model

The preliminary ground model presented in Section 2 provides an understanding of the ground conditions and is the basis for preparing the preliminary geotechnical hazard assessment (Section 3.3) and the preliminary geo-environmental exposure model (Section 3.4).

3.3 Geotechnical hazard identification

3.3.1 Context

The preliminary geotechnical hazard identification has been undertaken in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622.

The following section sets out the identified geotechnical hazards and the development elements potentially affected (see Table J.1 in Appendix H for further information).

3.3.2 Plausible geotechnical hazards

Plausible geotechnical hazards identified at the site are:

- Uncontrolled Made Ground (variable strength and compressibility).
- Soft compressible ground (low strength and high settlement potential).
- Shrinkage / swelling of the clay fraction of soils under the influence of vegetation.
- Variable lateral and vertical changes in ground conditions.
- Attack of buried concrete by aggressive ground conditions.
- Obstructions.
- Existing below ground structures to remain (foundations).
- Shallow groundwater.
- Changing groundwater conditions.
- Loose Made Ground, leading to difficulty with excavation and collapse of side walls.

3.3.3 Potential development elements affected

Development elements potentially affected by geotechnical hazards are:

- Buildings – foundations.
- Buildings – floor Slabs
- Roads and pavements.

- Services.
- Sports pitches and areas of soft landscaping.
- Construction staff, vehicles and plant operators.
- Concrete below ground.

Health and safety risks to site Contractors and maintenance workers have not been assessed during these works and will need to be considered separately during design.

The above plausible geotechnical hazards and development elements affected have been carried forward for investigation and assessment. The investigation is presented in Section 5 and the assessment is presented in Section 6.

3.4 Geo-environmental exposure model

3.4.1 Context

The preliminary exposure model is used to identify geo-environmental hazards and to establish potential pollution linkages, based on the source-pathway-receptor (SPR) approach.

A viable pollution linkage requires all the components of an SPR to be present. If only one or two are present, there is no linkage and no further assessment is required.

3.4.2 Potential contaminants

For the purpose of this assessment the potential contaminants have been separated according to whether they are likely to have originated from an on-site or off-site source.

Potential on-site sources of contamination

- Made Ground, associated with historical construction activities and imported fill, including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S01).
- Hydrocarbon fuels, from the former Tank on-site (contents unknown) (S02).
- PCBs and oils from transformers in the electricity sub-stations on site (S03).
- Ground gases (carbon dioxide and methane) from organic materials in the Made Ground / Glacial Till deposits (S04).

Potential off-site sources of contamination

None identified

3.4.3 Potential receptors

The following potential receptors in relation to the proposed land use have been identified.

- People (neighbours, site end users) (R01).
- Development end use (buildings, utilities and landscaping) (R02).
- Groundwater: Principal aquifer status of the Chester Pebble Beds Formation (R03).
- Surface water: Platt Brook located 366m south (R04).

3.4.4 Potential pathways

The following potential pathways have been identified.

- Ingestion, skin contact, inhalation of dust and outdoor air by people (P01).
- Methane and/or carbon dioxide ingress via permeable soils and/or construction gaps (P02).
- Petroleum hydrocarbon vapour ingress via permeable soils and/or construction gaps (P03).
- Root uptake by plant (P04).
- Surface water via overland flow (P05).
- Surface water, via drainage discharge (P06).

Health and safety risks to site development contractors and maintenance workers have not been assessed as part of this study and will need to be considered separately.

The above sources, pathways and receptors have been considered as part of the Preliminary Risk Assessment in accordance with LCRM (2019), are considered to be plausible in the context of this site and have been carried forward for investigation and assessment. The investigation is presented in Section 5 and the assessment is presented in Section 7. An assessment of the Source – Pathway – Receptor linkages is undertaken following the assessment (Section 7) and is presented in Appendix I (Table K.1).

4. GROUND INVESTIGATIONS

4.1 Investigation rationale

Exploratory hole locations have been provided by BDP and will be undertaken at the locations shown on the proposed exploratory hole location plan within the tender document (Drawing Ref 009433-MDG-ZZ-ZZ-DR-V-0001). The ground investigation rationale was based on the findings of the preliminary risk assessment and is summarised in Table 4.1.

For the investigation rationale of the historical investigations, please refer to the historical reports.

Table 4.1: Investigation rationale

Location	Purpose
HYD-BH01-03	To assess deeper ground conditions and to allow SPTs to be undertaken. To allow collection of samples for geotechnical characterisation. To allow collection of samples for contamination testing. Installation of gas and groundwater monitoring and sampling wells. Targeted (based on proposed development plan)
HYD-WS01-03	To assess shallow ground conditions and to allow SPTs to be undertaken. To allow collection of samples for geotechnical characterisation. To allow collection of samples for contamination testing. Installation of gas and groundwater monitoring and sampling wells. Targeted (based on proposed development plan)
HYD-CBR01-04	Plate load tests to obtain CBR values for the formation soils below the hardstanding. To allow collection of samples for contamination testing. Targeted (based on proposed development plan)
HYD-SA01-06	To assess shallow ground conditions. To allow soil infiltration rate tests to be carried out. Targeted (based on proposed development plan)

4.2 Constraints

The footprints of the cinema could not be investigated as it is in the process of being demolished, preventing intrusive ground investigation. Demolition activities also meant that the location of some of the exploratory holes had to be adjusted.

4.3 Site works

The fieldwork took place between 15th to 19th March and 29th March to 1st April 2021 and is summarised in Table 4.2. The ground investigation locations were surveyed in using a Total Station GPS survey instrument and are shown on the Exploratory Hole Location Plan (Hydrock Drawing 18170-HYD-XX-XX-DR-GE-1002) in Appendix A.

The logs, including details of ground conditions, soil sampling, *in situ* testing and any installations, are also presented in Appendix C.

The weather conditions during the Hydrock fieldwork and for the previous week were Sunny, overcast and cold to mild.

Table 4.2: Summary of site works

Activity	Method	No.	Depth Range (m bgl)	*In situ* tests	Notes (e.g. installations)
Drilling, Pitting and Probing					
Boreholes	Cable percussive	3	20.00	SPT	63mm HDPE wells with gas taps in 2 holes
	Windowless sampler	3	1.30 - 5.45	SPT	63mm HDPE wells with gas taps in 2 holes
Trial pits	Machine (JCB 3X)	10	1.10-3.50	Hand shear vane (HSV)	
Other in situ testing or monitoring					
Plate load tests		4	1.10-1.70	-	In TPs HYD-CBR01, 03 & 04
Infiltration	Indicative	6	1.40-3.50	-	In TPs HYD-SA01-06

Wells for monitoring groundwater levels and ground gas concentrations, and to facilitate the sampling of groundwater, were installed in a number of the windowless sampler and cable percussion boreholes. A summary of the monitoring well installations is presented in Table 4.3.

Table 4.3: Summary of monitoring installations

Location	Ground level (m OD)	Standpipe diameter	Screen top and base depth (m bgl)	Screen top and base elevation (m OD)	Strata targeted
HYD-BH02	60.32	50	2.00-15.00	58.32-45.32	Glacial Till
HYD-BH03	60.23	50	2.00-15.00	58.23-45.23	
HYD-WS02	60.42	50	2.00-4.00	58.42-56.42	
HYD-WS03	60.33	50	2.00-4.00	58.33-56.33	

4.4 Geo-environmental testing

4.4.1 Sampling strategy and protocols

Exploratory hole positions were determined by BDP based on the proposed design, reference to the site conditions and uncertainties identified in the previous ground investigation.

No specific sampling statistics or grid were utilised in this instance.

Samples were taken, stored and transported in general accordance with BS 10175:2011+A2:2017.

4.4.2 Geo-environmental monitoring

Gas monitoring boreholes have been monitored on two occasions. The results are presented in Appendix E. Monitoring is ongoing and this report will be updated on completion of the monitoring.

4.4.3 Geo-environmental laboratory analyses

The chemical test certificates for testing undertaken by Hydrock are provided in Appendix F. Wherever possible, UKAS and MCERTS accredited procedures have been used.

The chemical test certificates for testing undertaken as part of historical investigations are provided in the relevant reports.

The geo-environmental analyses undertaken on soils are summarised in Table 4.4.

Table 4.4: Geo-environmental analyses of soils

Determinand Suite	Made Ground
Hydrock Data	
Hydrock minimum suite of determinands for solids*	8
Speciated aliphatic and aromatic banding Total petroleum hydrocarbons by HS-GC/MS and GC/FID (Hydrock Tier 2 TPH Suite)	4
Asbestos quantification	4
WAC Full Solid Suite	2
*Hydrock minimum soil suite comprises: As, B (water soluble), Be, Cd, Cr (total), Cr (VI), Cu, Hg, Ni, Pb, S (elemental), Se, V, Zn, cyanide (total), sulphide, pH, asbestos fibres, speciated polynuclear aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon	

The soils chemical test data (including both Hydrock and historical data) are interpreted and assessed in Sections 7.3 and 7.4.

The geo-environmental analyses undertaken on waters, for testing undertaken by Hydrock are summarised in Table 4.5.

Table 4.5: Geo-environmental analyses of waters

Determinand Suite	Ground-water
Hydrock Data	
Hydrock minimum suite of determinands for waters	3
Speciated aliphatic and aromatic banding Total petroleum hydrocarbons by HS-GC/MS and GC/FID (Hydrock Tier 2 TPH Suite)	3

The groundwater chemical test data (including both Hydrock and historical data) are interpreted and assessed in Section 7.5.

4.5 Geotechnical testing

The geotechnical tests undertaken by Hydrock are summarised in Table 4.6 and the test certificates are provided in Appendix D. Wherever possible, UKAS accredited procedures have been used.

The geotechnical tests undertaken as part of historical investigations are provided in the relevant reports.

Table 4.6: Summary of sample numbers for geotechnical tests

Test	Made Ground	Glacial Till
Hydrock data		
Natural moisture content	5	11
Atterberg limits	0	11
Particle size distribution (sieve)	1	2
Sulphate and aggressive chemical environment classification for buried concrete classification (full BRE SD1 suite)	5	3
Single stage undrained triaxial compressive strength	0	11
One dimensional oedometer consolidation	0	2
Remoulded California Bearing Ratio at natural moisture content	2	1
Organic Matter	2	0

The geotechnical test data (including both Hydrock and historical data) are summarised in Section 5.6 and interpreted in Section 6.

5. GROUND INVESTIGATION RECORDS AND DATA

5.1 Physical ground conditions

5.1.1 Summary of strata encountered

The following presents a summary of the properties of the ground and groundwater conditions encountered, based on field observations, interpretation of the field data and laboratory test results, taking into account drilling, excavation and sampling methods, transport, handling and specimen preparation.

All relevant data from the Hydrock investigation discussed in Section 4 as well as any reliable data from previous investigations noted in Section 1.4 and discussed in Section 2 are used from this point forward.

Details of the Hydrock ground investigation works are provided in the logs in Appendix C, a summary of the ground model is presented in Table 5.1 and the individual strata are described in the sections below.

Table 5.1: Strata encountered

Stratum	Depth to top (m bgl)	Depth to base (m bgl)	Thickness (m) (range)	Thickness (m) (average)
Made Ground	0.00	0.30-3.30	0.30-3.30	1.33
Glacial Till	0.30-3.30	14.50-17.10	13.30-15.90	14.73
Weathered Chester Formation	14.50-17.10	>20.00	>5.50	Not proven

5.1.2 Surface covering

The following surface cover was identified during the field reconnaissance and the fieldworks:

- Bituminous bound pavement hardstanding, covering approximately 60% of the site and noted to be in a fair condition).
- Cinema covering approximately 20% of the site.
- Vegetation (grass, trees, etc), covering approximately 20% of the site.

5.1.3 Made Ground

Below the surface covering, a 'general' Made Ground was recorded across the entire site. Generally the Made Ground increases in thickness from the northern corner of the site to the south and west, as shown on Hydrock Drawings 18170-HYD-XX-XX-DR-GE-1003 and 1004 in Appendix A.

In general, the Made Ground comprised:

- The Bituminous bound pavement (Asphalt) hardstanding to depths of between 0.05m-0.18m, with an average thickness of 0.10m over;
- a SAND and GRAVEL of limestone hardcore to depths of between 0.20m and 0.35m, with an average thickness of 0.15m.
- 'General' Made Ground, to depths of between 0.30m and 3.30m, with an average thickness of 1.33m. Comprises a mixture of sand, gravel and clay with a low to medium cobble content of brick

and concrete. Gravel is comprised of brick, asphalt, concrete, coal, sandstone, mudstone and occasional ceramics, timber, clinker, fabrics, metal and plastic. Overlying a dark grey mottled black slightly sandy gravelly CLAY with a weak organic (humic) odour. Gravel includes brick concrete, mudstone, occasional slate and coal.

5.1.4 Glacial Till

Glacial Till was encountered underlying the Made Ground across the site. Glacial Till is between 13.30 and 15.90m thick, with an average thickness of 14.73m.

This generally consisted of firm becoming very stiff slightly sandy, slightly gravelly CAY. Gravel is of mudstone, sandstone and coal.

5.1.5 Weathered Chester Formation

Weathered Chester Formation was encountered underlying the Glacial Till in the Hydrock Cable Percussive Boreholes drilled in the north of the site. However, it is also likely to underly the Glacial Till across the rest of the site as well. The formation is greater than 5.50m thick.

This generally consisted of very stiff thinly interlaminated CLAY and fine SAND.

5.2 Obstructions

Obstructions were encountered in a number of trial pits and boreholes during the investigation. These intrusive locations are summarised in Table 5.2.

Table 5.2: Obstructions encountered

Stratum	Location	Depth (m bgl)	Description
Made Ground	HYD-SA01	1.00	Asphalt
	HYD-SA03	0.40	
	HYD-WS01	1.30	Concrete
	WS109	1.30	Refused in Made Ground
	WS112	0.80	Concrete
	WS114	0.40	
	WS115	0.90	

5.3 Visual and olfactory evidence of contamination (soil)

In addition to the more common man-made constituents (ash, clinker, plastic, etc), described above in Section 5.1.3, visual and olfactory evidence of contamination was noted in a number of locations, summarised in Table 5.3.

Table 5.3: Visual and olfactory evidence of contamination - soils

Stratum	Location	Depth (m bgl)	Description
Made Ground	HYD-BH03	1.00	Weak petroleum hydrocarbon odour (possibly diesel)
	HYD-CBR02	0.35	Clay stained black (possibly from petroleum hydrocarbons)

Stratum	Location	Depth (m bgl)	Description
	HYD-WS02	0.70-1.10	Clay stained black and weak petroleum hydrocarbon odour.
	CP103	0.80-1.30	Slight petroleum hydrocarbon odour
	CP106	0.50-1.00	
	WS106	0.40-0.80	Petroleum hydrocarbon odour

5.4 Groundwater

5.4.1 Groundwater observations and levels

Groundwater encountered during the investigation is listed in Table 5.4. A groundwater observation represents the depth at which groundwater was first observed and is likely to be deeper than the actual water table level at that location.

Table 5.4: Groundwater occurrence

Stratum	Date	Location	Fieldwork		Comment
			Groundwater observation (m bgl)	Rose to after 20 mins (m bgl)	
Made Ground	15/03/21	HYD-BH02	0.50	0.50	Slight seepage, black but no odour
	16/03/21	HYD-CBR01	1.25		Very slight seepage
		HYD-CBR02	0.25		Moderate groundwater inflow
	31/03/21	HYD-SA03	0.70		Moderate seepage
		HYD-SA05	0.30		Fast inflow
		HYD-SA06	2.30		Sudden ingress
Glacial Till	19/03/21	HYD-WS03	4.00		Slight seepage

Groundwater levels recorded during post-fieldwork monitoring are summarised in Table 5.5.

Table 5.5: Groundwater level data summary

Stratum	Date range	Location	Post-fieldwork monitoring	
			Depth to groundwater (range) (m bgl)	Groundwater elevation (range) (m OD)
Glacial Till	30/03/21-14/04/21	HYD-BH02	11.97-12.90	47.42-48.35
		HYD-BH03	10.03-12.12	48.11-50.20
		HYD-WS03	3.18-3.20	57.13-57.15
		WS113	1.42	59.04
Made Ground	30/03/21	WS116	1.16	60.11

5.4.2 *Visual / olfactory evidence of contamination (water)*

Visual and olfactory evidence of contamination in water was noted in two trial pits and is summarised in Table 5.6,

Table 5.6: Visual and olfactory evidence of contamination - waters

Stratum	Location	Depth (m bgl)	Description	Comment
Made Ground	HYD-CBR02	0.25-0.35	Groundwater with oily sheen and hydrocarbon odour.	-
	HYD-SA05	1.00	Groundwater becomes black from 1.00m bgl	Groundwater encountered at 0.30m bgl.

5.4.3 *Infiltration tests*

The results of the infiltration testing undertaken are summarised in Table 5.7. The results sheets are presented in Appendix C.

Testing was carried out in accordance with Hydrock's 1-day assessment methodology (see reference in Appendix J). This is in general accordance with BRE Digest 365 (BRE DG 2016) where infiltration rates allow three test runs during a working day (or where there is no infiltration), but where low infiltration rates were encountered the available time may not have been sufficient to fully comply with the BRE test method (i.e. three runs of the test).

Table 5.7: Infiltration test results

Stratum	Location	Depth to base of pit (m bgl)	Infiltration rate (m/s)			
			Run 1	Run 2	Run 3	Range
Glacial Till	HYD-SA01	3.40	No infiltration*			-
	HYD-SA02	1.40				
	HYD-SA03	1.80				
	HYD-SA04	3.50				

*Where less than three tests were possible in a particular location the results provided should be considered indicative only and should not be used for design purposes. If infiltration is critical to the development of the site, multi-day infiltration testing should be undertaken.

5.4.4 *Groundwater summary*

In general, shallow groundwater was encountered within the Made Ground at a range of depths between 0.20-2.30m bgl. Subsequent monitoring indicates groundwater is occasionally present in the Glacial Till, likely to be associated with bands of sandy clay.

No infiltration was recorded in the Glacial Till.

5.5 Ground gases (carbon dioxide and methane)

Records from the gas monitoring boreholes are presented in Appendix E and summarised in Table 5.8.

To date two monitoring visits have been undertaken, with a further four visits to be undertaken as part of the current commission. The data are assessed in Section 7.6.

Table 5.8: Range of ground gas data

Stratum	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Steady flow rate (l/hr)	Comment
Glacial Till	0.1-13.5	<0.1-6.6	0.3-20.7	<0.1-19.5	Four out of the ten methane readings are below detection.
Made Ground	0.1-0.9	3.8-3.5	80.9-14.7	<0.1	One out of the two methane readings are below detection.

5.6 Geotechnical data

5.6.1 Introduction

Laboratory test results are contained in Appendix D with *in situ* test results shown on the relevant exploratory hole log or datasheet in Appendix C. The following sections summarise the main findings and provide interpretation where appropriate.

5.6.2 Plasticity

The volume change potentials in terms of with respect to building near trees have been determined from the results of plasticity index tests on samples of soil. These are summarised in Table 5.9.

Table 5.9: Volume change potential

Stratum	No. of tests	Plasticity Index			Modified Plasticity Index			Plasticity designation	Volume Change Potential
		Min.	Max.	Av.	Min.	Max.	Av.		
Made Ground	4	20	29	25	11	29	20	Intermediate to high	Low to Medium
Glacial Till	28	12	37	22	12	36	21	Low to high	Low to Medium

5.6.3 Particle size distribution

Particle Size Distribution test (PSDs) results are summarised in Table 5.10 and summary descriptions and PSD plots of the material analysed are presented in Appendix D.

Table 5.10: PSD results summary

Stratum	No. of tests	Silt/Clay %	Sand %	Gravel %	General description
Made Ground	8	4-20	12-33	20-82	Slightly clayey/silty sandy fine to coarse GRAVEL (with cobbles)
Glacial Till	5	3-83	15-97	0-6	Generally, slightly clayey/silty fine to coarse SAND or slightly gravelly clayey/silty fine to coarse SAND.

5.6.4 Soil strength

Table 5.11 summarises information pertaining to the shear strength of the soils according to geological stratum. Factual results are summarised for laboratory tests, field tests (e.g. hand shear vane) and uncorrected Standard Penetration Tests (SPT). Where the SPT is used to infer shear strength by published correlation, this is also tabulated. A shear strength versus depth profile is summarised in

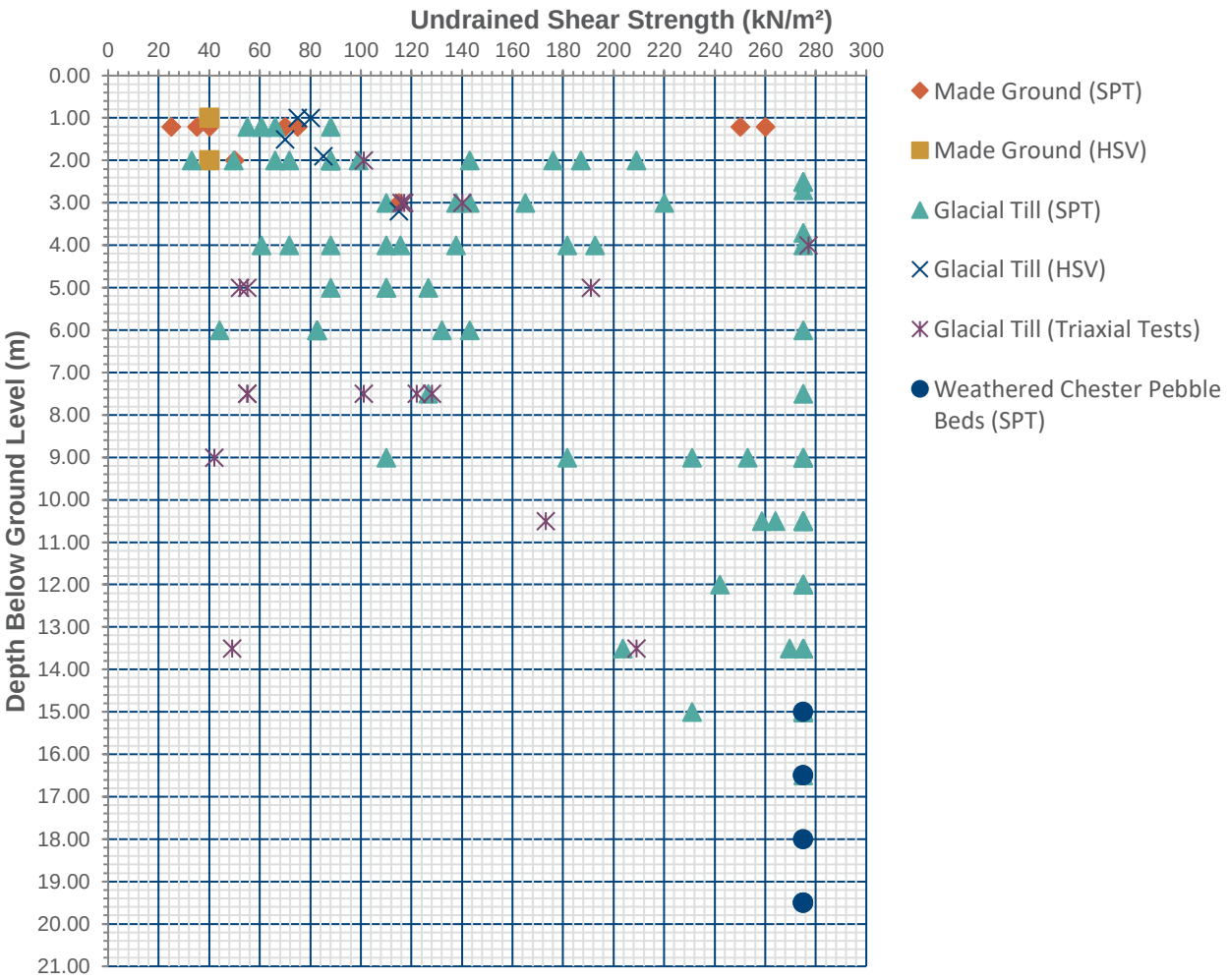


Figure 5.1, and plots are presented in Appendix D.

Table 5.11: Soil strength results and derived values

Stratum	No. of tests	SPT (N-value) (range)	c_u (kPa)	c' (kPa)	phi' (°)	Method
Made Ground	3	7-15	35-75*	0	25	SPT – cable percussion.

	6	5-50	25-250*			SPT – windowless sampler boreholes.
	2	-	40			Hand shear vane
Glacial Till	58	6-50	33-275*	0	26	SPT – cable percussion.
	22	11-50	60.5-275*			SPT – windowless sampler boreholes.
	5	-	70-115			Hand shear vane
	17	-	42-277			Laboratory triaxial test
Weathered Chester Formation	7	50	>250**	0	-	SPT – cable percussion.
*Correlation with Stroud (1975) based on 'average' plasticity ** Estimated						

As shown by Figure 5.1, the strength profile of the Made Ground is variable, ranging between 25-260kN/m². The Glacial Till encountered from 1.20m to 16.50m bgl , with one exception, are comprised of firm to stiff clays, typically with undrained shear strengths of 44 - 275kN/m².

It should be noted that that between 4.00m to 7.50m bgl there is a general decrease in strength falling from 61-193 kN/m² to 44-128kN/m². Below 7.50m bgl the strength again increases with depth (110 - 275 kN/m²).

A number of triaxial tests from the previous investigation recorded low shear strength values between 7.00-14.00m bgl. Based on the weight of evidence from the SPT data, the geological descriptions and other triaxial at similar depths, it is likely that these samples may have been affected by sample disturbance and have been discounted.

The Weathered Chester Formation encountered from 14.50m bgl were comprised of stiff thinly interlaminated clay and sand with estimated shear strengths >250kN/m².

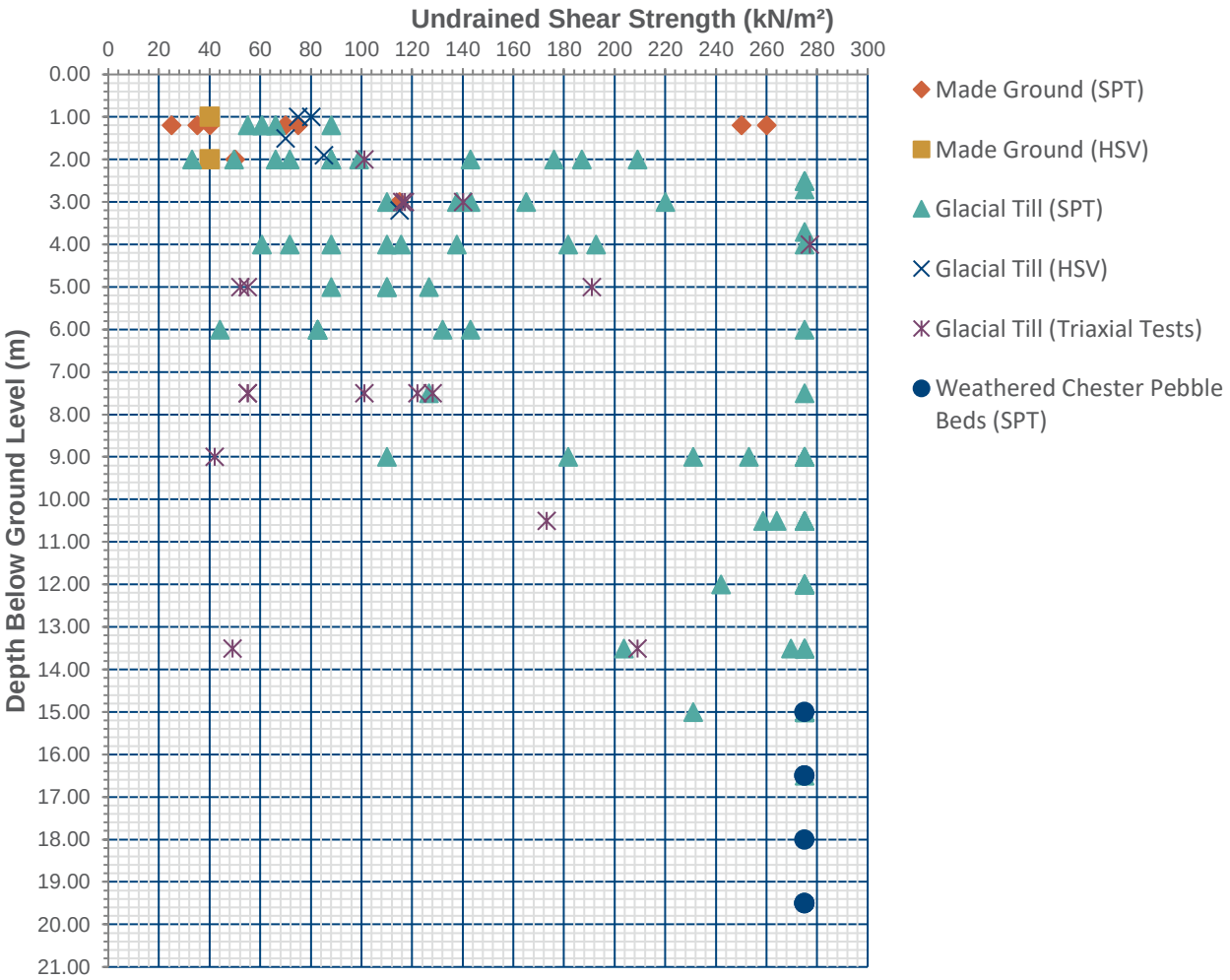


Figure 5.1: Undrained shear strength versus depth summary

5.6.5 Compressibility

Table 5.12 presents a summary of the derived parameters for coefficient of consolidation and compressibility. The data indicates that the material is generally of medium to high compressibility over the pressure ranges tested.

Table 5.12: Summary of compressibility

Stratum	No. of tests / results	Method	Pressure range (kN/m²)	Coefficient of volume compressibility (m_v) (m²/MN)	Coefficient of consolidation (C_v)*** (m²/yr)
Made Ground	9	Correlation with SPT*	-	0.40-0.008	-
	1	One Dimensional Oedometer Testing		0.401	
Glacial Till	70	Correlation with SPT**	-	0.055-0.007	-
	2	One Dimensional Oedometer Testing	0-50	0.521-0.188	42.693-42.583

			30-100	0.30-0.160	33.065-29.441
			60-200	0.216-0.125	19.970-12.983
			120-400	0.127-0.077	13.382-4.564
			240-800	0.079-0.053	7.147-3.913
			Unload	0.045-0.025	19.581-3.617

* An f_2 value of 0.5 has been used based on a plasticity index of 20. (Tomlinson (2001), after Stroud)).
** An f_2 value of 0.55 has been used based on a plasticity index of 21. (Tomlinson (2001), after Stroud)).
*** The previous investigation recorded C_v very low values of between 0.54-1.6.

5.6.6 Moisture content

Table 5.13 presents a summary of the moisture content tests completed at the site.

Table 5.13: Compaction study results

Stratum	No. tests	Natural moisture content (%) (range)
Made Ground	8	6-33
Glacial Till	24	9-28

5.6.7 Subgrade stiffness

The subgrade stiffness (CBR and Modulus of Subgrade Reaction) results are summarised in Table 5.14.

Table 5.14: CBR results and derived values

Stratum	No. tests	Method	Modulus of Subgrade Reaction k (MN/m²/m) (Range)	CBR (%) (Range)
Coarse granular Made Ground	*1*	Laboratory remoulded sample at Natural Moisture Content (NMC)	-	78.60-81.30
Made Ground	2			5.10-7.90
	4	Plate Load Test	18-32	1.50-4.00

5.6.8 Sulphate content

In accordance with BRE (Special Digest 1), the Design Sulphate (DS) classification and the Aggressive Chemical Environment for Concrete (ACEC) classification are presented in Table 5.15. The assessment summary sheets are presented in Appendix D.

Table 5.15: Aggressive chemical environment concrete classification

Stratum	No. tests	DS	ACEC
Made Ground	2	DS-1	AC-1
Glacial Till	6	DS-2	AC-2

6. GEOTECHNICAL ASSESSMENT

6.1 Geotechnical categorization of the proposed development

Eurocode 7, Section 2 advocates the use of geotechnical categorization of the proposed structures to establish the design requirements.

The proposed development is to comprise a 92,000sq ft, 1200 place, 2-3 storey high school, with sports pitches, car parking and associated infrastructure. An initial review of the site indicates minimal cut to fill or retaining is likely to be required.

Based on the above, for the purposes of this investigation, the proposed structures have been classed as Geotechnical Category 2.

For Category 2 structures, the Geotechnical Category should be re-assessed at the design stage and specific geotechnical design (in addition to this investigation), is required.

Following ground investigation and as part of the assessment provided in the following section, the preliminary geotechnical hazard identification undertaken in Section 3.3 has been updated.

Assessment has been undertaken in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622. The preliminary Geotechnical Risk Register following investigation is provided in Appendix H (Table J.3) and will need to be updated during future design works.

6.2 Characteristic design values

In accordance with BS EN ISO 1997-1 (EC 7), Hydrock consider the proposed structures would be classified as Category 2 structures. As part of the separate geotechnical design, the designer should determine the geotechnical design values.

Table 6.1provides characteristic geotechnical values to assist the designer. These are based on laboratory testing, *in situ* testing and by professional judgement using published data together with knowledge and experience of the ground conditions. Care should be exercised in using these assumed soil strength parameters for any purpose beyond the scope of this report because it may be that additional sampling and testing are required for certain purposes. The reader should refer to the original test results summarised in Section 5 and provided in Appendix C and Appendix D.

Table 6.1: Characteristic geotechnical values

Parameter Stratum	Bulk unit weight kN/m³	Effective angle of internal friction °	Effective cohesion kN/m²	Undrained shear strength kN/m²	Coefficient of compressibility m²/MN	CBR %
	γ [a]	ϕ' [b]	c' [c]	c_u [d]	m_v [e]	k [d]
Made Ground	20	-	-	25	0.40	<2.5
Glacial Till	21	26	0	40	0.50	2.5
Weathered Chester Formation	21	-	-	250	-	-

a. Measured as part of the triaxial strength test and estimated based on the recommendations of BS 8004-2015.

Parameter Stratum	Bulk unit weight kN/m³	Effective angle of internal friction °	Effective cohesion kN/m²	Undrained shear strength kN/m²	Coefficient of compressibility m²/MN	CBR %
	γ [a]	ϕ' [b]	c' [c]	c_u [d]	m_v [e]	k [d]

b. Internal friction (φ') values for the cohesive in-situ material derived from BS 8004-2015, where φcv' is derived from plasticity index. The use of φcv' in the analysis is considered to provide a conservative estimate of φ'.

c. BS 8002:1994 Code of practice for Earth retaining structures, British Standards institution.

d. Site measurements and laboratory data.

e. Laboratory data.

6.3 Groundwork

6.3.1 Site preparation

The redevelopment will involve demolition of the existing buildings (currently underway). This should be undertaken to an appropriate Specification to ensure any asset materials generated are geotechnically suitable for use.

Buried obstructions were encountered during this investigation associated with foundations of old buildings, services etc., and there is a possibility of further such obstructions being encountered.

Topsoil should be removed from beneath all building and hardstanding areas.

6.3.2 Groundworks

Following breaking out of hardstanding and obstructions, excavation of shallow soils should be readily undertaken by conventional plant and equipment. However, excavation through any buried construction may require heavy-duty plant.

Trial pit faces were noted to remain generally vertical without collapse. The faces of shallow, near vertically sided excavations put down at the site are likely to remain stable for short periods of time.

Random and sudden falls should be expected from the faces of near vertically sided excavations put down at the site. Particularly where the Made Ground is deep and/or groundwater ingress occurs. Rapid groundwater ingress should be anticipated, particularly in the south of the site, near HYD-SA05 and HYD-SA06.

Temporary trench support, or battering of excavation sides, is recommended for all excavations that are to be left open for any length of time and will definitely be required where man entry is required. Particular attention should be paid to excavation at, or close to, site boundaries/adjoining existing roads/structures/buildings, where collapse of excavation faces could have a disproportionate effect.

A risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015); Construction Information Sheet 47: Inspections and Reports (2005) and HSG47: Avoiding Danger from Underground Services.

To ensure no loads are imposed on the sides of the excavation, spoil should not be placed immediately adjacent to the excavation. Spoil should be placed a suitable distance from the side of the excavation (as assessed by a competent person).

Based on site observations, the rate of water ingress to the majority of excavations is likely to be slow. In these circumstances, groundwater control by sump pumping is likely to be sufficient.

However, based on site observations, where the rate of water ingress to the proposed excavations is likely to be fast through the Made Ground, in the vicinity of HYD-SA05 and HYD-SA06. In these circumstances, groundwater control by sump pumping may not be sufficient to deal with anticipated flows and alternative methods of dewatering, such as well points, or use of impermeable cut-offs should be allowed for.

Furthermore, it should be recognised that groundwater levels may vary from those at the time of the investigation, for example in response to seasonal fluctuations and the timing of construction may dictate the extent of groundwater control required.

Any water pumped from excavations may need to be passed via settlement tanks (to reduce suspended solids) before being discharged to the sewer. Discharge consents may also be required.

6.3.3 Earthworks/reuse of site-won materials

At this stage, Hydrock is not aware of proposals for earthworks at the site. However, the over excavation of the shallow soils is likely to be required as part of the enabling works to form a suitable subgrade for ground bearing structures and external works.

Based on observations made from trial pitting a proportion of the Made Ground should be suitable for reuse, subject to further testing, processing and screening that may be required.

Where earthworks are required, supplementary testing and an earthworks specification will be necessary to ensure the appropriate management and reuse of the existing soils.

If significant earthworks are required, the works may be Category 2 in accordance with BS EN ISO 1997-1 (EC 7) and further geotechnical design may be necessary. Once site proposals have been further defined more specific consideration will need to be given to the reuse of materials and reference should be made back to this office.

6.4 Foundation recommendations

In accordance with EC7, BS EN 1997-1+A1 (2013), the 2-3 storey school buildings are considered to be Geotechnical Category 2. As such, foundation recommendations are presented to aid development proposals only and separate geotechnical design will be required.

6.4.1 Foundation Type

The Made Ground underlying the site is generally between 0.75-2.90m thick and is considered unsuitable in its present condition for use as founding soils on the basis of its unpredictable nature and likely deposition in an uncontrolled manner and should be fully penetrated by all new foundations or excavated, screened, processed and re-engineered to create the development platform.

The Glacial Till is present to depths of around 15m to 17mbgl overlying the Chester Formation. The Glacial Till comprises firm to stiff and very stiff sandy gravelly clay. Groundwater was recorded at

shallow depth within the Made Ground and within sandy horizons likely to be at various levels within the Glacial Till.

On the basis of the ground conditions indicated from the current and previous investigation, shallow foundations within the firm to stiff Glacial Till are considered appropriate, with an allowable bearing pressure of 120kPa used for initial sizing of the foundations. In accordance with Eurocode 7 additional settlement analysis should be completed as part of the foundation design.

If enlarging the foundations is considered (for example because loads are such that the quoted permissible bearing pressure is inadequate) this could lead to increased settlements and the above recommendations should be reviewed. Also, if loads were to increase an alternative foundation such as piling may be required.

Based on the low to medium volume change potential of the clay soils, the minimum founding depth for pad foundations is below the base of the Made Ground and 0.90m below final ground level, whichever is deeper.

In addition, the foundations may need to be deepened to below the depth of influence of trees from desiccation effects and roots.

If trees are to be removed, the roots should be grubbed out and foundations extended to below the zone of disturbance created by this activity and to below any remaining root hairs.

Deepening of foundations in accordance with BRE 240 and BRE 298 will be required where pad foundations are within the zone of influence of existing, removed or proposed trees and proposed shrub planting. NHBC Standards (Chapter 4.2) should also be taken into account. A tree survey should be undertaken by an arboriculturist in accordance with BS 5837:2012 to identify the type, and height of existing trees on the site and including any off-site trees, that could have an effect on foundation design.

Where it is not practical to deepen individual pads beyond the influencing distance of the desiccated soils, it is recommended that bulk excavation of the affected area be undertaken and, following moisture conditioning, the soils are replaced to an Engineered Specification.

Where foundations are within the zone of potential desiccation from trees and are deeper than 1.5m bgl, a suitable compressible material or void former will be required on the inside faces of foundations to external walls, and beneath piled ring beams and ground bearing floor slabs.

Foundation formations should be inspected by a geotechnical engineer or other suitably competent person to ensure the founding conditions are suitable and as indicated in this report. Any formation materials deemed as unsuitable should be excavated and replaced with lean mix concrete or deepened to suitable strata.

Foundation excavations should be protected from rain and snow and inflow of surface water, frost and freezing conditions. They should also be protected from drying out in hot dry weather.

Any water that collects at the base of the foundation excavations should be removed by pumping from a sump in the base.

Glacial Till can be an over consolidated clay, which can swell and soften in contact with water. Therefore, care will be required to ensure that foundation excavations are kept as free of water as practicable. Foundation concrete should be poured as soon as practicable after excavation.

6.4.2 Working platform

A working platform will be required prior to the arrival on site of tracked plant. This should be designed and installed in accordance with BR470 (BRE 2004) based on data on the specific plant in accordance with an FPS certificate for the tracked plant/rig loadings.

6.5 Ground floor slabs

As Made Ground is greater than 600mm thick and clay soils of medium volume change potential are present on site, it is recommended that either suspended floor slabs with a void be adopted or over excavation and reengineering of the made ground is undertaken. These earthworks should be undertaken in accordance with a suitable design and excavations may need to be deepened to remove potentially desiccated soils.

Ground floor slabs should be designed to incorporate any gas mitigation measures that may be required, as discussed later within this report.

6.6 Roads and pavements

Based on the presence of variable Made Ground, the test results, it is considered likely a CBR of <2.5% should be used for design, on the basis that some nominal ground improvements will be required. It is envisaged that this will take the form of some over excavation and replacement. This should identify any buried obstruction in the Made Ground that may adversely affect construction.

Proof rolling of the formation level will be required and any loose or soft spots should be removed and replaced with an engineered fill, in accordance with a suitable Specification. The formation level will also need to be protected during inclement weather from deterioration; all slopes should be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

Prior to the placement of the founding materials and the construction of the road pavement, the sub-formation and formation will need to be inspected and checked in accordance with a suitable specification to ensure the ground conditions are as expected. All testing should be carried out in accordance with DMRB CD 225 to confirm that the ground conditions at time of construction are consistent with the previous design parameters.

Where the CBR is found to be less than 2.5%, the sub-grade may be unsuitable for both the trafficking of site plant and as support for a permanent foundation, without improvement works being undertaken. Improvement works should be carried out in accordance with DMRB CD 225. In summary, consideration may be given to the following potential remedial techniques:

- excavation and re-engineering or replacement of weaker soils;
- the inclusion of geosynthetic reinforcement within the unbound layers of the capping and sub-grade; and
- where cohesive soils are present and they are deemed suitable for treatment with hydraulic binders, to employ modification and/or stabilisation techniques on the formation.

6.7 Drainage

Indicative infiltration rates for the ground investigation are presented in Appendix D and are summarised in Table 5.7.

Soakaways are considered unsuitable for the site based on the low infiltration rates obtained from testing, the presence of variable thickness of Made Ground and the risk of mobilising contaminants within the soils. However, the infiltration rates recorded may assist with attenuation as part of a Sustainable Urban Drainage System (SUDS).

Temporary drainage will need to be considered by the contractor during excavations within the Made Ground.

6.8 Buried concrete

Based on guidelines provided in BRE Special Digest 1 (BRE 2005) and the information presented in Section 5.6.8 (Table 5.15):

- the Made Ground can be classified as Design Sulphate Class DS-1 and ACEC Class AC-1; and
- the Glacial Till can be classified as Design Sulphate Class DS-2 and ACEC Class AC-2.

This equates to a Design Chemical Class[1] of:

- DC-1 for the Made Ground; and
- DC-2 for the Glacial Till.

The designer should check and confirm the classification of concrete using the information presented in Appendix C and Appendix D during the design.

[1] The calculated ACEC class can be used in accordance with BS 8500-1+A2 (2019), Table A.9 to select the Designated Concrete (DC) class for an intended working life of 50 years. However, the designer is referred to BS 8500-1+A2 (2019), for full details and notes to Table A.9, including any Additional Protective Measures (APMs).

7. GEO-ENVIRONMENTAL ASSESSMENT

7.1 Updated conceptual model

7.1.1 Updated ground model

The preliminary ground model developed from the desk study and field reconnaissance survey (Section 2) has been updated using the findings of the ground investigation and is presented in Section 5. This ground model is the basis for the geo-environmental assessment presented in this section.

7.1.2 Updated exposure model

Following the ground investigation, the plausible contaminant sources, receptors and pathways identified in the preliminary geo-environmental exposure model (Section 3), have been updated or confirmed as follows.

Sources

No potential sources have been removed from, or added to, the exposure model.

Receptors

No potential receptors have been removed from, or added to, the exposure model.

Pathways

No pathways have been removed from, or added to, the exposure model.

Using the updated ground model and updated exposure model, generic risk assessment is undertaken as presented below.

7.2 Risk assessment approach

Generic risk assessments have been undertaken in accordance with the principles of LCRM (Environment Agency, 2019) using the CM that has been updated following the ground investigation.

Firstly, the risks associated with the identified potential contaminant linkages have been estimated using standardised methods (typically involving comparison of site data with published 'screening values'). Secondly, where screening values are exceeded, the result has been evaluated in an authoritative review of the findings with other pertinent information to determine whether or not the exceedance is, or is not acceptable in the site-specific circumstances. Further explanation is presented in Appendix J.

The data sets used in the assessment comprise the analytical results obtained by Hydrock as listed in Section 4 together with any reliable data from previous investigations as listed in Section 2.

In cases where unacceptable risks are indicated, actions such as more advanced stages of risk assessment or remediation are proposed in Section 7.10.

7.3 Human health risk assessment

There are no soil screening values for use in assessing the school land use and in this instance a conservative screening option has been adopted by using the residential without plant uptake scenario.

The soil screening values used are generic assessment criteria (GAC). It should be noted that Category 4 Screening Levels (C4SL) for lead have been used as there is no recognised GAC for lead and the use of the term 'GAC' in this report includes the C4SL for lead.

Statistical testing is used where data sets are suitable. The critical issue is sample numbers. For data sets with low sample numbers or where sampling is targeted at specific areas, individual sample test results are compared directly with the screening values. Larger and non-targeted data sets are subject to statistical testing.

The phrase 'further assessment required' is used to denote soil concentrations that are equal to, or exceed, a GAC. This does not necessarily mean that the soil is 'contaminated' or not otherwise suitable for use. The assessment and any mitigation required are to ensure the site does not pose an 'unacceptable risk'.

The results of the assessment are presented in Appendix F.

7.3.1 Averaging areas

The 'averaging area' used in this report is based on the conceptual model and the proposed development, and is taken to be the entire area of the site, with the data separated into Made Ground and natural soils.

7.3.2 Risk estimation (including statistical testing)

The data set for each chemical determinand has been assessed for potential outliers (based on the conceptual model). No outliers have been removed.

Statistical assessment

In accordance with the guidance provided by the CIEH (May 2008) the 95th upper confidence level on the true mean (US_{95}) has been calculated from the sample data. Reference to the methodology for statistical assessment is given in Appendix J.

Based on a US_{95} exceedance of the GAC, the pervasive chemicals of potential concern which require further assessment are summarised in Table 7.1.

Table 7.1: Pervasive chemicals of potential concern for which further assessment is required (human health)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	US_{95} (mg/kg)	No. samples exceeding generic criterion
Made Ground							
Lead	310	C4SL	21	3.98	2070	760.19	8
Benz(a)anthracene	7.8	LQM/CIEH + CLEA 1.07	21	0.014	74	33.55	6
Benzo(a)pyrene	1.6		21	0.015	53	24.57	14
Benzo(b)fluoranthene	11		21	0.015	58	24.69	5
Chrysene	16		21	0.01	46	24.21	5
Dibenz(a,h)anthracene	1.4		21	0.0115	6.3	2.55	4
Indeno(1,2,3,cd)pyrene	6.6		21	0.018	22	9.90	4

The presence of Lead, Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Chrysene, Dibenz(a,h)anthracene and Indeno(1,2,3,cd)pyrene in Made Ground requires further consideration.

7.3.3 Risk estimation (without statistical testing)

Hydrock default list of determinands

Based on individual test results that exceed the GAC, the chemicals of potential concern which require further assessment are summarised in Table 7.2.

Table 7.2: Chemicals of potential concern for which further assessment is required (human health)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	No. samples exceeding generic criterion
Glacial Till						
No Exceedances						

Asbestos

Asbestos has been identified by laboratory testing of soil samples as provided in Table 7.3.

Table 7.3: Asbestos in soil samples (laboratory testing)

Location	Depth (m bgl)	% Asbestos (w/w)	Comment
HYD-BH02	0.70	*	Fibres (chrysotile)
HYD-CBR02	0.35		Fibres (amosite)
HYD-WS02	0.80		Loose fibrous debris (chrysotile)
HYD-WS03	0.30		Fibres (chrysotile)
CP107	0.30	<0.001	Fibres (amosite)
WS109	0.50-0.60	<0.001	Fibres (chrysotile)
WS116	0.30-0.30	<0.001	Fibres (chrysotile)
**Awaiting laboratory results*			

The presence of Asbestos Containing Materials and asbestos fibres in soil requires further consideration.

Petroleum hydrocarbons (PHC)

Although petroleum hydrocarbons odours were noted in CP103, CP106, WS106, HYD-BH03, HYD-CBR02 and HYD-WS02, targeted analysis of soils (based on visual / olfactory evidence of contamination) has not identified petroleum hydrocarbons in soils with exceedances of the any TPH fractions. However it should be noted that potentially impacted soils (stained black) were encountered in HYD-CBR02 and HYD-WS02.

Volatile organic compounds (VOC) and semi volatile organic compounds (SVOC) - soils

Three soil samples were scheduled for testing for the presence of VOCs and SVOCs in the previous investigation. No exceedances of VOC or SVOCs were identified at concentrations in excess of the GAC.

7.3.4 Risk evaluation

The screening exercise has identified asbestos, lead, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3,cd)pyrene and naphthalene in Made Ground at concentrations above the GAC. These are considered further here to assess if the exceedance may be acceptable with respect to the proposed development. The phrase 'further assessment' does not necessarily mean that the soil is 'contaminated' or not fit for use.

Asbestos

No visible asbestos containing materials have been noted on site during the ground investigation completed to date. However, there were a number of exploratory hole locations where asbestos fibres (amosite and chrysotile) have been detected in the Made Ground and one instance of loose fibrous debris being recorded in HYD-WS02.

Hydrock consider it plausible for asbestos to be present in any of the Made Ground soils and asbestos, (even at low concentrations), which represents an unacceptable risk and robust mitigation measures will be required.

Metals and Speciated PAHs in Made Ground

Lead, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene and indeno(1,2,3,cd)pyrene are present in the Made Ground with a US_{95} values which exceed the GAC (significantly for lead, benz(a)anthracene and benzo(a)pyrene). These exceedances are considered to be an unacceptable risk, which requires mitigation for the proposed end use.

7.4 Plant life risk assessment

7.4.1 Risk estimation

Priority phytotoxic chemical concentrations have been screened against published values to determine the likely risk to plant growth and the findings presented in Appendix F. As with human health, statistical testing is used where data sets are suitable, otherwise individual sample test results are compared directly with the screening values.

Based on a US_{95} exceedance of the GAC, the pervasive chemicals of potential concern which require further assessment are summarised in Table 7.4.

Table 7.4: Pervasive chemicals of potential concern for which further assessment is required (risk to plants)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	US_{95} (mg/kg)	No. samples exceeding generic criterion
Made Ground							
Copper	135	BS3882 2015	21	2.05	540	180.50	1
Zinc	300		21	8.43	482	306.45	5
Glacial Till							

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	US_{95} (mg/kg)	No. samples exceeding generic criterion
No Exceedances							

7.4.2 Risk evaluation

Within the Made Ground, concentrations of copper and zinc are elevated when compared to the GAC. Detriment to plant life is difficult to quantify and many of the GAC are based on agricultural crop yields rather than harm to particular plant species. As the exceedance are not significant and the vegetation on site did not show any signs of physical distress, Hydrock does not believe there to be an unacceptable risk to plant life from contamination and no any additional consideration is required with regard to risks to plant life.

Notwithstanding the concentrations of contamination identified, there is no subsoil or topsoil growing medium on the site and this will require import.

The requirement for mitigation of risk to human health (as discussed in Section 7.3.4) will also serve to mitigate risks to plant life.

7.5 Pollution of controlled waters risk assessment

7.5.1 Risk estimation

The risks to groundwater and surface water from contaminants on site have been assessed in accordance with the Environment Agency (2006) Remedial Targets Methodology (RTM).

Site contaminant loadings are compared with relevant screening values (Water Quality Targets), which are linked to the Conceptual Model.

Acceptable WQT are defined for protection of human health (based on Drinking Water Standards (DWS)) and for protection of aquatic ecosystems (Environmental Quality Standards (EQS)).

As related specifically to this site, the data are compared with criteria selected in accordance with the methodology presented in Appendix J. This methodology involves selecting which of several alternative risk scenarios apply in this case. The assessment is presented in Table 7.5 below, with the justification for the scenarios selected explained in the following text:

- It has been confirmed that the Chester Pebble Beds Principal Aquifer is separated from the potential contaminant sources above it by greater than 10m of low-permeability Glacial Till which will act as a barrier to downward transmission of contaminants. As a result, there is no viable pathway to groundwater in the Chester Pebble Beds;
- The site is currently predominantly covered in hardstanding. Much of which will be removed as part of the redevelopment allowing increased infiltration into the Made Ground;
- There are no active licensed groundwater abstractions within 500m of the site;
- The nearest surface water body is Platt Brook located 366m south of the site. Due to the distance from site, there is a low risk of surface water runoff or contaminants leached from the Made Ground entering the brook; and

- There are no licensed surface water abstractions within 500m of the site boundary.

Table 7.5: Summary of water quality risk assessment protocol

Hydrock scenario	Water body receptors	Secondary receptors	Example contaminant linkages	RTM level and data used	Water quality targets
D	Groundwater. Surface water.	Human health (abstraction). Aquatic ecosystem.	Contaminants from site leach or seep into a groundwater body that feeds inland surface water by base flow. The surface water may be used for human consumption and is an aquatic ecosystem.		DWS EQS (inland)
Notes: Some EQS are water hardness dependent. This is measured either in the receiving surface water or in groundwater (if it is part of the pathway), or is estimated from national maps. Inland waters EQS applicable to freshwater, 'other' waters EQS applicable to coastal or transitional waters. This table and the results of the assessment are considered as a first screening for potential risks of pollution of Controlled Waters. More specific requirements may be stipulated by the relevant Agency.					

The results of the screening assessment are presented in Appendix F and are summarised in Table 7.6.

There are no WQT for petroleum hydrocarbon fractions in water. However, because of the sensitivity of the water environment to petroleum hydrocarbons, an initial screening exercise is also included in Table 7.6 irrespective of the assessment scenario(s) stated in Table 7.5.

In some instances, the reporting limit (or detection limit) quoted by the laboratory may be greater than the WQT that it is being assessed against. As the current exercise is an initial screening assessment, further assessment of these elements has not been undertaken.

Table 7.6: Chemicals of potential concern for which further assessment is required (controlled waters)

Chemical of potential concern	Water quality target (WQT) (µg/l)	Basis for water quality target	No. samples	No. samples above LoD	Min. (µg/l)	Max. (µg/l)	No. samples exceeding WQT and above LoD
Shallow groundwater in the Made Ground							
Zinc	12.3	Bioavailable EQS (inland)	1	1	23.7		1
Fluoranthene	0.0063	EQS	1	1	0.0177		1
Deep groundwater (Glacial Till)							
Aluminium	200	DWS	3	3	140	2100	2
Cadmium	0.08	EQS	3	3	0.03	0.63	1
Cobalt	3	EQS	3	2	0.2	7.1	2
Copper	1	Bioavailable EQS (inland) †	3	3	6.6	16	3
Manganese	50	DWS	3	3	1.9	1400	2
	123	Bioavailable EQS (inland) †					1

Chemical of potential concern	Water quality target (WQT) (µg/l)	Basis for water quality target	No. samples	No. samples above LoD	Min. (µg/l)	Max. (µg/l)	No. samples exceeding WQT and above LoD
Sodium	200000	DWS	3	3	150000	800000	2
Nickel	20	DWS	3	3	1.7	23	1
	4	Bioavailable EQS (inland) †					2
Antimony	5	DWS	3	3	0.6	5.5	1
Selenium	10	DWS	3	3	34	130	3
Zinc	12.3	Bioavailable EQS (inland) †	3	3	3.5	35	1
Ammonium	500	DWS	3	3	80	830	1
Ammnoniacal Nitrogen	300	EWS	3	3	62	650	1
Nitrite	500	DWS	3	3	70	1800	1
Sulphate	250000	DWS	3	3	197000	1390000	2
	400000	EWS					1
Electrical conductivity (µS/cm)	2500	DWS	3	3	940	2600	1

Note: the maximum recorded value is compared with the water quality target.

† The EQS for these substances represents a bioavailable concentration, which will be a proportion of the actual dissolved concentrations in water. No site-specific bioavailablity testing was able to be undertaken at the site and therefore the EQS bioavailable represents a conservative screening approach.

7.5.2 Risk evaluation

The EQS for zinc and fluoranthene in the Made Ground, cadmium, cobalt, copper, manganese, nickel, zinc, ammoniacal nitrogen and sulphate in the Glacial Till are exceeded. The DWS for aluminium, manganese, sodium, nickel, antimony, selenium, ammonium, nitrite, sulphate and electrical conductivity (µS/cm) are also exceeded. The exceedances are found predominantly in HYD-BH02 and HYD-WS03. However, the greatest exceedances are typically concentrated only in HYD-BH02. It is likely these exceedances are caused by an anthropogenic source (e.g. sewage).

However, whilst there are concentrations of chemicals of potential concern elevated above the water quality criteria, due to the thickness of the Glacial Till, overlying the principal aquifer, the distance to the nearest surface water source and subject to agreement with regulators, Hydrock does not believe the site poses a significant risk to controlled waters. Furthermore, it would be technically challenging and probably disproportionately costly to remove these contaminants from the water or to prevent further infiltration.

7.6 Ground gases risk assessment

7.6.1 Data

It is judged from the available evidence that the gas generation potential at the site is low (The site is underlain by Made ground with limited degradable material) and that the sensitivity of the development is low to moderate (The proposed development is for a 2-3 storey School). Consequently, and in accordance with CIRIA C665 (Table 5.5a and 5.5b), an appropriate minimum monitoring regime is six readings over three months, provided other monitoring requirements are also met, such as prevailing atmospheric pressure conditions (for example, BS 8485:2015 +A1:2019 suggests monitoring should include a period of falling atmospheric pressure).

Hydrock has undertaken two of the six readings required, but monitoring has not been undertaken during periods of low atmospheric pressure. As such, the conclusions presented below are considered interim, pending ongoing ground gas monitoring.

7.6.2 Assessment

The risks associated with the ground gases methane (CH_4) and carbon dioxide (CO_2) have been assessed using BS 8485:2015 +A1:2019, which cites the guidelines published by CIRIA (Wilson et al 2007) (known as Situation A).

There is an alternative assessment method described by the NHBC (Boyle and Witherington 2007) (known as Situation B). Whilst 'Situation B' may also be suitable for the assessment, it is Hydrock's opinion that the NHBC Guidelines are not at the current time fully aligned with current ground gas risk assessment principles (as described in BS 8485:2015 +A1:2019). As such, 'Situation A' has been chosen as the means by the gas risk will be assessed.

The assessment guidelines published by CIRIA are based on interpretation of the gas concentrations and the gas flow rates, amongst other variables, and are compliant with the model procedures of LCRM. The modified Wilson and Card assessment has been used by comparing the maximum gas concentrations and gas screening values (GSV[2]) in Appendix D with the published table (CIRIA Table 8.5) and the assessment is summarised in Table 7.7. The assessment is presented in Appendix E.

Table 7.7: Ground gas risk assessment

	Min	Max	Typical [(i)]	Comment
Steady Flow Rate (l/hr)	<0.10	19.50	<0.01	Significant positive gas flows only recorded in HYD-BH02.
Methane (%)	<0.10	13.50	<0.1	There are occasional concentrations of methane elevated above 1% and concentrations of carbon dioxide, elevated above 5%. Hydrock considers that as a precautionary measure the Characteristic Situation indicated by the GSV requires raising by one level.
Carbon Dioxide (%)	0.10	6.60	<5	
Carbon Monoxide (ppm)	1	27	<5	-
Hydrogen Sulphide (ppm)	<1	<1	<1	-
Oxygen (%)	0.30	20.70	>12	-

[2] Note: GSV is synonymous with 'site characteristic hazardous gas flow rate' (Q_{hgs}) of BS 8485:2015 +A1:2019 Table.

	Min	Max	Typical [i]	Comment
Carbon Dioxide GSV Maximum flow and Concentration Per Hole (l/hr)	0.00	0.25	<0.7	CS2
Methane GSV Maximum Concentration Per Hole (l/hr)	0.00	0.02	<0.7	CS1, but raised to CS2 due to recorded concentrations of methane elevated above 1%

[i] Hydrock assume that values are considered to be atypical if 95% or more of the remaining data are less than the value under consideration

For the purposes of the calculation, where the recorded gas flow rate is below the manufacturer's limit of detection for the instrument used, the detection limit has been adopted for the gas flow rate.

As indicated in Table 7.7, the computed GSV for carbon dioxide indicates CS2 conditions and the computed GSV for methane indicates CS1 conditions. However, methane concentrations have been measured at concentrations above 1%. As such, the classification requires additional consideration and the site is provisionally classified as Characteristic Situation 2 subject to the ongoing monitoring.

Hydrock do not at this time believe CS3 condition apply, due to only negative flows being recorded in WS113 where the high methane levels were recorded and there is no obvious source. Also high gas flows were only recorded in HYD-BH02 and little to no methane or carbon dioxide has been recorded in this location so far.

Based on the data to date, mitigation measures are required. These are described in Section 7.10.

7.6.3 Off-site risks from carbon dioxide and methane

The National Planning Policy Framework requires that a developed site should be incapable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990. This position includes a consideration of the potential for off-site migration of ground gases that may impact on adjacent properties.

Consequently, it may be necessary to consider the imposition of measures to protect adjacent, off-site receptors. In this case there is unlikely to be a risk as all the buildings surrounding the site are fairly modern and are likely to have been built on similar ground conditions (the site of the former Belle Vue Zoological Gardens). This means they should have included the risk of ground gases in their design and construction.

7.7 Construction materials risk assessment

7.7.1 Water pipelines

A formal water pipe investigation and risk assessment is beyond the scope of this report. However, the findings of this investigation have been compared to the threshold values in Water UK HBF (2014), Table 1 as far as is practicable, to give an indication of the possible restrictions to the use of plastic pipes for water supply to the site (see the reference in Appendix J for further information).

The site is brownfield and organic contamination (PAHs) has been identified in exceedance of the threshold values and Hydrock believes barrier pipe is required. However, confirmation should be sought from the water supply company at the earliest opportunity.

7.7.2 Other construction materials

Plastic pipes for drains and sewers are manufactured from unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) or polyethylene (PE). These materials may be affected by the presence of organic compounds in the soil.

In accordance with the British Plastics Federation Guidance (August, 2018), as the concentrations of PAH and BTEX are below 100mg/kg and the concentrations of petroleum hydrocarbons (TPH) are below 200 mg/kg, PVC-U, PP or PE pipework is considered suitable.

The implications for buried concrete are discussed in Section 6.8.

7.8 Contamination risks to ground workers

7.8.1 Introduction

Whilst risks to construction workers are not discussed in detail, the following section discusses potential risks that should be considered.

Information presented in this document is provided to assist in managing the risk associated with contamination in soil and groundwater at the site but is not definitive. The Contractors are responsible for undertaking their own assessments and assessing what risks are present and what control measures are required.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and, if required, RPE should be provided and utilised.

7.8.2 Metals, metalloids, PAH and petroleum hydrocarbons

The soils contain metals, metalloids and PAHs, recorded as pervasive concentrations throughout the Made Ground, with significantly elevated concentrations of lead, benz(a)anthracene and benzo(a)pyrene found across the site.

7.8.3 Ground Gas

It is noted that concentrations of carbon dioxide (an asphyxiant) in the soil exceed HSE Workplace Exposure Limits for personnel in the working environment of 1.5% for short term (15 minutes) exposure and 0.5% for long term exposure. Furthermore, soil concentrations of oxygen have been recorded below the HSE recommendations of 18%.

Soil gas concentrations are not necessarily reflected by those in the breathing zone, as such, all Contractors and maintenance workers should be made aware of the possible presence of carbon dioxide and should take all necessary health and safety precautions when working in trenches or confined spaces.

7.8.4 Asbestos

Whilst no clearly identifiable ACM has been seen during the site walkover or during the ground investigation, the laboratory testing has identified low concentrations of asbestos fibres (<0.001%) in the soils.

All site staff should be made aware of the possibility to encounter unidentified fragments of asbestos within the Made Ground soils anywhere on the site at any stage of the development. It is advised that the Contractor should consider supplying suitable and sufficient 'Asbestos Awareness' training (specific to asbestos in soils) to all site staff who could foreseeably encounter asbestos containing materials during the course of their work.

The Contractor for each stage of works must undertake a suitable and sufficient Risk Assessment in accordance the Regulation 6 of the Control of Asbestos Regulations 2012 (CAR2012). The results of the assessment should be used to compile a methodology in accordance with Regulation 7 of CAR2012, which limits the potential exposure and spread of asbestos fibre. Appropriate training should be provided to all site staff identified within the risk assessment as having the potential to be exposed or encounter asbestos during their work in accordance with Regulation 10 of CAR2012.

It is the responsibility of the Contractor to ensure that mitigation measures are suitable and sufficient to prevent exposure to airborne asbestos so far as is reasonably practicable in accordance with Regulation 11 of CAR2012. However, the asbestos fibres detected at the site are within a soil matrix, if the soils are kept damp and appropriate site hygiene measures are in place, this should assist in minimising the risk of the release of airborne fibres.

7.9 Findings of the generic contamination risk assessments

The potential sources, pathways and receptors identified in the desk study (Section 2) have been investigated (Sections 4 and 5) and assessed (Sections 7.2 to 7.7). A Source-Pathway-Receptor linkage assessment has been undertaken and is presented in Appendix I (Table K.2).

A summary of the Source-Pathway-Receptor (SPR) contaminant linkages for which the risks may be unacceptable and require mitigation (those that are moderate or higher) are discussed in Table 7.8.

Table 7.8 assumes the following SPR linkages which have been discounted (subject to agreement) at the risk evaluation stage are confirmed by the regulators and the warranty provider as not requiring further consideration (mitigation). If these assumptions are not agreed during regulatory discussions, the conclusions as noted in Table 7.8 will need to be updated:

- Slightly elevated levels of copper and zinc were found in the Made Ground when compared to the GACs for plant life (US95 of 180.5mg/kg and 306.45mg/kg, versus the GAC of 135mg/kg and 300mg/kg respectively). However, there is no subsoil or topsoil growing medium on the site and this will be required to be imported anyway for landscaped areas. Also, the requirement for mitigation of risk to human health (discussed below) will also serve to mitigate risks to plant life.
- The WQT for zinc and fluoranthene in the Made Ground, aluminium, cadmium, cobalt, copper, manganese, sodium, nickel, antimony, selenium, zinc, ammonium, ammoniacal nitrogen, nitrite, sulphate and electrical conductivity (µS/cm) in the Glacial Till are exceeded. The greatest exceedances are typically concentrated only in one borehole, HYD-BH02. Also, due to the thickness of the Glacial Till, overlying the principal aquifer and the distance to the nearest surface water source, Hydrock does not believe the site poses a significant risk to Controlled Waters.

Table 7.8: Residual risks following risk evaluation

Contaminant Linkage				Comments	
Pollutant Linkage	Sources	Pathways	Receptors	General	Mitigation
PL 1.	Pervasive lead, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene and indeno(1,2,3,cd)pyrene in the Made Ground.	Ingestion, inhalation or direct contact.	Human health.	Significant exceedance of the GAC for lead, benz(a)anthracene and benzo(a)pyrene.	Mitigation required in the form of an engineered cover system.
PL 2.	Asbestos fibres in the Made Ground	Inhalation of fugitive dust.	Human health.	Asbestos fibres measured in soil samples.	Mitigation required in the form of an engineered cover system. In addition, any ACM encountered during construction will need to be handpicked and removed from site.
PL 3.	Methane from biodegradable matter in the Made Ground.	Migration through soils or groundwater to indoor air.	End users of new buildings (asphyxiation).	Characteristic Situation 2.	Mitigation required by the installation of suitable gas resistant membrane. To be installed by trained installer. To be validated and verified.
PL 4.			New buildings (damage by explosion).		
PL 5.	Carbon dioxide from biodegradable matter in the Made Ground.	Migration through soils or groundwater to indoor air.	End users of new buildings (asphyxiation).		
PL 6.	PAH in soils	Direct contact	Water supply pipes.	The Made Ground contain contaminants of concern at levels in excess of the GAC.	Installation of “Protectaline” (or similar) pipework .

7.10 Mitigation measures

The outline remediation strategy presented below is provided for guidance only, and does not represent a 'Remediation Options Appraisal', or a 'Remediation Strategy', prepared in accordance with LCRM (2019).

As shown in Table 7.8 (and subject to regulatory agreement), Hydrock consider the following mitigation is required to ensure the site is suitable for use for the proposed end use. The mitigation measures include:

- The installation of a 450mm engineered cover system in areas of soft landscaping and grassed sports pitches comprising a geo membrane underlying a subsoil beneath a topsoil thickness of between 150mm and 300mm (PL1 and PL2).
- Installation of Protectaline pipework (PL6).
- Installation of ground gas mitigation measures to comply with CS2 conditions (as described in Section 7.10.1) (PL3, PL4 and PL5).

The methodology for the remediation should be set out in a Remediation Strategy (which will include the 'Implementation Plan', the 'Verification Plan' and the 'Long Term Monitoring and Maintenance Plan'), which will need to be submitted to the warranty provider and the regulatory authorities for approval.

In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow reuse of suitable material at the site in accordance with waste regulations.

Verification reports by a competent independent geo-environmental specialist will be required following completion of any remedial works (including ground gas membrane installation).

7.10.1 Gas protection measures

Mitigation of the risk from ground gases needs to be undertaken in accordance with BRE 414, CIRIA 665, BS 8485:2015 +A1:2019, CIRIA C735. In accordance with BS 8485:2015 +A1:2019, the design of gas protection measures needs to be undertaken in accordance with the Characteristic Situation and the building type:

- The site is provisionally classified as Characteristic Situation 2.
- The school is classified as Type C building. As such, the houses require 2.5 points of protection. This is illustrated in Table 7.9.

Table 7.9: Gas protection score by CS and type of building (after BS 8485:2015 +A1:2019)

Characteristic Situation	Minimum gas protection score (points)			
	High risk		Medium risk	Low risk
	Type A building	Type B building	Type C building	Type D building
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5[(A)]	5.5[(A)]	4.5	3.5
5	_[(B)]	6.0[(A)]	5.5	4.5
6	_[(B)]	_[(B)]	_[(B)]	6.0

Characteristic Situation	Minimum gas protection score (points)			
	High risk		Medium risk	Low risk
	Type A building	Type B building	Type C building	Type D building
A) Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations. B) The gas hazard is too high for this empirical method to be used to define the gas protection measures.				

The final design of ground gas protection measures is to be specified by the designer (in accordance with CIRIA 665) and BS 8485:2015 +A1:2019) and the protection will need to be achieved by a combination of two or more of the following three types of protection measures:

- the structural barrier of the floor slab;
- ventilation measures; and
- gas resistant membrane.

Where design elements are required to meet certain standards to qualify for the protection points (e.g. cast *in situ* monolithic reinforced floor slab), it is up to the designer to ensure the minimum requirements of the standards are met.

Where used, gas resistant membranes should be:

- sufficiently impervious to methane and carbon dioxide;
- capable, after installation, of providing a complete barrier to the entry of the relevant gas;
- sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- sufficiently strong to withstand in service stresses (e.g. due to ground settlement if placed below a floor slab);
- sufficiently strong to withstand the installation process and following construction activities until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, and dropping tools); and
- chemically resistant to degradation by other contaminants that might be present.

As preliminary guidance, Hydrock would suggest the following:

Either:

- Beam and block or pre-cast concrete floor slab (0 points);
- passive sub floor ventilation e.g. void (good performance 1.5 points); and
- 2000g gas resistant membrane (2.0 points).

Or:

- Cast *in situ* ground-bearing floor slab (with only nominal mesh reinforcement) (0.5 points);
- 2000g gas resistant membrane (2.0 points).

Other variations are possible. It is up to the designer to design and specify ground gas protection measures.

Where a gas resistant membrane is required as part of the design, all joints and penetrations are to be sealed and the installation is to be verified in accordance with CIRIA C735 (Mallet et al 2014) or it will score zero points and will not be deemed to afford any protection. This verification will involve verification by the Contractor and independent verification on a selected number of plots by Hydrock or alternative qualified independent third-party.

Whilst tape can be utilised to seal the seams Hydrock would recommend the membranes are sealed using welded seams and the use of specialist seals around penetrations (top hats etc.). The installer is to present an installation methodology and a QA/QC plan for installation to Hydrock for comment, with particular attention given to sealing the membrane.

In order to achieve the points specified for ventilation, the architect is to design passive ventilation to meet at least 'good performance', as described in Annex B of BS 8485:2015 +A1:2019.

8. WASTE AND MATERIALS MANAGEMENT

8.1 Introduction

The Waste Framework Directive (WFD) (2009/98/EC) defines waste as '*any substance which the holder discards or intends to discard.*' In a geo-environmental context, the waste is most often 'soil' and the two main scenarios are offsite disposal of the material as a waste and/or reuse of the material on site. For cost and sustainability reasons, reuse is preferred to off-site disposal.

Section 8.2 below describes the key issues relating to off-site disposal to landfill and Section 8.3 considers requirements relating to reuse of soils and materials management.

8.2 Waste disposal

8.2.1 Principles

Based on the WFD, any material excavated on site may be classified as waste and it is the responsibility of the producer of a material to determine whether or not it is waste. Where off-site disposal is undertaken, the following guidance applies.

Classification is a staged process:

- A hazardous waste is defined under the WFD as one which possesses one or more of fifteen defined hazardous properties. If a waste is not defined as hazardous, then it is non-hazardous.
- Where the materials are soil, it is then be assigned using the 'List of Waste Codes', which classifies the material as either:
  - hazardous (17-05-03), which is defined as "*soil and stones containing hazardous substances*"; or
  - non-hazardous (17-05-04), which is defined as "*soil and stones other than those mentioned in 17-05-03*".
  - Hydrock utilise the proprietary assessment tool, HazWasteOnline™ to undertake this assessment.
- Waste Acceptance Criteria (WAC) testing is then undertaken if required, and are only applicable following classification of the waste, and only where the waste is destined for disposal to landfill. The WAC are both qualitative and quantitative. The WAC and the associated laboratory analyses (leaching tests) are not suitable for use in the determination of whether a waste is hazardous or non-hazardous.

It should be noted that some non-hazardous wastes may be suitable for disposal at an inert landfill as non-hazardous waste, subject to meeting the appropriate waste acceptance criteria.

It should be noted that classification must be undertaken on the waste produced, by the waste producer. Necessary sampling frequency to adequately characterise a soil population is defined within WM3.

Further discussion with regards to the characterisation process for different scenarios and waste types is provided below.

Topsoil and Peat

Topsoil and peat are biodegradable, therefore if they are surplus to requirements and cannot be re-used in accordance with a Materials Management Plan, they cannot be classified as inert. As such, topsoil and peat need to be classified by a staged assessment and sampling process and would either be classified as hazardous or non-hazardous, depending upon the results of the assessment.

Greenfield Sites

Waste from completely greenfield sites may be accepted at a landfill as inert waste if it meets the requirements of paragraph 10 (wastes acceptable without testing at landfills for inert waste) of the Landfill (England and Wales) (Amendment) Regulations (2005) ('the Regulations') can be met. Paragraph 10 of the Regulations states, "*soils may be able to be classified as inert waste without testing, if:*

- *they are single stream waste of a single waste type;*
- *there is no suspicion of contamination and they do not contain other material or substances such as metals, asbestos, plastics, chemicals, etc….."*

As such, where the site is greenfield and the waste producer is confident about the quality of a soil (i.e. naturally occurring and uncontaminated), further sampling and laboratory testing is not necessary for the Basic Characterisation and this can be undertaken on qualitative Waste Acceptance Criteria testing.

In this instance the waste producer can characterise the waste based on visual assessment and written description of the waste in addition to supporting evidence such as a desk study assessment of the greenfield status. However, it should be noted this characterisation is subject to agreement by the landfill operator who may require testing to be undertaken to confirm classification.

Contaminated or potentially contaminated sites

If the site is brownfield, contaminated or potentially contaminated, the waste must undergo an initial waste classification exercise using background information on the source and origin of the waste and assessment of chemical test data in accordance with Environment Agency Technical Guidance WM3.

If following the initial waste classification exercise, the soils are acceptable for disposal to a non-hazardous landfill, further qualitative Waste Acceptance Criteria (WAC) testing is not required.

However, if soils are potentially able to be disposed to an inert landfill as non-hazardous waste, or require testing to determine if they can be disposed of to a stable non-reactive hazardous or hazardous class of landfill, the next stage of assessment is to undertake qualitative WAC testing. This will determine the Basic Characterisation and the landfill category at which the soils can be accepted.

Hazardous material must be subjected to WAC testing to determine whether it requires treatment before it can be accepted at the hazardous landfill, while non-hazardous material can be tested to determine whether it may be suitable for placement in an inert landfill.

8.2.2 HazWasteOnline™ assessment

As the site is brownfield, in order to inform the preliminary waste characterisation process, Hydrock has undertaken an exercise using the proprietary web-based tool HazWasteOnline™. The output of the HazWasteOnline™ assessment is provided in Appendix G and a summary of the preliminary waste classification is provided below in Section 8.2.4.

It should be noted that some of the soil samples assessed as part of the HazWasteOnline™ are classified as potentially hazardous on account of the designation 'HP3i' (with regards to petroleum hydrocarbons). However, based upon carbon banding of the TPH, the findings of the investigation and the way the petroleum hydrocarbons are distributed within the soil, it is likely that the potential for the soil being hazardous on account of HP3i can be all but discounted and it would be reasonable to assume that the result would indicate that the soil, would be non-hazardous as a result of the TPH content.

8.2.3 WAC Testing

The site is brownfield and the qualitative WAC tests are provided in Appendix G and a summary of the preliminary waste disposal options is provided below in Section 8.2.4.

The WAC test undertaken was on Made Ground present in HYD-WS01 at 0.40m bgl and HYD-SA05 at 1.00m bgl . The Made Ground is classified as hazardous due to Antimony concentration of 0.061mg/khg - 13mg/kg.

8.2.4 Preliminary waste disposal options

The site is brownfield and based on the site history, WAC testing and the HazWasteOnline™ assessment, if suitable segregation of different types of waste is put in place, for soils to be disposed of, it is considered that:

- The Made Ground soils are likely to be classified as 'Hazardous' waste and based on the WAC testing should be able to be disposed of at an hazardous waste landfill.
- Any soils containing > 0.1% asbestos or visible asbestos containing materials would be considered as hazardous.
- Screening and testing should be undertaken on bituminous bound pavement. If testing indicates that coal tars are not present, or below hazardous waste limits (0.1%), they will likely be classified as non-hazardous waste.

8.2.5 General waste comments

It should be noted that:

- It is the waste producer's responsibility to segregate the waste at source and waste producers must not mix waste materials/streams or dilute hazardous components, for example by mixing with less or non-hazardous waste on site to meet WAC limit values.
- The above preliminary assessment has been made on the basis of the soils tested as part of the ground investigation, using WAC testing and the HazWasteOnline™ assessment. However, the formal classification of waste can only be undertaken on the material to be disposed of, and by the waste producer and the receiving landfill as license conditions vary from landfill to landfill.
- Basic Characterisation should be undertaken in accordance with Environment Agency guidance by the waste producer. Hydrock can assist if required and this report will assist the characterisation.

However, Basic Characterisation does not form part of the current commission and would require further assessment and testing on the wastes actually to be disposed.

- Once the waste producer has undertaken an initial Basic Characterisation on each waste stream, they can manage the soils as part of the on-site processing programme (for example, stockpiling, treatment, screening and separation). The waste producer and landfill operator will then need to agree the suite of compliance testing for regularly generated waste to demonstrate compliance with the initial Basic Characterisation prior to disposal.
- At the time of disposal, additional testing on the excavated soils to be disposed of, will likely be necessary.
- Non-hazardous and hazardous soils require pre-treatment (separation, sorting and screening) prior to disposal.
- The costs for disposal of non-hazardous and hazardous soils are significant compared to disposal of inert material.
- In addition to disposal costs, landfill tax will be applicable. Non-hazardous and hazardous waste will generally be subject to the Standard Rate Landfill Tax. Inert or inactive waste will generally be subject to the Lower Rate Landfill Tax. The landfill tax value changes each April and can be found at https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2013.
- Before a waste producer can move waste to a landfill site for disposal, they need to check the landfill site has the appropriate permit and must have completed the following[3]:
  - Duty of care transfer note / Hazardous Waste consignment note, including comment as to if pre-treatment has been undertaken; and
  - Basic Characterisation of the waste, to include: description of the waste; waste code (using list of wastes); composition of the waste (by testing, if necessary) and; WAC testing (if required).

8.3 Materials management

8.3.1 Introduction

Soils that are to remain on site, should be managed and reused in accordance with a Materials Management Plan (MMP), prepared in accordance with 'The Definition of Waste: Development Industry Code of Practice', Version 2 (CL:AIRE), known as the DoWCoP. Where all aspects of the DoWCoP are followed the soils are considered not to be waste, because they were never discarded in the first place.

Version 2 of the DoWCoP clearly sets out the principles and an outline of the requirements of a MMP. The following compliance criteria must be seen to apply to the MMP for the site:

- Factor 1: Protection of human health and protection of the environment.
- Factor 2: Suitability for use, without further treatment.
- Factor 3: Certainty of Use.
- Factor 4: Fixed Quantity of Material.

[3] ENVIRONMENT AGENCY. November 2010. Guidance on waste acceptance procedures and criteria. Waste acceptance at landfills. The Environment Agency.

The reuse of soils at sites should be considered during the planning and development design process so that compliance with issues such as fixed quantity and certainty of use clearly relate to agreed site levels. Suitability of Use is normally evident from the remediation strategy or the design statement, which form an integral part of a MMP. However, some soils may need to be tested post-excavation to prove they are suitable for use.

Once the MMP is finalised, it must be declared by a Qualified Person (QP). The Declaration is an on-line submission as part of which the QP is required to confirm that the declaration is being made before the relevant works have commenced (i.e. it is not a retrospective application).

Once all material movements have been completed in accordance with the MMP a verification report must be produced, kept for 2 years and provided to the EA on request.

It should be noted that failure to comply with the requirements of the DoWCoP when re-using materials has potentially significant consequences for the waste holder. The risk is that the reused materials are still regarded as a waste that has been illegally deposited. From 1 April 2018, the scope of Landfill Tax has been extended to sites operating without the appropriate environmental disposal permit, and operators of illegal waste sites will now be liable for Landfill Tax. Further information is available at: https://www.gov.uk/government/publications/landfill-tax-disposals-not-made-at-landfill-sites/landfill-tax-disposals-not-made-at-landfill-sites.

If soils are excavated and reused on sites (or moved to another site) without a MMP, exemption, or appropriate Permit in place, anyone who knowingly facilitates the disposal may be *'jointly and severally liable'* to any assessment of tax, fines or prosecution.

8.3.2 Materials management scenarios

The materials management scenarios present on site are discussed below.

It should be noted that more than one scenario may apply, dependent upon where the soils are proposed for reuse.

Made Ground and other contaminated soils

On sites where Made Ground or contaminated soils are present, any soils excavated will be a waste as soon as they are excavated (even if they are clean, naturally occurring materials), unless they are subject to reuse in accordance with the DoWCoP. As such, for any brownfield site or a site where Made Ground is present and soils are being moved and reused, the materials could be deemed a waste, subject to either:

- a Materials Management Plan (MMP), to prevent the material being classified as a waste following reuse; or
- an exemption (for limited volumes); or
- an environmental permit, dependant on its status.

Other commonly occurring circumstances are:

If Made Ground is being moved between sites, it must be ensured that appropriate permits are in place to ensure the soils are not classified as a waste. Made Ground cannot be moved between sites under DoWCoP alone and would require relevant permits as part of the MMP documentation for the Hub site the material is being treated at.

All recycled materials (6F2 etc.) must be produced under the 2013 WRAP 'Quality Protocol: Aggregates from inert waste', whether on site or off-site. If they are not, they will be deemed a waste and can only be used on site under a permit. More information can be found at https://www.gov.uk/government/publications/quality-protocol-production-of-aggregates-frm-inert-waste.

Geotechnical improvement requirements

Construction activities carried out on uncontaminated soils solely for the purpose of improving geotechnical properties e.g. lime / cement modification, are not generally regarded as waste treatment operations and do not require a permit.

However, should processing be needed (such as screening, treatment or improvement), that would constitute a waste activity and require a mobile treatment permit. This may be as simple as removing oversize material with an excavator bucket, to using a riddle bucket to remove hardcore to full mechanical screening.

9. UNCERTAINTIES AND LIMITATIONS

9.1 Site-specific comments

The gas monitoring is ongoing and the conclusions of this report will be updated following completion of the scheduled monitoring.

Also, due to a delay at the Chemical Laboratory the asbestos quantifications for the Hydrock investigation have not yet been reported.

9.2 General comments

Hydrock Consultants Limited (Hydrock) has prepared this report in accordance with the instructions of Sir Robert McAlpine Ltd (the Client), by e-mail dated February 2021 under the terms of appointment for Hydrock, for the sole and specific use of the Client and parties commissioned by them to undertake work where reliance is placed on this report. Any third parties who use the information contained herein do so at their own risk. Hydrock shall not be responsible for any use of the report or its contents for any purpose other than that for which it was prepared or for use of the report by any parties not defined in Hydrock's appointment.

This report details the findings of work carried out in March and April 2021. The report has been prepared by Hydrock on the basis of available information obtained during the study period. Although every reasonable effort has been made to gather all relevant information, not all potential environmental constraints or liabilities associated with the site may have been revealed.

Hydrock has used reasonable skill, care and diligence in the design of the investigation of the site and in its interpretation of the information obtained. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred.

Groundwater data are only representative of the dates on which they were obtained and both levels and quality may vary.

Unless otherwise stated, the recommendations in this report assume that ground levels will remain as existing. If there is to be any re-profiling (e.g. to create development platforms or for flood alleviation) then the recommendations may not apply.

Information provided by third parties has been used in good faith and is taken at face value; however, Hydrock cannot guarantee its accuracy or completeness.

Where the existing report(s) prepared by others have been provided by the Client, it is assumed that these have been either commissioned by the Client, or can be assigned to the Client, and can be relied upon by Hydrock. Should this not be the case Hydrock should be informed immediately as additional work may be required. Hydrock is not responsible for any factual errors or omissions in the supplied data, or for the opinions and recommendations of others. It is possible that the conditions described may have since changed through natural processes or later activities.

The work has been carried out in general accordance with recognised best practice. The various methodologies used are referenced in Appendix J. Unless otherwise stated, no assessment has been made for the presence of radioactive substances or unexploded ordnance. Where the phrase 'suitable for use' is used in this report, it is in keeping with the terminology used in planning control and does not imply any specific warranty or guarantee offered by Hydrock.

The chemical analyses reported were scheduled for the purposes of risk assessment with respect to human health, plant life and controlled waters as discussed in the report. Whilst the results may be useful in applying the Hazardous Waste Assessment Methodology given in Environment Agency Technical Guidance WM3, they are not primarily intended for that purpose and additional analysis will be required at the time of disposal to fully classify waste. Discussion and comment with regards to waste classification are preliminary and do not form the requirements of 'Basic Characterisation' as required.

Assessment and testing for the presence of coal tar has only been completed at the locations of exploratory holes undertaken for risk assessment purposes. This investigation is not designed to provide a definitive assessment of the risk from coal tar, nor the waste classification for bituminous bound pavement arisings at the site.

Unless otherwise stated, at the time of this investigation the future routes of water supply pipes had not been established. This investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling and chemical testing may be required at a later date once the routes of the supply pipes are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

Whilst the preliminary risk assessment process has identified potential risks to construction workers, consideration of occupational health and safety issues is beyond the scope of this report.

Please note that notwithstanding any site observations concerning the presence or otherwise of archaeological sites, asbestos-containing materials or invasive weeds, this report does not constitute a formal survey of these potential constraints and specialist advice should be sought.

Any site boundary line depicted on plans does not imply legal ownership of land.

10. RECOMMENDATIONS FOR FURTHER WORK

Following the ground investigation works undertaken to date, the following further works will be required:

- discussion with specialists with regard to the presence of Japanese Knotweed within or close to the site boundary;
- completion and reporting of the ongoing gas monitoring, hence the conclusions in this report are provisional, subject to the completion of monitoring;
- discussion and agreement with utility providers regarding the materials suitable for pipework;
- discussions with regulatory bodies and the warranty provider regarding the conclusions of this report;
- assessment of tree influence on foundations and design of foundations;
- provision of geotechnical design for the Category 2 structures (floor slabs and foundations);
- production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies and the warranty provider);
- production of a Materials Management Plan relating to reuse of soils at the site and import of soils to the site;
- production of an asbestos management plan;
- remediation and mitigation works; and
- verification of the earthworks, remediation and mitigation works.

11. REFERENCES

ALLEN, D. L., BREWERTON, L. J., COLEBY, L. M., GIBBS, B. R., LEWIS, M. A., MACDONALD, A. M., WAGSTAFF, S. J. and WILLIAMS, A.T. 1997. The physical properties of major aquifers in England and Wales. British Geological Survey Technical Report WD/97/34. 312pp. Environment Agency R and D Publication 8.

ASSOCIATION OF GROUND INVESTIGATION SPECIALISTS. 2006. Guidelines for Good Practice in Site Investigation. Issue 2. AGS, Beckenham.

ASSOCIATION OF GROUND INVESTIGATION SPECIALISTS. 2019. Waste Classification for Soils – A Practitioners' Guide. AGS, Beckenham.

ASSOCIATION OF DIRECTORS OF ENVIRONMENT, ECONOMY, PLANNING & TRANSPORT (ADEPT) AND CONSTRUCTION WASTE FORUM (CWF). August 2019. Managing Reclaimed Asphalt. Highways and Pavements. An ADEPT and Construction Waste Forum Guidance Note.

BRE. 1980. Low-rise buildings on shrinkable clay soils: Part 1. BRE Digest 240. Building Research Establishment, Garston.

BRE. 1999. The influence of trees on house foundations in clay soils. BRE Digest 298. Building Research Establishment, Garston.

BRE. 2016. Soakaway design. BRE DG 365. BRE, Garston.

BRE. 2000. Specifying Vibro Stone Columns. BR391. BRE, Garston.

BRE. 2004. Working platforms for tracked plant: good practice guide to the design, installation, maintenance and repair of ground-supported working platforms. BR470. BRE, Garston.

BRE. 2005. Concrete in aggressive ground. BRE Special Digest 1, 3rd Edition. BRE, Garston.

BRITISH PLASTIC FEDERATION. August 2018. 'Designing Drains and Sewers for Brownfield Sites. Guidance Notes'. BPF Pipes Group (https://www.bpfpipesgroup.com/media/29155/Designing-drains-and-sewers-for-brownfield-sites.pdf)

BRITISH STANDARDS INSTITUTION. 2015. Code of Practice for Foundations. BS 8004. BSI, London.

BRITISH STANDARDS INSTITUTION. 2003. Geotechnical investigation and testing - Identification and classification of rock - Part 1: Identification and description. BS EN ISO 14689-1 Incorporating Corrigendum No.1. BSI, London

BRITISH STANDARDS INSTITUTION. 2015+A2 2019. Concrete – complementary British Standard to BS EN 206-1 – Part 1: Method of specifying and guidance to the specifier. BS 8500-1+A2 2019. BSI, London.

BRITISH STANDARDS INSTITUTION. 2007. Eurocode 7 – Geotechnical design - Part 2: Geotechnical investigation and testing. BS EN 1997-2. BSI, London.

BRITISH STANDARDS INSTITUTION. 2009. Code of practice for earthworks. BS 6031 Incorporating Corrigendum No.1:2010. BSI, London.

BRITISH STANDARDS INSTITUTION. 2011. Code of Practice for Investigation of Potentially Contaminated sites. BS 10175 Incorporating Amendment No. 2:2017. BSI, London.

BRITISH STANDARDS INSTITUTION. 2012. Trees in relation to design, demolition and construction – Recommendations. BS 5837. BSI, London.

BRITISH STANDARDS INSTITUTION. 2012. Geotechnical investigation and testing — Geohydraulic testing Part 2: Water permeability tests in a borehole using open systems BS EN ISO 22282-2. BSI, London.

BRITISH STANDARDS INSTITUTION. 2004+A1 2013. Eurocode 7 – Geotechnical design - Part 1: General rules. BS EN 1997-1+A1. Incorporating Corrigendum February 2009. BSI, London.

BRITISH STANDARDS INSTITUTION. 2015. Specification for topsoil. BS 3882. BSI, London.

BRITISH STANDARDS INSTITUTION. 2015. Code of practice for ground investigations. BS 5930. BSI, London.

BRITISH STANDARDS INSTITUTION. 2015+A1 2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. BS 8485:2015 +A1:2019. BSI, London.

CARD, G., WILSON, S. and MORTIMER, S. 2012. A pragmatic approach to ground gas risk assessment. CL:AIRE Research Bulletin RB17. CL:AIRE, London.

CIEH and CL:AIRE. May 2008. Guidance on comparing soil contamination data with a critical concentration. Chartered Institute of Environmental Health and Contaminated Land: Applications in Real Environments, London.

CLAYTON, C. R. I. 2001. Managing Geotechnical Risk. Improving productivity in UK building and construction. Thomas Telford, London.

CL:AIRE. March 2011. The Definition of Waste: Development Industry Code of Practice, Version 2. Contaminated Land: Applications in the Real Environment (CL:AIRE), London.

CL:AIRE. March 2016. CAR-SOIL™ Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance. Contaminated Land: Applications in the Real Environment (CL:AIRE), London.

CONCRETE SOCIETY, THE. 2013. Concrete industrial ground floors. A guide to design and construction. Technical Report 34 (4th Ed.). The Concrete Society, Camberley.

DCLG. February 2019. National Planning Policy Framework. DCLG, London.

DEPARTMENT FOR ENVIRONMENT FOOD AND RURAL AFFAIRS (DEFRA). 2005. 'Landfill (England and Wales) (Amendment) Regulations', (with reference to previous iterations of the regulations).

DEFRA. March 2014. SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document. Defra, London.

ENVIRONMENT AGENCY. June 2001. National Groundwater and Contaminated Land Centre Report NC/99/73: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. The Environment Agency, Bristol.

ENVIRONMENT AGENCY. 2006. Remedial Targets Methodology. Hydrogeological Risk Assessment for Land Contamination. The Environment Agency, Bristol.

ENVIRONMENT AGENCY. November 2010. Guidance on waste acceptance procedures and criteria. Waste acceptance at landfills. The Environment Agency.

ENVIRONMENT AGENCY. November 2010. Environment Agency Regulator Position Statement 075 (EARPS075). The Environment Agency.

ENVIRONMENT AGENCY. November 2011. Treatment of waste for landfill. Report – GEHO1111BVDF-E-E 913_11, Version 2 The Environment Agency. http://publications.environment-agency.gov.uk/pdf/GEHO1111BVDF-E-E.pdf

ENVIRONMENT AGENCY. 2018. Waste classification. Guidance on the classification and assessment of waste (1st Edition v1.1) Technical Guidance WM3. The Environment Agency.

ENVIRONMENT AGENCY. 2019. Land Contamination: Risk Management (LCRM). The Environment Agency.

HATANAKA, M, UCHIDA, A, KAKURAI, M, and AOKI, M. 1980. A consideration on the relationship between SPT N-value and internal friction angle of sandy soils. Journal of Structural and Construction Engineering (Transactions of AIJ). 63. 125-129. 10.3130/aijs.63.125_2.

HEALTH and SAFETY EXECUTIVE. December 2005. Construction Information Sheet 47: Inspections and Reports (CIS 47 (Rev 1)). HSE.

HEALTH and SAFETY EXECUTIVE. December 2005. EH40/2005 Workplace Exposure Limits (2nd edition 2011,). HSE.

HEALTH and SAFETY EXECUTIVE. 2014. HSG47 - Avoiding danger from underground services (Third edition). HSE.

HIGHWAYS AGENCY. 2009. Design Guidance for Road Pavement Foundations (Draft HD25). Interim Advice Note 73/06. Rev 1. Highway Agency, London.

HIGHWAYS AGENCY. 2014. Manual of Contract Documents for Highway Works, Specification for Highway Works: Volume 1, Amendment August 2014. Highway Agency, London.

THE HIGHWAYS AGENCY. 2015. Design Manual, Road and Bridges: Volume 4, Geotechnics and Drainage; Section 1, Earthworks; Part 3, HD 41/15, Maintenance of highway geotechnical assets. HD 41/15.

THE HIGHWAYS AGENCY. 2019. Design Manual for Roads and Bridges. Managing Geotechnical Risk. CD 622 Rev 0. Highway Agency, London.

JOHNSON, R. 2001. Protective measures for housing on gas contaminated land. Building Research Establishment Report BR 414. BRE, Garston.

JONES, H. K., MORRIS, B. L., CHENEY, C. S., BREWERTON, L. J., MERRIN, P. D., LEWIS, M. A., MACDONALD, A. M., COLEBY, L. M., TALBOT, J. C., MCKENZIE, A. A., BIRD, M. J., CUNNINGHAM, J. and ROBINSON, V. K. 2000. The physical properties of minor aquifers in England and Wales. British Geological Survey Technical Report WD/00/04. 234pp. Environment Agency R and D Publication 68.

LORD, J.A., CLAYTON, C.R.I. and MORTIMORE, R.N. 2002. Engineering in Chalk. CIRIA Report C574. Contaminated Land: Applications in Real Environments, London.

McDOWELL, P.W, COULTON, J., EDMONDS, C.N. AND POULSOM, A.J. 'The nature, formation and engineering significance of sinkholes related to dissolution of chalk in SE Hampshire, England', Quarterly Journal of Engineering Geology and Hydrogeology 2008, v.41, p279-290.

MALLETT, H., COX, L., WILSON, S., and CORBAN, M. 2014. Good practice on the testing and verification of protection systems for buildings against hazardous ground gases. CIRIA Report C735. Contaminated Land: Applications in Real Environments, London.

MILES, J. C. H., APPLETON, J. D., REES, D. M., GREEN, B. M. R., ADLAM. K. A. M. and MYRES. A. H. 2007. Indicative Atlas of Radon in England and Wales. Health Protection Agency and British Geological Survey. Report HPA-RPD-033.

MINISTRY OF HOUSING, COMMUNITIES and LOCAL GOVERNMENT. 12 June 2014. Land affected by contamination. Planning Policy Guidance Reference ID: 33-007-20140612.

MINISTRY OF HOUSING, COMMUNITIES and LOCAL GOVERNMENT (MHCLG). Internet published Planning practice guidance https://www.gov.uk/government/collections/planning-practice-guidance. MHCLG. London

NATHANAIL P., JONES A., OGDEN, R., AND ROBERTSON A. 2014. Asbestos in soil and made ground: a guide to understanding and managing risks. CIRIA Report C733 Contaminated Land: Applications in Real Environments, London.

NHBC. 2019. NHBC Standards. NHBC, Milton Keynes.

PARRY, D. and CHIVERRELL, C. (eds). 2019. Abandoned Mine Workings Manual. CIRIA Report C758D. CIRIA, London.

PECK, R.B., HANSON, W.E., AND THORNBURN, T.H., Foundation Engineering, 2nd Edn, John Wiley, New York, 1967, p.310.

RAWLINS, B. G., McGRATH, S. P., SCHEIB, A. J., CAVE, N., LISTER, T. R., INGHAM, M., GOWING, C. and CARTER, S. 2012 .The advanced geochemical atlas of England and Wales. British Geological Survey, Keyworth.

SCIVYER, C. 2015. Radon: Guidance on protective measures for new buildings. Building Research Establishment Report BR 211. BRE, Garston.

SHAND, P., EDMUNDS, W.M., LAWRENCE, A.R., SMEDLEY, PAULINE, BURKE, S. 2007. The natural (baseline) quality of groundwater in England and Wales. Environment Agency, 72pp. (RR/07/006)

SoBRA, 2017. Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater. 90pp. Version 1.0.

STONE, K., MURRAY, A., COOKE, S., FORAN, J. and GOODERHAM, L. 2009. Unexploded ordnance (UXO), a guide to the construction industry. CIRIA Report C681. Contaminated Land: Applications in Real Environments, London.

STROUD, M. A. 1975. The standard penetration test in insensitive clays and soft rocks. Proceedings of the European Symposium on penetration testing, 2, 367-375.

TOMLINSON. M.J. 2001. Foundation Design and Construction (6th Edition and 7th Edition). Prentice Hall Press

WASTE AND RESOURCES ACTION PROGRAMME (WRAP). October 2013. Quality Protocol. Aggregates from inert waste. End of waste criteria for the production of aggregates from inert waste.

WATER UK HBF. January 2014. Contaminated Land Assessment Guidance. Water UK and the Home Builders Federation.

WELSH ASSEMBLY GOVERNMENT. July 2004. Development and flood risk. Planning Policy Wales, Technical Advice Note 15.

WELSH ASSEMBLY GOVERNMENT. December 2018. Planning Policy Wales, Edition 10.

WFD-UKTAG. July 2014. UKTAG River and Lake Assessment Method, Specific Pollutants (Metals), Metal Bioavailability Assessment Tool (M-BAT). Water Framework Directive – United Kingdom Technical Advisory Group. Stirling.

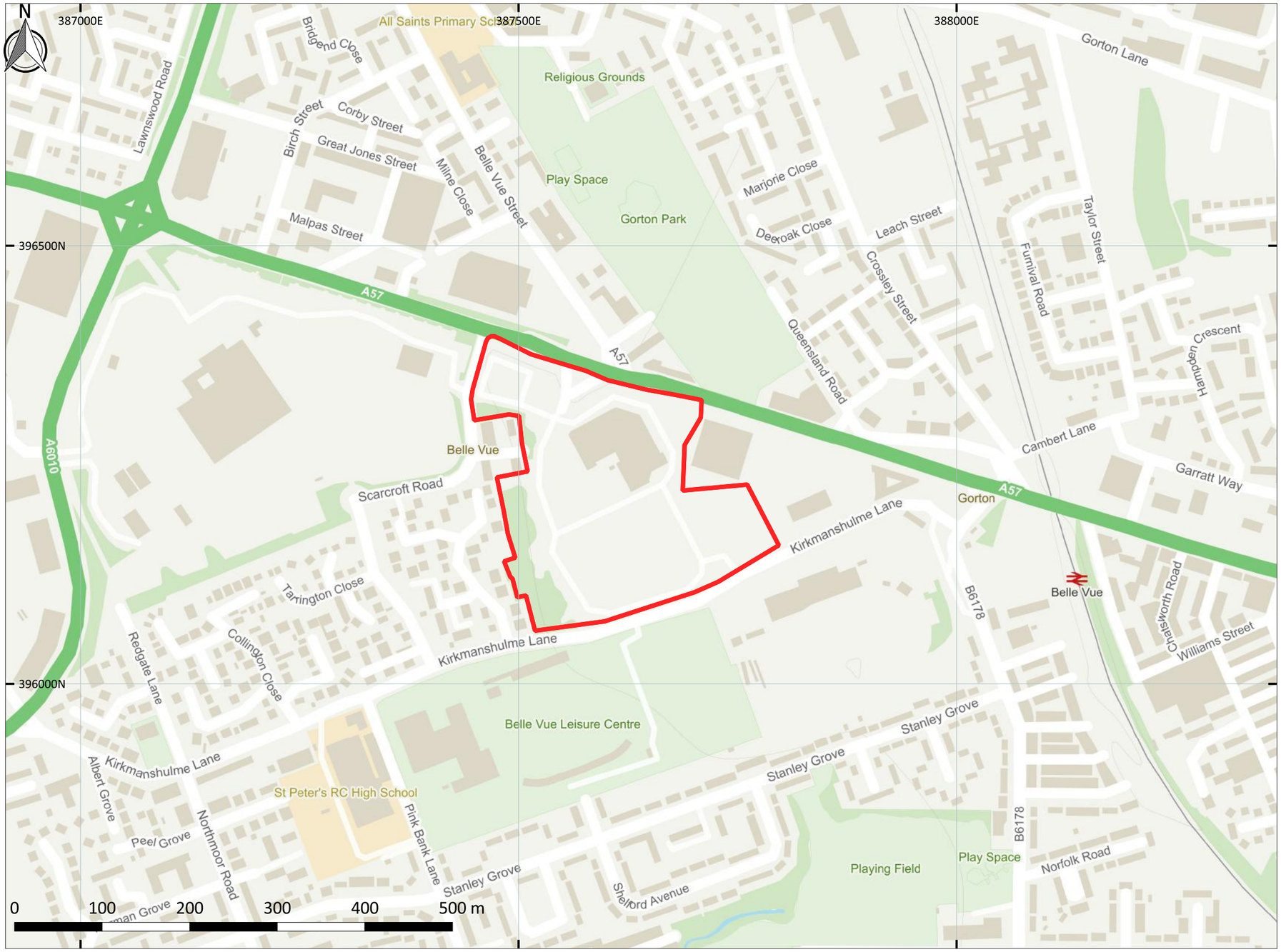
WILSON, S., OLIVER, S., MALLETT, H., HUTCHINGS, H. and CARD, G. 2007. Assessing risks posed by hazardous ground gases to buildings. CIRIA Report C665. Contaminated Land: Applications in Real Environments, London.

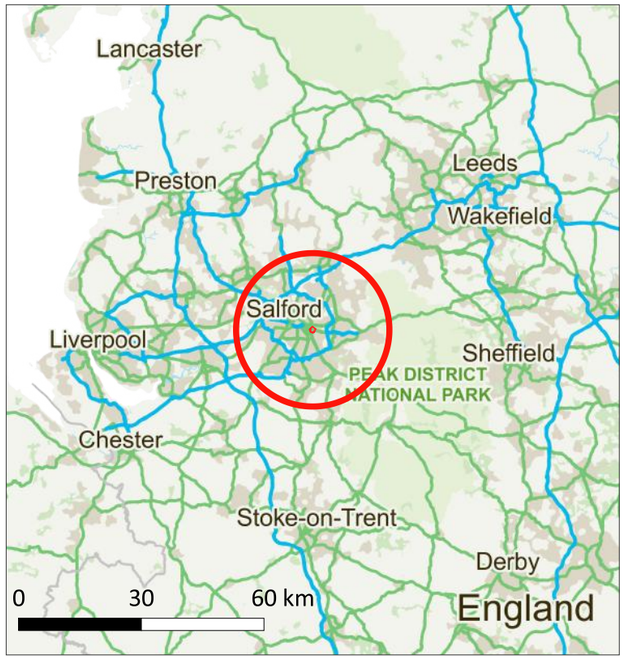
WILSON S., ABBOT S., MALLETT H. 2014. Guidance on the use of plastic membranes as VOC vapour barriers. CIRIA Report C748 Contaminated Land: Applications in Real Environments, London.

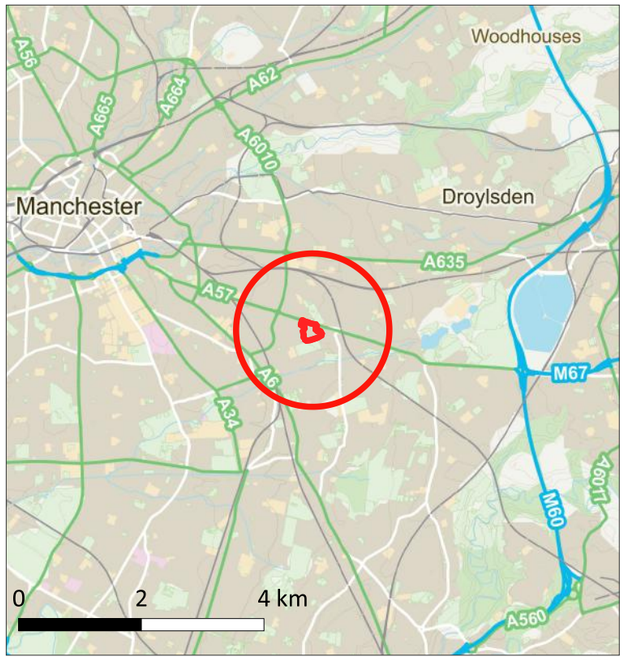
WILSON, S., COLLINS, F. and LAVERY, R., G. 30th July 2018. Using ternary plots for interpretation of ground gas monitoring results. Ground Gas Information Sheet No 1 Paper 1.0. Ambisense Limited and EPG Limited.

Appendix A

Drawings







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KEY PLAN

Site Boundary

NOTES

1. Contains OS data © Crown copyright and database right (2021)

REVISIONS

REV.	DRAWN BY INITIALS	CHECKED BY INITIALS	DATE	REVISION NOTES/COMMENTS
P01	GE	AC	23/04/21	First issue

Hydrock

TITLE
SITE LOCATION PLAN

HYDROCK PROJECT NO.
18170

SCALE @ A3
1:5,000

CLIENT
Sir Robet McAlpine Ltd

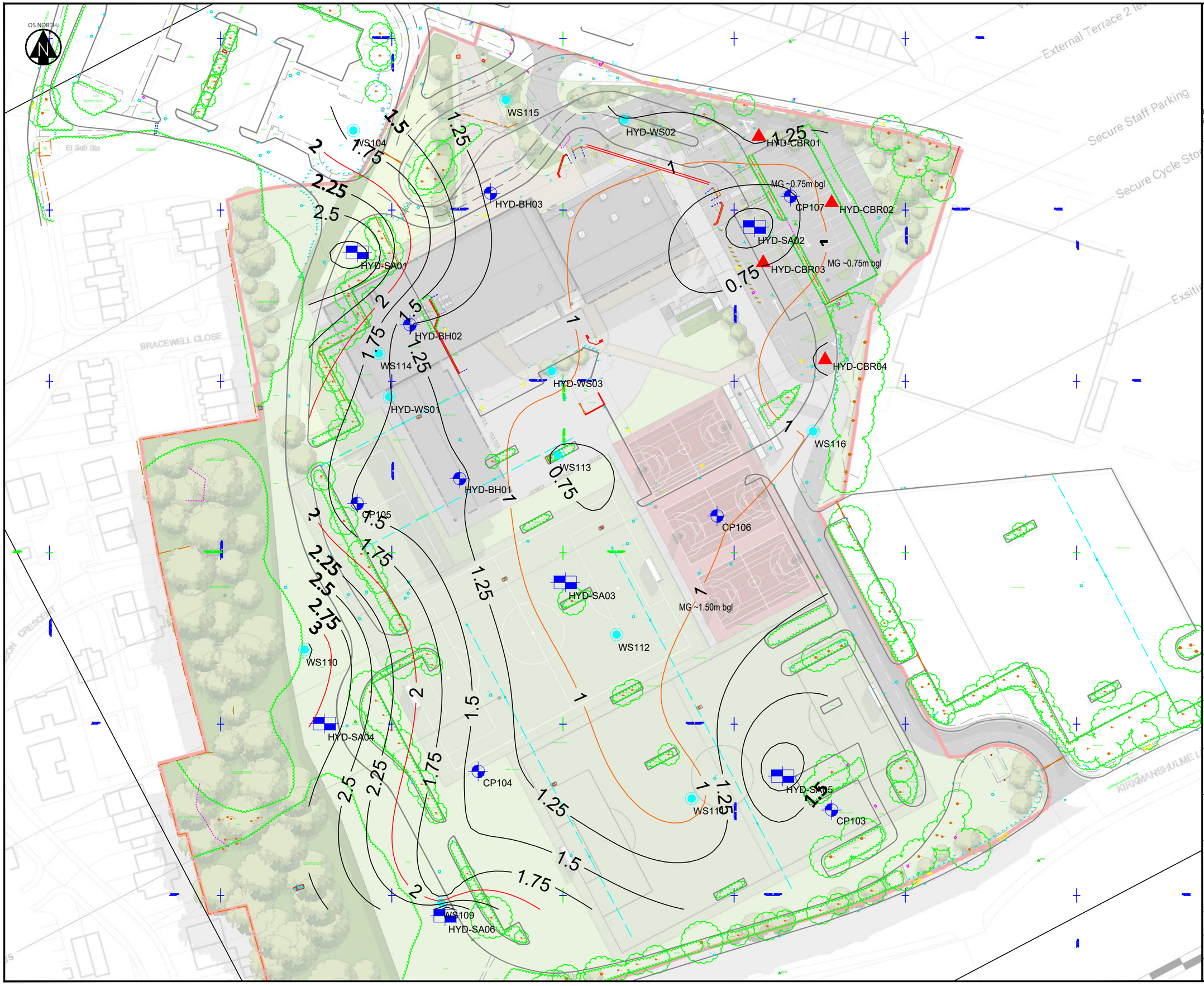
PURPOSE OF ISSUE
SUITABLE FOR INFORMATION

STATUS
S2

PROJECT
Belle Vue Co-op Academy, Hyde Road, Manchester

DRAWING NO.
18170-HYD-XX-XX-DR-GE-0001

REVISION
P01



KEY

HYS-SA0X	SOAKWAY TEST LOCATION
HYD-BH0X	CABLE PERCUSSIVE BOREHOLE
HYD-WS0X	WINDOWLESS SAMPLE BOREHOLE
CBR	PLATE BEARING TEST LOCATION

Boreholes with the prefix HYD - are Hydrock holes excavated in 2021, other holes are historical drilled by others.

NOTES

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.

2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

3. This drawing has been based on information provided by BDP including a topographical survey and proposed development plan produced by Space reference 01-XX-DR-L-910001 P02

REV.	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P02						
P01	FIRST ISSUE					
	WS	28/04/21	RS	29/04/21	DH	29/04/21

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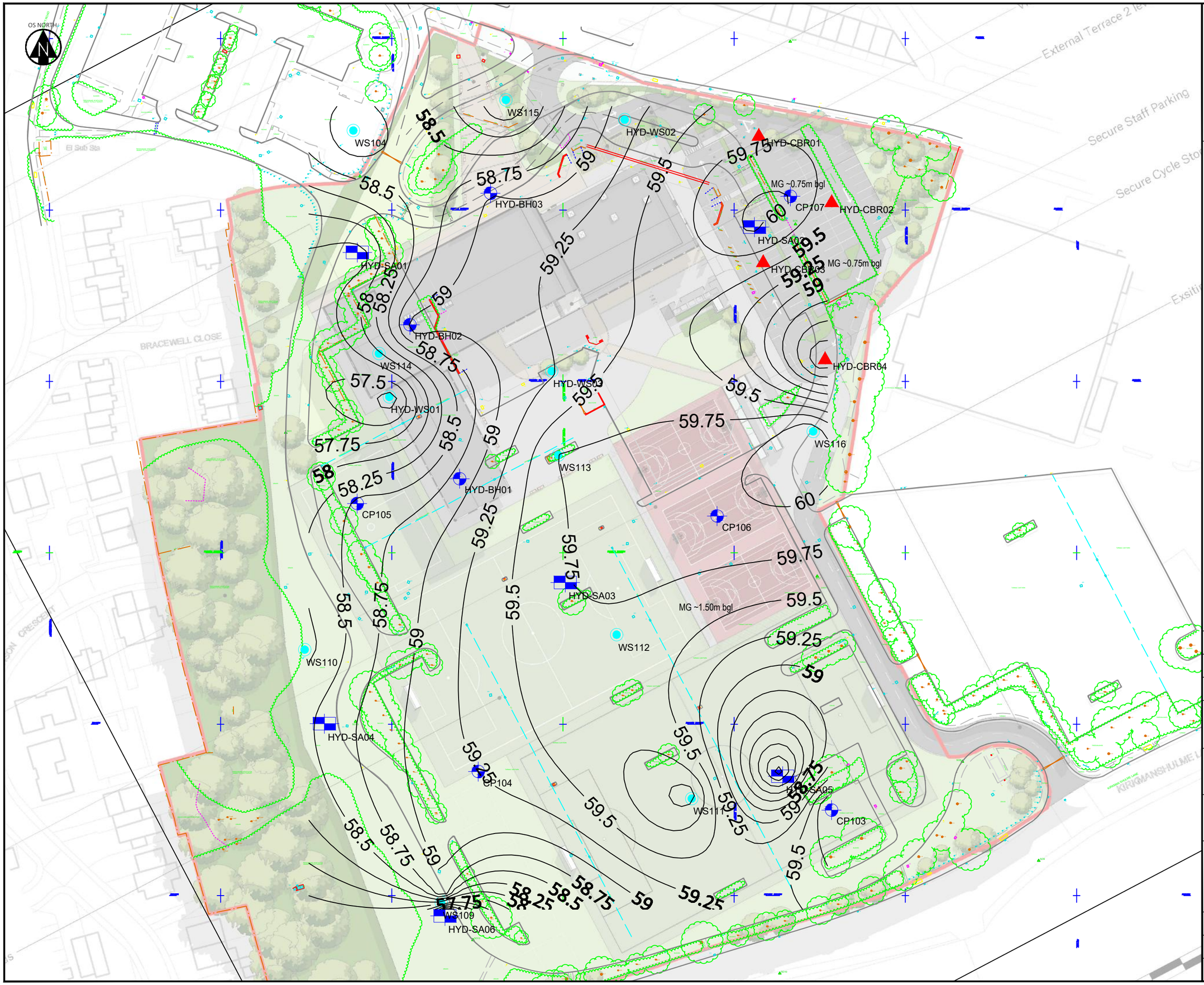
PROJECT
BELLE VUE CO-OP ACADEMY, HYDE ROAD, MANCHESTER

TITLE
DEPTH TO MADE GROUND
PLAN (mbgl)

HYDROCK PROJECT NO.	SCALE @ A3
C-18170	1:1000

PURPOSE OF ISSUE	STATUS
SUITABLE FOR INFORMATION	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
18170-HYD-XX-XX-DR-GE-1003	P02



KEY

- HYS-SA0X — SOAKWAY TEST LOCATION
- HYD-BH0X — CABLE PERCUSSIVE BOREHOLE
- HYD-WS0X — WINDOWLESS SAMPLE BOREHOLE
- CBR — PLATE BEARING TEST LOCATION

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REV.	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P02						
P01	FIRST ISSUE					
	WS	28/04/21	RS	29/04/21	DH	29/04/21

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CLIENT
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PROJECT
BELLE VUE CO-OP ACADEMY, HYDE ROAD, MANCHESTER

TITLE
BASE OF MADE GROUND PLAN (mOD)

HYDROCK PROJECT NO.	SCALE @ A3
C-18170	1:1000

PURPOSE OF ISSUE	STATUS
SUITABLE FOR INFORMATION	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
18170-HYD-XX-XX-DR-GE-1004	P02

Revision	Description	Author	Checker	Date
P01	Issued for Planning	LB	PB	06/01/21
P02	Redline Update & Annotation Clarification	PB	AW	16/03/21

SOFT LANDSCAPING

Refer to drawing 01-XX-DR-L-910012

HARD LANDSCAPING

Refer to drawing 01-XX-DR-L-910013

FENCING

Refer to drawing 01-XX-DR-L-910004

GATES

Refer to drawing 01-XX-DR-L-910016

N

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MANCHESTER CITY COUNCIL

Project
Belle Vue Co-op Academy, Manchester

Drawing Title
Proposed Site Plan

Project No.	Drawing No.	Status	Revision	Scale at A2
009433	01-XX-DR-L-910001		P02	As indicated

File Reference: 009433-SPACE-01-XX-DR-L-910001

Proposed Site Plan

1 : 1000

10m 100m

BIM 360://Hyde Road School/009433-SPA-01-ZZ-M3-A-0001-2020-S0-CENTRAL.rvt

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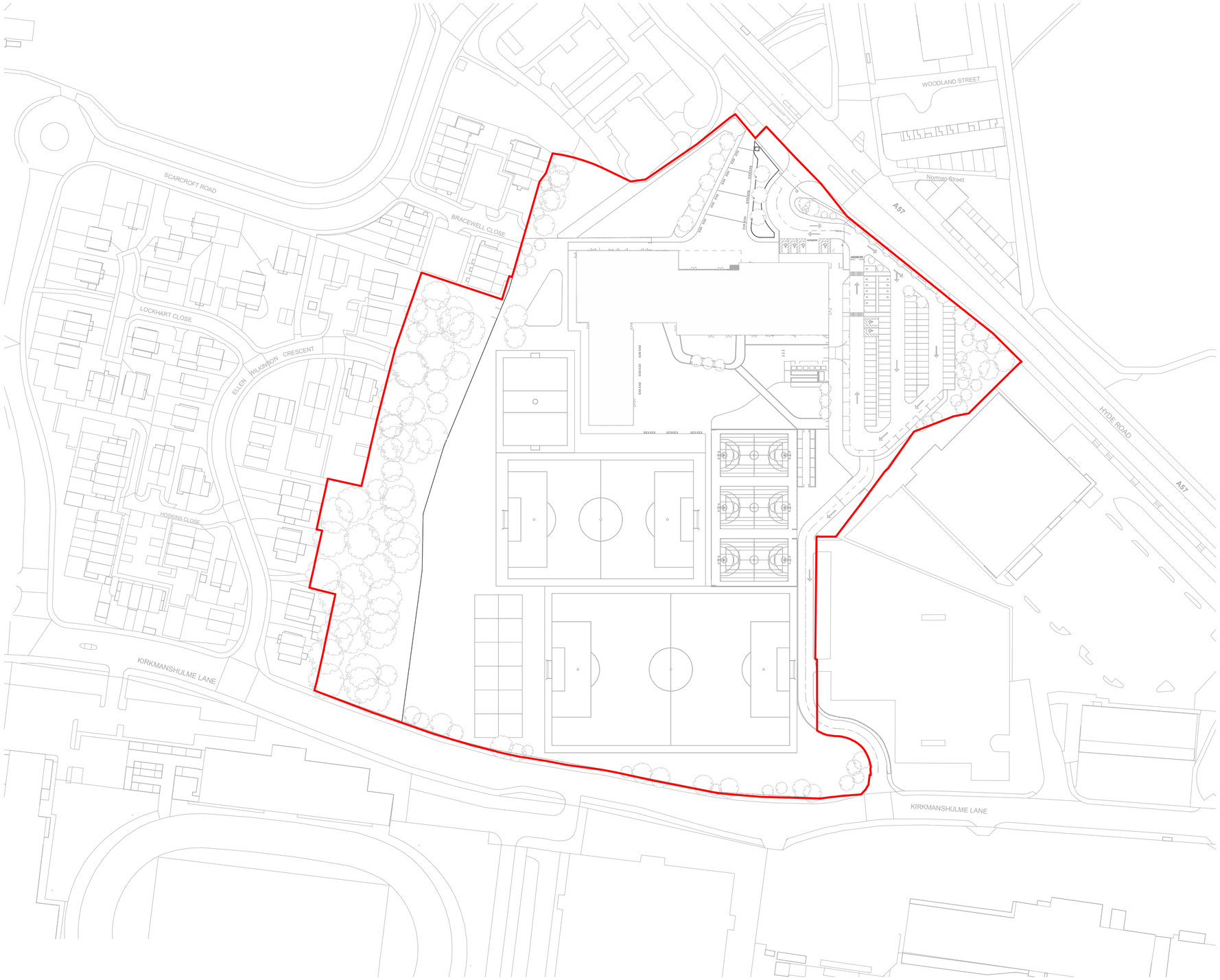
Revision	Description	Author	Checker	Date
P01	Issued for Planning	LB	PB	06/01/21
P02	Property line update	RG	NJ	25/02/21
P03	General Updates	RG	LB	16/03/21



N

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MANCHESTER CITY COUNCIL

Project
Belle Vue Co-op Academy, Manchester

Drawing Title
Application Boundary

Project No.	Drawing No.	Status	Revision	Scale at A2
009433	01-XX-DR-L-910002		P03	1:1250

File Reference: 009433-SPACE-01-XX-DR-L-910002

Application Boundary

1 : 1250

25m 125m

BIM 360://Hyde Road School/009433-SPA-01-ZZ-M3-A-0001-2020-S0-CENTRAL.rvt

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Revision	Description	Author	Checker	Date
P01	Issued for Planning	LB	PB	06/01/21
P02	Property line update	RG	LB	01/03/21
P03	General Updates	RG	LB	16/03/21

Proposed Area Around the Building Plan

1 : 500

BIM 360://Hyde Road School/009433-SPA-01-ZZ-M3-A-0001-2020-S0-CENTRAL.rvt

SOFT LANDSCAPING

Refer to drawing 01-XX-DR-L-910012

HARD LANDSCAPING

Refer to drawing 01-XX-DR-L-910013

FENCING

Refer to drawing 01-XX-DR-L-910004

GATES

Refer to drawing 01-XX-DR-L-910016

N

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MANCHESTER CITY COUNCIL

Project
Belle Vue Co-op Academy, Manchester

Drawing Title
Proposed Site Area Around Building

Project No.	Drawing No.	Status	Revision	Scale at A2
009433	01-XX-DR-L-910003		P03	As indicated

File Reference: 009433-SPACE-01-XX-DR-L-910003

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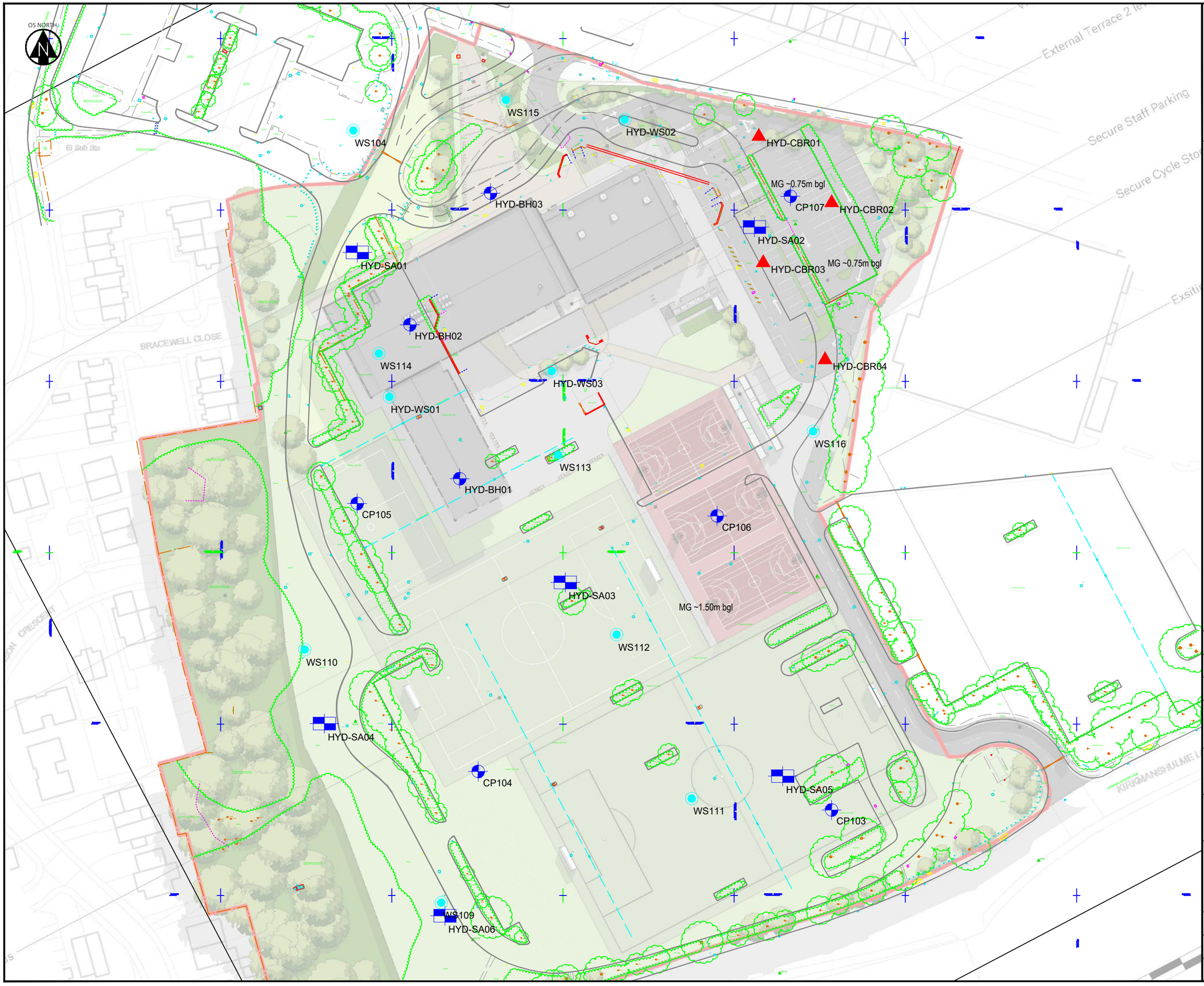
Appendix B

Field Reconnaissance Photographs

Appendix C

Exploratory Hole Location Plan, Exploratory Hole Logs and Photographs

Exploratory Hole Location Plan



KEY

HYS-SA0X	SOAKWAY TEST LOCATION
HYD-BH0X	CABLE PERCUSSIVE BOREHOLE
HYD-WS0X	WINDOWLESS SAMPLE BOREHOLE
CBR	PLATE BEARING TEST LOCATION

Boreholes with the prefix HYD - are Hydrock holes excavated in 2021, other holes are historical drilled by others.

NOTES

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.

2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

3. This drawing has been based on information provided by BDP including a topographical survey and proposed development plan produced by Space reference 01-XX-DR-L-910001 P02

REV.	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	FIRST ISSUE					
	WS	17/02/21	RS	17/02/21	DH	17/02/21
P02	Updated Exploratory Hole Locations					
	WS	24/03/21	AC	24/03/21	AC	24/03/21

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CLIENT

SIR ROBERT McALPINE LTD.

PROJECT

BELLE VUE CO-OP ACADEMY, HYDE ROAD, MANCHESTER

TITLE

EXPLORATORY HOLE LOCATION PLAN

HYDROCK PROJECT NO.	SCALE @ A3
C-18170	1:1000

PURPOSE OF ISSUE	STATUS
SUITABLE FOR INFORMATION	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
18170-HYD-XX-XX-DR-GE-1002	P02

Exploratory Hole Logs

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-BH01 Page No. 1 of 2	
Method: Cable Percussion	Date(s): 16/03/2021 - 17/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387569.83, 396221.61	Checked By: RS	Flush:
Hydrock Project No: C-18170	Ground Level: 60.18m OD		Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Depth (m)	Type	Results							
0.10 - 0.30	B			ASPHALT HARDSTANDING	0.10	(0.10)	60.08		
0.30 - 0.90	B			(MADE GROUND)	0.30	(0.20)	59.88		
0.50	ES			Light brown to yellowish brown fine to coarse angular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)		(0.60)			
0.90 - 1.20	B			Light greyish brown gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subrounded of brick, asphalt, concrete, coal, sandstone and mudstone with rare fragments of ceramic and timber. (MADE GROUND)	0.90		59.28		
1.20	SPT	N=8 (1,1,2,2,1,3)		Soft dark grey slightly sandy slightly gravelly CLAY with a weak organic (humic) odour. Gravel is fine to medium, occasionally coarse subangular to subrounded of brick, concrete and mudstone. (MADE GROUND)	1.30	(0.40)	58.88		
1.20 - 1.65	B			Firm dark brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse subangular to subrounded of mudstone, sandstone and coal. (GLACIAL TILL)					
1.20 - 1.65	D								
1.30	D								
2.00	SPT	N=9 (2,2,2,2,2,3)		*... At 2.00m bgl: Becoming stiff.*		(1.40)			
2.00 - 2.45	B								
2.00 - 2.45	D								
2.70	D				2.70		57.48		
3.00 - 3.45	U	(25,100%)		Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse subangular to subrounded of mudstone, sandstone and coal. (GLACIAL TILL)					
3.50	D								
4.00	SPT	N=13 (2,3,3,3,3,4)		*... At 4.00m bgl: Becoming firm.*					
4.00 - 4.45	B								
4.00 - 4.45	D								
5.00 - 5.45	U	(23,85%)				(4.30)			
5.50	D								
6.00	SPT	N=15 (2,2,3,3,4,5)		*... At 6.00m bgl: Becoming sandy.*					
6.00 - 6.45	B								
6.00 - 6.45	D								
7.00	D				7.00		53.18		
7.50 - 7.95	U	(23,100%)		Stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse subangular to subrounded of sandstone, mudstone and coal. (GLACIAL TILL)					
8.00	D					(1.80)			
8.80	D				8.80		51.38		
9.00	SPT	50/275mm (3,7,9,12,16,13)		Soft very sandy CLAY. (GLACIAL TILL)	9.00	(0.20)	51.18		
9.10 - 9.45	B			Very stiff dark brown very sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse subangular to subrounded of mudstone, sandstone and coal. (GLACIAL TILL)					
9.10 - 9.45	D								
10.00	D								

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

Chiselling

From (m)	To (m)	Duration (HH:MM)

General Remarks:
1) Location cleared for utilities and hand dug inspection pit complete from ground level to 1.20m bgl. 2) Cable percussive drilling from 1.20m to 20.00m bgl. 3)Borehole complete at 20.00m bgl and backfilled with arisings.

Groundwater: No groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-BH01 Page No. 2 of 2	
Method: Cable Percussion	Date(s): 16/03/2021 - 17/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387569.83, 396221.61	Checked By: RS	Flush:
Hydrock Project No: C-18170	Ground Level: 60.18m OD		Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Depth (m)	Type	Results							
				Very stiff dark brown very sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse subangular to subrounded of mudstone, sandstone and coal. (GLACIAL TILL)					
10.50	SPT	48/225mm (8,9,15,16,17)							
10.50 - 10.95	B								
10.50 - 10.95	D								
11.00	D				11				
12.00	SPT	N=50 (7,10,14,17,17,2)		*... At 12.00m bgl: Becoming sandy.*	12				
12.00 - 12.45	B								
12.00 - 12.45	D					(7.30)			
13.00	D				13				
13.50	SPT	50/275mm (7,9,12,14,14,10)							
13.50 - 13.95	B								
13.50 - 13.95	D				14				
14.50	D								
15.00	SPT	50/230mm (7,8,12,15,18,5)			15				
15.00 - 15.45	B								
15.00 - 15.45	D								
16.00	D				16				
16.30	D				16.30		43.88		
16.50	SPT	N=50 (9,10,14,16,18,2)		Very stiff thinly interlaminated dark brown CLAY and fine SAND. (WEATHERED CHESTER FORMATION)					
16.50 - 16.95	B								
16.50 - 16.95	D				17				
17.50	D								
18.00 - 18.45	U	(50,100%)			18				
						(3.70)			
18.50	D								
					19				
19.50	SPT	50/180mm (9,10,15,20,15)							
19.50 - 19.95	B								
19.50 - 19.95	D				20	20.00	40.18		
				End of Borehole at 20.00m					

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

Chiselling

From (m)	To (m)	Duration (HH:MM)

General Remarks:
1) Location cleared for utilities and hand dug inspection pit complete from ground level to 1.20m bgl. 2) Cable percussive drilling from 1.20m to 20.00m bgl. 3)Borehole complete at 20.00m bgl and backfilled with arisings.

Groundwater: No groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-BH02 Page No. 1 of 2	
Method: Cable Percussion	Date(s): 15/03/2021 - 16/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387555.28, 396266.49	Checked By: RS	Flush:
Hydrock Project No: C-18170	Ground Level: 60.32m OD		Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Depth (m)	Type	Results							
0.05 - 0.30	B			ASPHALT HARDSTANDING (MADE GROUND)	0.05	(0.05)	60.27		
0.30 - 0.60	B			Light brown very gravelly fine to medium SAND. Gravel is fine to coarse angular to subangular of limestone. (MADE GROUND)	0.25	(0.20)	60.07		
0.45	ES								
0.60 - 1.20	B			Brown, black and grey very sandy clayey fine to coarse angular to subangular GRAVEL of brick concrete, clinker, mudstone, with a low cobble content of angular to subangular brick and concrete. (MADE GROUND)		(0.95)			
0.70	ES								
1.20	SPT	N=10 (2,1,2,2,3,3)		Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium angular to subangular of mudstone, sandstone and coal. (GLACIAL TILL)	1.20		59.12		
1.20 - 1.65	B								
1.20 - 1.65	D								
2.00	SPT	N=13 (2,2,3,3,3,4)		*... At 2.00m bgl: Rebar recovered, pushed down from Made Ground above.*					
2.00 - 2.45	B					(2.30)			
2.00 - 2.45	D								
3.00 - 3.45	U	(27,75%)							
3.50	D			Stiff dark brown occasional mottled grey slightly gravelly slightly sandy CLAY. Gravel is fine to medium occasionally coarse angular to subangular of sandstone, mudstone and coal. (GLACIAL TILL)	3.50		56.82		
4.00	SPT	N=16 (2,3,3,4,4,5)							
4.00 - 4.50	B								
4.00 - 4.50	D								
5.00 - 5.45	U	(25,100%)							
5.50	D								
6.00	SPT	N=15 (2,2,3,3,4,5)		*... Between 6.00 - 6.45m bgl: Becomes firm to stiff and becomes sandy.*					
6.00 - 6.45	B								
6.00 - 6.45	D					(6.50)			
7.00	D								
7.50 - 7.95	U	(16,90%)							
8.00	D								
9.00	SPT	N=20 (2,3,4,5,5,6)							
9.00 - 9.45	B								
9.00 - 9.45	D								
10.00	D	(30,100%)			10.00		50.32		

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

Chiselling

From (m)	To (m)	Duration (HH:MM)

General Remarks:
1) Location cleared for utilities at hand dug inspection pit complete from ground level to 1.20m bgl. 2) Cable percussive drilling from 1.20m to 20.00m bgl. 3) Borehole complete at 20.00m bgl. 4) Installed with a response zone between 2.00m and 20.00m bgl.

Groundwater: Groundwater encountered at 0.50m bgl

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-BH02 Page No. 2 of 2	
Method: Cable Percussion	Date(s): 15/03/2021 - 16/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387555.28, 396266.49	Checked By: RS	Flush:
Hydrock Project No: C-18170	Ground Level: 60.32m OD		Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Depth (m)	Type	Results							
				Very stiff dark brown sandy slightly gravelly CLAY. Gravel is fine to medium occasionally coarse angular to subangular of sandstone, mudstone and coal. (GLACIAL TILL)					
10.50 - 10.95	U					(1.00)			
11.00	D				11.00		49.32		
				Very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse angular to subangular sandstone, mudstone and coal. (GLACIAL TILL)					
12.00	SPT	N=44 (5,6,7,9,12,16)							
12.00 - 12.45	B								
12.00 - 12.45	D								
						(3.50)			
13.50 - 13.95	U	(40,100%)							
14.00	D								
14.50	D				14.50		45.82		
				Firm to stiff dark brown thinly interlaminated CLAY and fine SAND. (WEATHERED CHESTER FORMATION)					
15.00	SPT	50/285mm (7,9,10,12,15,13)							
15.00 - 15.45	B								
15.00 - 15.45	D								
16.50	SPT	50/255mm (7,10,12,15,16,7)							
16.50 - 16.95	B								
16.50 - 16.95	D								
17.00	D					(5.50)			
18.00	SPT	50/180mm (9,12,15,22,13)		*... At 18.0m bgl: Becoming very sandy.*					
18.00 - 18.45	B								
18.00 - 18.45	D								
19.00	D								
19.50	SPT	N=50 (9,9,12,13,15,10)							
19.50 - 19.95	D								
				End of Borehole at 20.00m	20.00		40.32		

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

Chiselling

From (m)	To (m)	Duration (HH:MM)

General Remarks:
1) Location cleared for utilities at hand dug inspection pit complete from ground level to 1.20m bgl. 2) Cable percussive drilling from 1.20m to 20.00m bgl. 3) Borehole complete at 20.00m bgl. 4) Installed with a response zone between 2.00m and 20.00m bgl.

Groundwater: Groundwater encountered at 0.50m bgl

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-BH03 Page No. 1 of 2	
Method: Cable Percussion	Date(s): 18/03/2021 - 19/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387578.82, 396304.90	Checked By: RS	Flush:
Hydrock Project No: C-18170	Ground Level: 60.23m OD		Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Depth (m)	Type	Results							
				ASPHALT HARDSTANDING (MADE GROUND)	0.18	(0.18)	60.05		
0.35 - 1.00	B			Brown fine to coarse angular to subrounded GRAVEL of limestone. (MADE GROUND)	0.35	(0.17)	59.88		
				Brown and grey very sandy fine to coarse angular to subangular GRAVEL of brick and concrete with high cobble content of brick and concrete. (MADE GROUND)	1.00	(0.65)	59.23		
1.00 - 1.20 1.10 1.10 1.20	B ES ES SPT	N=11 (2,1,2,3,3,3)		Soft dark grey sandy gravelly CLAY with a weak petroleum hydrocarbon odour (possibly diesel). Gravel is fine to coarse, angular to subrounded of brick, concrete, slate and asphalt. (MADE GROUND)	1.20	(0.20)	59.03		
1.20 - 1.65 1.20 - 1.65	B D			Firm dark brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse of mudstone, sandstone and coal. (GLACIAL TILL)					
2.00	SPT	N=16 (2,2,3,3,4,6)		*... At 2.00m bgl: Becoming stiff.*	2				
2.00 - 2.45 2.00 - 2.45	B D								
3.00 - 3.45	U	(20,80%)			3				
3.50	D			*... At 3.50m bgl: Becoming sandy and no longer mottled grey.*					
4.00	SPT	N=11 (2,2,2,3,3,3)		*... At 4.00m bgl: Becoming firm.*	4				
4.00 - 4.45 4.00 - 4.45	B D								
5.00 - 5.45	U	(15,100%)			5	(7.80)			
5.50	D								
6.00	SPT	N=8 (2,2,2,2,2,2)			6				
6.00 - 6.50 6.00 - 6.50	B D								
7.00	D			*... At 7.00m bgl: Becoming firm to stiff.*	7				
7.50 - 7.95	U	(15,100%)							
8.00	D				8				
9.00	SPT	N=33 (4,4,5,6,10,12)		Very stiff dark brown sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse mudstone, sandstone and coal. (GLACIAL TILL)	9.00		51.23		
9.00 - 9.45 9.00 - 9.45	B D								
9.80	D				10				

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

Chiselling

From (m)	To (m)	Duration (HH:MM)

General Remarks:
1) Location cleared for utilities at hand dug inspection pit complete from ground level to 1.20m bgl. 2) Cable percussive drilling from 1.20m to 20.00m bgl. 3) Borehole complete at 20.00m bgl. 3) Borehole complete at 20.00m bgl. 4) Installed with a response between 2.00m and 15.00m bgl.

Groundwater: No groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-BH03 Page No. 2 of 2	
Method: Cable Percussion	Date(s): 18/03/2021 - 19/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387578.82, 396304.90	Checked By: RS	Flush:
Hydrock Project No: C-18170	Ground Level: 60.23m OD		Scale: 1:50

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Depth (m)	Type	Results							
				Very stiff dark brown sandy slightly gravelly CLAY. Gravel is fine to medium, occasionally coarse mudstone, sandstone and coal. (GLACIAL TILL)					
10.50	SPT	50/200mm (9,12,14,20,16)							
10.50 - 10.95	B								
10.50 - 10.95	D								
					11				
11.50	D								
12.00	SPT	50/200mm (9,12,20,15,15)		*... At 12.00m bgl: Becoming slightly sandy.*	12				
12.00 - 12.45	B								
12.00 - 12.45	D								
13.00	D				13	(8.10)			
13.50	SPT	50/210mm (9,11,16,18,16)							
13.50 - 13.95	B								
13.50 - 13.95	D				14				
14.50	D								
15.00	SPT	50/180mm (8,15,17,19,14)		*... At 15.00m bgl: Becoming sandy with occasional pockets of fine sand.*	15				
15.00 - 15.45	B								
15.00 - 15.45	D								
16.00	D				16				
16.50	SPT	50/180mm (7,4,16,17,17)							
16.50 - 16.95	B								
16.50 - 16.95	D								
17.10	D				17	17.10	43.13		
				Stiff dark brown thinly interlaminated CLAY and fine SAND. (WEATHERED CHESTER FORMATION)					
18.00 - 18.45	U	(50,100%)			18				
18.50	D					(2.90)			
					19				
19.50	SPT	50/190mm (10,12,16,18,16)							
19.50 - 19.95	D								
				End of Borehole at 20.00m	20	20.00	40.23		

Progress and Observations

Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)

Chiselling

From (m)	To (m)	Duration (HH:MM)

General Remarks:
1) Location cleared for utilities at hand dug inspection pit complete from ground level to 1.20m bgl. 2) Cable percussive drilling from 1.20m to 20.00m bgl. 3) Borehole complete at 20.00m bgl. 3) Borehole complete at 20.00m bgl. 4) Installed with a response between 2.00m and 15.00m bgl.

Groundwater: No groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-CBR01 Page No. 1 of 1	
Method: Trial Pit	Date(s): 16/03/2021	Logged By: WS	Checked By: RS
Client: Sir Robert McAlpine Ltd	Co-ords: 387657.20, 396322.03	Stability: Stable	Dimensions: 2.00m × 1.00m / Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 61.02m OD	Plant: 13T Tracked Excavator	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Very soft dark brown very sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, concrete and mudstone. (MADE GROUND)	0.30	(0.30)	60.72	
0.35 0.40	D CBR	3.8%		Soft dark brown and brown very sandy gravelly CLAY to a very clayey gravelly fine to coarse SAND with a medium cobble content of subangular brick, concrete and slate. Gravel is fine to coarse angular to rounded of brick, concrete, sandstone, coal, slate, fragments plastic, clay pipe fragments and rare wire. (MADE GROUND) *... From 0.50m bgl: Becoming a soft dark greyish brown gravelly very sandy CLAY with a medium cobble content and boulders of brick wall and a concrete post.*	0.90	(0.60)	60.12	
0.70 0.70	D CBR	3.2%		Black reddish orange very sandy clayey fine to coarse angular to subangular GRAVEL of brick, mudstone, glass, clinker and a high cobble content of subangular brick and concrete. (MADE GROUND)	1.30	(0.40)	59.72	
				Stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of mudstone sandstone and coal. (GLACIAL TILL)	1.70	(0.40)	59.32	
				Base of Excavation at 1.70m				

General Remarks:
1) Machine dug trial pits from ground level to 1.70m bgl. 2) Plate Bearing Test undertaken at 0.40m bgl. 3) Backfilled with arisings on completion.

Groundwater: Water ingress at 1.25m bgl

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-CBR02 Page No. 1 of 1	
Method: Trial Pit	Date(s): 16/03/2021	Logged By: WS	Checked By: RS
Client: Sir Robert McAlpine Ltd	Co-ords: 387678.48, 396302.68	Stability: Stable	Dimensions: 2.00m × 1.00m / Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 60.71m OD	Plant: 13T Tracked Excavator	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				ASPHALT HARDSTANDING (MADE GROUND)	0.09	(0.09)	60.62	
				Light brown fine to coarse angular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)	0.25	(0.16)	60.46	
0.35	ES			Light brown, brown and grey fine to coarse angular to subrounded SAND and GRAVEL with a high cobble content of subangular brick and concrete. Gravel is fine to coarse angular to subrounded of brick, concrete, mudstone, sandstone and asphalt. (MADE GROUND) *... Between 0.25m and 0.35m bgl: Groundwater encountered with oily sheen and weak hydrocarbon odour.*	0.35	(0.10)	60.36	
				Firm dark grey stained black very gravelly CLAY. Gravel is fine to coarse angular to subrounded of concrete, brick, sandstone and mudstone and rare rope. (MADE GROUND)	0.70	(0.35)	60.01	
				Firm light brown mottled grey slightly gravelly CLAY with a low cobble content of subangular brick. Gravel is fine to coarse angular to subrounded of coal and brick. (MADE GROUND)	1.10	(0.40)	59.61	
				Stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded of mudstone sandstone and coal. (GLACIAL TILL)	1.30	(0.20)	59.41	
				Base of Excavation at 1.30m				

General Remarks:
1) Machine dug trial pits from ground level to 1.30m bgl. 2) Plate Bearing Test undertaken at 0.35m bgl. 3) Backfilled with arisings on completion.

Groundwater: Water ingress at 0.25m bgl

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-CBR03 Page No. 1 of 1

Method: Trial Pit	Date(s): 16/03/2021	Logged By: WS	Checked By: RS
Client: Sir Robert McAlpine Ltd	Co-ords: 387658.48, 396285.18	Stability: Stable	Dimensions: 2.00m × 1.00m; Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 60.33m OD	Plant: 13T Tracked Excavator	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				ASPHALT HARDSTANDING	0.05	(0.05)	60.28	
				(MADE GROUND) Light brown fine to coarse subangular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)	0.20	(0.15)	60.13	
0.25	ES			Dark grey and dark greyish brown very gravelly fine to coarse SAND with a high cobble content of angular brick and concrete. Gravel is fine to coarse angular to subrounded of brick, tile, slate, mudstone, sandstone, wood with occasional fragments of glass, asphalt and ceramics. (MADE GROUND)	0.30	(0.10)	60.03	
0.40	D			Firm light brown mottled grey slightly gravelly laminated CLAY with low cobble content cobble of subangular of brick. Gravel is fine to coarse angular to subrounded of coal and occasional brick. (MADE GROUND)	0.75	(0.45)	59.58	
0.65	CBR	1.5%		Stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium angular to subrounded of sandstone, mudstone and coal. (GLACIAL TILL)	1.20	(0.45)	59.13	
				Base of Excavation at 1.20m				

General Remarks:
1) Machine dug trial pits from ground level to 1.20m bgl. 2) Plate Bearing Test undertaken at 0.65m bgl. 3) Backfilled with arisings on completion.

Groundwater: No Groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-CBR04 Page No. 1 of 1

Method: Trial Pit	Date(s): 16/03/2021	Logged By: WS	Checked By: RS
Client: Sir Robert McAlpine Ltd	Co-ords: 387676.55, 396256.89	Stability: Stable	Dimensions: 2.00m × 1.00m; Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 60.39m OD	Plant: 13T Tracked Excavator	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				ASPHALT HARDSTANDING (MADE GROUND)	0.15	(0.15)	60.24	
				Yellowish brown fine to coarse angular to subangular SAND and GRAVEL of limestone. (MADE GROUND)	0.25	(0.10)	60.14	
				Reddish brown fine to coarse angular to subangular GRAVEL of brick, concrete and quartzite with a high cobble content of subangular brick and concrete. (MADE GROUND)	0.30	(0.05)	60.09	
0.40 0.40	D CBR	4.0%		Stiff grey and brown slightly gravelly CLAY with occasional cobble of brick. Gravel is fine to coarse angular to subrounded of brick, sandstone, mudstone and coal. (MADE GROUND)	0.70	(0.40)	59.69	
				Stiff grey and brown slightly gravelly CLAY with occasional cobble of brick. Gravel is fine to coarse angular to subrounded of sandstone, mudstone and coal. (MADE GROUND)	1.10	(0.40)	59.29	
				Base of Excavation at 1.10m				

General Remarks:
1) Machine dug trial pits from ground level to 1.10m bgl. 2) Plate Bearing Test undertaken at 0.40m bgl. 3) Backfilled with arisings on completion.

Groundwater: No Groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-SA01 Page No. 1 of 1	
Method: Trial Pit	Date(s): 31/03/2021	Logged By: WS	Checked By:
Client: Sir Robert McAlpine Ltd	Co-ords: 387539.94, 396287.61	Stability: Stable	Dimensions: 0.60m × 1.50m / Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 60.51m OD	Plant: JCB3CX	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown very clayey slightly gravelly fine to coarse SAND with roots and rootlets. Gravel is fine to coarse, angular to subrounded of mudstone, brick and coal. (MADE GROUND)	0.25	(0.25)	60.26	
				Firm greyish brown slightly sandy gravelly CLAY. Gravel is fine to coarse, angular to subrounded of brick, concrete, coal and sandstone. (MADE GROUND)	0.50	(0.25)	60.01	
				Brown slightly clayey gravelly fine to coarse SAND with a medium cobble content of brick, concrete and plastic. Gravel is fine to coarse, angular to subrounded of brick, concrete, plastic, sandstone and coal. (MADE GROUND)	1.00	(0.50)	59.51	
				ASPHALT (MADE GROUND)	1.10	(0.10)	59.41	
				Light brown fine to coarse angular to subrounded SAND and GRAVEL of sandstone, limestone, brick and concrete with a high cobble content of brick, plastic, tile and occasional metal. (MADE GROUND)	2.30	(1.20)	58.21	
				Reddish brown clayey fine to medium SAND. (MADE GROUND) *... At 2.30m bgl: Concrete boulder in edge of pit.* *... Between 2.50m and 2.90m bgl: Pocket of grey fine to coarse angular to subrounded GRAVEL of granite and clay pipe fragments.*	2.90	(0.60)	57.61	
				Stiff dark brown mottled grey slightly gravelly CLAY. Gravel is fine to coarse, angular to subangular of sandstone, mudstone and coal. (GLACIAL TILL)	3.40	(0.50)	57.11	
				Base of Excavation at 3.40m				

General Remarks:
1) Machine dug trial pits from ground level to 3.40m bgl. 2) Infiltration Test undertaken in trial pit. 3) Backfilled with arisings on completion.

Groundwater: No Groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-SA02 Page No. 1 of 1

Method: Trial Pit	Date(s): 31/03/2021	Logged By: WS	Checked By:
Client: Sir Robert McAlpine Ltd	Co-ords: 387655.91, 396295.03	Stability: Stable	Dimensions: 0.60m × 2.40m; Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 60.33m OD	Plant: JCB3CX	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				ASPHALT HARDSTANDING (MADE GROUND)	0.08	(0.08)	60.25	
				Light brown fine to coarse subangular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)	0.20	(0.12)	60.13	
				Dark brown clayey very gravelly fine to coarse SAND with a medium cobble content of brick and concrete. Gravel is fine to coarse, angular to subrounded of brick, concrete, mudstone and quartzite. (MADE GROUND)	0.30	(0.10)	60.03	
1.00 1.00	B HSV	80kPa		Stiff dark brown mottled grey sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of quartzite, mudstone and sandstone. (GLACIAL TILL)	1	(1.10)		
				Base of Excavation at 1.40m	1.40		58.93	
					2			
					3			
					4			
					5			

General Remarks:
1) Machine dug trial pits from ground level to 1.40m bgl. 2) Infiltration Test undertaken in trial pit. 3) Backfilled with arisings on completion.

Groundwater: No Groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-SA03 Page No. 1 of 1

Method: Trial Pit	Date(s): 31/03/2021	Logged By: WS	Checked By:
Client: Sir Robert McAlpine Ltd	Co-ords: 387600.66, 396191.35	Stability: Stable	Dimensions: 0.60m × 2.25m / Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 60.54m OD	Plant: JCB3CX	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				ASPHALT HARDSTANDING (MADE GROUND)	0.08	(0.08)	60.46	
				Light brown fine to coarse angular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)	0.20	(0.12)	60.34	
				Brown fine to coarse angular to subrounded of SAND and GRAVEL with roots and a high cobble content of brick. Gravel is fine to coarse, angular to subrounded of brick, concrete and tile. (MADE GROUND)	0.40	(0.20)	60.14	
				ASPHALT. (MADE GROUND)	0.45	(0.05)	60.09	
				Soft to firm grey sandy gravelly CLAY. Gravel is fine to coarse, angular to subrounded of brick and coal. (MADE GROUND)	0.80	(0.35)	59.74	
1.00	HSV	75kPa		Firm to stiff light grey mottled brown CLAY. (GLACIAL TILL)				
				... At 1.40m bgl: Becoming brown mottled grey.		(1.00)		
1.50	HSV	70kPa						
				Base of Excavation at 1.80m	1.80		58.74	
1.90	HSV	85kPa						

General Remarks:
1) Machine dug trial pits from ground level to 1.80m bgl. 2) Infiltration Test undertaken in trial pit. 3) Backfilled with arisings on completion.

Groundwater: Moderate Groundwater ingress at 0.70m bgl

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-SA04 Page No. 1 of 1

Method: Trial Pit	Date(s): 31/03/2021	Logged By: WS	Checked By:
Client: Sir Robert McAlpine Ltd	Co-ords: 387530.34, 396150.15	Stability: Stable	Dimensions: 0.60m × 2.10m; Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 61.51m OD	Plant: JCB3CX	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown very clayey slightly gravelly fine to medium SAND with rootlets. Gravel is fine to coarse, angular to subrounded of brick and occasional concrete and ceramic. (MADE GROUND)	0.30	(0.30)	61.21	
1.00 - 1.50 1.00	B HSV	40kPa		Firm dark brown to dark grey sandy gravelly CLAY with a low cobble content of brick and concrete. Gravel is fine to coarse, angular to subrounded of brick and concrete with occasional ceramic, metal, wood and pipe. (MADE GROUND) *... At 1.00m bgl: Cobbles and boulders of concrete.*	2.90	(2.60)	58.61	
2.00	HSV	40kPa						
3.20	HSV	115kPa		Stiff dark brown mottled grey slightly gravelly CLAY. Gravel is fine to medium, subangular to subrounded of sandstone, mudstone and coal. (GLACIAL TILL)	3.50	(0.60)	58.01	
				Base of Excavation at 3.50m				

General Remarks:
1) Machine dug trial pits from ground level to 3.50m bgl. where it refused. 2) Infiltration Test undertaken in trial pit. 3) Backfilled with arisings on completion.

Groundwater: No Groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-SA05 Page No. 1 of 1

Method: Trial Pit	Date(s): 31/03/2021	Logged By: WS	Checked By:
Client: Sir Robert McAlpine Ltd	Co-ords: 387664.18, 396134.81	Stability: Stable	Dimensions: m × m / Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 61.16m OD	Plant: JCB3CX	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				ASPHALT HARDSTANDING (MADE GROUND)	0.08	(0.08)	61.08	
				Light brown fine to coarse angular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)	0.20	(0.12)	60.96	
				Brown very sandy fine to coarse angular to subangular GRAVEL of brick, concrete, tile, wood, fabrics, coal, metal and plastic with a high cobble content of brick. (MADE GROUND)				
				... Between 0.70m and 1.40m bgl: Firm light brown CLAY with low cobble content of brick at the east end of the trial pit.				
1.00	B			*... At 1.00m bgl: High cobble content.*	1.70	(1.50)	59.46	
				Grey medium to coarse subrounded GRAVEL of igneous rock. (MADE GROUND)	1.80	(0.10)	59.36	
				Base of Excavation at 1.80m				

General Remarks:
1) Machine dug trial pits from ground level to 1.80m bgl. 2) Infiltration Test unable to be carried out due to fast groundwater inflow at 0.30m bgl. 3) Backfilled with arisings on completion.

Groundwater: Fast Groundwater ingress at 0.30m bgl

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Trialpit No HYD-SA06 Page No. 1 of 1

Method: Trial Pit	Date(s): 31/03/2021	Logged By: WS	Checked By:
Client: Sir Robert McAlpine Ltd	Co-ords: 387565.55, 396094.06	Stability: Stable	Dimensions: m × m / Scale: 1:25
Hydrock Project No: C-18170	Ground Level: 62.05m OD	Plant: JCB3CX	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown very clayey slightly gravelly fine to medium SAND. Gravel is fine to coarse, angular to subrounded of coal, sandstone and occasional brick and concrete. (MADE GROUND)	0.50	(0.50)	61.55	
				Dark brown slightly clayey very gravelly fine to coarse SAND with a high cobble content of brick and concrete. Gravel is fine to coarse, angular to subangular of brick, concrete, asphalt, sandstone and occasional wood and metal. (MADE GROUND)	2.70	(2.20)	59.35	
				Base of Excavation at 2.70m				

General Remarks:
1) Machine dug trial pits from ground level to 2.70m bgl. 2) Infiltration Test unable to be carried out due to sudden groundwater inflow at 2.30m bgl. 3) Backfilled with arisings on completion.

Groundwater: Sudden Groundwater ingress at 2.30m bgl.

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-WS01 Page No. 1 of 1	
Method: Dynamic (Windowless) Sampler	Date(s): 19/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387549.27, 396245.49	Checked By: RS	Rig: Archway Dart
Hydrock Project No: C-18170	Ground Level: 59.90m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrum-entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
							ASPHALT.	0.10	(0.10)	59.80		
							(MADE GROUND)	0.20	(0.10)	59.70		
			0.30	D			Light brown fine to coarse angular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)					
			0.30	ES					(0.35)			
			0.40	ES			Dark brown and grey fine to coarse angular to subangular SAND and GRAVEL of brick, concrete, asphalt, quartzite, with occasional fragments of metal and tile and a medium cobble content of brick, concrete and quartzite. (MADE GROUND)	0.55		59.35		
			0.80	D			Firm dark grey sandy gravelly organic CLAY with cobble content of brick. Gravel is fine to coarse angular to subrounded of brick mudstone coal and quartzite. (MADE GROUND)		(0.75)			
			1.20	SPT	50/30mm (10,13,50)			1.30		58.60		
							End of Borehole at 1.30m					

General Remarks:
1) Location cleared for utilities and hand dug inspection pit complete from ground level to 1.20m bgl 2) Refused at 1.30m bgl on suspected concrete obstruction and backfilled with arisings.

Groundwater: No groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-WS02 Page No. 1 of 2	
Method: Dynamic (Windowless) Sampler	Date(s): 19/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387618.00, 396332.00	Checked By: RS	Rig: Archway Dart
Hydrock Project No: C-18170	Ground Level: 60.42m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
							Dark brown very sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of quartzite. (MADE GROUND)	0.30	(0.30)	60.12		
							Brown and grey very sandy clay fine to coarse angular to subrounded GRAVEL of brick, concrete, coal, quartzite, sandstone and mudstone. (MADE GROUND)	0.70	(0.40)	59.72		
			0.80 0.80	ES ES			Stiff dark grey and stained black slightly sandy gravelly CLAY with a weak hydrocarbon odour. Gravel is fine to coarse, angular to subangular of brick, concrete, mudstone and quartzite. (MADE GROUND)	1	(0.60)			
1.20 - 2.00	80mm	100%	1.20	SPT	N=52 (7,10,21,17,7,7)		*... At 1.10m bgl: Becoming firm, weak organic (humic) odour present, no black staining.*	1.30		59.12		
			1.50	D			Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to rounded of sandstone, mudstone and coal. (GLACIAL TILL)	1.75	(0.45)	58.67		
2.00 - 3.00	75mm	100%	2.00	SPT	N=18 (3,3,4,4,5,5)		Stiff dark brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to rounded of sandstone, mudstone and coal. (GLACIAL TILL)	2				
			2.50	D								
3.00 - 4.00	60mm	100%	3.00	SPT	N=30 (3,4,6,7,8,9)		*... At 2.90m bgl: No longer mottled grey.*	3				
			3.50	D					(3.70)			
4.00 - 5.00	50mm	85%	4.00	SPT	N=20 (3,4,5,5,5,5)			4				
			4.50	D								
			5.00	SPT	N=20 (2,3,4,5,5,6)			5				
							End of Borehole at 5.45m	5.45		54.97		
								6				

General Remarks:
1) Location cleared for utilities and hand dug inspection pit complete from ground level to 1.20m bgl. 2) Windowless sampling drilling from 1.20m to 5.45m bgl. 3)Borehole complete at 5.45m bgl. 4) Installed with a response between 2.00m and 4.00m bgl.

Groundwater: No groundwater encountered

Logged in general accordance with BS5930:2015

Hydrock	Project: Belle Vue Co-op Academy, Hyde Road, Manchester	Borehole No HYD-WS03 Page No. 1 of 2	
Method: Dynamic (Windowless) Sampler	Date(s): 19/03/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Sir Robert McAlpine Ltd	Co-ords: 387596.72, 396253.00	Checked By: RS	Rig: Archway Dart
Hydrock Project No: C-18170	Ground Level: 60.33m OD		Scale: 1:30

Sample Run Info: Sample Run	Run Ø	Recovery	Testing: Depth (m)	Type	Results	Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
							ASPHALT HARDSTANDING	0.08	(0.08)	60.25		
							(MADE GROUND)					
							Light brown fine to coarse angular to subrounded SAND and GRAVEL of limestone. (MADE GROUND)	0.20	(0.12)	60.13		
			0.30	D								
			0.30	ES								
			0.30	ES			Grey and brown fine to coarse angular to subrounded GRAVEL of brick, concrete, quartzite and asphalt. (MADE GROUND)	0.70	(0.50)	59.63		
			0.80	D			Stiff dark grey mottled black CLAY with a mild organic ~(humic) odour. (MADE GROUND)	1.10	(0.40)	59.23		
1.20 - 2.00	80mm	100%	1.20	SPT	N=12 (2,2,3,3,3,3)		Firm light brown mottled grey slightly gravelly CLAY. Gravel is fine to coarse, subangular to rounded of quartzite, mudstone, sandstone and coal. (GLACIAL TILL)	1.30	(0.20)	59.03		
			1.20	D								
			1.50	D			Firm dark brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of coal, sandstone, mudstone and suspected rare iron pyrite (GLACIAL TILL)	1.70	(0.40)	58.63		
2.00 - 3.00	75mm	100%	2.00	SPT	N=16 (2,3,3,4,4,5)		Stiff dark brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of coal, sandstone and mudstone. (GLACIAL TILL)					
			2.70	D					(2.30)			
3.00 - 4.00	60mm	100%	3.00	SPT	N=25 (3,4,5,6,7,7)							
			3.70	D								
4.00 - 5.00	50mm	80%	4.00	SPT	N=25 (4,5,5,6,7,7)			4.00		56.33		
							Soft dark brown very sandy CLAY. (GLACIAL TILL) *... At 4.00m bgl: No longer mottled grey.*	4.10	(0.10)	56.23		
			4.70	D			Firm to stiff dark brown sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to subrounded of sandstone, mudstone and coal. (GLACIAL TILL)		(1.35)			
			5.00	SPT	N=20 (3,4,5,5,5,5)			5.45		54.88		
							End of Borehole at 5.45m					

General Remarks:
1) Location cleared for utilities and hand dug inspection pit complete from ground level to 1.20m bgl. 2) Windowless sampling drilling from 1.20m to 5.45m bgl. 3. Borehole complete at 5.45m bgl. 4) Installed with a response between 2.00m and 4.00m bgl.

Groundwater: Slight seepage at 4.00m bgl

Logged in general accordance with BS5930:2015

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

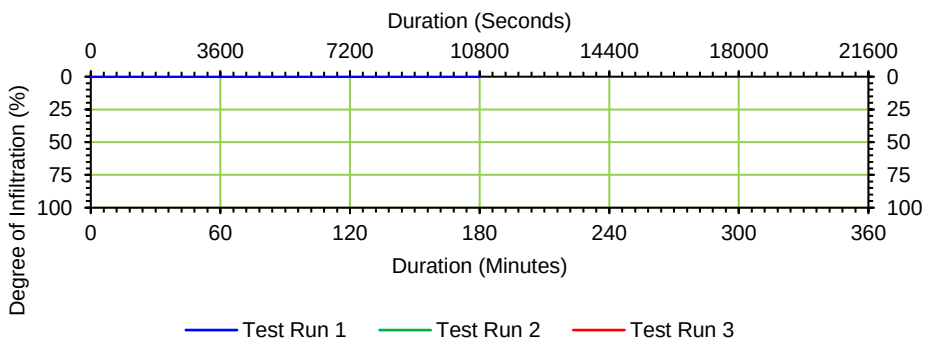
Site: Hyde Road School, Manchester
Client: BDP
Test Location HYD-SA03 **Date of start** 31/03/2021 **Date at end** 31/03/2021

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	2.250m	Trial Pit Length (L)		Trial Pit Length (L)	
Trial Pit Breadth / Width (B)	0.600m	Trial Pit Breadth / Width (B)		Trial Pit Breadth / Width (B)	
Effective Depth (D)	1.800m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	11.47	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	11.50	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	0.900m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	0.900m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	1.215m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	1.215m³	Corrected Water Volume (V_{WC})	-	Corrected Water Volume (V_{WC})	-

Time to soakaway

Test Run 1 Time Day	Time	Depth to water (m bgl)	Duration Seconds	Test Run 2 Time Day	Time	Depth to water (m bgl)	Duration Seconds	Test Run 3 Time Day	Time	Depth to water (m bgl)	Duration Seconds
1	11.500	0.900	0								
1	11.510	0.890	60								
1	11.520	0.880	120								
1	11.530	0.880	180								
1	11.540	0.880	240								
1	11.550	0.880	300								
1	11.560	0.880	360								
1	11.570	0.875	420								
1	11.580	0.875	480								
1	11.590	0.870	540								
1	12.000	0.870	600								
1	12.050	0.870	900								
1	12.100	0.860	1200								
1	12.150	0.860	1500								
1	12.200	0.860	1800								
1	12.300	0.830	2400								
1	12.400	0.820	3000								
1	12.500	0.810	3600								
1	13.200	0.760	5400								
1	13.500	0.760	7200								
1	14.500	0.730	10800								
			10800								
			10800								

25% water loss (75% full)	1.125m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	1.350m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	1.575m	**75% water loss (25% full)**	-	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-	**75% time (seconds)**	-
Vp 75-25	0.608m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	3.915m³	**ap 50 (Actual area from test)**	-	**ap 50 (Actual area from test)**	-
tp 75 - 25		**tp 75 - 25**		**tp 75 - 25**	
Soil Infiltration Rate	-	**Soil Infiltration Rate**	-	**Soil Infiltration Rate**	-



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	SIGN	DS
	DATE	31/03/2021
Calculated By	PRINT	DS
	SIGN	DS
	DATE	07/04/2021
Checked by	PRINT	WS
	SIGN	WS
	DATE	13/04/2021

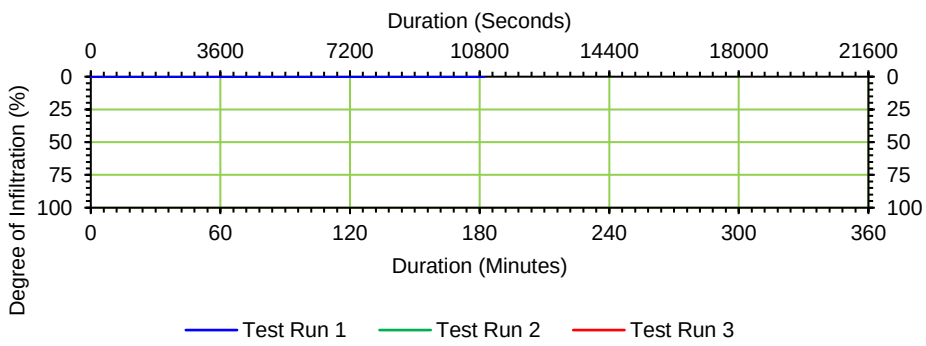
1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site: Hyde Road School, Manchester
Client: BDP
Test Location HYD-SA04 **Date of start** 31/03/2021 **Date at end** 31/03/2021

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	2.100m	Trial Pit Length (L)		Trial Pit Length (L)	
Trial Pit Breadth / Width (B)	0.600m	Trial Pit Breadth / Width (B)		Trial Pit Breadth / Width (B)	
Effective Depth (D)	3.500m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	12.40	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	12.43	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	2.900m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	0.600m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	0.756m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	0.756m³	Corrected Water Volume (V_{WC})	-	Corrected Water Volume (V_{WC})	-

Time to soakaway				Time to soakaway				Time to soakaway			
Time		Depth to water	Duration	Time		Depth to water	Duration	Time		Depth to water	Duration
Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds
1	12.430	2.900	0								
1	12.435	2.900	30								
1	12.440	2.900	60								
1	12.450	2.900	120								
1	12.460	2.900	180								
1	12.470	2.900	240								
1	12.480	2.900	300								
1	12.530	2.900	600								
1	12.580	2.900	900								
1	13.030	2.900	1200								
1	13.080	2.900	1500								
1	13.130	2.900	1800								
1	13.230	2.900	2400								
1	13.330	2.900	3000								
1	13.430	2.900	3600								
1	14.130	2.900	5400								
1	14.430	2.900	7200								
1	15.450	2.900	10920								
			10920								
			10920								
			10920								
			10920								
			10920								

25% water loss (75% full)	3.050m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	3.200m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	3.350m	**75% water loss (25% full)**	-	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-	**75% time (seconds)**	-
Vp 75-25	0.378m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	2.880m³	**ap 50 (Actual area from test)**	-	**ap 50 (Actual area from test)**	-
tp 75 - 25		**tp 75 - 25**		**tp 75 - 25**	
Soil Infiltration Rate	-	**Soil Infiltration Rate**	-	**Soil Infiltration Rate**	-



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	DATE	31/03/2021
Calculated By	PRINT	DS
	SIGN	DS
	DATE	07/04/2021
Checked by	PRINT	WS
	SIGN	WS
	DATE	13/03/2021

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

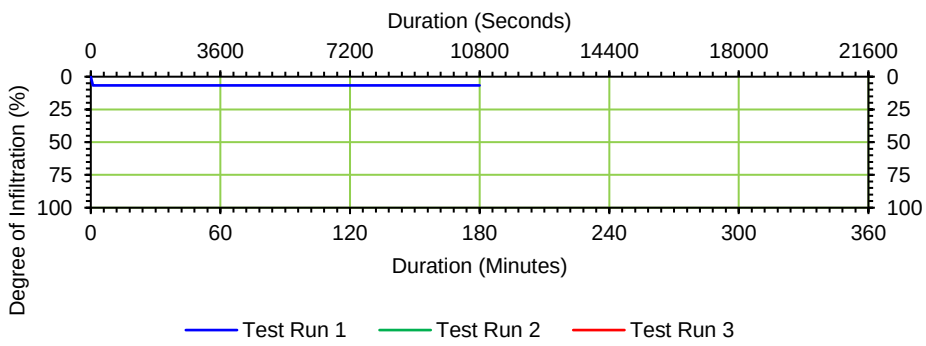
Site: Hyde Road School, Manchester
Client: BDP
Test Location HYD-SA01 **Date of start** 31/03/2021 **Date at end** 31/03/2021

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	1.500m	Trial Pit Length (L)		Trial Pit Length (L)	
Trial Pit Breadth / Width (B)	0.600m	Trial Pit Breadth / Width (B)		Trial Pit Breadth / Width (B)	
Effective Depth (D)	3.400m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	13.55	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	13.58	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	2.950m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	0.450m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	0.405m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	0.405m³	Corrected Water Volume (V_{WC})	-	Corrected Water Volume (V_{WC})	-

Time to soakaway

Test Run 1 Day	Time	Depth to water (m bgl)	Duration Seconds	Test Run 2 Day	Time	Depth to water (m bgl)	Duration Seconds	Test Run 3 Day	Time	Depth to water (m bgl)	Duration Seconds
1	13.580	2.950	0								
1	13.590	2.980	60								
1	14.000	2.980	120								
1	14.010	2.980	180								
1	14.020	2.980	240								
1	14.030	2.980	300								
1	14.080	2.950	600								
1	14.130	2.950	900								
1	14.180	2.950	1200								
1	14.280	2.950	1800								
1	14.380	2.950	2400								
1	14.580	2.950	3600								
1	15.280	2.950	5400								
1	15.580	2.950	7200								
1	16.580	2.950	10800								
			10800								
			10800								
			10800								
			10800								
			10800								
			10800								
			10800								
			10800								

25% water loss (75% full)	3.063m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	3.175m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	3.288m	**75% water loss (25% full)**	-	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-	**75% time (seconds)**	-
Vp 75-25	0.203m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	1.845m³	**ap 50 (Actual area from test)**	-	**ap 50 (Actual area from test)**	-
tp 75 - 25		**tp 75 - 25**		**tp 75 - 25**	
Soil Infiltration Rate	-	**Soil Infiltration Rate**	-	**Soil Infiltration Rate**	-



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	SIGN	WS
	DATE	13/04/2021
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	SIGN	AC
	DATE	13/04/2021

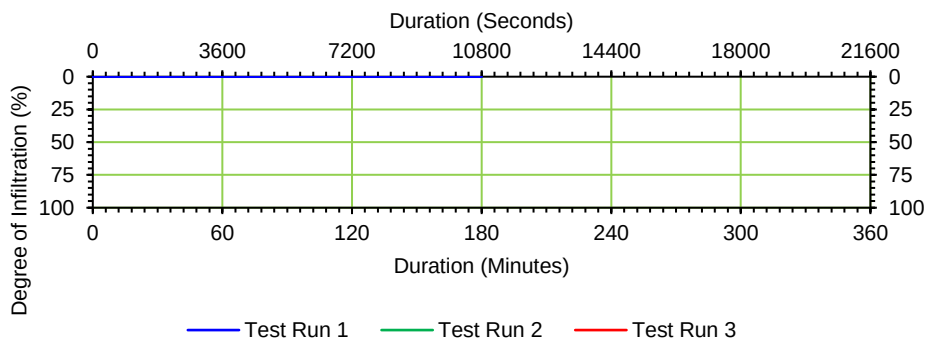
1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site: Hyde Road School, Manchester
Client: BDP
Test Location HYD-SA02 **Date of start** 31/03/2021 **Date at end** 31/03/2021

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	2.400m	Trial Pit Length (L)		Trial Pit Length (L)	
Trial Pit Breadth / Width (B)	0.600m	Trial Pit Breadth / Width (B)		Trial Pit Breadth / Width (B)	
Effective Depth (D)	1.400m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	11.40	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	11.42	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	0.680m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	0.720m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	1.037m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit	No
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	1.037m³	Corrected Water Volume (V_{WC})	-	Corrected Water Volume (V_{WC})	-

Time to soakaway				Time to soakaway				Time to soakaway			
Time		Depth to water	Duration	Time		Depth to water	Duration	Time		Depth to water	Duration
Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds	Day	Time	(m bgl)	Seconds
1	11.420	0.680	0								
1	11.425	0.680	30								
1	11.430	0.680	60								
1	11.440	0.680	120								
1	11.450	0.680	180								
1	11.460	0.680	240								
1	11.470	0.680	300								
1	11.520	0.680	600								
1	11.570	0.680	900								
1	12.020	0.680	1200								
1	12.070	0.680	1500								
1	12.120	0.680	1800								
1	12.220	0.680	2400								
1	12.320	0.680	3000								
1	12.420	0.680	3600								
1	13.120	0.680	5400								
1	13.420	0.670	7200								
1	14.420	0.670	10800								
			10800								
			10800								
			10800								
			10800								
			10800								

25% water loss (75% full)	0.860m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	1.040m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	1.220m	**75% water loss (25% full)**	-	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-	**75% time (seconds)**	-
Vp 75-25	0.518m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	3.600m³	**ap 50 (Actual area from test)**	-	**ap 50 (Actual area from test)**	-
tp 75 - 25		**tp 75 - 25**		**tp 75 - 25**	
Soil Infiltration Rate	-	**Soil Infiltration Rate**	-	**Soil Infiltration Rate**	-



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Calculated By	PRINT	DS
	SIGN	DS
	DATE	07/04/2021
Checked by	PRINT	WS
	SIGN	WS
	DATE	13/04/2021

Exploratory Hole Photographs

Appendix D

Geotechnical Test Results and Geotechnical Plots

Geotechnical Laboratory Test Results

LABORATORY REPORT

4043

Contract Number: PSL21/2793

Report Date: 28 April 2021

Client's Reference: C-18170

Client Name: Hydrock
9-21 Princess Street
Albert Square
Manchester
M2 4DN

For the attention of: Will Swinnerton

Contract Title: Hyde Road School, Manchester

Date Received: 7/4/2021
Date Commenced: 7/4/2021
Date Completed: 28/4/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS03		D	1.20		Brown slightly gravelly slightly sandy CLAY.
WS03		D	2.70		Brown slightly gravelly very sandy CLAY.
WS02		D	1.50		Brown slightly gravelly sandy CLAY.
WS02		D	2.50		Brown slightly gravelly very sandy CLAY.
CBR03		D	0.40		Brown slightly gravelly sandy CLAY.
CBR01		D	0.35		Brown very sandy clayey GRAVEL.
CBR01		D	0.70		Brown slightly gravelly sandy CLAY.
CBR04		D	0.40		Brown slightly gravelly sandy CLAY.
BH02		B	0.30		MADE GROUND brown very sandy slightly clayey gravel.
BH02		B	0.60		MADE GROUND grey very sandy clayey silty gravel.
BH02		B	2.00		Brown slightly gravelly sandy CLAY.
BH02		U	3.00		Stiff brown slightly gravelly very sandy CLAY.
BH02		D	3.50		Brown slightly gravelly very sandy CLAY.
BH02		U	5.00		Very stiff brown slightly gravelly very sandy CLAY.
BH02		D	5.50		Brown slightly gravelly very sandy CLAY.
BH02		U	7.50		Stiff brown slightly gravelly very sandy CLAY.
BH02		U	10.50		Very stiff brown slightly gravelly very sandy CLAY.
BH02		U	13.50		Very stiff brown slightly gravelly very sandy CLAY.
BH01		B	0.30		Brown very gravelly clayey SAND.

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH01		D	1.30		Brown slightly gravelly sandy CLAY.
BH01		B	2.00		Brown slightly gravelly sandy CLAY.
BH01		D	2.70		Brown slightly gravelly very sandy CLAY.
BH01		U	3.00		Stiff brown slightly gravelly very sandy CLAY.
BH01		U	5.00		Firm brown slightly gravelly very sandy CLAY.
BH01		U	7.50		Stiff brown slightly gravelly very sandy CLAY.
BH03		B	1.20		Brown slightly gravelly sandy CLAY.
BH03		B	2.00		Brown slightly gravelly very sandy CLAY.
BH03		U	3.00		Stiff brown slightly gravelly very sandy CLAY.
BH03		D	3.50		Brown slightly gravelly sandy CLAY.
BH03		B	4.00		Brown slightly gravelly sandy CLAY.
BH03		U	5.00		Firm brown slightly gravelly very sandy CLAY.
BH03		U	7.50		Firm brown slightly gravelly very sandy CLAY.

SUMMARY OF SOIL CLASSIFICATION TESTS

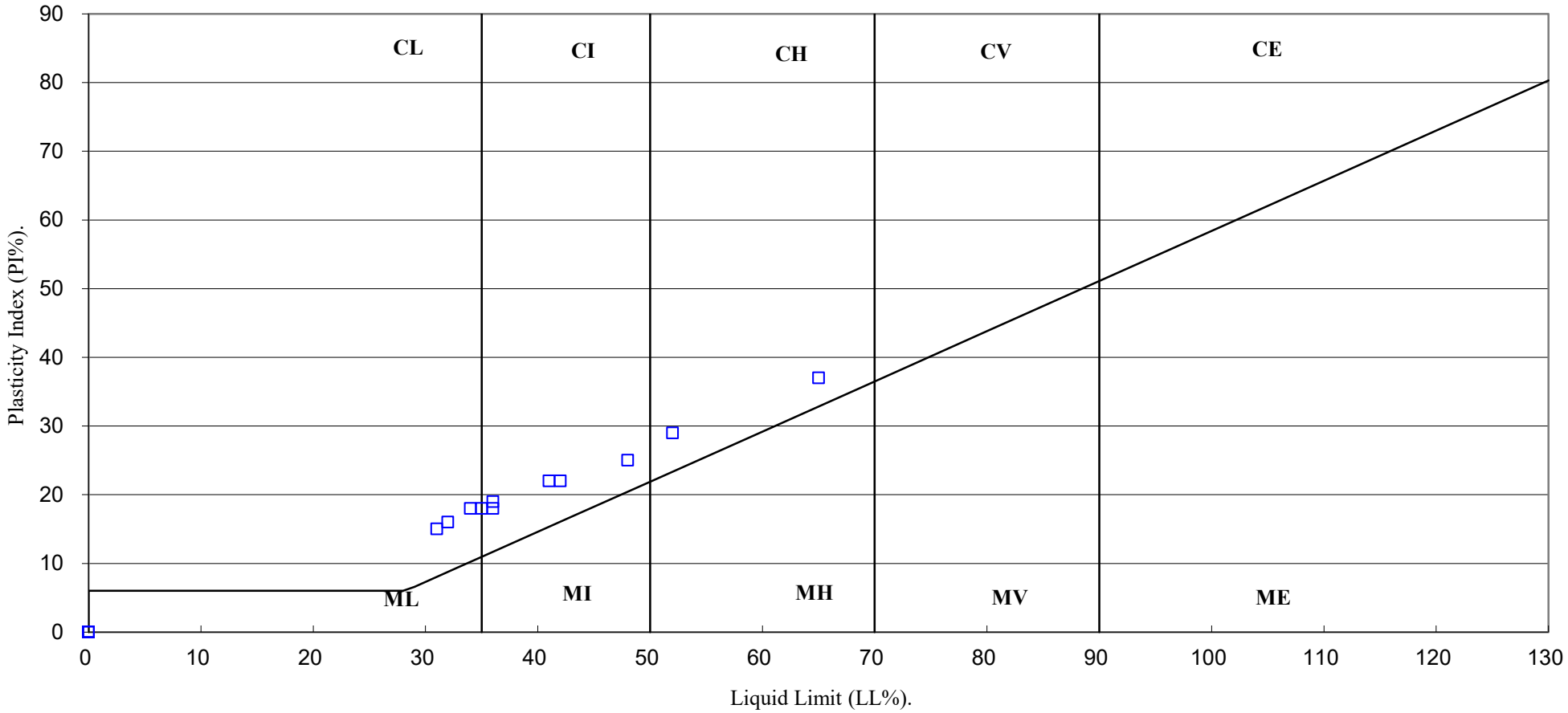
(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS03		D	1.20		28			65	28	37	97	High Plasticity CH
WS03		D	2.70		14			34	16	18	96	Low Plasticity CL
WS02		D	1.50		21			48	23	25	98	Intermediate Plasticity CI
WS02		D	2.50		15			36	17	19	95	Intermediate Plasticity CI
CBR03		D	0.40		25							
CBR01		D	0.35		19							
CBR01		D	0.70		26							
CBR04		D	0.40		19							
BH02		B	0.30		6.3							
BH02		B	2.00		17			41	19	22	97	Intermediate Plasticity CI
BH02		D	3.50		14			32	16	16	94	Low Plasticity CL
BH02		D	5.50		16			35	17	18	98	Intermediate Plasticity CI
BH01		D	1.30		21			52	23	29	95	High Plasticity CH
BH01		D	2.70		15			36	18	18	93	Intermediate Plasticity CI
BH03		B	2.00		14			31	16	15	96	Low Plasticity CL
BH03		D	3.50		21			42	20	22	94	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	Contract No: PSL21/2793
			Client Ref: C-18170

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	Contract No:
			PSL21/2793
			Client Ref:
			C-18170

PARTICLE SIZE DISTRIBUTION TEST

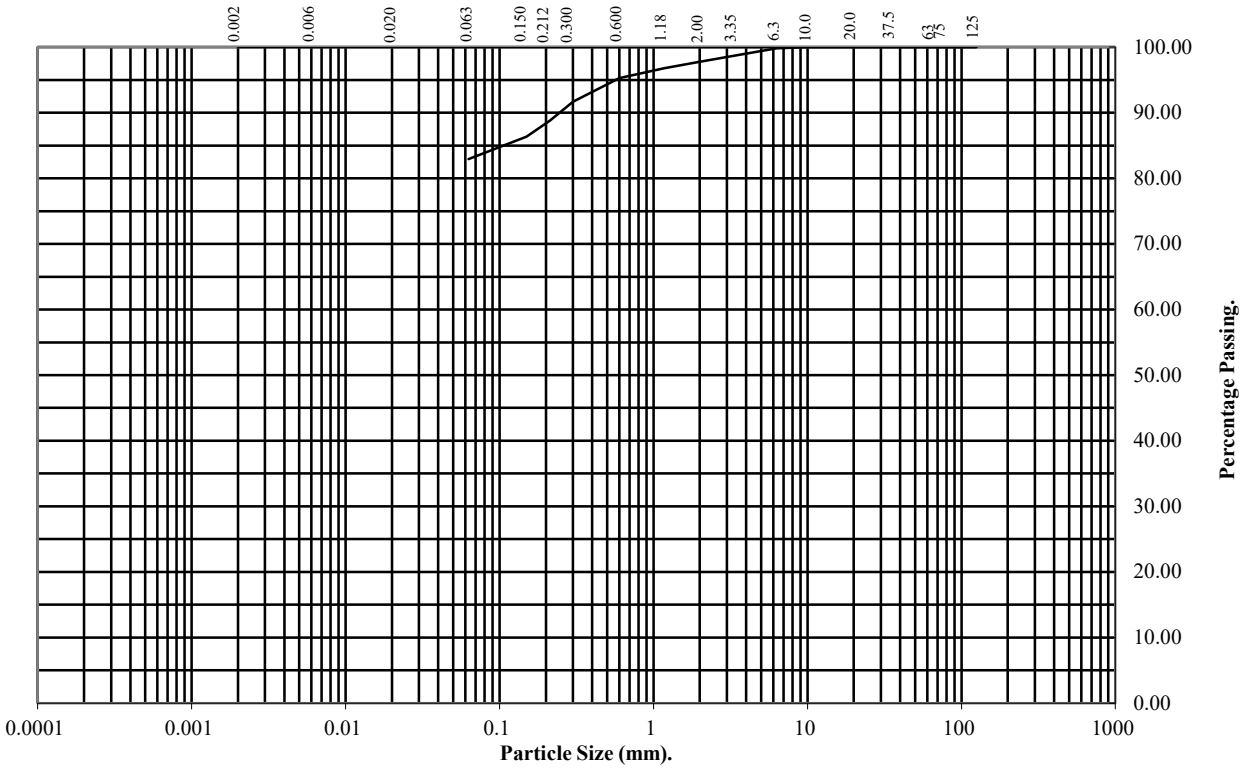
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH01** **Top Depth (m):** **2.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	98
1.18	97
0.6	95
0.3	92
0.212	89
0.15	86
0.063	83

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	15
Silt/Clay	83

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hyde Road School, Manchester**	**Contract No:** PSL21/2793 **Client Ref:** C-18170

PARTICLE SIZE DISTRIBUTION TEST

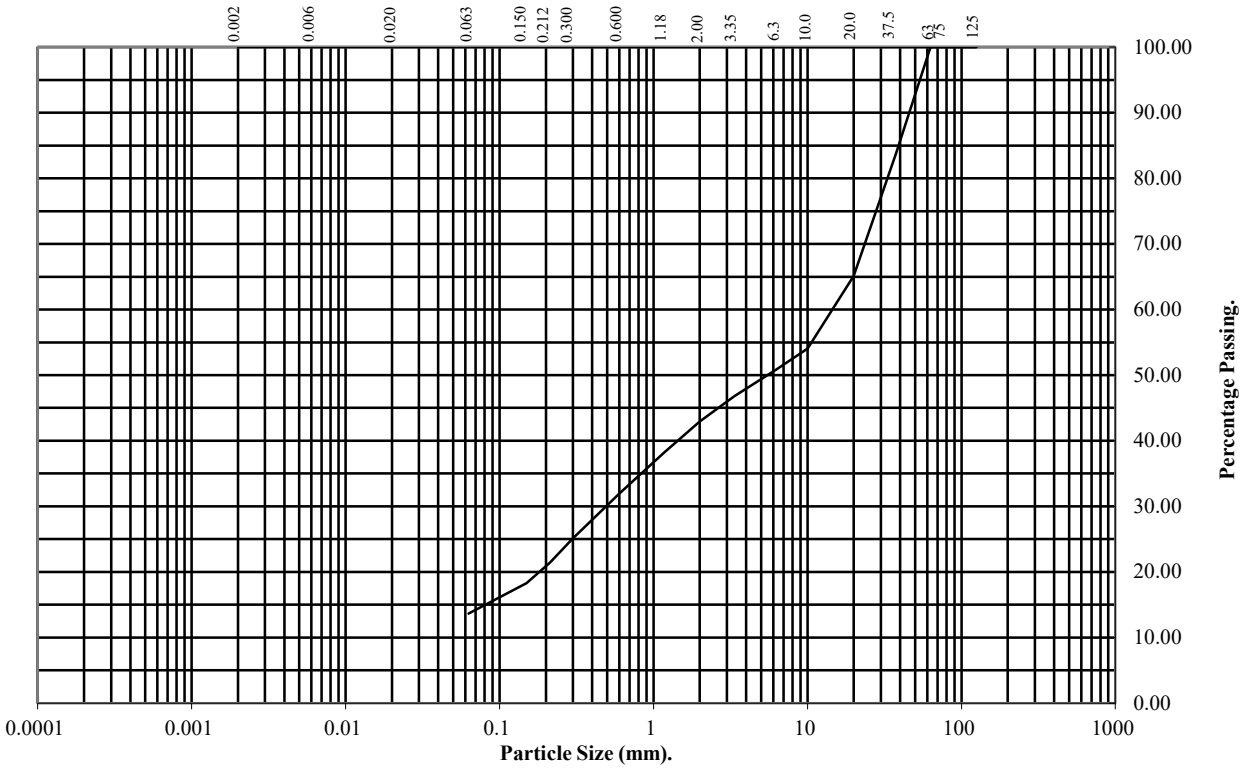
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH02** **Top Depth (m):** **0.60**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	84
20	65
10	54
6.3	51
3.35	47
2	43
1.18	38
0.6	32
0.3	25
0.212	21
0.15	18
0.063	14

Soil Fraction	Total Percentage
Cobbles	0
Gravel	57
Sand	29
Silt/Clay	14

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Hyde Road School, Manchester

Contract No:
PSL21/2793
Client Ref:
C-18170

PARTICLE SIZE DISTRIBUTION TEST

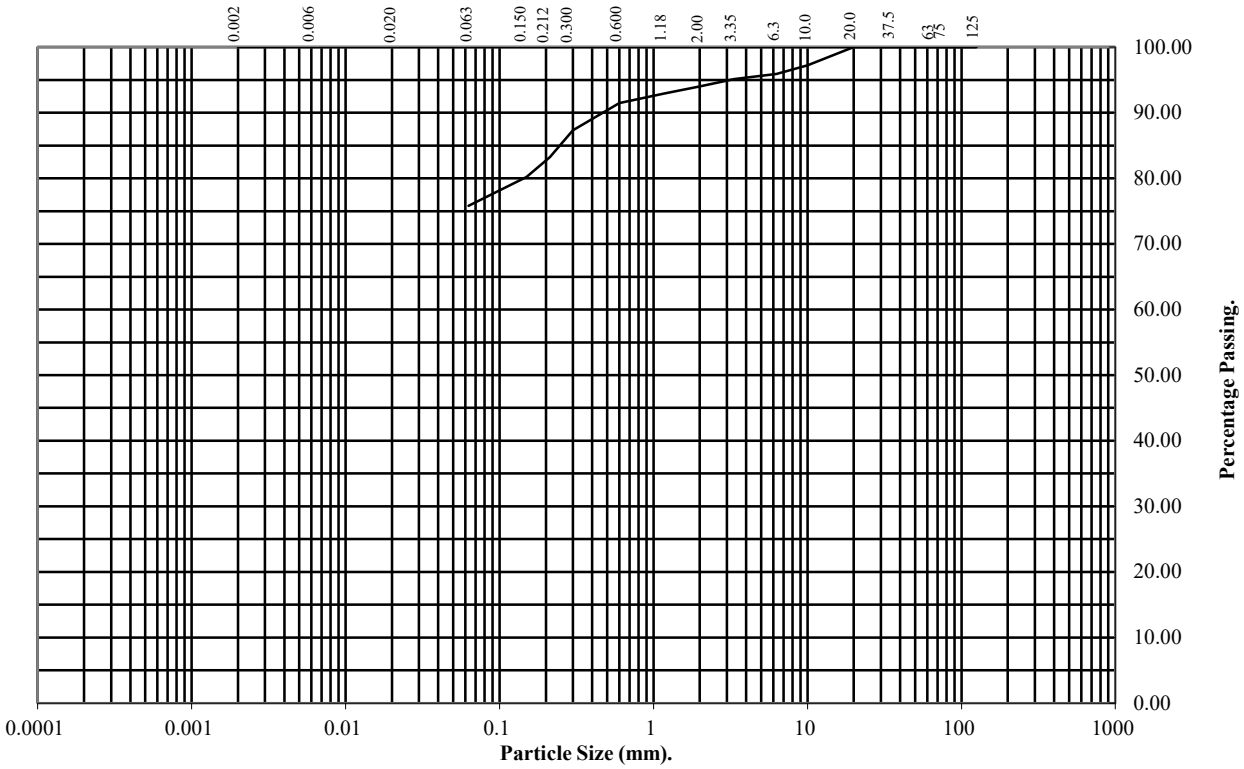
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH03** **Top Depth (m):** **4.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	97
6.3	96
3.35	95
2	94
1.18	93
0.6	91
0.3	87
0.212	83
0.15	80
0.063	76

Soil Fraction	Total Percentage
Cobbles	0
Gravel	6
Sand	18
Silt/Clay	76

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hyde Road School, Manchester**	**Contract No:** PSL21/2793 **Client Ref:** C-18170

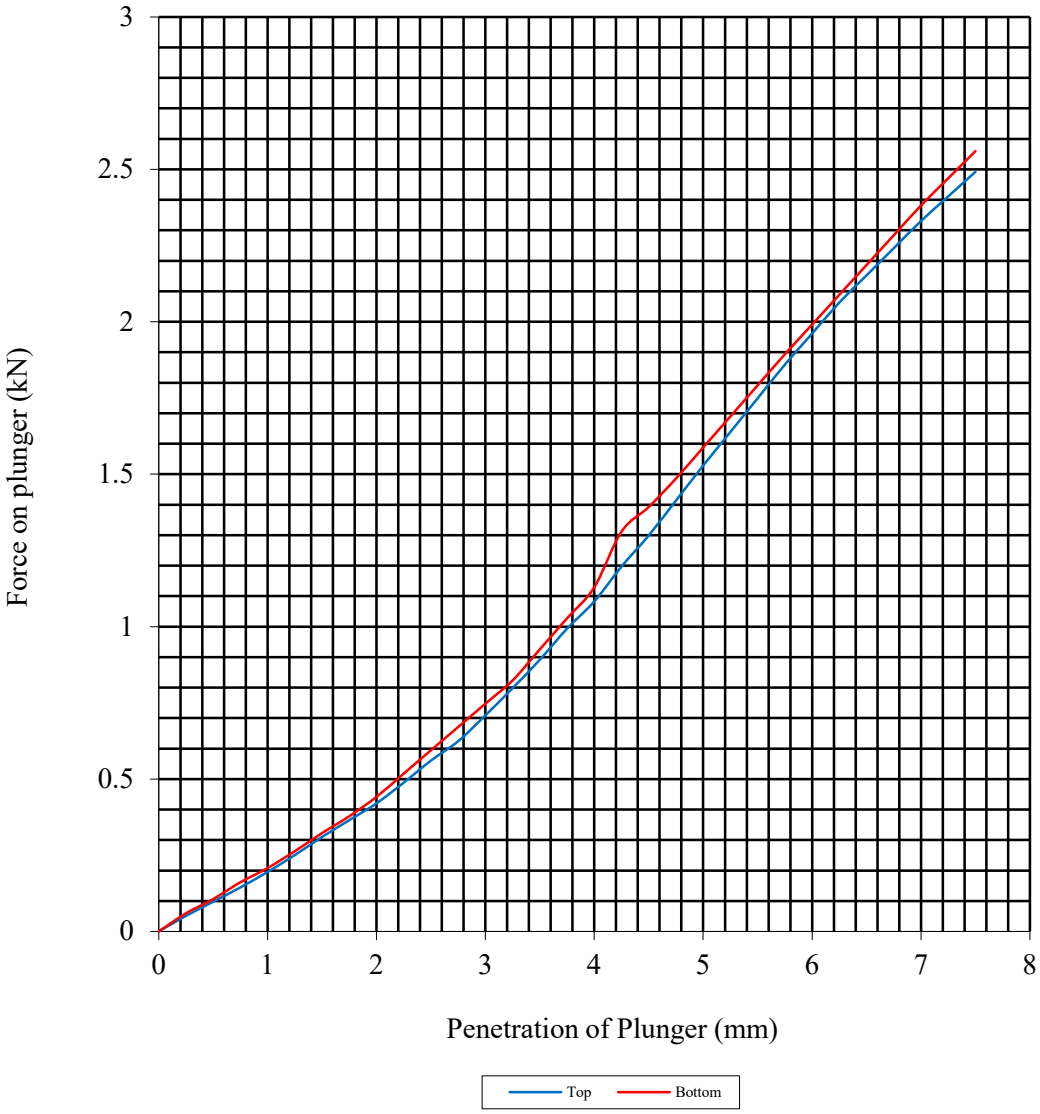
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH01 **Top Depth (m):** 0.30

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	22	Surcharge Kg:	4.20	Sample Top	22	Sample Top	7.6
Bulk Density Mg/m3:	1.99	Soaking Time hrs	0	Sample Bottom	22	Sample Bottom	7.9
Dry Density Mg/m3:	1.63	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			5				
Compaction Conditions		4.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

Hyde Road School, Manchester

Contract No: PSL21/2793

Client Ref: C-18170

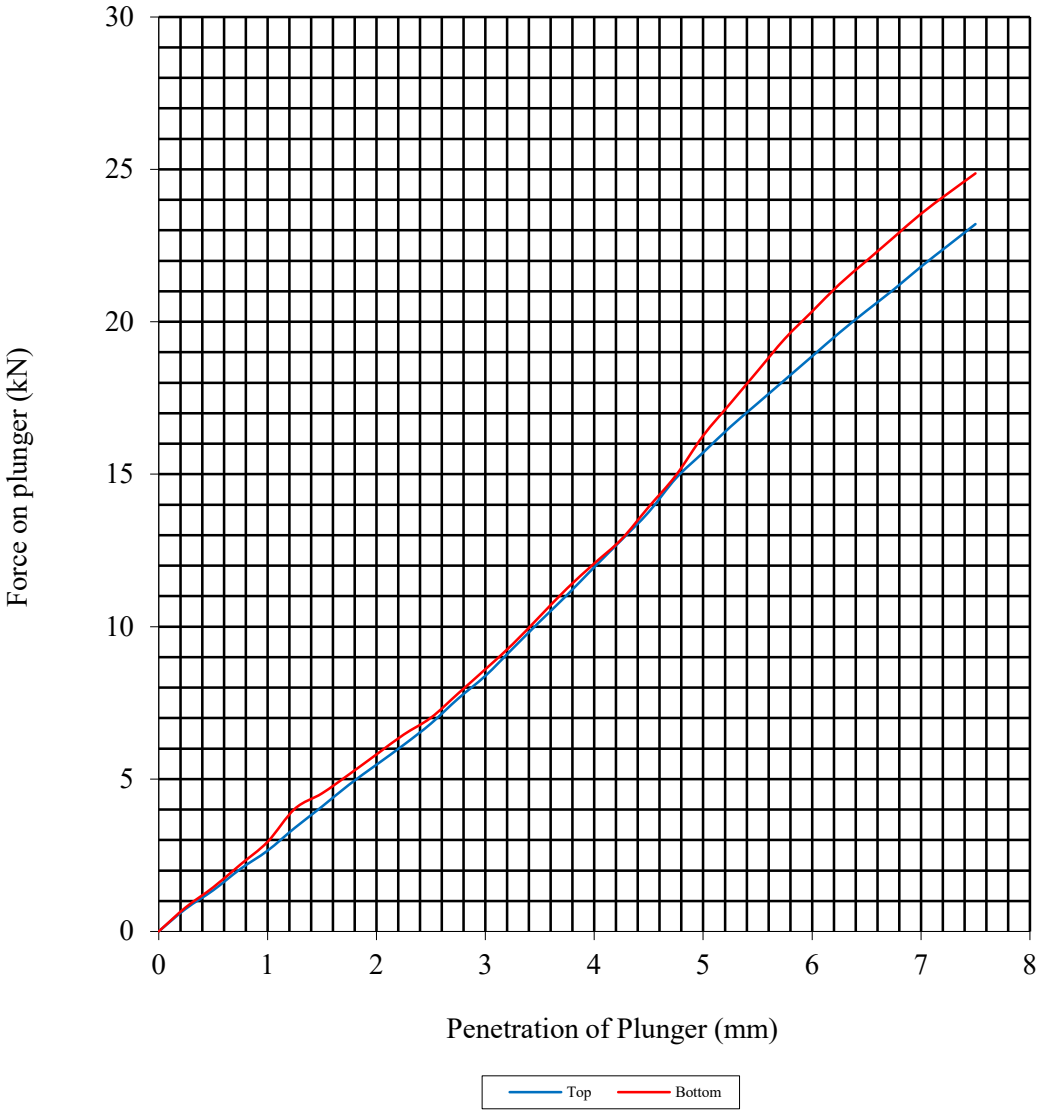
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH02 **Top Depth (m):** 0.30

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	6.3	Surcharge Kg:	4.20	Sample Top	6.3	Sample Top	78.6
Bulk Density Mg/m3:	2.29	Soaking Time hrs	0	Sample Bottom	6.3	Sample Bottom	81.3
Dry Density Mg/m3:	2.15	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			20				
Compaction Conditions		4.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

Hyde Road School, Manchester

Contract No: PSL21/2793

Client Ref: C-18170

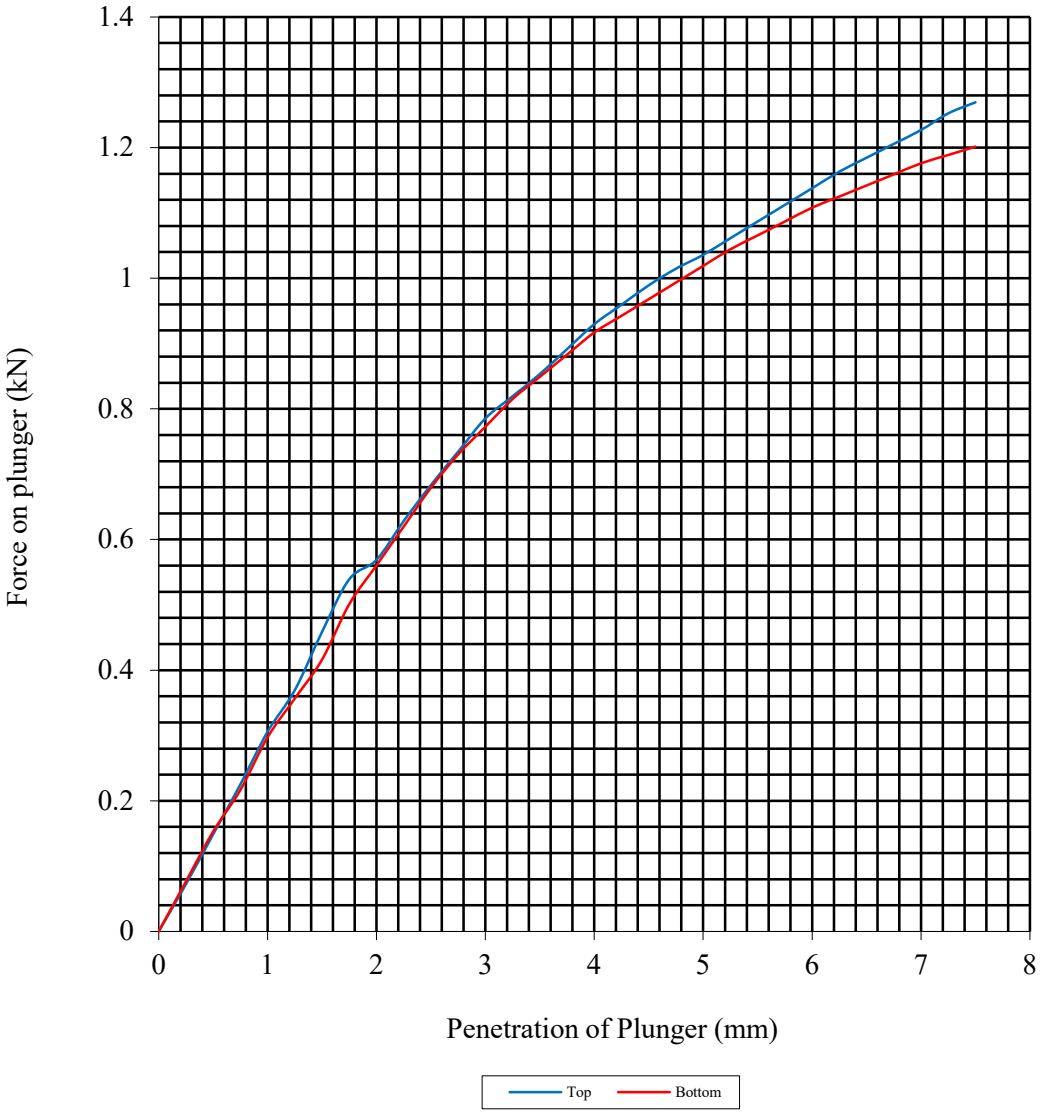
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH03 **Top Depth (m):** 1.20

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	18	Surcharge Kg:	4.20	Sample Top	18	Sample Top	5.2
Bulk Density Mg/m3:	1.98	Soaking Time hrs	0	Sample Bottom	18	Sample Bottom	5.1
Dry Density Mg/m3:	1.67	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		4.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

Hyde Road School, Manchester

Contract No: PSL21/2793

Client Ref: C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

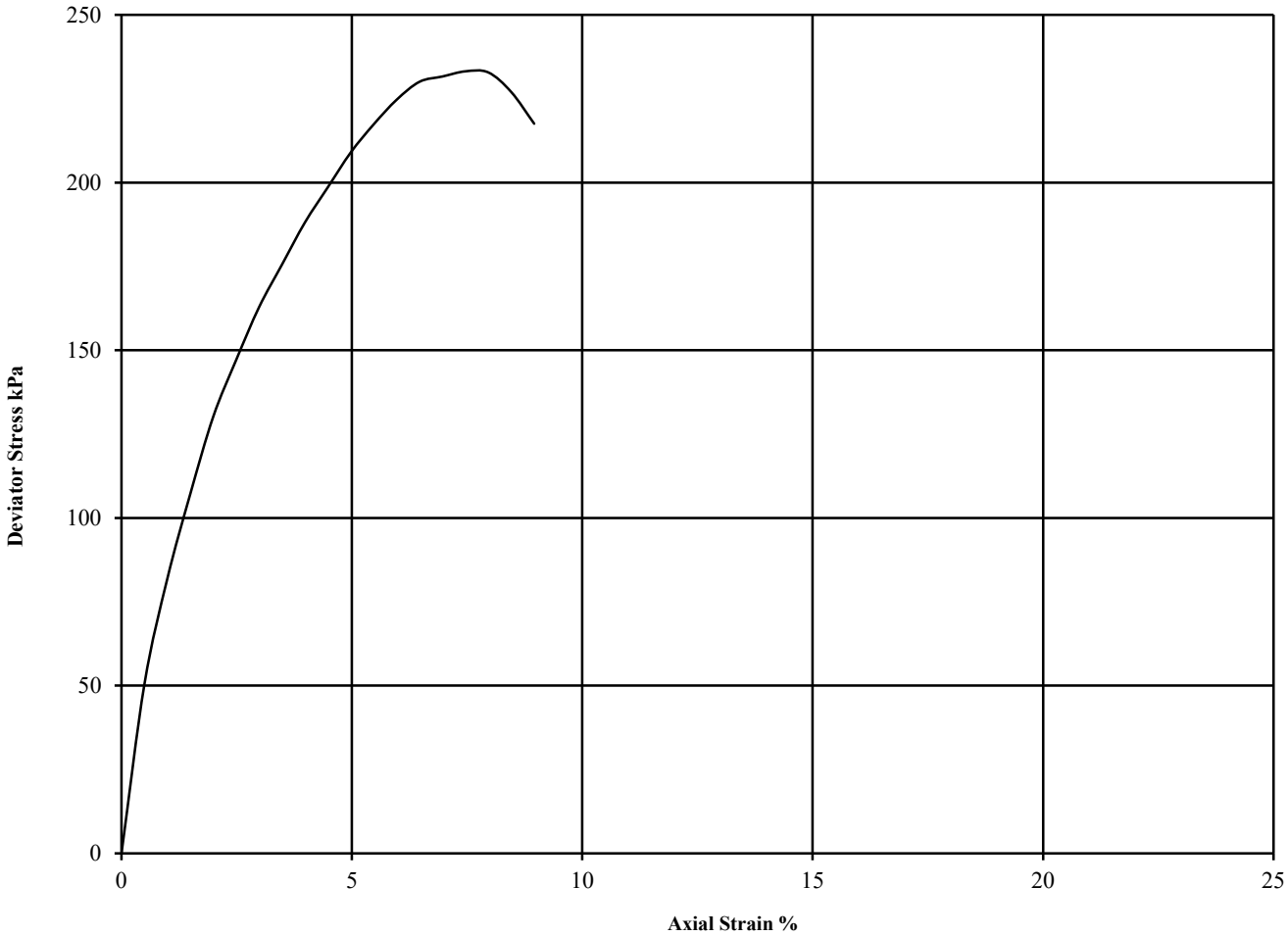
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH01 **Top Depth (m):** 3.00

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36
1	15	2.11	1.84	60	233	117	7.5	Brittle	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	Contract No: PSL21/2793 Client Ref: C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

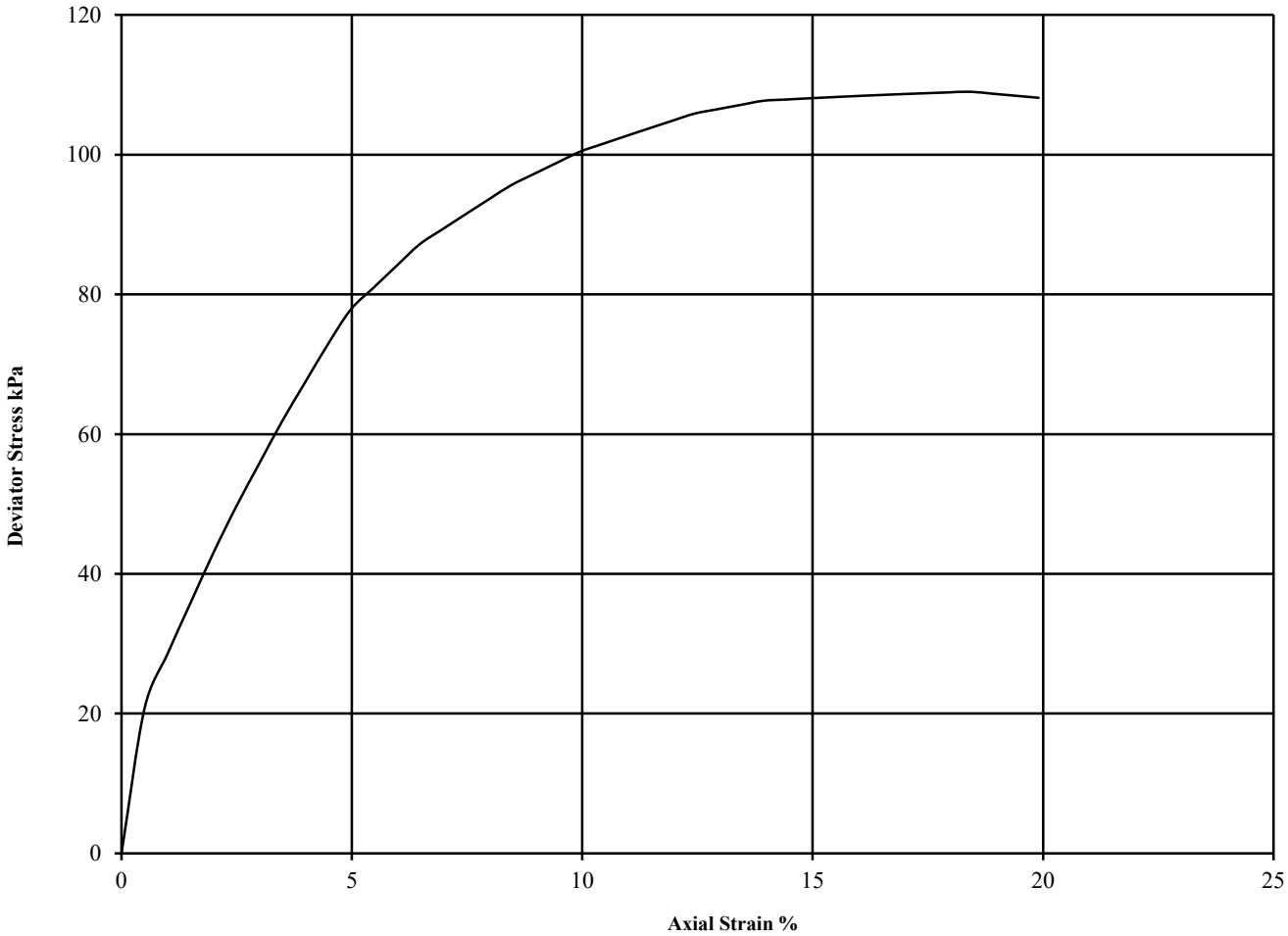
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH01 **Top Depth (m):** 5.00

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33
1	17	2.15	1.85	100	109	55	18.4	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

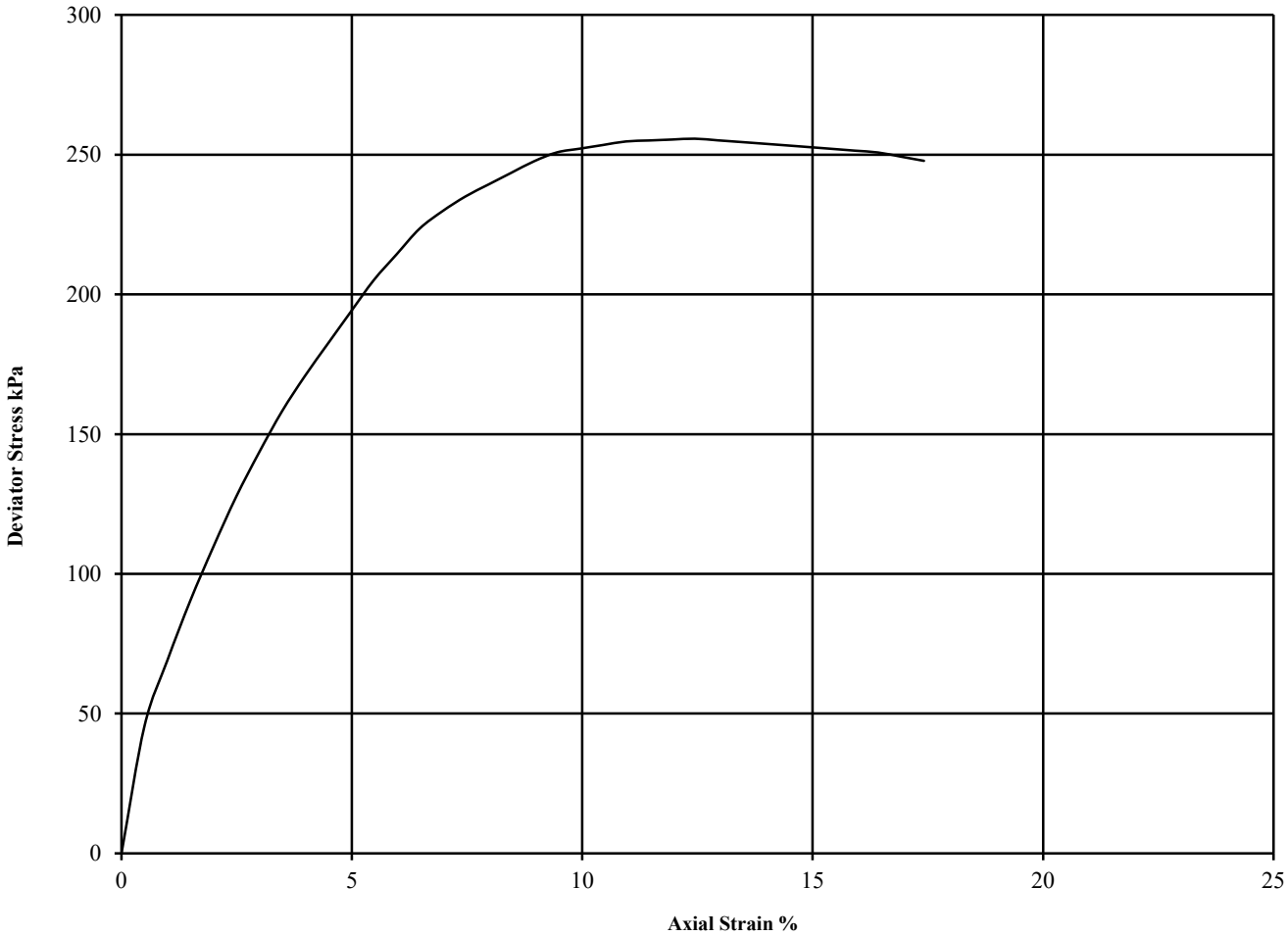
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH01 **Top Depth (m):** 7.50

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35
1	16	2.15	1.85	150	256	128	12.4	Intermediate	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

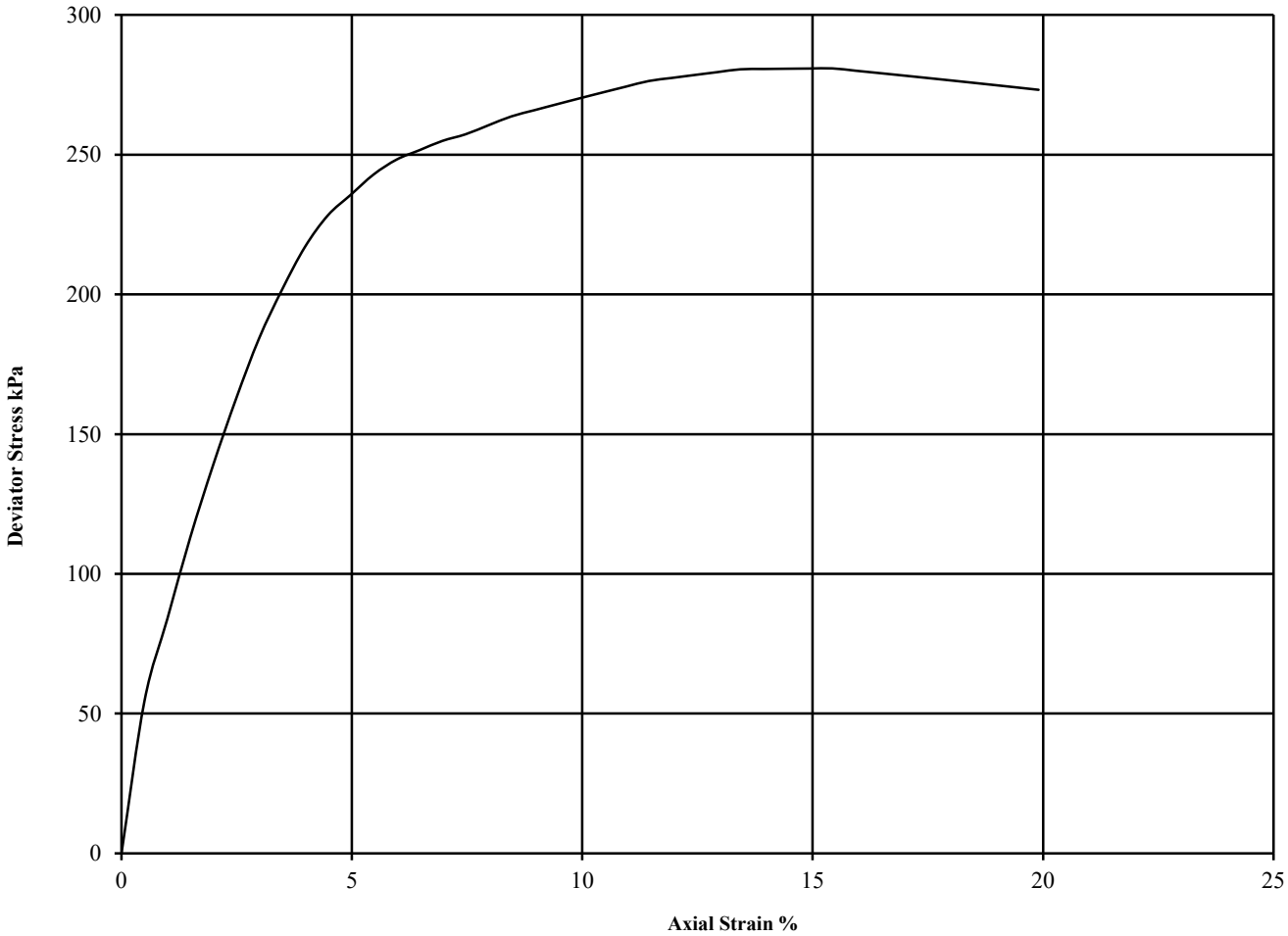
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH02 **Top Depth (m):** 3.00

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	15	2.14	1.86	60	281	140	15.4	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

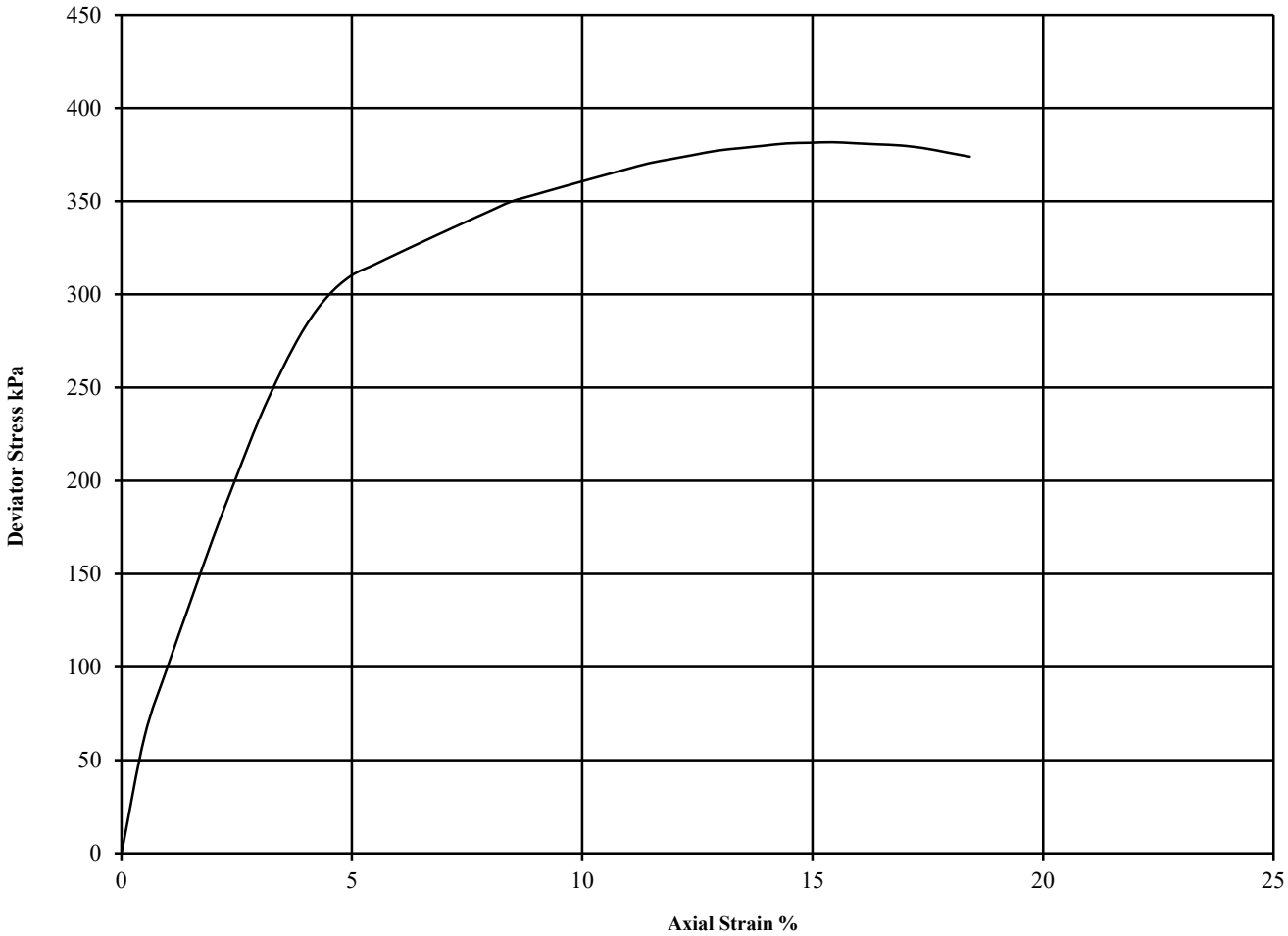
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH02 **Top Depth (m):** 5.00

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	16	2.18	1.89	100	382	191	15.4	Intermediate	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

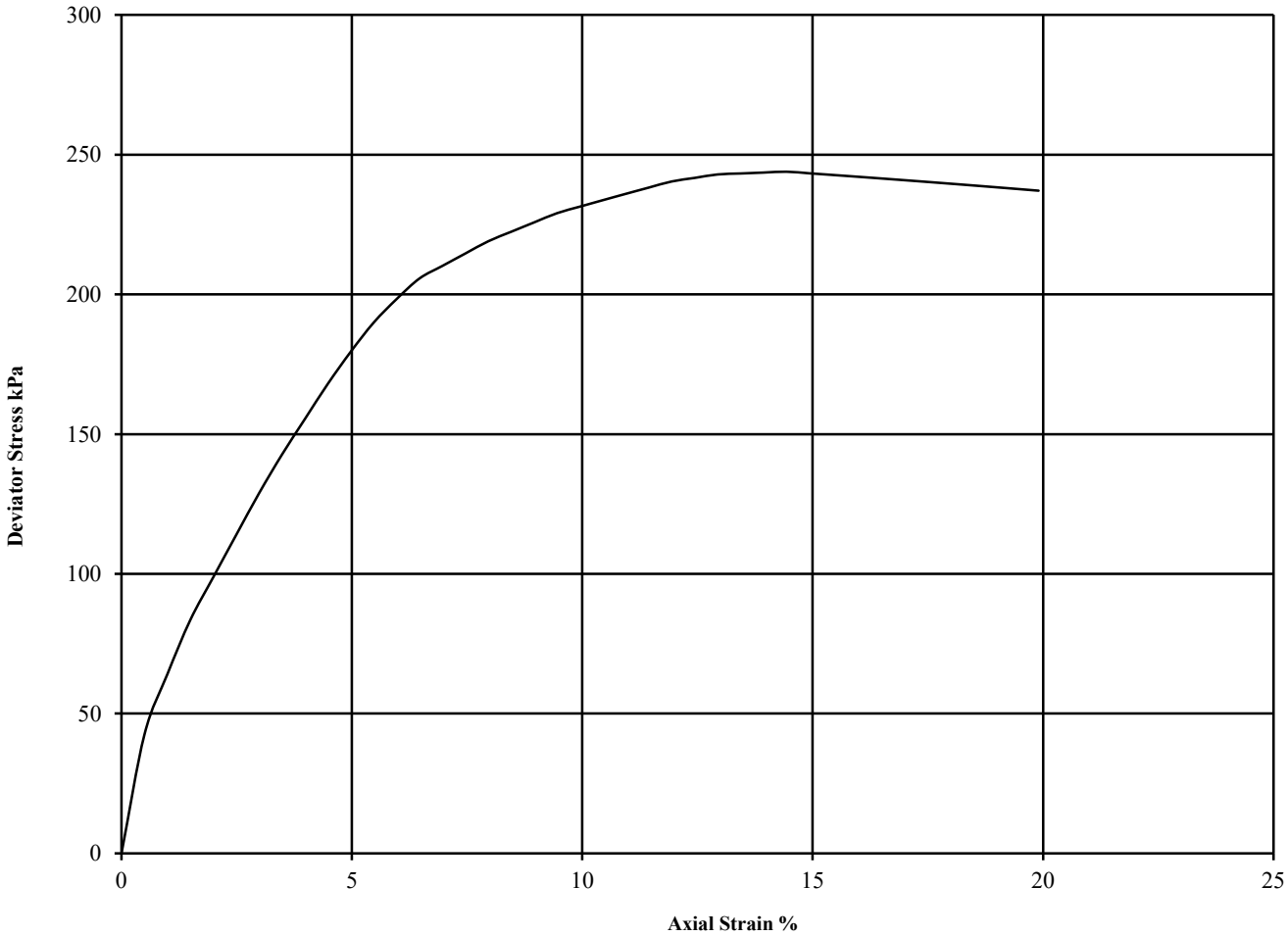
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH02 **Top Depth (m):** 7.50

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	16	2.18	1.88	150	244	122	14.4	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

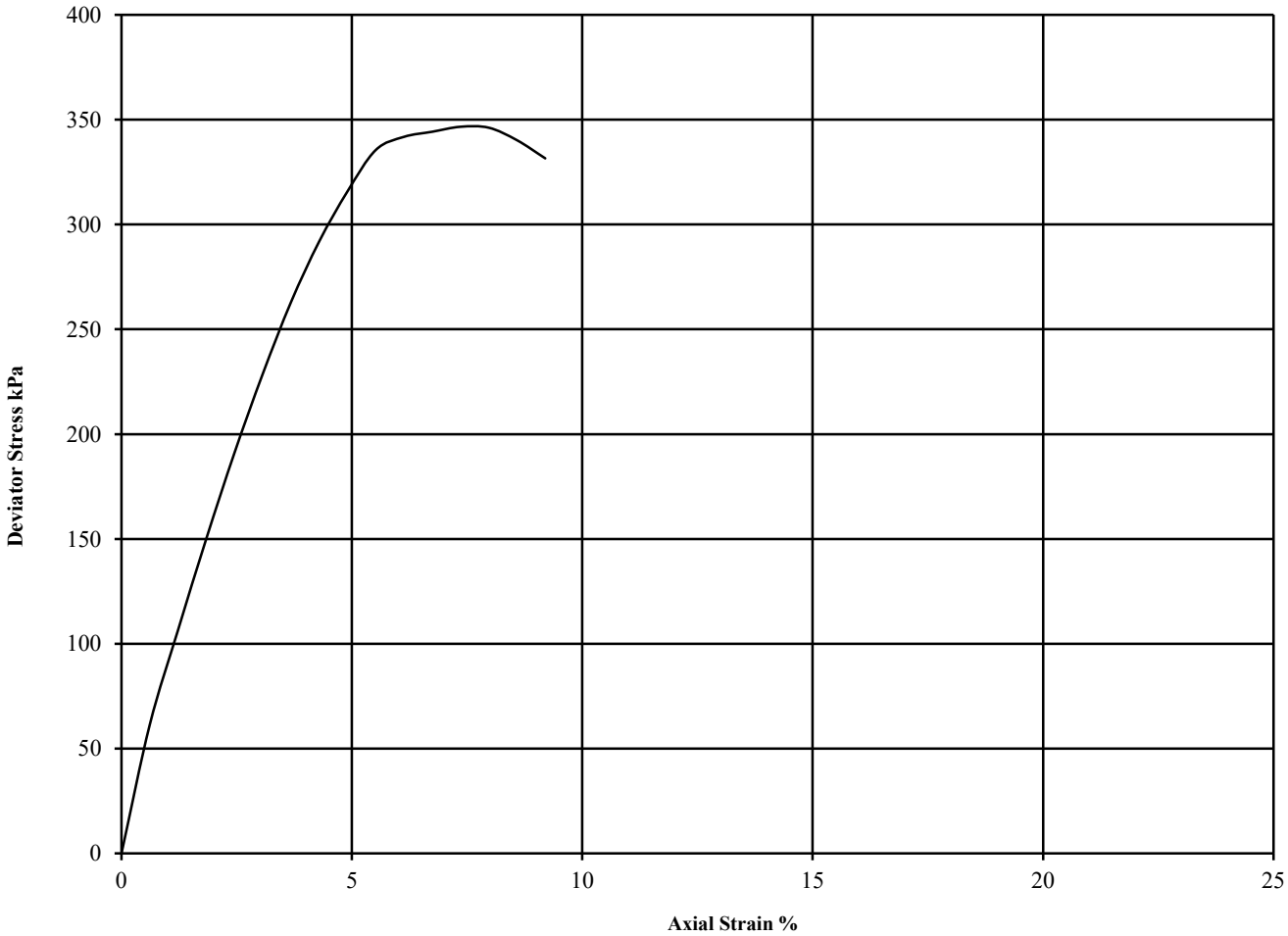
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH02 **Top Depth (m):** 10.50

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		168	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36
1	15	2.08	1.81	210	347	173	7.4	Brittle	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	Contract No: PSL21/2793 Client Ref: C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

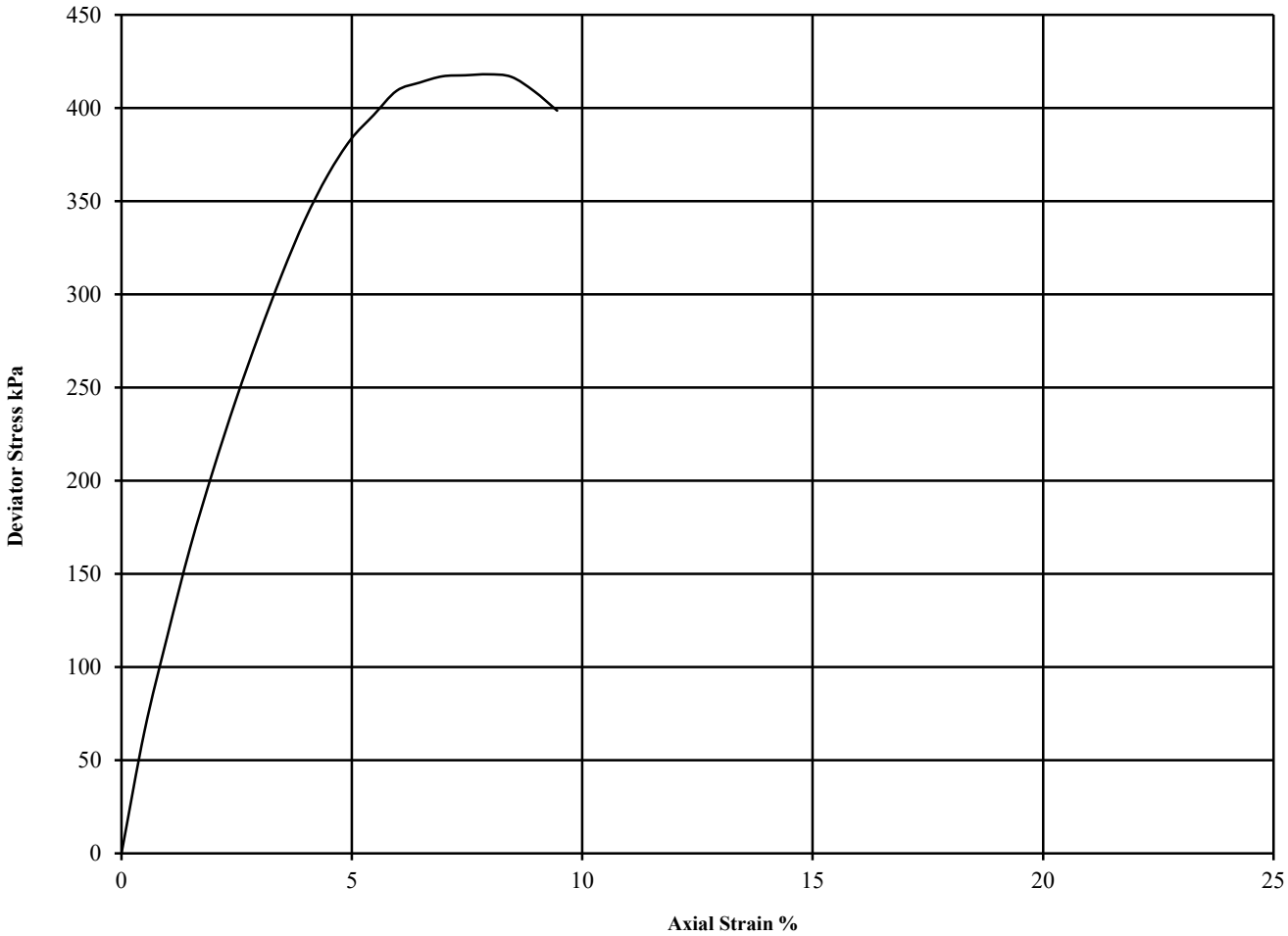
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH02 **Top Depth (m):** 13.50

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35
1	16	2.10	1.81	270	418	209	8.0	Brittle	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	Contract No: PSL21/2793 Client Ref: C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

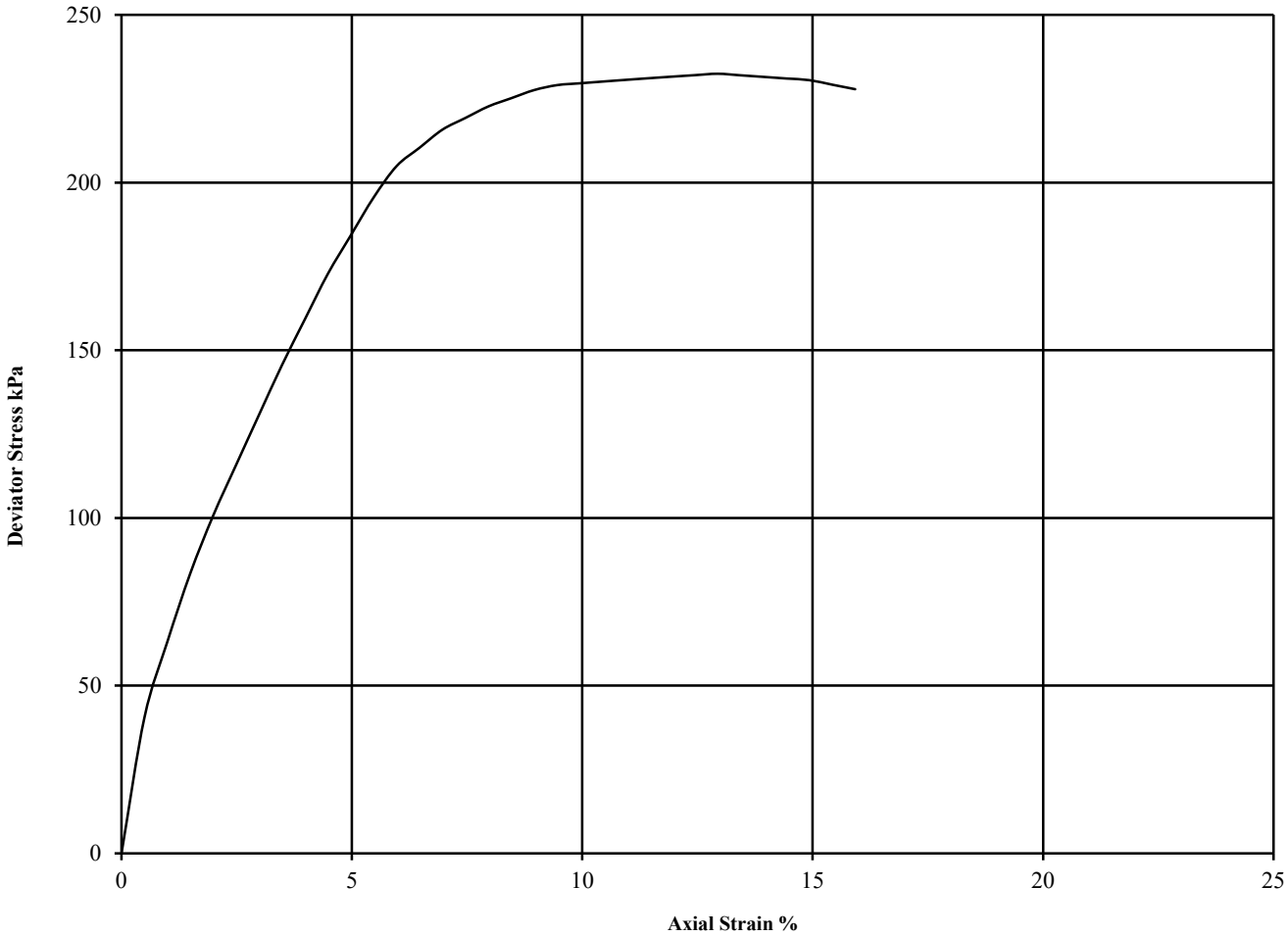
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH03 **Top Depth (m):** 3.00

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	17	2.04	1.74	60	232	116	12.9	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

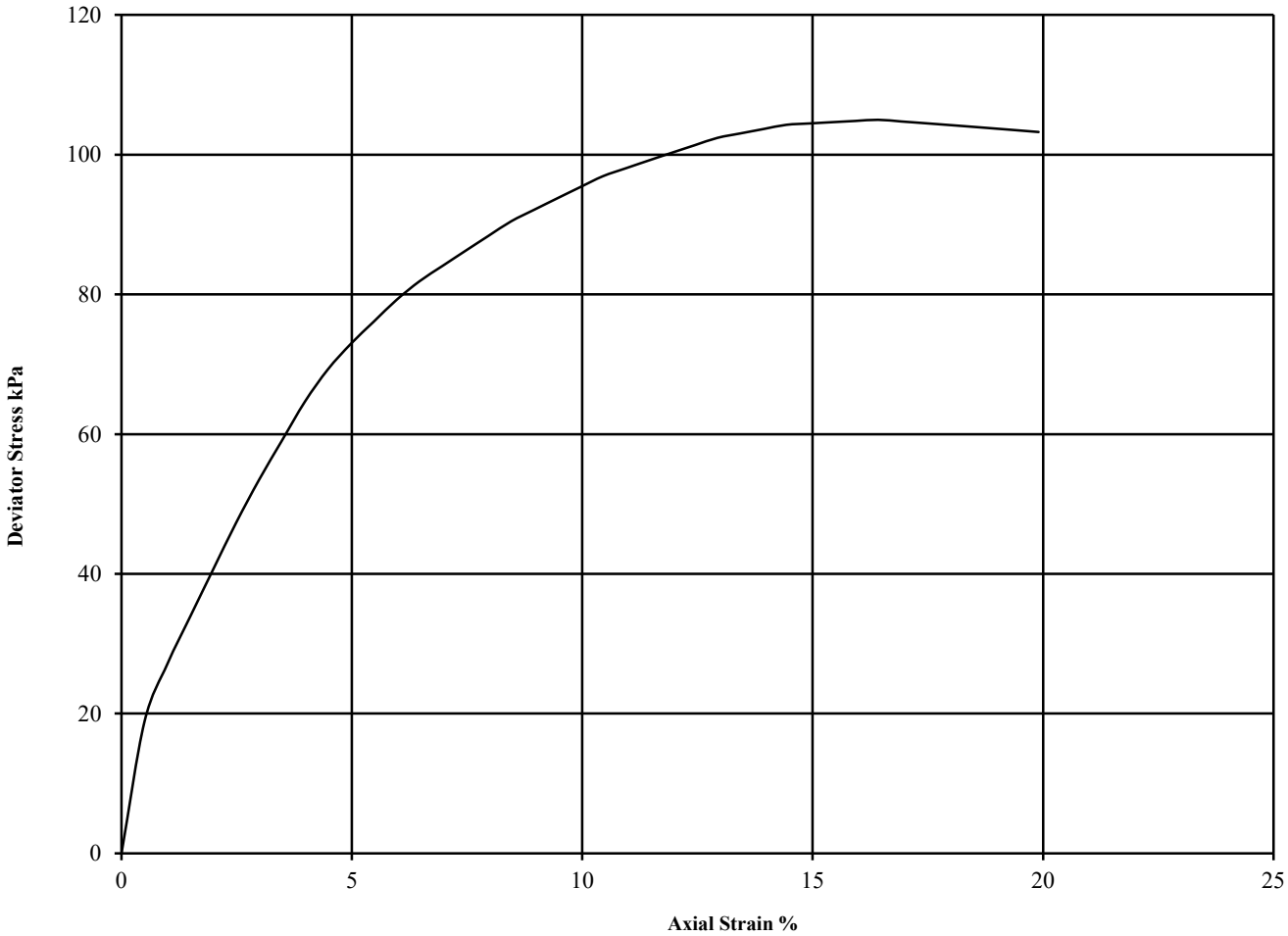
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH03 **Top Depth (m):** 5.00

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	16	2.13	1.84	100	105	52	16.4	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

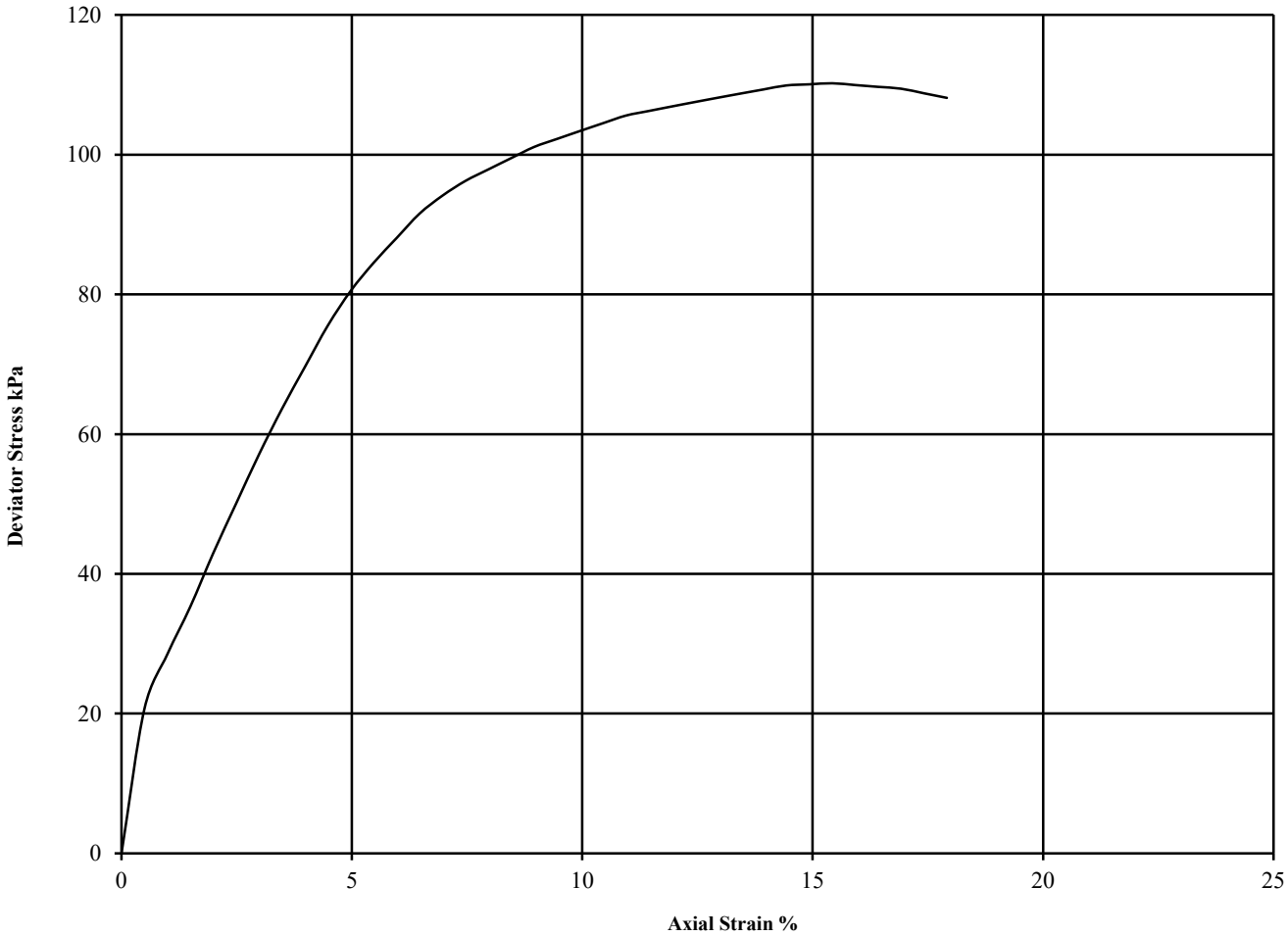
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH03 **Top Depth (m):** 7.50

Sample Number: **Base Depth (m):**

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	18	2.09	1.77	150	110	55	15.4	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	**Contract No:** PSL21/2793 **Client Ref:** C-18170

ONE DIMENSIONAL CONSOLIDATION TEST

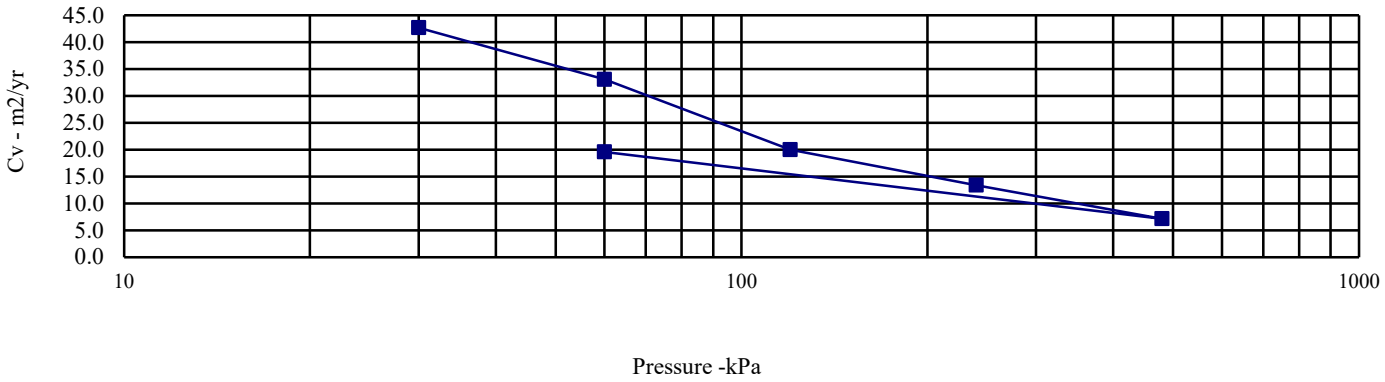
BS 1377: Part 5: 1990: Clause 3

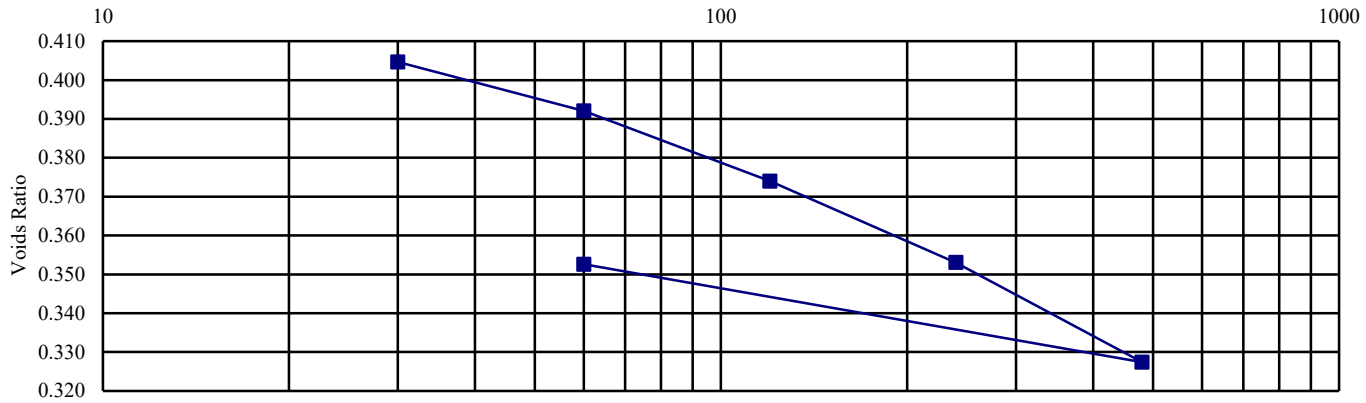
Hole Number: BH02 **Top Depth (m):** 3.00

Sample Number: **Base Depth (m) :**

Sample Type: U

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	16						
Bulk Density (Mg/m3):	2.16	0	30	0.521	42.693	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.86	30	60	0.300	33.065		
Voids Ratio:	0.427	60	120	0.216	19.970	Nominal temperature during test ' C:	20
Degree of saturation:	99.8	120	240	0.127	13.382		
Height (mm):	20.012	240	480	0.079	7.147	Remarks: See summary of soil descriptions	
Diameter (mm)	75.013	480	60	0.045	19.581		
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	Contract No: PSL21/2793
			Client Ref: C-18170

ONE DIMENSIONAL CONSOLIDATION TEST

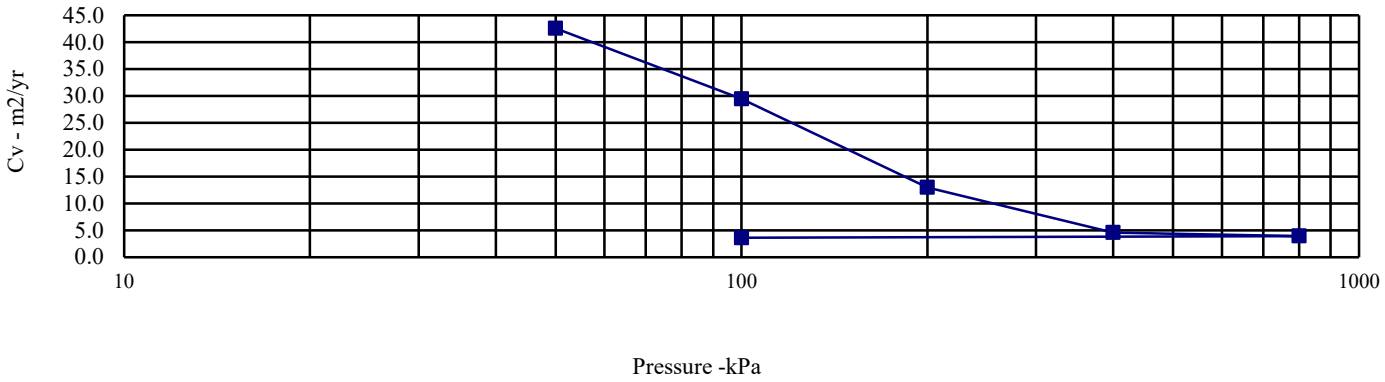
BS 1377: Part 5: 1990: Clause 3

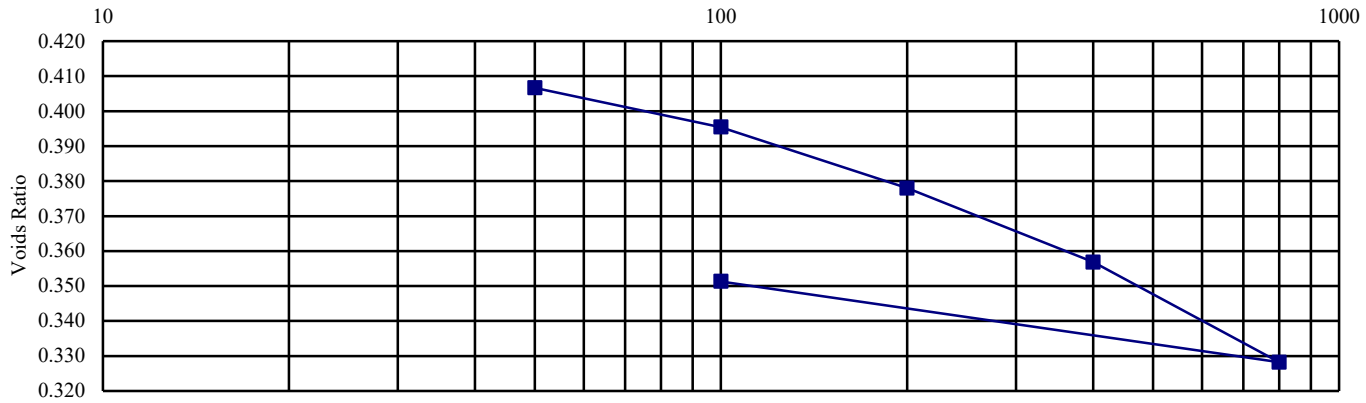
Hole Number: BH02 **Top Depth (m):** 5.00

Sample Number: **Base Depth (m) :**

Sample Type: U

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	17						
Bulk Density (Mg/m3):	2.18	0	50	0.188	42.583	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.87	50	100	0.160	29.441		
Voids Ratio:	0.420	100	200	0.125	12.983	Nominal temperature during test ' C:	20
Degree of saturation:	106.2	200	400	0.077	4.564		
Height (mm):	20.088	400	800	0.053	3.913	Remarks: See summary of soil descriptions	
Diameter (mm)	75.04	800	100	0.025	3.617		
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	Hyde Road School, Manchester	Contract No: PSL21/2793
			Client Ref: C-18170

Certificate of Analysis

Certificate Number 21-08171 *Issued:* 26-Apr-21

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 21-08171

Client Reference PSL21/2793

Order No (not supplied)

Contract Title Hyde Road School, Manchester

Description 8 Soil samples.

Date Received 20-Apr-21

Date Started 20-Apr-21

Date Completed 26-Apr-21

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-08171
Client Ref PSL21/2793
Contract Title Hyde Road School, Manchester

			Lab No	1834468	1834469	1834470	1834471	1834472	1834473	1834474	1834475
			.Sample ID	WS03	WS03	BH02	BH02	BH01	BH01	BH03	BH03
			Depth	1.50	3.70	0.60	7.00	0.90	1.20-1.65	1.20-1.65	5.50
			Other ID								
			Sample Type	D	D	B	D	B	B	D	D
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**								
Metals											
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10	10	< 10	< 10	< 10	< 10	< 10
Inorganics											
pH	DETSC 2008#		pH	7.6	8.9	6.8	8.3	7.5	7.4	8.0	8.3
Organic matter	DETSC 2002#	0.1	%					4.2	2.0		
Chloride Aqueous Extract	DETSC 2055	1	mg/l	6.9	14	14	6.0	13	7.7	11	6.4
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	1.5	< 1.0	1.3	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	25	58	180	60	160	33	53	69
Sulphur as S, Total	DETSC 2320	0.01	%	0.01	0.04	0.07	0.07	0.06	0.03	0.02	0.09
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.03	0.07	0.14	0.05	0.10	0.04	0.04	0.05

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 21-08171
Client Ref PSL21/2793
Contract Hyde Road School, Manchester

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1834468	WS03 1.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1834469	WS03 3.70 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1834470	BH02 0.60 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1834471	BH02 7.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1834472	BH01 0.90 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
1834473	BH01 1.20-1.65 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
1834474	BH03 1.20-1.65 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1834475	BH03 5.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Information in Support of the Analytical Results

Our Ref 21-08171
Client Ref PSL21/2793
Contract Hyde Road School, Manchester

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

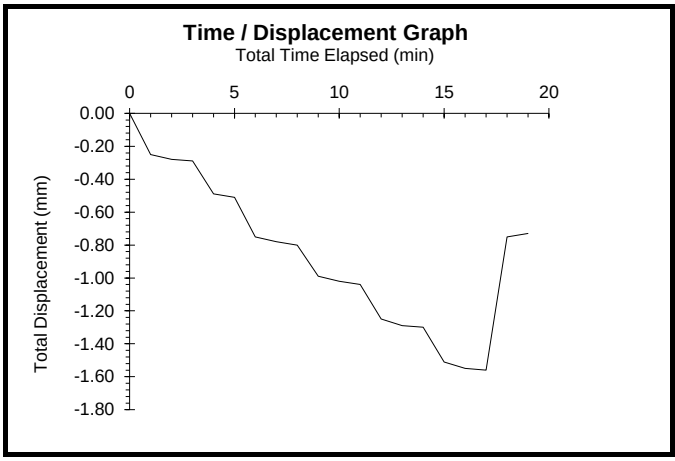
4041

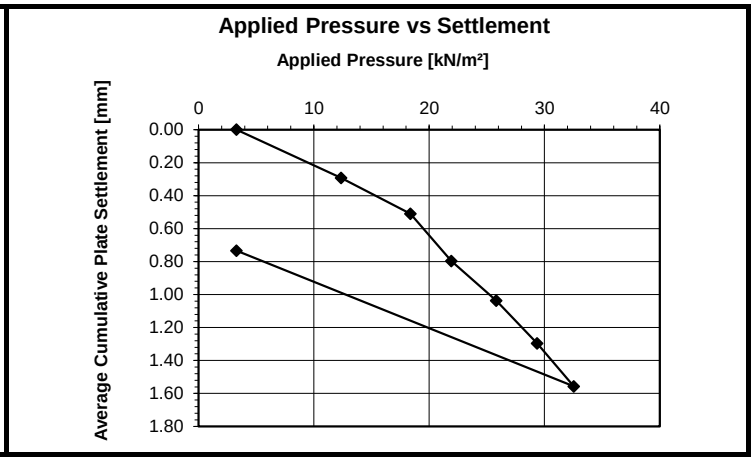
Client:	Hydrock	Client Reference:	PO04886
Client Address:	4 Lakeside Festival Park Stoke-On-Trent ST1 5RY	Job Number:	21-55172_1
		Date Tested:	16/03/2021
		Tested By:	NS
Contact:	William Swinnerton		
Testing Carried Out At:	Former Showcase Cinema, Hyde Road, Manchester		

Test Results

Laboratory Reference:	55172_1	Depth Top (m):	400
Test Reference:	1	Layer Thickness (mm):	N/K
Material Description:	CLAY	Weather Conditions:	Overcast/ Wet
Test Location:	HYDCBR03	Kentledge Type:	14700 360
		Plate Diameter [m]:	0.60

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.93	3	0.00
3.50	12	0.29
5.20	18	0.51
6.20	22	0.80
7.30	26	1.04
8.30	29	1.30
9.20	33	1.56
0.93	3	0.73
End of Test		
Recovery %	52.89%	





Pressure at 1.25mm Settlement:	**28.7 kN/m²**	**Max Apllied Pressure:**	**32.5 kN/m²**
Modulus of Subgrade Reaction:	**18.5 kN/m²**	**Maximum settlement:**	**1.56 mm**
Equivalent CBR By Plate Loading:	**1.5 %**	**Moisture Content:**	**N/A**

Remarks:

Signed:

Robin Paine
Geotechnical Regional Manager

SSF68.3
Date Reported: 17/03/2021

for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis.

TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

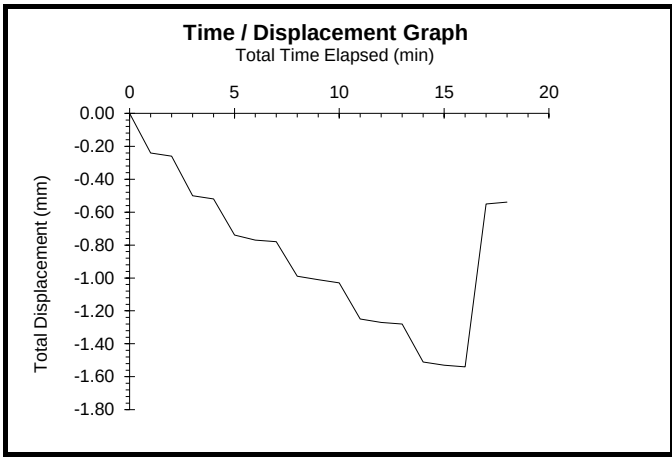
4041

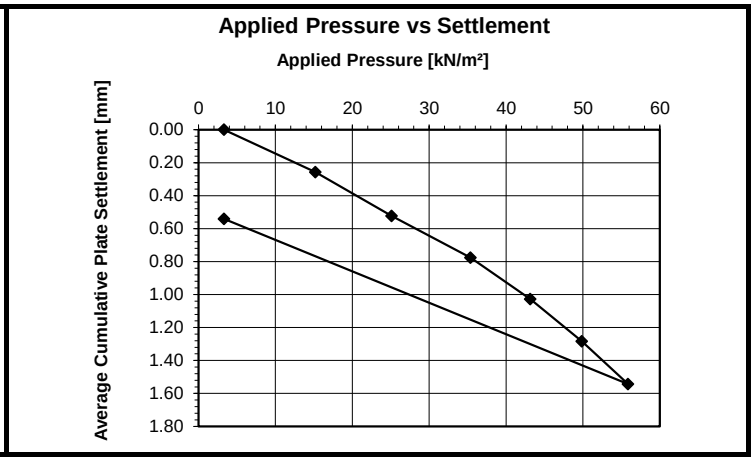
Client:	Hydrock	Client Reference:	PO04886
Client Address:	4 Lakeside Festival Park Stoke-On-Trent ST1 5RY	Job Number:	21-55172_2
		Date Tested:	16/03/2021
		Tested By:	NS
Contact:	William Swinnerton		
Testing Carried Out At:	Former Showcase Cinema, Hyde Road, Manchester		

Test Results

Laboratory Reference:	55172_2	Depth Top (m):	350
Test Reference:	2	Layer Thickness (mm):	N/K
Material Description:	CLAY	Weather Conditions:	Overcast/ Wet
Test Location:	HYDCBR01	Kentledge Type:	14700 360
		Plate Diameter [m]:	0.60

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.93	3	0.00
4.30	15	0.26
7.10	25	0.52
10.00	35	0.78
12.20	43	1.03
14.10	50	1.28
15.80	56	1.54
0.93	3	0.54
End of Test		
Recovery %	65.01%	





Pressure at 1.25mm Settlement:	**49.0 kN/m²**	**Max Apllied Pressure:**	**55.9 kN/m²**
Modulus of Subgrade Reaction:	**31.5 kN/m²**	**Maximum settlement:**	**1.54 mm**
Equivalent CBR By Plate Loading:	**3.8 %**	**Moisture Content:**	**N/A**

Remarks:

Signed:

Robin Paine
Geotechnical Regional Manager

SSF68.3
Date Reported: 17/03/2021

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

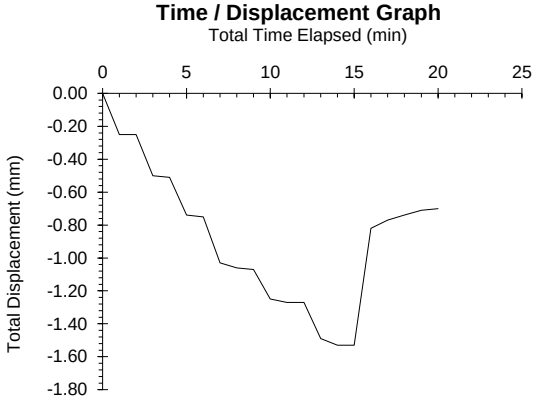
Client:	Hydrock	Client Reference:	PO04886
Client Address:	4 Lakeside Festival Park Stoke-On-Trent ST1 5RY	Job Number:	21-55172_3
		Date Tested:	16/03/2021
		Tested By:	NS
Contact:	William Swinnerton		
Testing Carried Out At:	Former Showcase Cinema, Hyde Road, Manchester		

Test Results

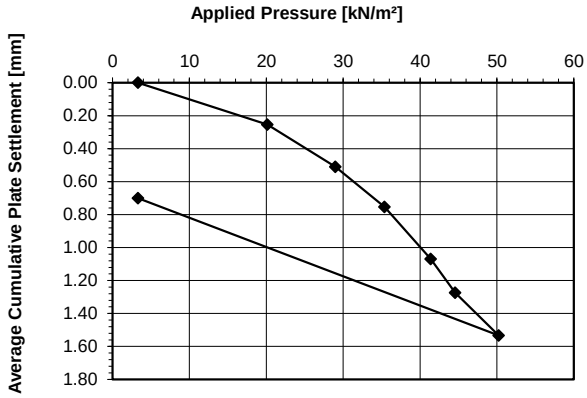
Laboratory Reference:	55172_3	Depth Top (m):	650
Test Reference:	3	Layer Thickness (mm):	N/K
Material Description:	CLAY & Rubble	Weather Conditions:	Overcast/ Wet
Test Location:	HYDCBR01	Kentledge Type:	14700 360
		Plate Diameter [m]:	0.60

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.93	3	0.00
5.70	20	0.25
8.20	29	0.51
10.00	35	0.75
11.70	41	1.07
12.60	45	1.27
14.20	50	1.53
0.93	3	0.70
End of Test		
Recovery %	54.35%	

Time / Displacement Graph



Applied Pressure vs Settlement



Pressure at 1.25mm Settlement:	**44.2 kN/m²**	**Max Apllied Pressure:**	**50.2 kN/m²**
Modulus of Subgrade Reaction:	**28.4 kN/m²**	**Maximum settlement:**	**1.53 mm**
Equivalent CBR By Plate Loading:	**3.2 %**	**Moisture Content:**	**N/A**

Remarks:

Signed:

Robin Paine
Geotechnical Regional Manager

SSF68.3
Date Reported: 17/03/2021

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Equivalent CBR Value derived from Plate Bearing test BS1377-9

Tested in accordance with In House Procedure based upon SHW Design manual IAN73/06

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

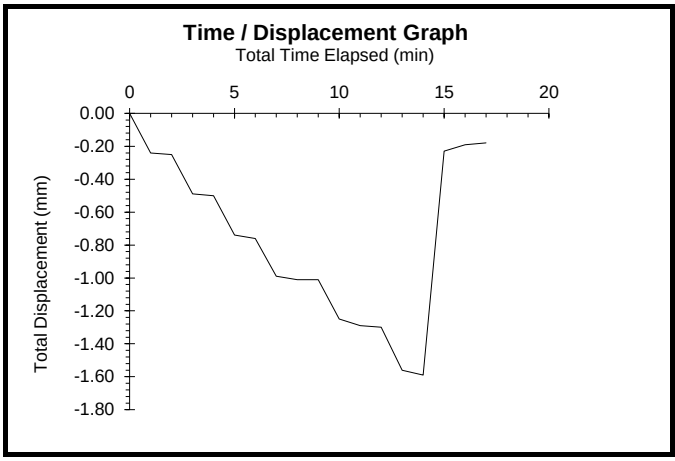
4041

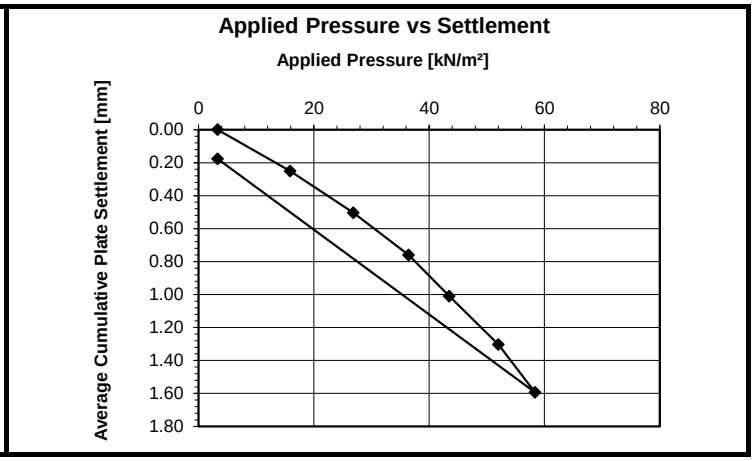
Client:	Hydrock	Client Reference:	PO04886
Client Address:	4 Lakeside Festival Park Stoke-On-Trent ST1 5RY	Job Number:	21-55172_4
		Date Tested:	16/03/2021
		Tested By:	NS
Contact:	William Swinnerton		
Testing Carried Out At:	Former Showcase Cinema, Hyde Road, Manchester		

Test Results

Laboratory Reference:	55172_4	Depth Top (m):	400
Test Reference:	4	Layer Thickness (mm):	N/K
Material Description:	CLAY & Rubble	Weather Conditions:	Overcast/ Wet
Test Location:	HYDCBR04	Kentledge Type:	14700 360
		Plate Diameter [m]:	0.60

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0.93	3	0.00
4.50	16	0.25
7.60	27	0.50
10.30	36	0.76
12.30	44	1.01
14.70	52	1.30
16.50	58	1.59
0.93	3	0.18
End of Test		
Recovery %	88.91%	





Pressure at 1.25mm Settlement:	**50.4 kN/m²**	**Max Apllied Pressure:**	**58.4 kN/m²**
Modulus of Subgrade Reaction:	**32.5 kN/m²**	**Maximum settlement:**	**1.59 mm**
Equivalent CBR By Plate Loading:	**4.0 %**	**Moisture Content:**	**N/A**

Remarks:

Signed:

Robin Paine
Geotechnical Regional Manager

SSF68.3
Date Reported: 17/03/2021

for and on behalf of i2 Analytical Ltd

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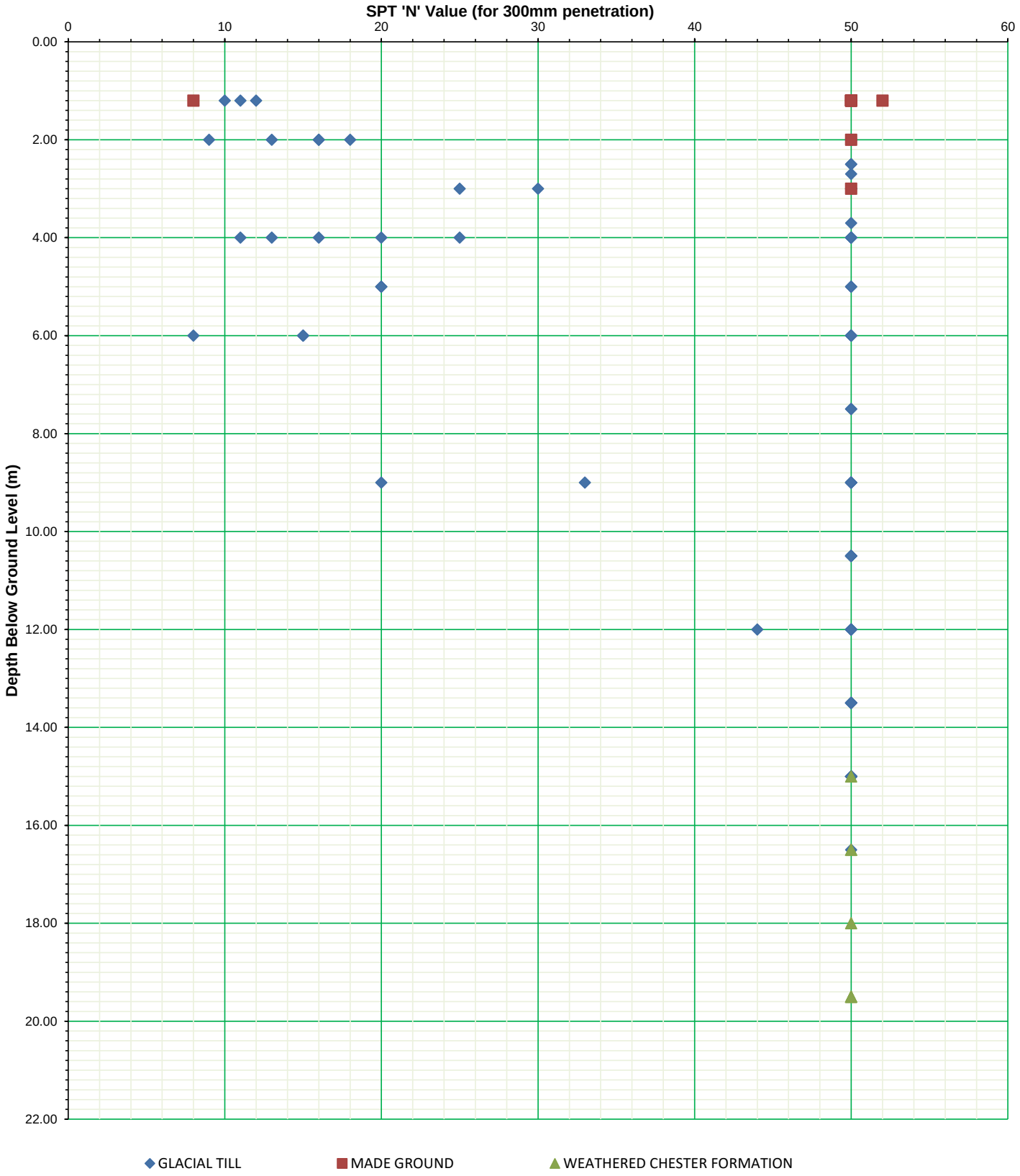
Geotechnical Plots

Hydrock

SPT 'N' VALUES vs DEPTH

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	

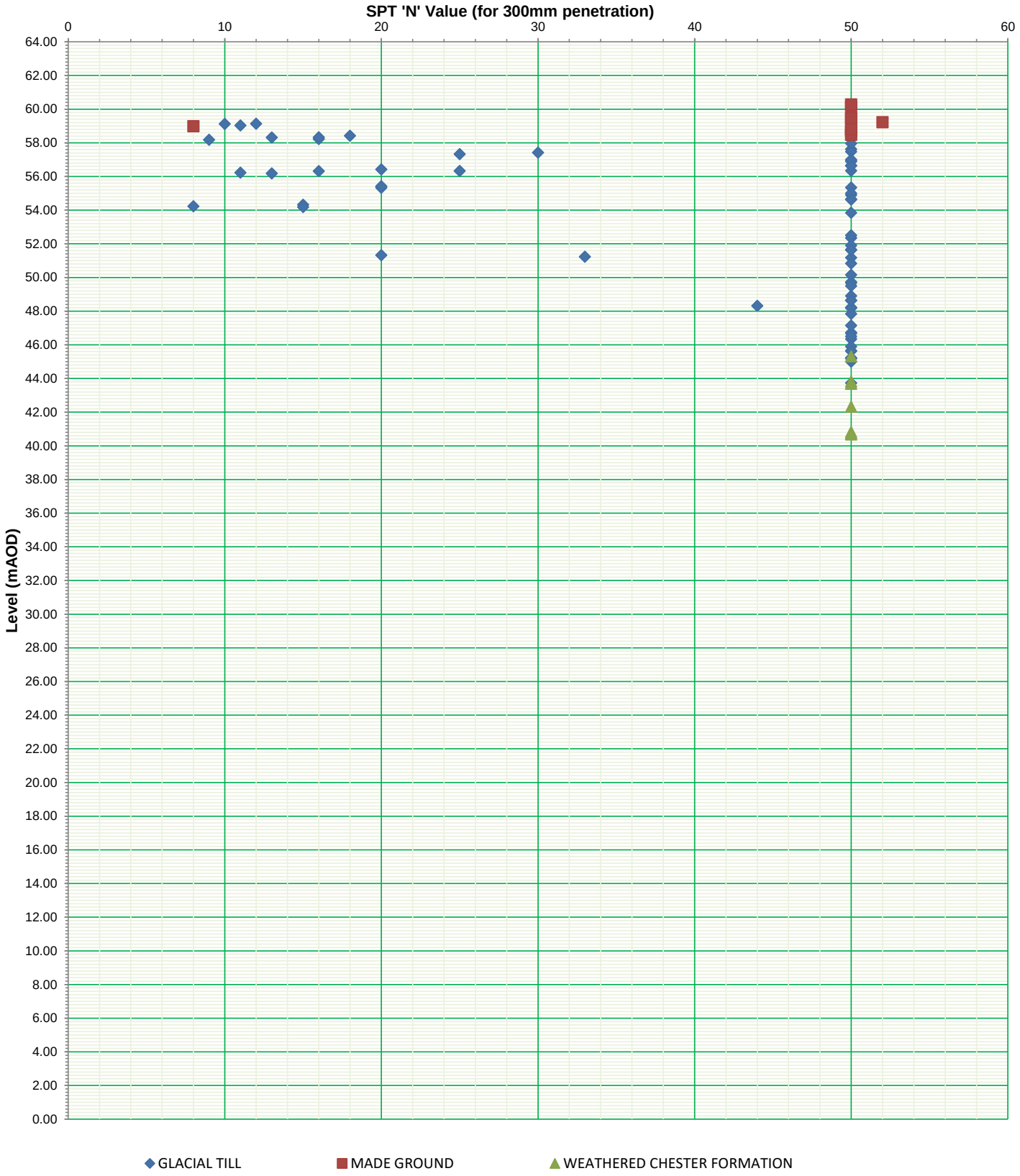


Template Version	1	Template Date	10/07/2019

Hydrock

SPT 'N' VALUES vs LEVEL

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	

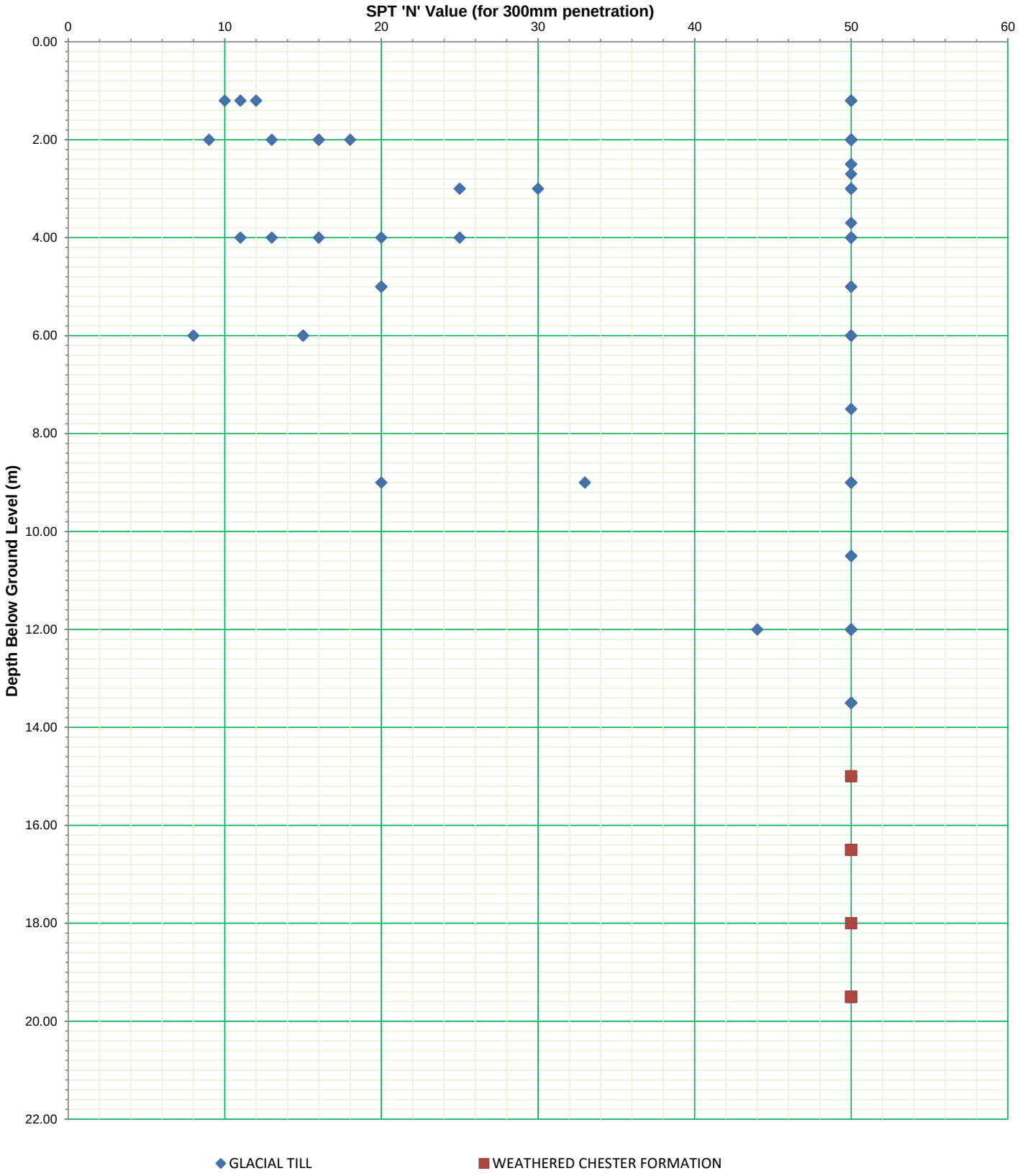


Template Version	1	Template Date	10/07/2019

Hydrock

SPT 'N' VALUES vs DEPTH COHESIVE NATURAL STRATA

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	

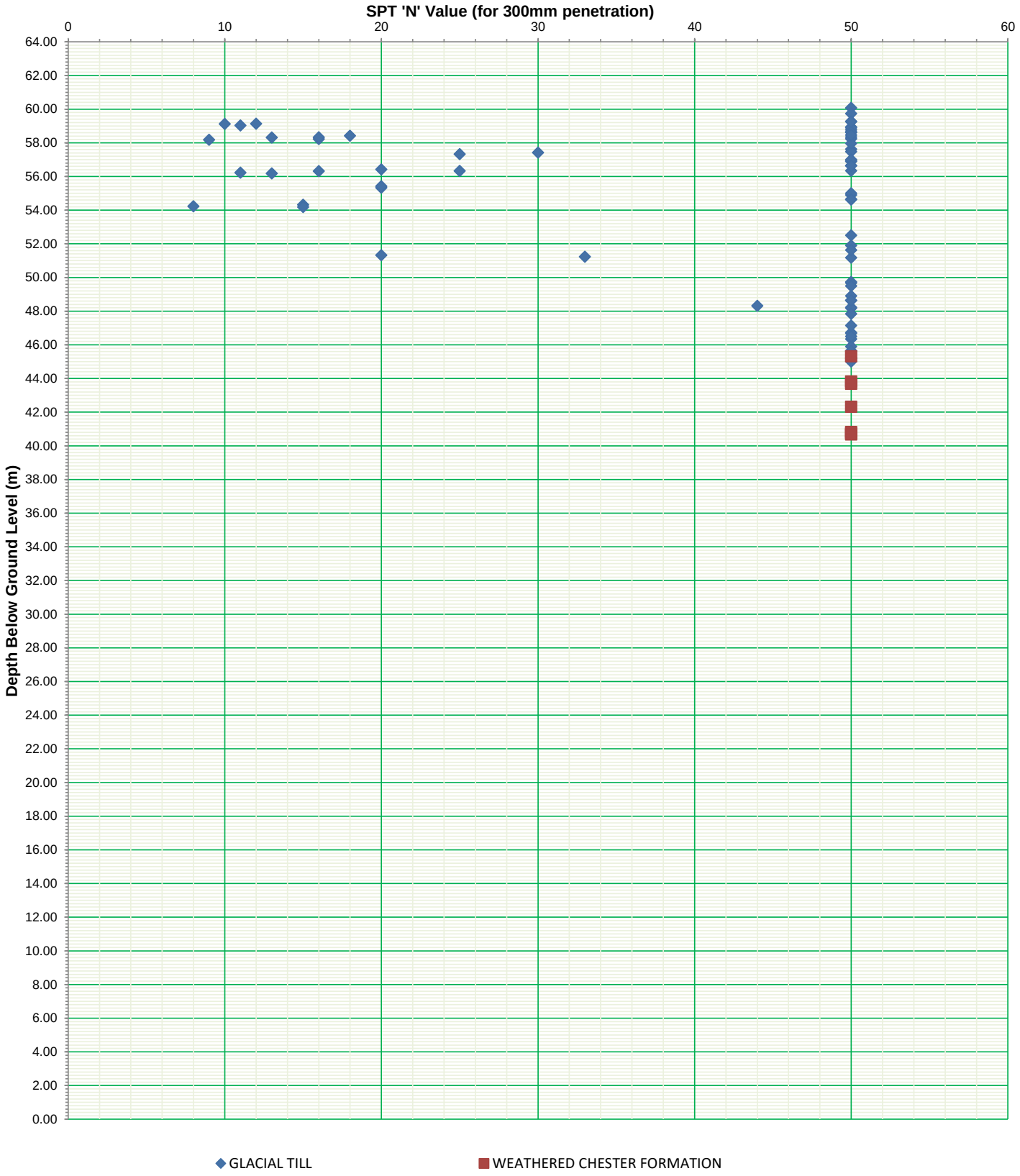


Template Version	1	Template Date	10/07/2019

Hydrock

SPT 'N' VALUES vs LEVEL COHESIVE STRATA

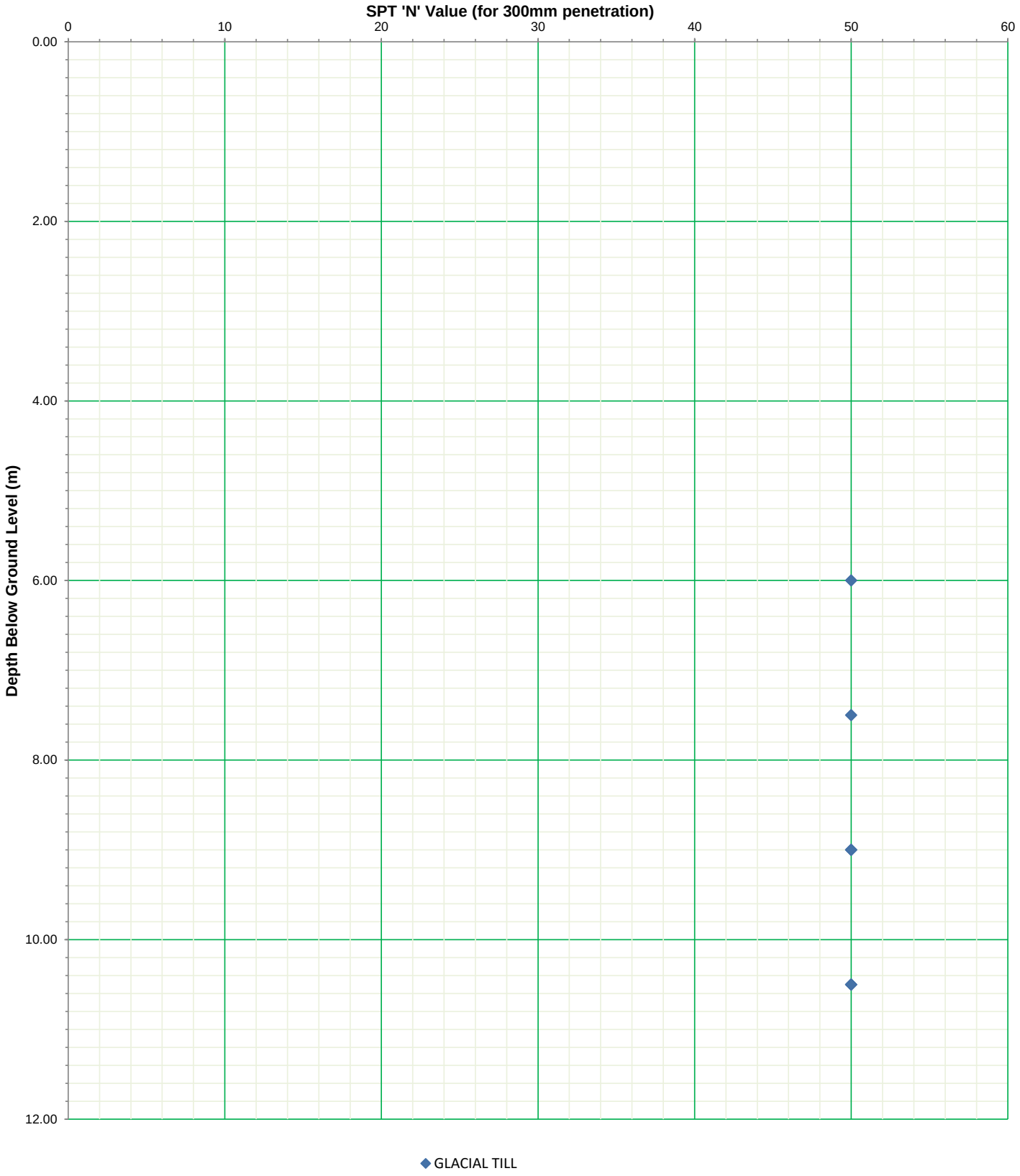
Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	



Hydrock

SPT 'N' VALUES vs DEPTH GRANULAR NATURAL STRATA

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	

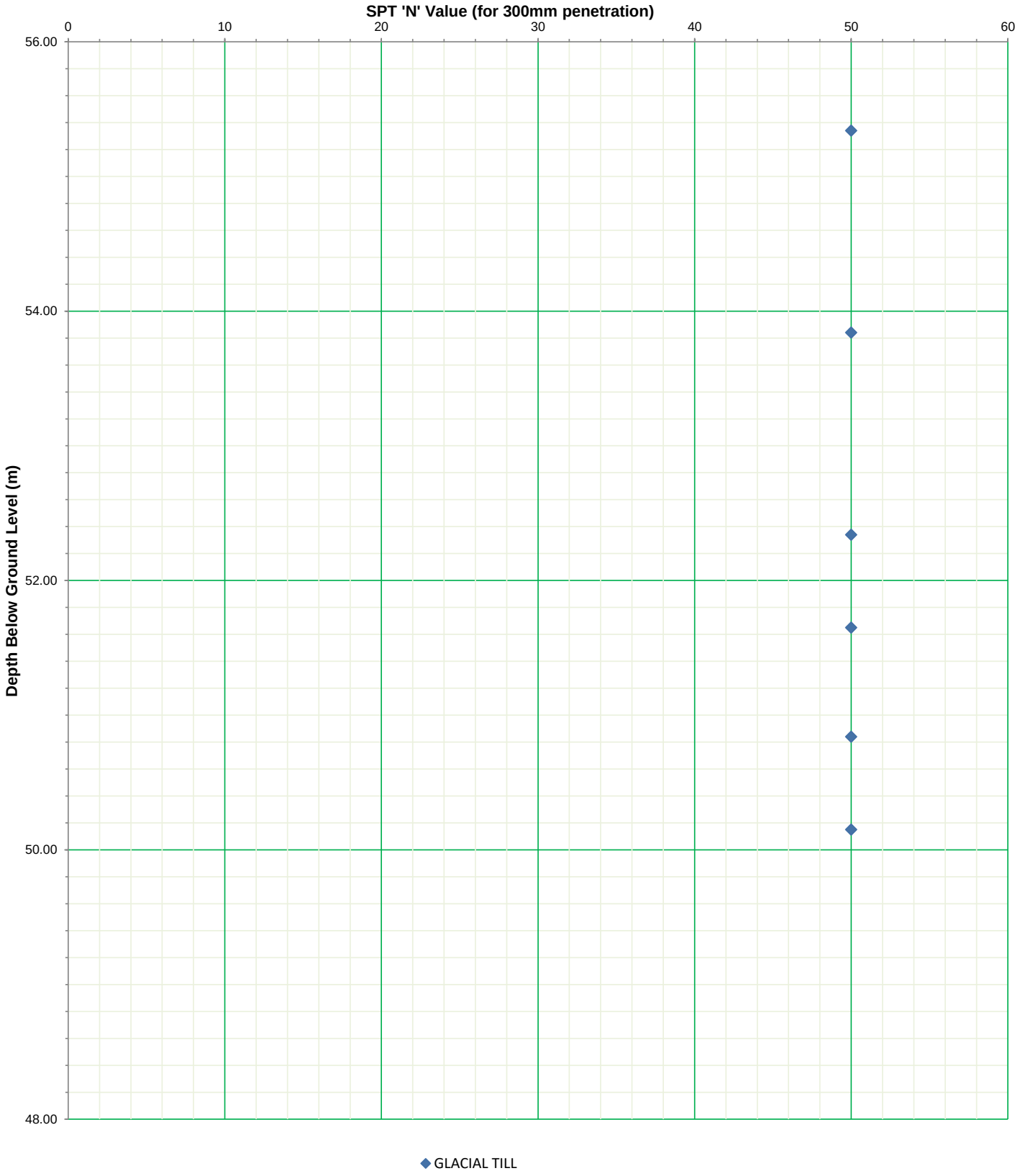


Template Version	1	Template Date	10/07/2019

Hydrock

SPT 'N' VALUES vs LEVEL GRANULAR STRATA

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	

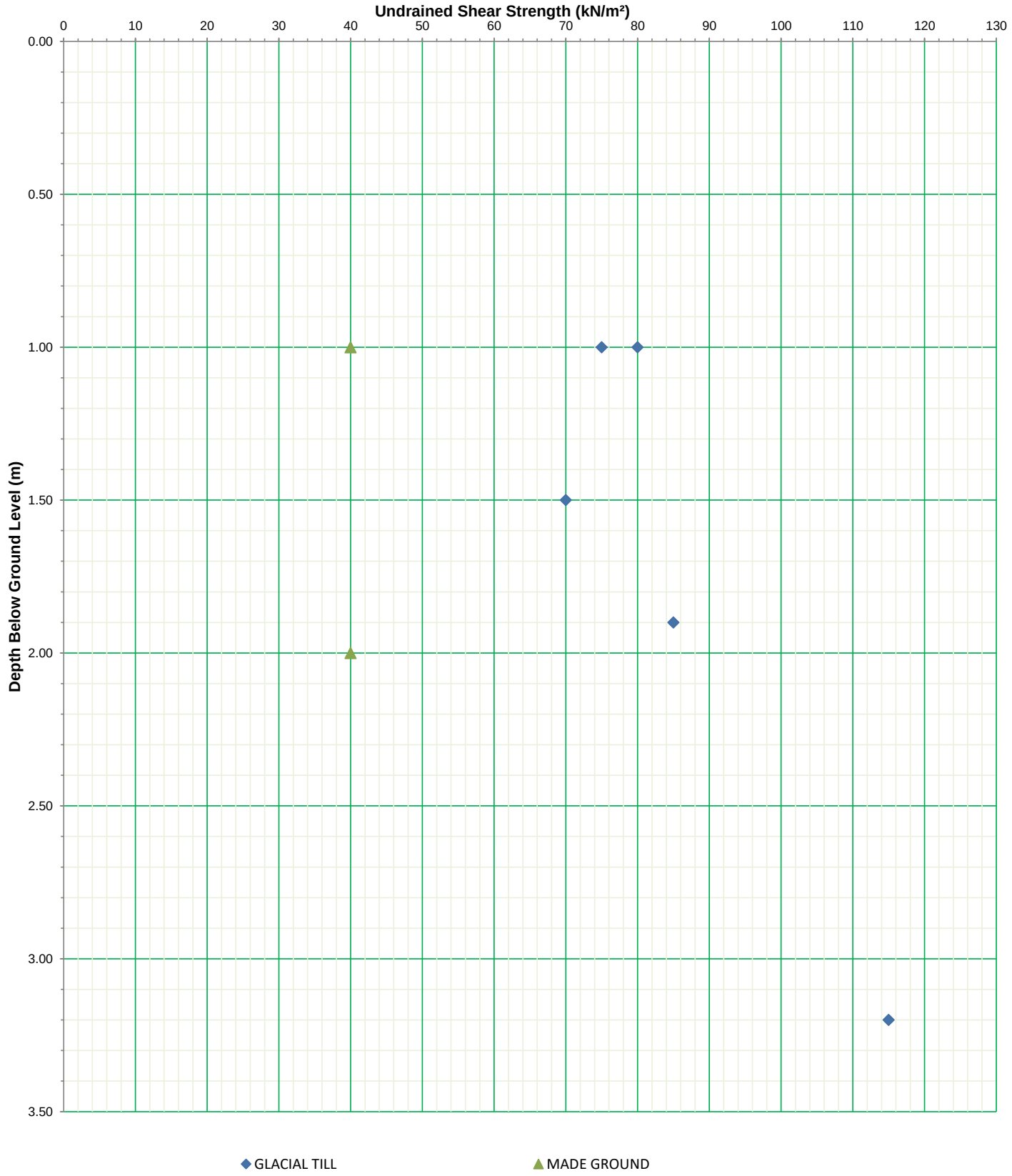


Template Version	1	Template Date	10/07/2019

Hydrock

UNDRAINED SHEAR STRENGTH vs DEPTH

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	Hand Shear Vane	

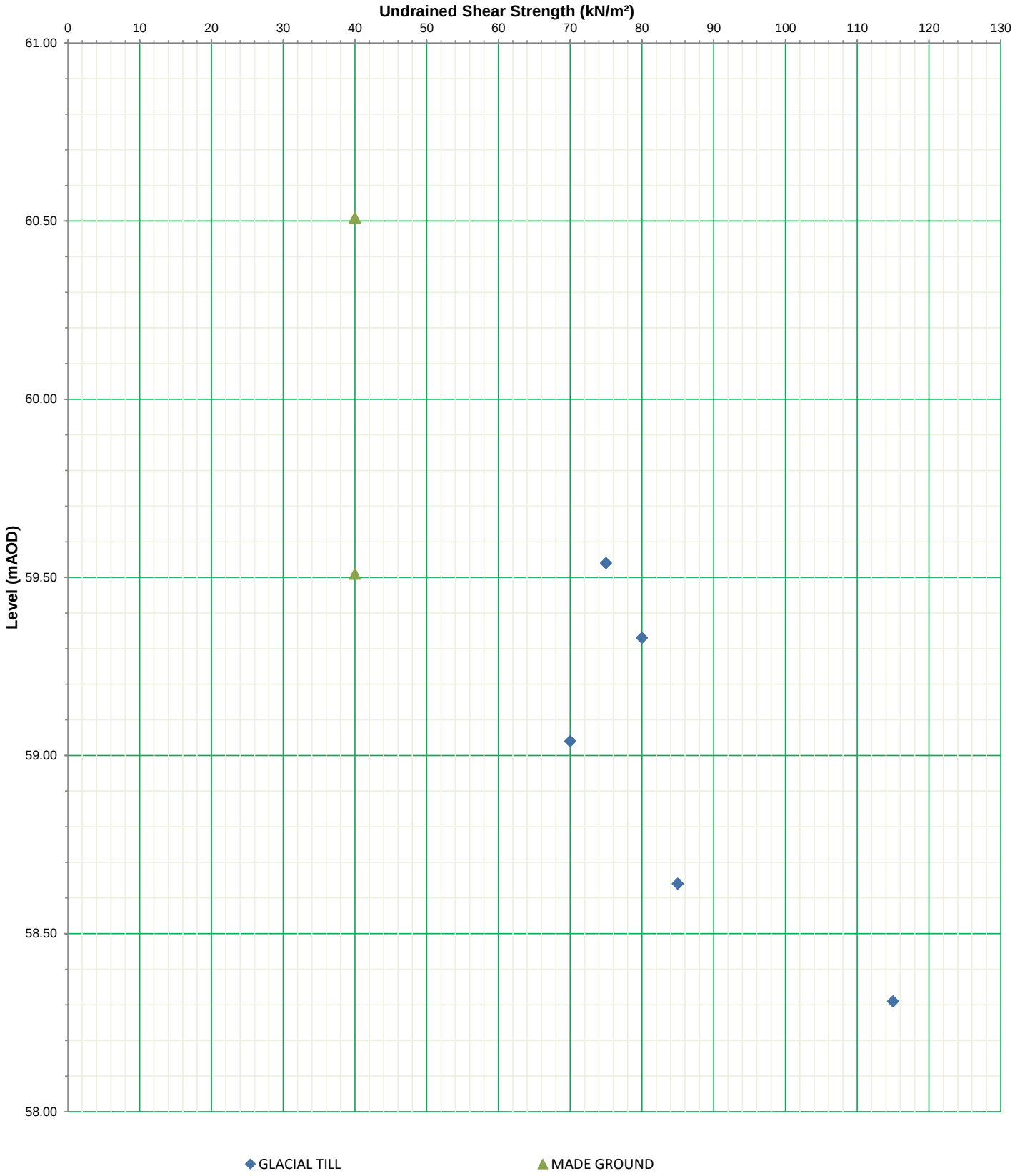


Template Version	1	Template Date	10/07/2019

Hydrock

UNDRAINED SHEAR STRENGTH vs LEVEL

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	Hand Shear Vane	

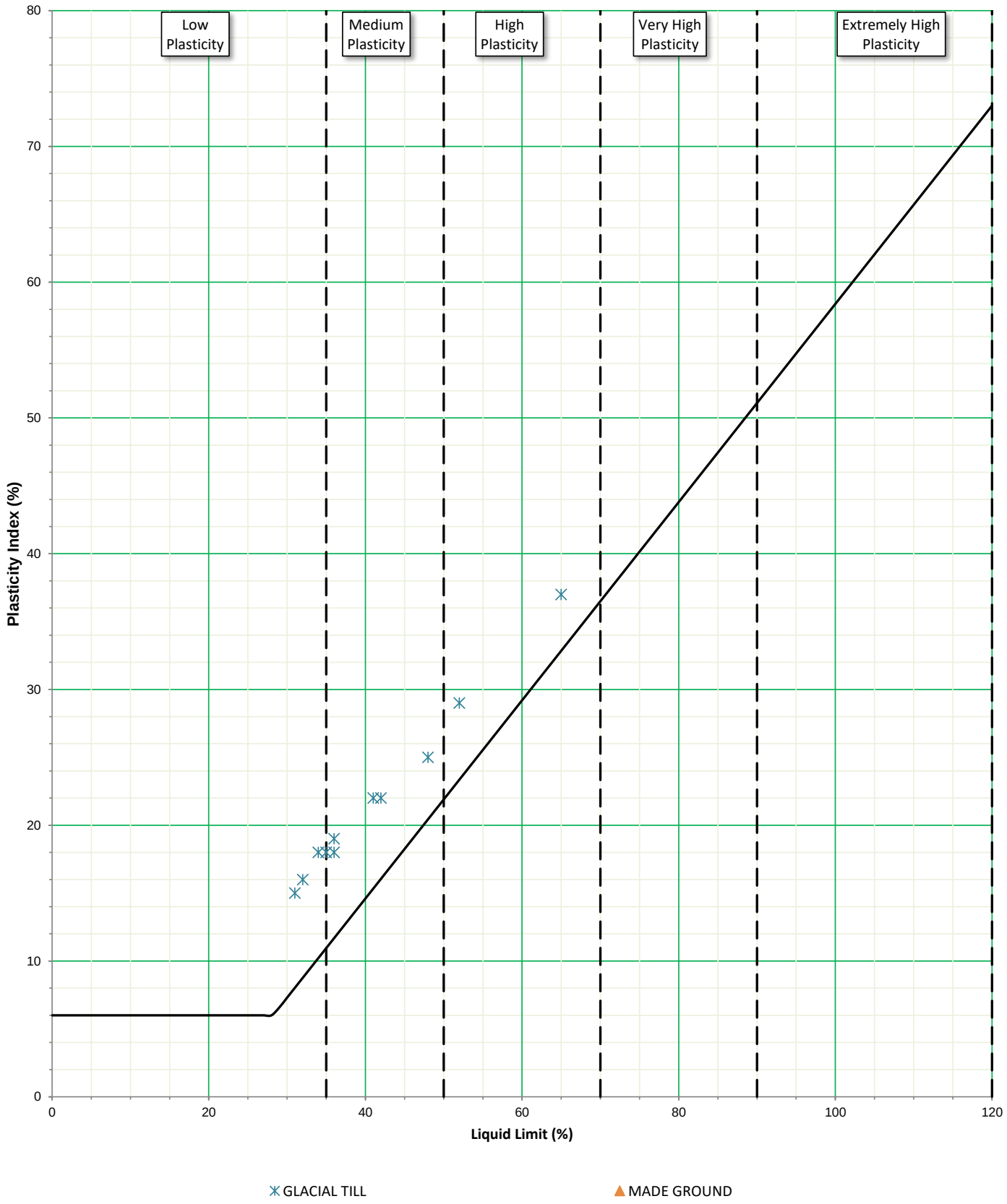


Template Version	1	Template Date	10/07/2019

Hydrock

PLASTICITY CLASSIFICATION CHART

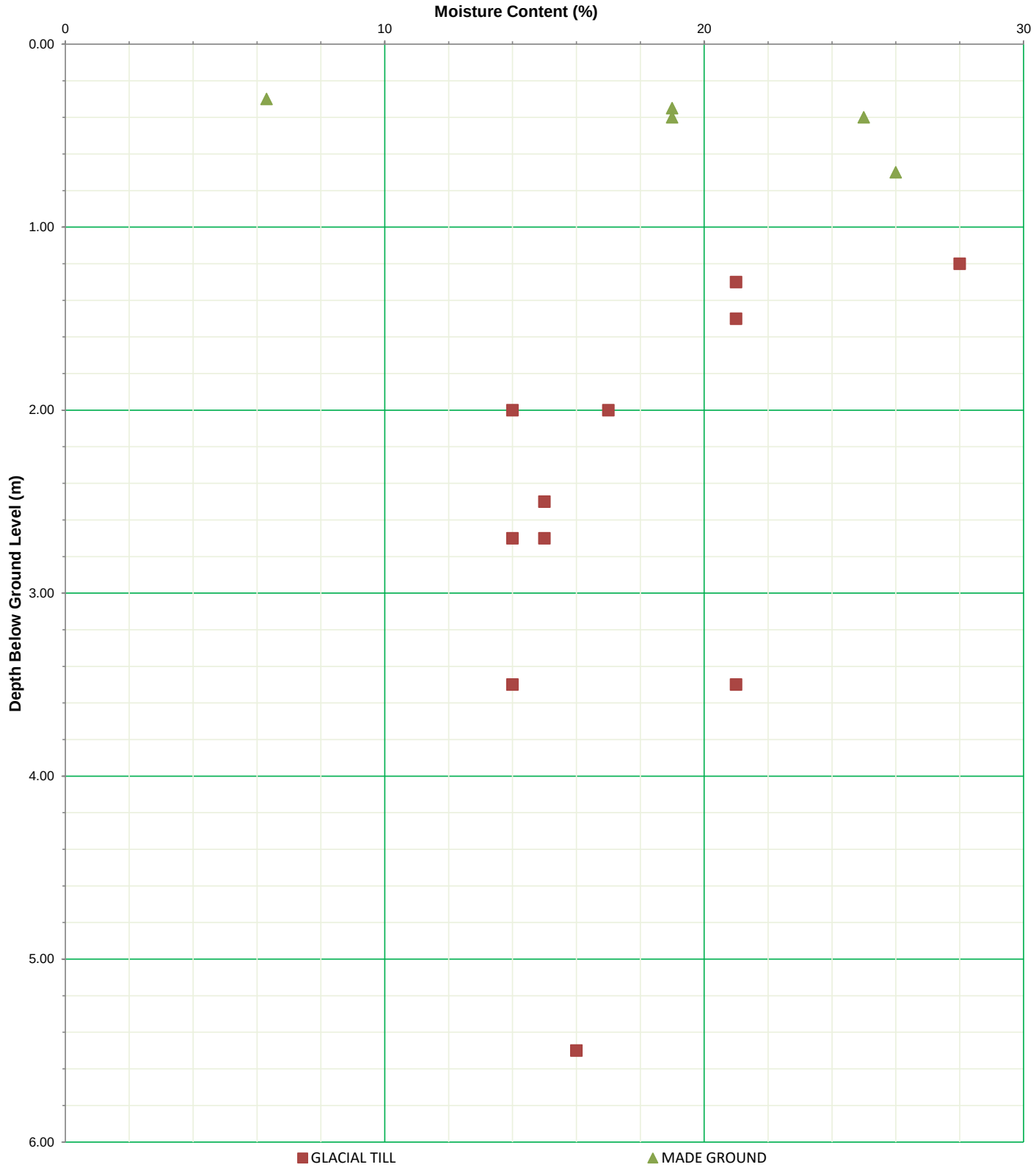
Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	



Template Version	1	Template Date	10/07/2019

MOISTURE CONTENT vs DEPTH

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	All Data	



Template Version	1	Template Date	10/07/2019

Hydrock Consultants

UNDRAINED SHEAR STRENGTH vs DEPTH

Site:	Client:	Contract No.	C-18170
Belle Vue Co-op Academy, Hyde Road, Manchester	Sir Robert McAlpine Ltd	all data	

Hydrock

Client Sir Robert McAlpine Ltd	**Location or material to which this assessment applies** Glacial Till
Project Belle Vue Co-op Academy, Hyde Road, Manc.	
Job number C-18170	

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	6	6	6
No. tests in 20% data set	1	1	1
No. tests with suspected pyrite		0	
Maximum value	69	0.3	10
Mean of highest two values	65	0	10
Mean of highest 20%			
Characteristic Value	**65**	**0**	**10**
			Mg not required
	[no pyrite]	**[pyrite suspected]**	
DS Class	**DS-1**	**DS-1**	

If pyrite suspected, DS Class limited to **DS-1**

Is pyrite assumed to be present? Yes **Adopted DS Class = DS-1**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value	1400	0
(Maximum Level)		**Mg not required**
DS Class	**DS-2**	

pH data

	Soil	Water
Number of tests	6	3
No. tests in 20% data set	1	1
Lowest pH	7.4	7.5
Mean of lowest 20%	7.4	7.5
Characteristic value	**7.4**	**7.5**
Design value	**7.4**	
Number of soil pH results less than 5.5	0	

DS Class design value

Based on higher of soil and water data **DS-2**

ACEC Class design value

Brownfield
Mobile groundwater **AC-2**

Hydrock

Client Sir Robert McAlpine Ltd	**Location or material to which this assessment applies** Made Ground
Project Belle Vue Co-op Academy, Hyde Road, Manc.	
Job number C-18170	

Concrete in aggressive ground

After BRE Special Digest 1, 2005

Soil data

	(Adjusted) water soluble sulfate (mg/l)	Total potential sulfate (%)	Water soluble magnesium (mg/l)
Number of tests	2	2	2
No. tests in 20% data set	0	0	0
No. tests with suspected pyrite		0	
Maximum value	180	0.2	10
Mean of highest two values	170	0	10
Mean of highest 20%			
Characteristic Value	**180**	**0.2**	**10**
			Mg not required
	[no pyrite]	**[pyrite suspected]**	
DS Class	**DS-1**	**DS-1**	

If pyrite suspected, DS Class limited to **DS-1**

Is pyrite assumed to be present? **No** **Adopted DS Class =** **DS-1**

Water data

	(Adjusted) soluble sulfate (mg/l)	Soluble magnesium (mg/l)
Characteristic Value	0	0
(Maximum Level)		**Mg not required**
DS Class		

pH data

	Soil	Water
Number of tests	2	0
No. tests in 20% data set	0	
Lowest pH	6.8	
Mean of lowest 20%		
Characteristic value	**6.8**	
Design value	**6.8**	
Number of soil pH results less than 5.5	0	

DS Class design value

Based on higher of soil and water data **DS-1**

ACEC Class design value

Brownfield
Mobile groundwater **AC-1**

Appendix E

Ground Gas Risk Assessment

Hydrock

Site: Belle Vue Co-op Academy, Hyde Rd
Job number: C-18170
Client: Sir Robert McAlpine

Gas analyser: GFM 435 SERIES
Equipment check OK: Y
Service in date: Y
Calibration check OK: Y
Name of person monitoring: See Notes.

Notes on site conditions:

Date	Operator	Weather Conditions
22/07/2020	Arcadis	Dry & Bright
31/07/2020	Arcadis	Dry, Hot & Bright
05/08/2020	Arcadis	Dry & Overcast
20/08/2020	Arcadis	Dry & Sunny
30/03/2021	WS-Hydrock	Sunny and warm
14/04/2021	WS-Hydrock	Sunny and mild

Notes: LEL = lower explosive limit = 5%v/v. * where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in **blue**). GSVs are rounded to 3 places.

Monitoring round		Borehole details					Pressure and flow					Gas concentrations										GSV		Local conditions
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	CH_4 (%v/v)		CH_4 (%LEL)		CO_2 (%v/v)		O_2 (%v/v)		Other Gases		Gas Screening Value (CH_4) (l/hr)	Gas Screening Value (CO_2) (l/hr)	Notes on condition of borehole and surrounding ground
												Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO (PPM)	H_2S (PPM)			
							Max. individual values:				**19.5**		**13.5**		**4.0**		**6.6**		**20.7**			**0.020**	**0.250**	**Summary statistics for this monitoring period.**
							Min. individual values:				0.0		0.1		2.0		0.1		0.3			0.000	0.000	
							Worst-case GSVs based on max. individual flow and max. individual conc. over the duration of this table:															**2.6325**	**1.287**	
22/07/20	PM	WS104	S	1.55	1.55	D	1006		0.0	0.1	0.1	0.1	0.1	2	2	0.9	0.9	19.9	7.5	1.0	1	0.000	0.001	
22/07/20	PM	WS113	S	2.60	0.88		1015		0.0	0.1	0.1	0.1	0.1	2	2	0.4	0.1	19.9	19.6	1.0	1	0.000	0.000	
22/07/20	PM	WS116	S	1.22	1.22	D	1016		0.1	0.1	0.1	0.1	0.1	2	2	2.5	2.0	20.2	18.6	1.0	1	0.000	0.002	
31/07/20	AM	WS104	S	1.55	1.48		1005		0.1	0.1	0.1	0.1	0.1	2	2	0.1	1.1	7.0	6.3	1.0	1	0.000	0.001	
31/07/20	PM	CP107	S	11.75	8.55		1006		0.1	0.3	0.3	0.1	0.1	2	2	2.0	2.0	19.7	15.0	1.0	7	0.000	0.006	
31/07/20	AM	WS113	S	2.59	0.94		1005		0.1	10.0	10.0	0.1	0.1	2	2	0.5	0.5	19.8	18.9	1.0	6	0.010	0.050	
31/07/20	AM	WS116	S	1.20	1.20	D	1005		-0.1	0.2	0.2	0.1	0.1	2	2	3.0	3.4	20.1	17.0	1.0	3	0.000	0.007	
05/08/20	AM	WS104	S	1.55	1.50		1002		0.0	0.1	0.1	0.1	0.1	2	2	0.1	0.1	20.2	20.0	1.0	1	0.000	0.000	
05/08/20	PM	CP107	S	11.75	8.55		1002		0.1	0.2	0.2	0.1	0.1	2	2	0.3	0.3	20.2	12.8	1.0	4	0.000	0.001	
05/08/20	AM	WS113	S	2.60	0.95		1002		0.1	0.2	0.2	0.1	0.1	2	2	0.3	0.2	19.7	19.3	1.0	4	0.000	0.000	
05/08/20	AM	WS116	S	1.20	1.20	D	1002		-0.1	0.1	0.1	0.1	0.1	2	2	2.5	2.5	19.6	18.1	1.0	3	0.000	0.003	
20/08/20	AM	WS104	S	1.55	1.55	D	996		0.1	0.0	0.0	0.3	0.2	6	4	1.5	1.5	20.6	6.5	1.0	3	0.000	0.000	
20/08/20	PM	CP107	S	11.75	8.50		996		0.0	0.1	0.1	0.1	0.1	2	2	0.1	0.1	19.9	16.3	1.0	4	0.000	0.000	
20/08/20	PM	WS113	S	2.60	0.95		996		0.1	0.1	0.1	0.2	0.2	4	4	0.3	0.2	20.0	19.0	1.0	1	0.000	0.000	
20/08/20	PM	WS116	S	1.20	1.20	D	996		0.3	0.1	0.1	0.1	0.1	2	2	1.1	1.1	20.2	19.5	1.0	1	0.000	0.001	
30/03/21	PM	HYD-BH02	S	15.56	12.90		1020	F	98.5	19.5	19.5	0.6	0.1	12	2	0.7	0.7	14.7	14.7	22.0	1	0.020	0.137	Fast out flow of air on removing gas monitor
30/03/21	PM	HYD-BH03	S	14.90	12.12		1020	F	0.0	0.1	0.1	0.1	0.1	2	2	0.9	0.8	19.1	19.1	27.0	1	0.000	0.001	
30/03/21	PM	HYD-WS02	S	4.00	4.00	D	1020	F	0.0	0.1	0.1	0.1	0.1	2	2	0.3	0.1	17.3	19.3	4.0	1	0.000	0.000	
30/03/21	PM	HYD-WS03	S	4.00	3.18		1021	F	0.0	0.1	0.1	0.1	0.1	2	2	0.2	0.2	20.1	20.4	2.0	1	0.000	0.000	
30/03/21	PM	CP107	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Unable to monitor due to obstruction
30/03/21	PM	WS113	S	2.60	1.42		1020	F	-21.8	-0.1	0.1	13.6	13.5	>>>>	>>>>	5.6	5.6	0.3	0.3	5.0	1	0.014	0.006	Peak flow: -15.7l/hr
30/03/21	PM	WS116	S	1.20	1.16		1020	F	-0.1	0.1	0.1	0.1	0.1	2	2	3.8	3.8	8.9	8.9	5.0	1	0.000	0.004	
14/04/21	PM	HYD-BH02	S	14.82	11.97		1028	F	97.2	19.2	19.2	0.1	0.1	2	2	1.4	1.3	11.7	11.7	1.0	1	0.019	0.250	Peak flow: 19.7l/hr. Continued fast out flow of air on removing gas monitor
14/04/21	PM	HYD-BH03	S	15.00	10.03		1028	F	0.0	0.1	0.1	0.1	0.1	2	2	1.1	1.1	18.1	18.5	2.0	1	0.000	0.001	

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Monitoring round		Borehole details					Pressure and flow					Gas concentrations										GSV		Local conditions
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	CH_4 (%v/v)		CH_4 (%LEL)		CO_2 (%v/v)		O_2 (%v/v)		Other Gases		Gas Screening Value (CH_4) (l/hr)	Gas Screening Value (CO_2) (l/hr)	Notes on condition of borehole and surrounding ground
												Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO (PPM)	H_2S (PPM)			
14/04/21	PM	HYD-WS02	S	4.02	4.02	D	1027	F	0.0	0.1	0.1	0.1	0.1	2	2	0.5	0.1	18.1	18.2	1.0	1	0.000	0.000	
14/04/21	PM	HYD-WS03	S	4.00	3.20		1027	F	0.0	0.1	0.1	0.1	0.1	2	2	0.4	0.1	20.2	20.7	1.0	1	0.000	0.000	
14/04/21	PM	WS113	S	2.58	1.42		1027	F	-32.5	0.1	0.1	8.4	8.4	>>>>	>>>>	6.6	6.6	0.4	0.4	3.0	1	0.008	0.007	Peak flow: -15.7l/hr
14/04/21	PM	WS116	S	1.20	1.20	D	1027	F	0.0	0.1	0.1	0.9	0.1	18	2	3.5	3.5	14.7	14.7	1.0	1	0.000	0.004	

Appendix F

Contamination Test Results and Statistical Analysis

Contamination Test Results

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Analytical Report Number : 21-62863

Project / Site name:	Hyde Rd. School, Manchester	**Samples received on:**	16/03/2021
Your job number:	18170	**Samples instructed on/ Analysis started on:**	16/03/2021
Your order number:	PO05825	**Analysis completed by:**	24/03/2021
Report Issue Number:	1	**Report issued on:**	24/03/2021
Samples Analysed:	5 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-62863
Project / Site name: Hyde Rd. School, Manchester

Lab Sample Number				1804439	1804440	1804441	1804442	1804443
Sample Reference				HYD-BH01	HYD-BH02	HYD-BH02	HYD-CBR02	HYD-CBR03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.50	0.45-0.45	0.70-0.70	0.35-0.35	0.25-0.25
Date Sampled				16/03/2021	16/03/2021	16/03/2021	16/03/2021	16/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	10	15	20	13
Total mass of sample received	kg	0.001	NONE	1.0	1.0	1.5	1.5	1.5

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile- Loose Fibres	Amosite- Loose Fibres	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	11.1	6.8	9.5	8.3	8.5
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.23	0.66	0.45	0.11	0.21
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.018	0.011	0.016	0.016	0.0072

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.7	< 0.05	0.67	1.7	0.43
Acenaphthylene	mg/kg	0.05	MCERTS	2.1	0.16	0.18	1.6	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	3.8	0.45	1.5	6.8	0.30
Fluorene	mg/kg	0.05	MCERTS	4.1	0.40	1.8	8.3	0.29
Phenanthrene	mg/kg	0.05	MCERTS	32	4.1	9.7	57	2.2
Anthracene	mg/kg	0.05	MCERTS	8.2	1.0	2.9	17	0.44
Fluoranthene	mg/kg	0.05	MCERTS	38	8.0	12	81	3.7
Pyrene	mg/kg	0.05	MCERTS	39	8.0	12	78	3.7
Benzo(a)anthracene	mg/kg	0.05	MCERTS	24	5.1	6.7	41	2.0
Chrysene	mg/kg	0.05	MCERTS	16	3.7	4.6	30	1.7
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	20	4.3	4.9	37	1.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	6.0	2.6	2.9	12	1.1
Benzo(a)pyrene	mg/kg	0.05	MCERTS	18	4.6	5.0	31	1.9
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	6.1	2.2	2.2	12	0.98
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.59	3.5	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	7.4	2.7	2.6	14	1.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	226	47.5	70.1	431	21.8

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Analytical Report Number: 21-62863
Project / Site name: Hyde Rd. School, Manchester

Lab Sample Number				1804439	1804440	1804441	1804442	1804443
Sample Reference				HYD-BH01	HYD-BH02	HYD-BH02	HYD-CBR02	HYD-CBR03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50-0.50	0.45-0.45	0.70-0.70	0.35-0.35	0.25-0.25
Date Sampled				16/03/2021	16/03/2021	16/03/2021	16/03/2021	16/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.7	8.0	12	18	12
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	0.86	0.95	1.1	0.60
Boron (water soluble)	mg/kg	0.2	MCERTS	2.4	2.6	1.7	1.7	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	6.5	72	< 0.2	0.8
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	28	16	19	23	13
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	29	16	20	23	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	43	61	540	99	50
Lead (aqua regia extractable)	mg/kg	1	MCERTS	100	110	220	580	310
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	19	23	27	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	30	23	34	34	20
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	79	130	310	480	200
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	3.5	1.9	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	19	11	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	47	18	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	51	43	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	11	34	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	3.7	9.9	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	10	33	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	36	220	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	45	210	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	14	26	-

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

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1804439	HYD-BH01	None Supplied	0.50-0.50	Brown clay and sand with gravel and brick.
1804440	HYD-BH02	None Supplied	0.45-0.45	Brown clay and loam with gravel and brick.
1804441	HYD-BH02	None Supplied	0.70-0.70	Brown clay and sand with gravel.
1804442	HYD-CBR02	None Supplied	0.35-0.35	Brown clay and loam with gravel.
1804443	HYD-CBR03	None Supplied	0.25-0.25	Brown clay and loam with gravel and brick.

Analytical Report Number : 21-62863
Project / Site name: Hyde Rd. School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE

Analytical Report Number : 21-62863
Project / Site name: Hyde Rd. School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

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

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

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Analytical Report Number : 21-64528

Project / Site name:	Hyde Road School, Manchester	**Samples received on:**	22/03/2021
Your job number:	C-18170	**Samples instructed on/ Analysis started on:**	24/03/2021
Your order number:	PO05825	**Analysis completed by:**	30/03/2021
Report Issue Number:	1	**Report issued on:**	30/03/2021
Samples Analysed:	3 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-64528
Project / Site name: Hyde Road School, Manchester
Your Order No: PO05825

Lab Sample Number				1814019	1814020	1814021
Sample Reference				HYD-BH03	HYD-WS02	HYD-WS03
Sample Number				1	1	1
Depth (m)				1.10	0.80	0.30
Date Sampled				18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	8.2	6.5
Total mass of sample received	kg	0.001	NONE	1.2	1.2	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile- Loose Fibrous Debris	Chrysotile- Loose Fibres
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.1	9.2	9.7
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.43	0.31	0.30
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.017	0.019	0.0066

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	7.2	1.6	4.6
Acenaphthylene	mg/kg	0.05	MCERTS	3.0	1.4	0.24
Acenaphthene	mg/kg	0.05	MCERTS	9.8	8.8	5.2
Fluorene	mg/kg	0.05	MCERTS	16	9.3	4.0
Phenanthrene	mg/kg	0.05	MCERTS	88	69	22
Anthracene	mg/kg	0.05	MCERTS	21	23	5.9
Fluoranthene	mg/kg	0.05	MCERTS	94	130	22
Pyrene	mg/kg	0.05	MCERTS	100	120	20
Benzo(a)anthracene	mg/kg	0.05	MCERTS	59	74	11
Chrysene	mg/kg	0.05	MCERTS	46	45	7.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	36	58	9.0
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	25	27	3.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	42	53	7.0
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	13	22	3.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	4.4	6.3	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	16	26	4.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	579	670	129

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Analytical Report Number: 21-64528
Project / Site name: Hyde Road School, Manchester
Your Order No: PO05825

Lab Sample Number				1814019	1814020	1814021
Sample Reference				HYD-BH03	HYD-WS02	HYD-WS03
Sample Number				1	1	1
Depth (m)				1.10	0.80	0.30
Date Sampled				18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	24	17	4.8
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.8	1.1	0.43
Boron (water soluble)	mg/kg	0.2	MCERTS	1.5	1.5	2.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	21	23	12
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	24	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	60	110	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	300	800	66
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1.2	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	38	26	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	38	35	14
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	350	63
Monoaromatics & Oxygenates						
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-
Petroleum Hydrocarbons						
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	3.6	14	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	16	35	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	26	60	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	32	180	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	120	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	26	12	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	120	79	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	330	310	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	390	610	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	39	170	-

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

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Analytical Report Number : 21-64528
Project / Site name: Hyde Road School, Manchester

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1814019	HYD-BH03	1	1.1	Brown clay.
1814020	HYD-WS02	1	0.8	Brown sandy clay with gravel.
1814021	HYD-WS03	1	0.3	Brown sandy clay with gravel.

Analytical Report Number : 21-64528
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE

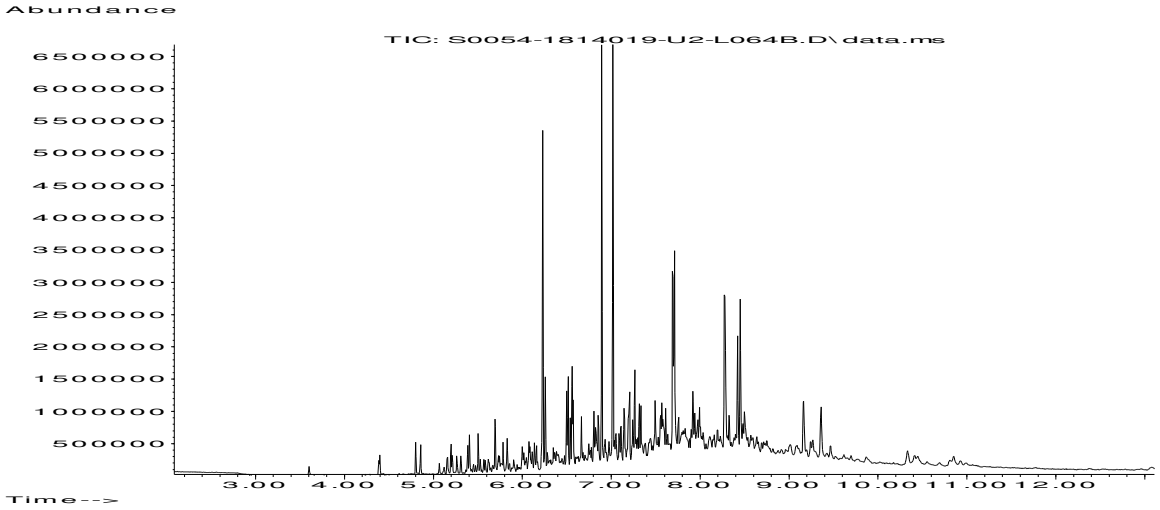
Analytical Report Number : 21-64528
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

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

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.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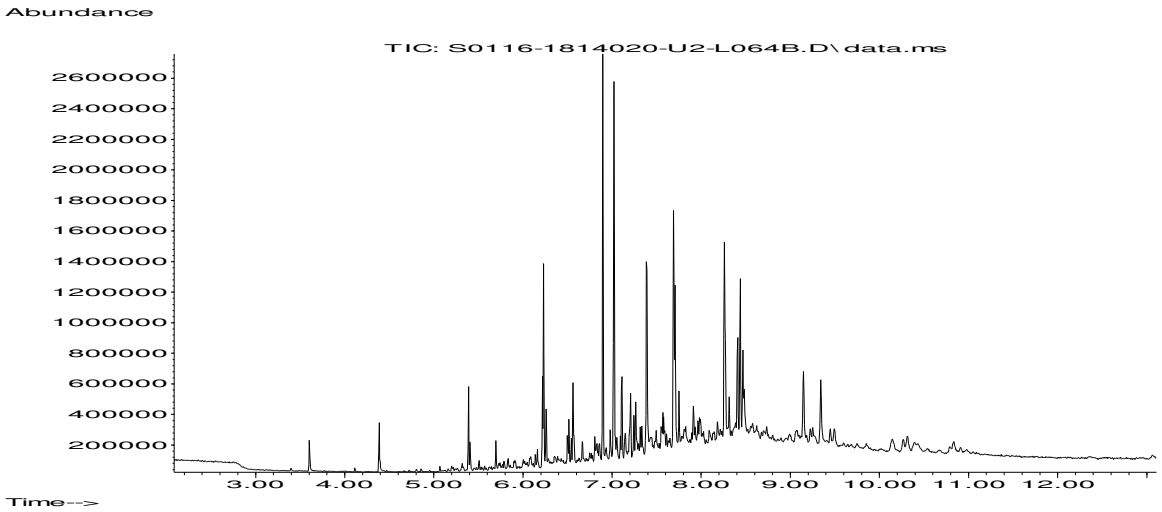
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Analytical Report Number : 21-66207

Project / Site name:	Hyde Road School, Manchester	**Samples received on:**	31/03/2021
Your job number:	C-18170	**Samples instructed on/ Analysis started on:**	31/03/2021
Your order number:	PO06011	**Analysis completed by:**	09/04/2021
Report Issue Number:	1	**Report issued on:**	09/04/2021
Samples Analysed:	3 water samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-66207
Project / Site name: Hyde Road School, Manchester

Your Order No: PO06011

Lab Sample Number				1823167	1823168	1823169
Sample Reference				HYD-BH02	HYD-BH03	HYD-WS03
Sample Number				1	1	1
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				30/03/2021	30/03/2021	30/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			

General Inorganics

pH	pH Units	N/A	ISO 17025	7.5	7.9	7.7
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	2600	1200	940
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Sulphate as SO4	µg/l	45	ISO 17025	1390000	382000	197000
Chloride	mg/l	0.15	ISO 17025	620	39	51
Fluoride	µg/l	50	ISO 17025	460	940	170
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	650	100	62
Ammoniacal Nitrogen as NH3	µg/l	15	ISO 17025	790	120	75
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	830	130	80
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	4.12	3.63	12.2
Nitrate as N	mg/l	0.01	ISO 17025	1.48	0.13	0.23
Nitrate as NO3	mg/l	0.05	ISO 17025	6.54	0.57	1.04
Nitrite as N	µg/l	1	ISO 17025	560	45	21
Nitrite as NO2	µg/l	5	ISO 17025	1800	150	70

Hardness - Total	mgCaCO3/l	1	ISO 17025	847	210	454
Bromate by IC	mg/l	0.002	NONE	< 0.002	< 0.002	< 0.002

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01

PAH Sums

Sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02
Sum of Benzo(ghi)perylene & Indeno(1,2,3-cd)pyrene	µg/l	0.02	NONE	< 0.020	< 0.020	< 0.020
Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benz	µg/l	0.04	NONE	< 0.040	< 0.040	< 0.040

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-66207
Project / Site name: Hyde Road School, Manchester

Your Order No: PO06011

Lab Sample Number				1823167	1823168	1823169
Sample Reference				HYD-BH02	HYD-BH03	HYD-WS03
Sample Number				1	1	1
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				30/03/2021	30/03/2021	30/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Boron (dissolved)	µg/l	10	ISO 17025	240	120	130
Calcium (dissolved)	mg/l	0.012	ISO 17025	200	52	77
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	4.2	4.0	3.8
Iron (dissolved)	mg/l	0.004	ISO 17025	0.006	0.008	0.027
Iron (dissolved)	µg/l	4	ISO 17025	5.8	8.2	27
Magnesium (dissolved)	mg/l	0.005	ISO 17025	87	19	64
Sodium (dissolved)	mg/l	0.01	ISO 17025	800	350	150
Aluminium (dissolved)	µg/l	1	ISO 17025	290	140	2100
Antimony (dissolved)	µg/l	0.4	ISO 17025	0.6	1.4	5.5
Arsenic (dissolved)	µg/l	0.15	ISO 17025	7.87	1.92	4.52
Barium (dissolved)	µg/l	0.06	ISO 17025	32	46	200
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.63	0.03	0.08
Chromium (dissolved)	µg/l	0.2	ISO 17025	4.2	4.0	3.8
Cobalt (dissolved)	µg/l	0.2	ISO 17025	3.6	0.2	7.1
Copper (dissolved)	µg/l	0.5	ISO 17025	14	6.6	16
Lead (dissolved)	µg/l	0.2	ISO 17025	0.3	0.3	0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	1400	1.9	110
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	9.7	1.7	23
Selenium (dissolved)	µg/l	0.6	ISO 17025	34	97	130
Silver (dissolved)	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	0.34
Vanadium (dissolved)	µg/l	0.2	ISO 17025	6.7	1.7	3.5
Zinc (dissolved)	µg/l	0.5	ISO 17025	35	5.8	3.5
Monoaromatics & Oxygenates						
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Sum of m, p & o-Xylene	µg/l	2	ISO 17025	< 2.0	< 2.0	< 2.0

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-66207
Project / Site name: Hyde Road School, Manchester

Your Order No: PO06011

Lab Sample Number				1823167	1823168	1823169
Sample Reference				HYD-BH02	HYD-BH03	HYD-WS03
Sample Number				1	1	1
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				30/03/2021	30/03/2021	30/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Petroleum Hydrocarbons						
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C35 - C44	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C44)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG Total C5 - C44	µg/l	10	NONE	< 10	< 10	< 10

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

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 21-66207
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Speciated EPA-16 PAHs in water (LOW LEVEL Dets)	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270 (low level)	L102B-PL	W	NONE
TPH in (Water)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L070-PL	W	NONE

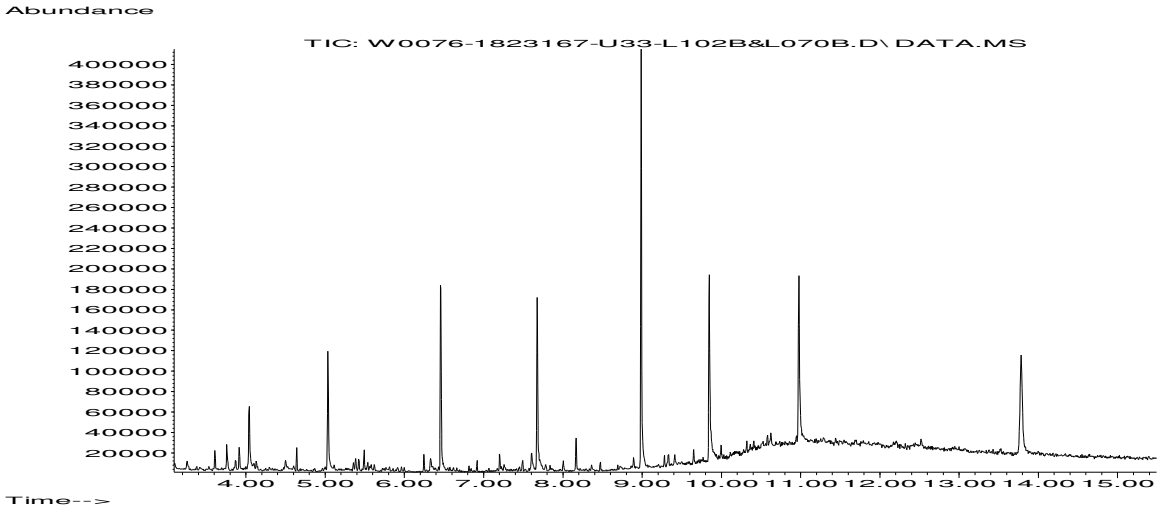
Analytical Report Number : 21-66207
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonia as NH3 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
TPH Chromatogram in Water	TPH Chromatogram in Water.	In-house method	L070-PL	W	NONE
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Bromate in Water	Determination of bromate in waters based on ion chromatography. Accredited matrices GW, PW, SW.	In house method based on Standard Methods for the Analysis of Water and Waste Water, method 4500	L008-PL	W	NONE
Specific PAH sums in water	Determination of PAH compounds in water by extraction in hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

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

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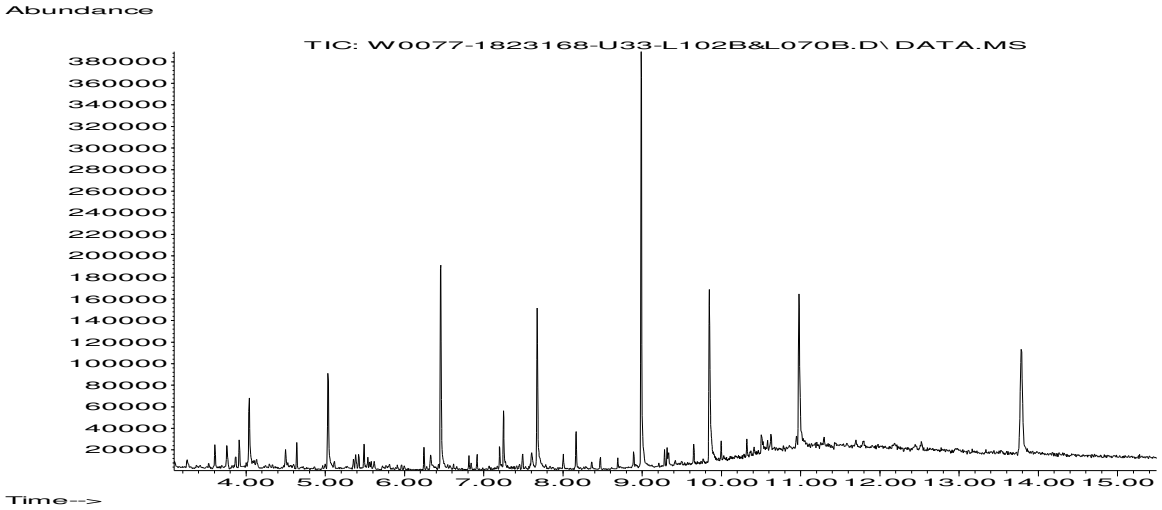
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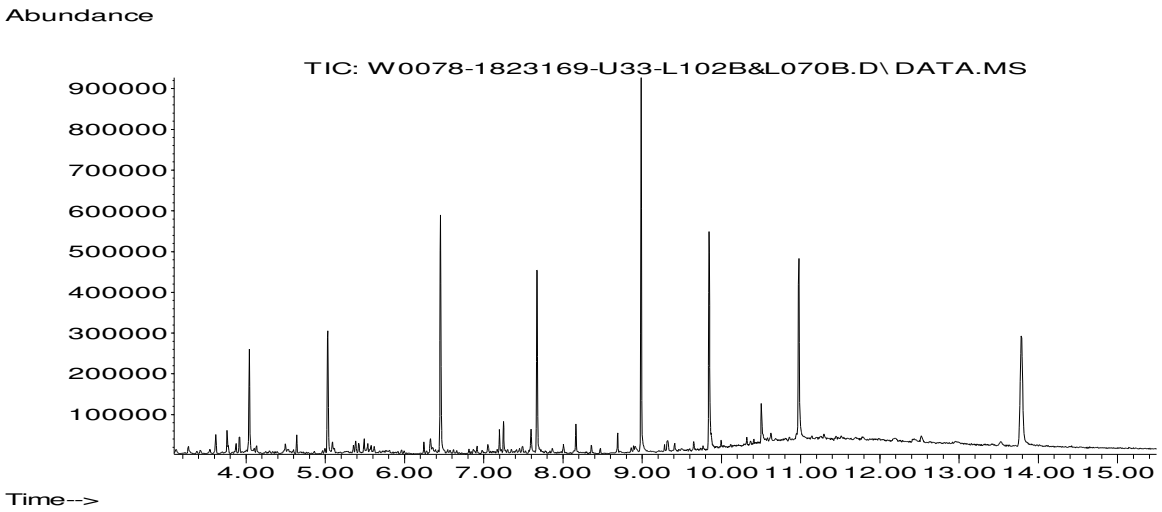
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Statistical Analysis

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

						Soil Type	GT	GT	GT	GT	GT	GT	GT	GT
All values in mg/kg unless otherwise stated						Location & Depth	CP103	CP103	CP105	CP106	CP107	WS110	WS111	WS113
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**1.5**	**5.6**	**9.5**	**4**	**8**	**3.5-3.6**	**2-2.1**	**0.8-0.9**
Arsenic	1	4	5.41	14.9	0	40	7.62					14.9	6.94	5.41
Beryllium	0.06	4	0.689	2.07	0	73	1.17					2.07	0.911	0.689
Boron	0.2	4	1	1.4	0	11000	1					1	1	1.4
Cadmium	0.2	4	0.152	0.232	0	87	0.232			0.2		0.2	0.2	0.2
Chromium (III)	1	4	14.8	17.6	0	890	17.3					15.9	17.6	14.8
Chromium (VI)	1.2	4	0.6	0.6	0	6.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Copper	1	4	14	42.6	0	7300	21.6					42.6	17.6	14
Lead	1	4	15.4	138	0	310	15.4					138	46.2	25.3
Mercury, inorganic	0.3	4	0.14	0.14	0	240	0.3	0.3	0.3	0.3	0.3	0.3	0.14	0.3
Nickel	1	4	17.4	32.7	0	180	32.7					31.2	17.6	17.4
Selenium	1	4	1	1	0	600	1	1	1	1	1	1	1	1
Vanadium	1	4	24.5	34.7	0	1200	24.7					34.7	29.4	24.5
Zinc	1	4	35	68.8	0	40000	60.4					68.8	41.4	35
Cyanide (free)	1	0	0	0	0	800	1	1	1	1	1	1	1	1
Phenol (total)	1	0	0	0	0	1300	1	1	1	1	1	1	1	1
Acenaphthene	0.05	4	0.008	0.183	0	4700	0.0212					0.183	0.008	0.0375
Acenaphthylene	0.05	4	0.012	0.0508	0	4600	0.012				0.05	0.0508	0.012	0.012
Anthracene	0.05	4	0.016	0.406	0	35000	0.0712					0.406	0.016	0.0715
Benz(a)anthracene	0.05	4	0.014	1.05	0	7.8	0.293					1.05	0.014	0.154
Benzo(a)pyrene	0.05	4	0.015	0.928	0	1.6	0.204					0.928	0.015	0.131
Benzo(b)fluoranthene	0.05	4	0.015	1.22	0	11	0.214					1.22	0.015	0.179
Benzo(ghi)perylene	0.05	4	0.024	0.448	0	72	0.103					0.448	0.024	0.0738
Benzo(k)fluoranthene	0.05	4	0.014	0.35	0	16	0.0932					0.35	0.014	0.0663
Chrysene	0.05	4	0.0169	1.02	0	16	0.26					1.02	0.0169	0.145
Dibenz(a,h)anthracene	0.05	4	0.023	0.0979	0	1.4	0.05	0.05			0.05	0.0979	0.023	0.05
Fluoranthene	0.05	4	0.033	2.24	0	1600	0.498					2.24	0.033	0.305
Fluorene	0.05	4	0.01	0.155	0	3800	0.028					0.155	0.01	0.0344
Indeno(1,2,3,cd)pyrene	0.05	4	0.018	0.453	0	6.6	0.123					0.453	0.018	0.0785
Naphthalene	0.05	4	0.009	0.158	0	5.6	0.0159	0.05				0.0311	0.009	0.158
Phenanthrene	0.05	4	0.0237	1.12	0	1500	0.223					1.12	0.0237	0.207
Pyrene	0.05	4	0.0326	2.2	0	3800	0.579					2.2	0.0326	0.27
Asbestos identified	Y/N						N	N	N	N	Y	N	N	N
FOC (dimensionless)		**(mean)**												
SOM (calculated)		**(mean)**												
pH (su)	8.3	**(mean)**					8.48	8.7	8.68	8.85	8.66	8.03	7.56	7.79

Risk parameter: **Human health - residential without plant uptake (2.5%SOM)**
Data set: Glacial Till
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: Arcadis Data

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

						Soil Type	GT	GT	GT	GT	GT	GT	GT	GT				
All values in mg/kg unless otherwise stated						Location & Depth	CP103	CP103	CP105	CP106	CP107	WS110	WS111	WS113				
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**1.5**	**5.6**	**9.5**	**4**	**8**	**3.5-3.6**	**2-2.1**	**0.8-0.9**				
Arsenic	1	4	5.41	14.9	0	250	7.62					14.9	6.94	5.41				
Boron	0.2	4	1	1.4	0	3	1					1	1	1.4				
Chromium (III)	1	4	14.8	17.6	0	400	17.3					15.9	17.6	14.8				
Chromium (VI)	1.2	4	0.6	0.6	0	25	0.6					0.6	0.6	0.6				
Copper	1	4	14	42.6	0	135	21.6					42.6	17.6	14				
Nickel	1	4	17.4	32.7	0	75	32.7					31.2	17.6	17.4				
Zinc	1	4	35	68.8	0	300	60.4					68.8	41.4	35				
	Mean																	
pH (su)	8.3						8.48	8.7	8.68	8.85	8.66	8.03	7.56	7.79				

Risk parameter: **Plant life pH 7**
Data set: Glacial Till
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: Arcadis Data

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test											
								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
								Location & Depth	HYD-BH01	HYD-BH02	HYD-BH02	HYD-CBR02	HYD-CBR03	HYD-BH03	HYD-WS02	HYD-WS03	CP103	CP104	CP105
									0.5	0.45	0.7	0.35	0.25	1.10	0.80	0.30	1	0.08-0.9	0.5
Arsenic	1	21	1.11	31.7	0	40	22.21794	POTENTIALLY SUITABLE FOR USE	7.7	8	12	18	12	24	17	4.8	11	21.3	4.03
Beryllium	0.06	21	0.0721	4.8	0	73	2.004981	POTENTIALLY SUITABLE FOR USE	1.1	0.86	0.95	1.1	0.6	1.8	1.1	0.43	1.33	1.06	0.0721
Boron	0.2	21	0.8	2.6	0	11000	1.893322	POTENTIALLY SUITABLE FOR USE	2.4	2.6	1.7	1.7	0.8	1.5	1.5	2.4	1.45	1.77	1
Cadmium	0.2	21	0.0265	72	0	87	18.96552	POTENTIALLY SUITABLE FOR USE	0.5	6.5	72	0.2	0.8	0.2	0.2	0.2	0.387	0.164	0.0265
Chromium (III)	1	21	1.83	28	0	890	21.09397	POTENTIALLY SUITABLE FOR USE	28	16	19	23	13	21	23	12	7.12	12.8	1.83
Chromium (VI)	1.2	21	0.6	1.2	0	6.1	1.112638	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.6	0.6	0.6
Copper	1	21	2.05	540	0	7300	180.5043	POTENTIALLY SUITABLE FOR USE	43	61	540	99	50	60	110	17	62.5	31.4	2.88
Lead	1	21	3.98	2070	8	310	760.1873	FURTHER ASSESSMENT REQUIRED	100	110	220	580	310	300	800	66	99.5	488	3.98
Mercury, inorganic	0.3	21	0.14	1.2	0	240	0.602696	POTENTIALLY SUITABLE FOR USE	0.3	0.3	0.3	0.3	0.3	0.3	1.2	0.3	0.14	0.14	0.14
Nickel	1	21	4.33	48.7	0	180	32.96764	POTENTIALLY SUITABLE FOR USE	22	19	23	27	17	38	26	14	17.2	26.1	4.33
Selenium	1	21	1	1	0	600	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1	1
Vanadium	1	21	3.3	42.7	0	1200	34.12217	POTENTIALLY SUITABLE FOR USE	30	23	34	34	20	38	35	14	21.3	25.4	3.3
Zinc	1	21	8.43	482	0	40000	306.4539	POTENTIALLY SUITABLE FOR USE	79	130	310	480	200	120	350	63	105	70.1	8.43
Cyanide (free)	1	8	1	1	0	800	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1			
Phenol (total)	1	11	0.1	1	0	1300	1.2631	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	0.1	
Acenaphthene	0.05	21	0.008	9.8	0	4700	4.906425	POTENTIALLY SUITABLE FOR USE	3.8	0.45	1.5	6.8	0.3	9.8	8.8	5.2	2.28	0.0132	0.16
Acenaphthylene	0.05	21	0.012	3	0	4600	1.320149	POTENTIALLY SUITABLE FOR USE	2.1	0.16	0.18	1.6	0.05	3	1.4	0.24	1	0.012	0.24
Anthracene	0.05	21	0.016	23	0	35000	11.67909	POTENTIALLY SUITABLE FOR USE	8.2	1	2.9	17	0.44	21	23	5.9	9.35	0.038	0.32
Benz(a)anthracene	0.05	21	0.014	74	6	7.8	33.55459	FURTHER ASSESSMENT REQUIRED	24	5.1	6.7	41	2	59	74	11	37	0.164	0.28
Benzo(a)pyrene	0.05	21	0.015	53	14	1.6	24.57271	FURTHER ASSESSMENT REQUIRED	18	4.6	5	31	1.9	42	53	7	28.9	0.178	0.3
Benzo(b)fluoranthene	0.05	21	0.015	58	5	11	24.68802	FURTHER ASSESSMENT REQUIRED	20	4.3	4.9	37	1.9	36	58	9	16.9	0.112	0.3
Benzo(ghi)perylene	0.05	21	0.024	26	0	72	11.1171	POTENTIALLY SUITABLE FOR USE	7.4	2.7	2.6	14	1.2	16	26	4.2	12.4	0.058	0.103
Benzo(k)fluoranthene	0.05	21	0.014	27	3	16	13.37383	POTENTIALLY SUITABLE FOR USE	6	2.6	2.9	12	1.1	25	27	3.2	21.8	0.137	0.28
Chrysene	0.05	21	0.01	46	5	16	24.2069	FURTHER ASSESSMENT REQUIRED	16	3.7	4.6	30	1.7	46	45	7.5	34.3	0.206	0.2
Dibenz(a,h)anthracene	0.05	21	0.0115	6.3	4	1.4	2.545971	FURTHER ASSESSMENT REQUIRED	0.05	0.05	0.59	3.5	0.05	4.4	6.3	0.05	1.68	0.023	0.46
Fluoranthene	0.05	21	0.017	130	0	1600	57.90607	POTENTIALLY SUITABLE FOR USE	38	8	12	81	3.7	94	130	22	59.3	0.247	0.34
Fluorene	0.05	21	0.01	16	0	3800	6.279697	POTENTIALLY SUITABLE FOR USE	4.1	0.4	1.8	8.3	0.29	16	9.3	4	2.44	0.0227	0.2
Indeno(1,2,3,cd)pyrene	0.05	21	0.018	22	4	6.6	9.896195	FURTHER ASSESSMENT REQUIRED	6.1	2.2	2.2	12	0.98	13	22	3.3	15	0.058	0.36
Naphthalene	0.05	21	0.009	7.2	1	5.6	2.723977	POTENTIALLY SUITABLE FOR USE	1.7	0.05	0.67	1.7	0.43	7.2	1.6	4.6	1.46	0.0145	0.18
Phenanthrene	0.05	21	0.0182	88	0	1500	40.55933	POTENTIALLY SUITABLE FOR USE	32	4.1	9.7	57	2.2	88	69	22	34.1	0.233	0.32
Pyrene	0.05	21	0.015	120	0	3800	57.85351	POTENTIALLY SUITABLE FOR USE	39	8	12	78	3.7	100	120	20	71.4	0.301	0.3
Asbestos identified	Y/N								N	N	N	N	N	N	Y	Y	N	N	N
FOC (dimensionless)	0.01385	**(mean)**							0.018	0.011	0.016	0.016	0.0072	0.017	0.019	0.0066			
SOM (calculated)	2.39%	**(mean)**							3.10%	1.90%	2.76%	2.76%	1.24%	2.93%	3.28%	1.14%			
pH (su)	8.8	**(mean)**							11.1	6.8	9.5	8.3	8.5	9.1	9.2	9.7	8.13	8.29	8.78

Risk parameter: **Human health - residential without plant uptake (2.5%SOM)**
Data set: Made Ground
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: 21-62863, 21-64528 & Arcadis Data

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
								Location & Depth	CP106	CP107	WS104	WS109	WS110	WS111	WS112	WS114	WS115	WS116
									0.6	0.3	1.5-1.6	0.5-0.6	1.1-1.2	1-1.1	0.3-0.4	0.2-0.3	0.5-0.6	0.2-0.3
Arsenic	1	21	1.11	31.7	0	40	22.21794	POTENTIALLY SUITABLE FOR USE	3.47	7.56	31.7	25.6	21.8	6.93	26.8	1.11	8.47	17.9
Beryllium	0.06	21	0.0721	4.8	0	73	2.004981	POTENTIALLY SUITABLE FOR USE	0.24	0.39	4.8	1.37	1.42	1.07	1.3	0.689	0.779	0.717
Boron	0.2	21	0.8	2.6	0	11000	1.893322	POTENTIALLY SUITABLE FOR USE	1.17	1	1	1	1	1	1.07	1	1	1
Cadmium	0.2	21	0.0265	72	0	87	18.96552	POTENTIALLY SUITABLE FOR USE	0.196	0.245	0.429	0.609	0.473	0.222	1.63	0.132	0.294	0.847
Chromium (III)	1	21	1.83	28	0	890	21.09397	POTENTIALLY SUITABLE FOR USE	6	10.2	25	13.1	14.1	17.5	16	3.01	10.6	7.66
Chromium (VI)	1.2	21	0.6	1.2	0	6.1	1.112638	POTENTIALLY SUITABLE FOR USE	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Copper	1	21	2.05	540	0	7300	180.5043	POTENTIALLY SUITABLE FOR USE	6.1	16.9	97.1	86.1	83.4	23.2	76.5	2.05	31.3	58.7
Lead	1	21	3.98	2070	8	310	760.1873	FURTHER ASSESSMENT REQUIRED	18.1	99.8	350	2070	408	18.9	494	6.77	134	225
Mercury, inorganic	0.3	21	0.14	1.2	0	240	0.602696	POTENTIALLY SUITABLE FOR USE	0.14	0.14	0.865	0.338	0.474	0.14	0.188	0.14	0.14	0.77
Nickel	1	21	4.33	48.7	0	180	32.96764	POTENTIALLY SUITABLE FOR USE	6.61	11	48.7	31.2	31.2	36	27.3	6.27	18.6	19.6
Selenium	1	21	1	1	0	600	1	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1	1	1	1	1	1
Vanadium	1	21	3.3	42.7	0	1200	34.12217	POTENTIALLY SUITABLE FOR USE	9.92	20.4	42.7	26.5	31.4	24.9	29.4	4.45	18	22.3
Zinc	1	21	8.43	482	0	40000	306.4539	POTENTIALLY SUITABLE FOR USE	28.7	28.7	181	370	193	62.3	482	16.4	79.7	129
Cyanide (free)	1	8	1	1	0	800	1	POTENTIALLY SUITABLE FOR USE										
Phenol (total)	1	11	0.1	1	0	1300	1.2631	POTENTIALLY SUITABLE FOR USE	0.5									
Acenaphthene	0.05	21	0.008	9.8	0	4700	4.906425	POTENTIALLY SUITABLE FOR USE	0.16	0.915	0.112	0.466	0.254	0.008	0.157	0.08	0.327	0.484
Acenaphthylene	0.05	21	0.012	3	0	4600	1.320149	POTENTIALLY SUITABLE FOR USE	0.5	0.258	0.158	0.0829	0.112	0.012	0.06	0.12	0.119	0.06
Anthracene	0.05	21	0.016	23	0	35000	11.67909	POTENTIALLY SUITABLE FOR USE	0.5	7.79	0.574	0.894	0.739	0.016	0.322	0.16	0.91	1.1
Benz(a)anthracene	0.05	21	0.014	74	6	7.8	33.55459	FURTHER ASSESSMENT REQUIRED	1.12	3.03	1.62	2.38	2.03	0.014	1.27	0.149	3.07	2.02
Benzo(a)pyrene	0.05	21	0.015	53	14	1.6	24.57271	FURTHER ASSESSMENT REQUIRED	0.678	3.18	1.32	2.35	1.77	0.015	1.13	0.15	2.77	1.74
Benzo(b)fluoranthene	0.05	21	0.015	58	5	11	24.68802	FURTHER ASSESSMENT REQUIRED	0.565	3.73	1.77	3.16	2.02	0.015	1.56	0.15	3.61	2.47
Benzo(ghi)perylene	0.05	21	0.024	26	0	72	11.1171	POTENTIALLY SUITABLE FOR USE	1.02	2.05	0.667	1.4	1.04	0.024	0.713	0.24	1.6	1.16
Benzo(k)fluoranthene	0.05	21	0.014	27	3	16	13.37383	POTENTIALLY SUITABLE FOR USE	0.735	1.39	0.659	1.03	0.781	0.014	0.566	0.14	1.25	0.76
Chrysene	0.05	21	0.01	46	5	16	24.2069	FURTHER ASSESSMENT REQUIRED	1.19	2.96	1.5	2.5	2.03	0.01	1.31	0.15	2.87	1.94
Dibenz(a,h)anthracene	0.05	21	0.0115	6.3	4	1.4	2.545971	FURTHER ASSESSMENT REQUIRED	0.859	0.283	0.153	0.254	0.245	0.023	0.0115	0.023	0.338	0.213
Fluoranthene	0.05	21	0.017	130	0	1600	57.90607	POTENTIALLY SUITABLE FOR USE	2.42	2.42	3.26	5.64	4.27	0.017	2.8	0.33	6.15	4.49
Fluorene	0.05	21	0.01	16	0	3800	6.279697	POTENTIALLY SUITABLE FOR USE	0.5	0.954	0.153	0.346	0.252	0.01	0.128	0.1	0.275	0.325
Indeno(1,2,3,cd)pyrene	0.05	21	0.018	22	4	6.6	9.896195	FURTHER ASSESSMENT REQUIRED	0.746	2.09	0.726	1.39	0.984	0.018	0.682	0.18	1.51	1.1
Naphthalene	0.05	21	0.009	7.2	1	5.6	2.723977	POTENTIALLY SUITABLE FOR USE	0.139	0.139	0.0465	1.101	0.0927	0.009	0.0589	0.09	0.182	0.273
Phenanthrene	0.05	21	0.0182	88	0	1500	40.55933	POTENTIALLY SUITABLE FOR USE	2.31	4.87	1.38	3.55	2.37	0.0182	1.22	0.188	2.76	3.44
Pyrene	0.05	21	0.015	120	0	3800	57.85351	POTENTIALLY SUITABLE FOR USE	0.3	7.22	3.06	5.18	4.08	0.015	2.58	0.318	5.72	4.11
Asbestos identified	Y/N								N	Y	N	Y	N	N	Y	N	N	Y
FOC (dimensionless)	0.01385	**(mean)**																
SOM (calculated)	2.39%	**(mean)**																
pH (su)	8.8	**(mean)**							11.6	9.03	8.22	8.6	7.82	8.14	8	9.38	8.77	7.81

Risk parameter: **Human health - residential without plant uptake (2.5%SOM)**
Data set: Made Ground
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: 21-62863, 21-64528 & Arcadis Data

Assessment of Chemicals of Potential Concern to Plant Life

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test															
								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
								Location & Depth	HYD-BH01	HYD-BH02	HYD-BH02	HYD-CBR02	HYD-CBR0	HYD-BH03	HYD-WS02	HYD-WS03	CP103	CP104	CP105	CP106	CP107	WS104	WS109
									0.5	0.45	0.7	0.35	0.25	1.10	0.80	0.30	1	0.08-0.9	0.5	0.6	0.3	1.5-1.6	0.5-0.6
Arsenic	1	21	1.11	31.7	0	250	22.21794	POTENTIALLY SUITABLE FOR USE	7.7	8	12	18	12	24	17	4.8	11	21.3	4.03	3.47	7.56	31.7	25.6
Boron	0.2	21	0.8	2.6	0	3	1.893322	POTENTIALLY SUITABLE FOR USE	2.4	2.6	1.7	1.7	0.8	1.5	1.5	2.4	1.45	1.77	1	1.17	1	1	1
Chromium (III)	1	21	1.83	28	0	400	21.09397	POTENTIALLY SUITABLE FOR USE	28	16	19	23	13	21	23	12	7.12	12.8	1.83	6	10.2	25	13.1
Chromium (VI)	1.2	21	0.6	1.2	0	25	1.112638	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Copper	1	21	2.05	540	1	135	180.5043	FURTHER ASSESSMENT REQUIRED	43	61	540	99	50	60	110	17	62.5	31.4	2.88	6.1	16.9	97.1	86.1
Nickel	1	21	4.33	48.7	0	75	32.96764	POTENTIALLY SUITABLE FOR USE	22	19	23	27	17	38	26	14	17.2	26.1	4.33	6.61	11	48.7	31.2
Zinc	1	21	8.43	482	5	300	306.4539	FURTHER ASSESSMENT REQUIRED	79	130	310	480	200	120	350	63	105	70.1	8.43	28.7	28.7	181	370
	Mean																						
pH (su)	8.8								11.1	6.8	9.5	8.3	8.5	9.1	9.2	9.7	8.13	8.29	8.78	11.6	9.03	8.22	8.6

Risk parameter: Plant life pH 7
Data set: Made Ground
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: 21-62863, 21-64528 & Arcadis Data

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Values in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Plant Life

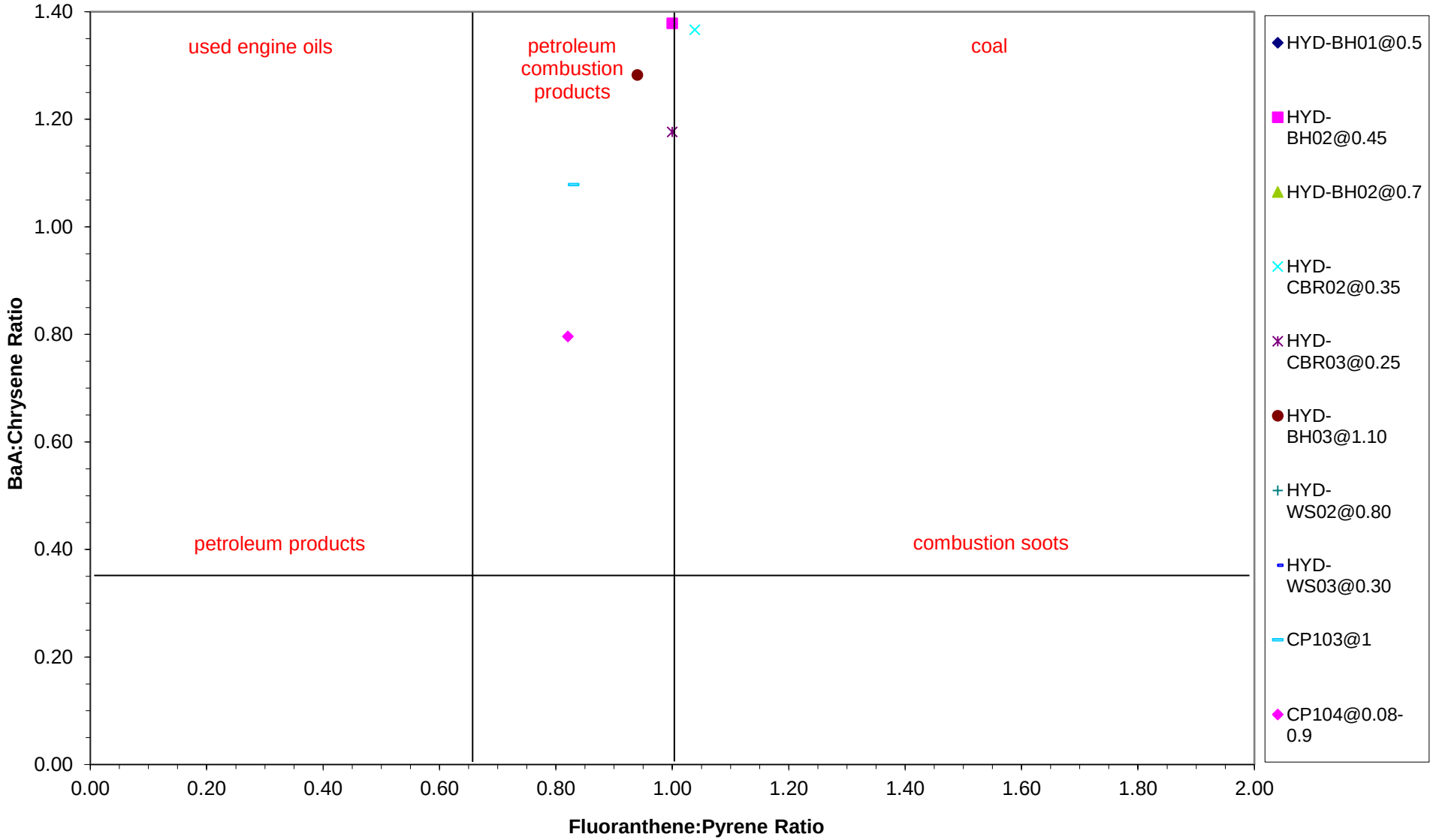
Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test						
								Soil Type	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**
								Location & Depth	**WS110**	**WS111**	**WS112**	**WS114**	**WS115**	**WS116**
									1.1-1.2	**1-1.1**	**0.3-0.4**	**0.2-0.3**	**0.5-0.6**	**0.2-0.3**
Arsenic	1	21	1.11	31.7	0	250	22.21794	POTENTIALLY SUITABLE FOR USE	21.8	6.93	26.8	1.11	8.47	17.9
Boron	0.2	21	0.8	2.6	0	3	1.893322	POTENTIALLY SUITABLE FOR USE	1	1	1.07	1	1	1
Chromium (III)	1	21	1.83	28	0	400	21.09397	POTENTIALLY SUITABLE FOR USE	14.1	17.5	16	3.01	10.6	7.66
Chromium (VI)	1.2	21	0.6	1.2	0	25	1.112638	POTENTIALLY SUITABLE FOR USE	0.6	0.6	0.6	0.6	0.6	0.6
Copper	1	21	2.05	540	1	135	180.5043	FURTHER ASSESSMENT REQUIRED	83.4	23.2	76.5	2.05	31.3	58.7
Nickel	1	21	4.33	48.7	0	75	32.96764	POTENTIALLY SUITABLE FOR USE	31.2	36	27.3	6.27	18.6	19.6
Zinc	1	21	8.43	482	5	300	306.4539	FURTHER ASSESSMENT REQUIRED	193	62.3	482	16.4	79.7	129
	Mean													
pH (su)	8.8								7.82	8.14	8	9.38	8.77	7.81

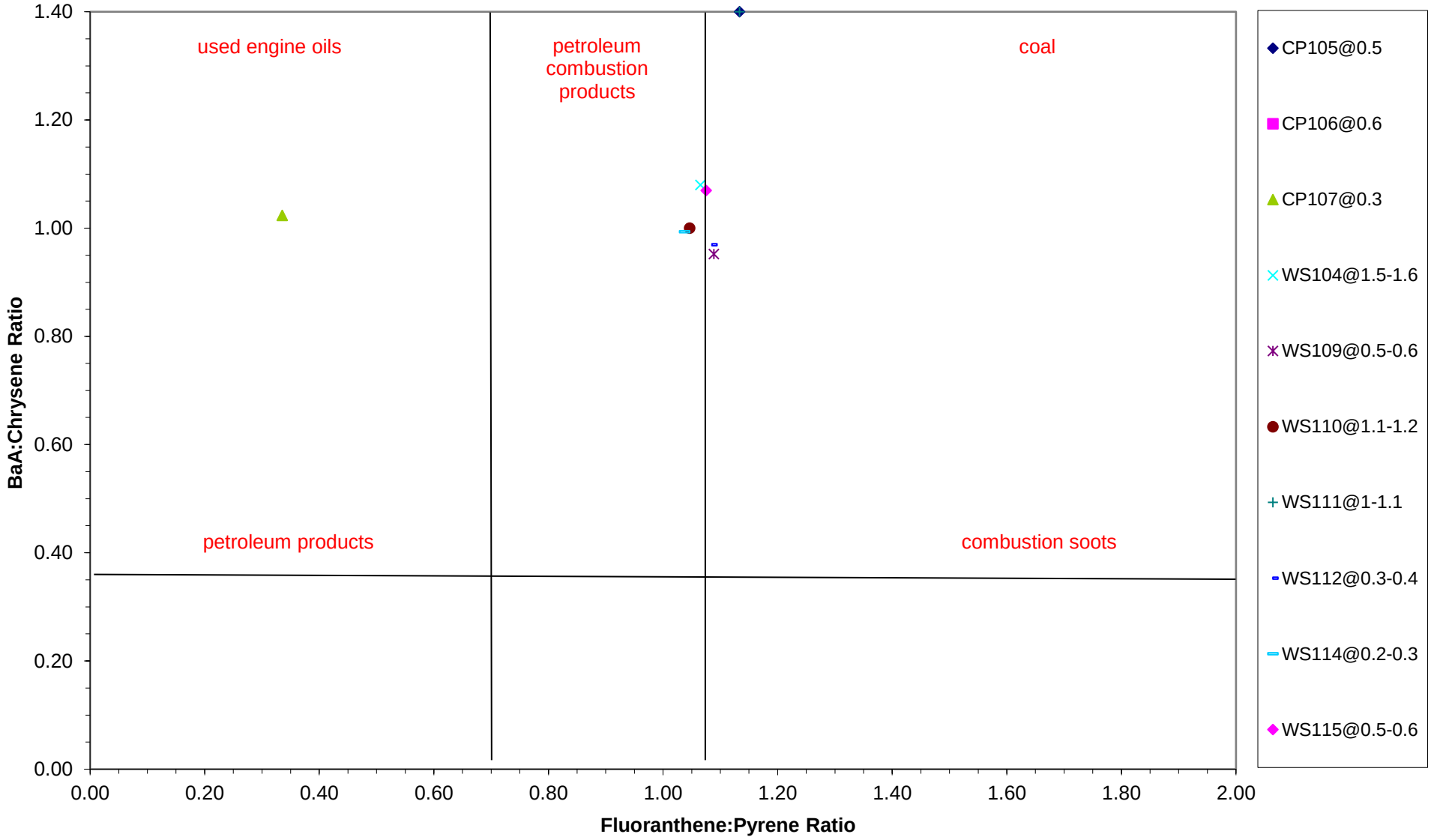
Risk parameter: **Plant life pH 7**
Data set: Made Ground
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: 21-62863, 21-64528 & Arcadis Data

Source Signature Double Ratio Plot



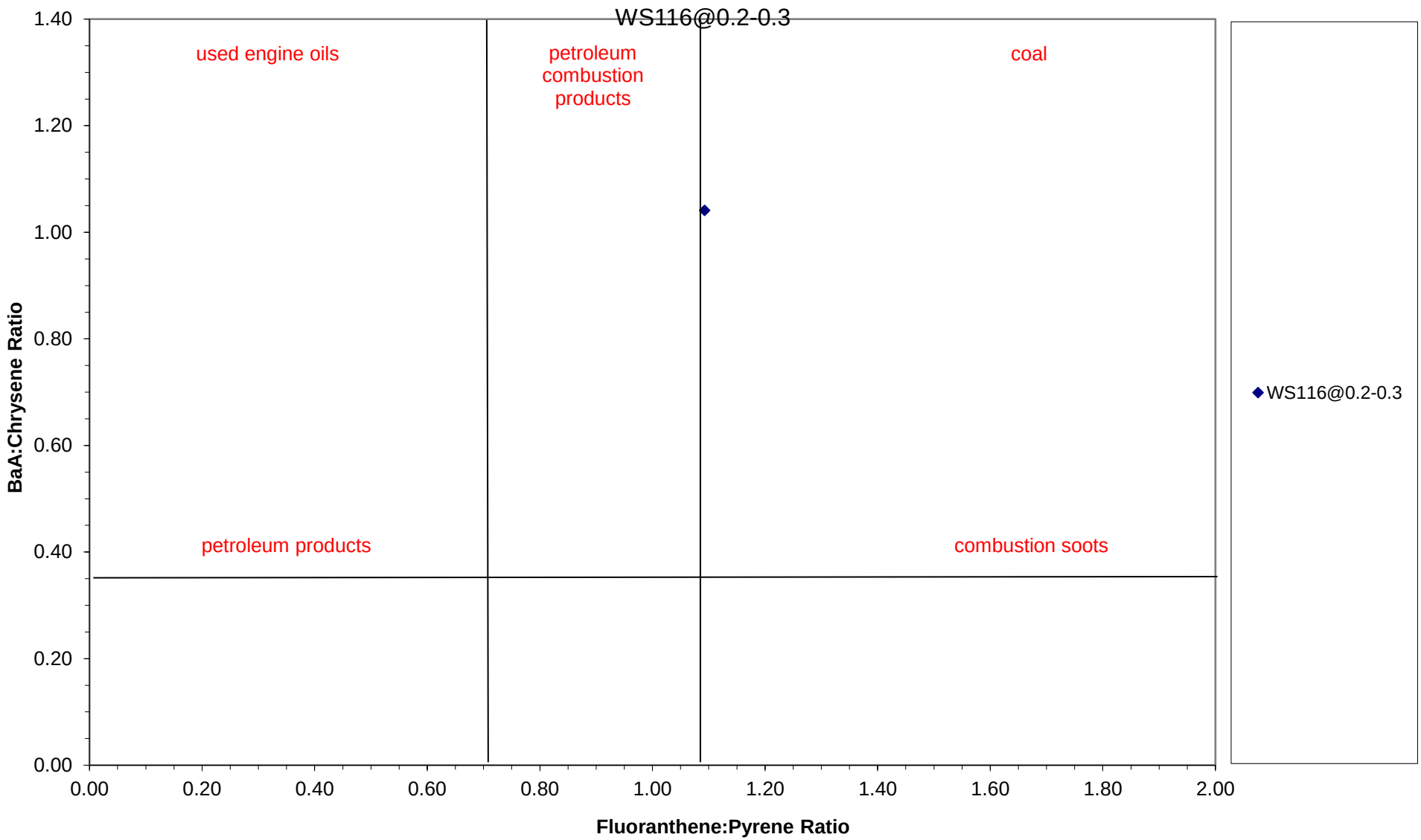
After ALcontrol laboratories (2006), Jones (2008)

Source Signature Double Ratio Plot



After ALcontrol laboratories (2006), Jones (2008)

Source Signature Double Ratio Plot



After ALcontrol laboratories (2006), Jones (2008)

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL
						Soil Type	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL
						Location & Depth	CP103	WS110	WS111	WS113
							1.5	3.5-3.6	2-2.1	0.8-0.9
Aliphatics EC5-EC6	0.001	4	0.01	0.0101	0	78	0.01	0.0101	0.001	0.001
Aliphatics >EC6-EC8	0.001	4	0.01	0.0391	0	230	0.01	0.0391	0.001	0.001
Aliphatics >EC8-EC10	0.001	4	0.01	0.0542	0	65	0.01	0.0542	0.001	0.001
Aliphatics >EC10-EC12	1	4	1	1	0	120	1	1	1	1
Aliphatics >EC12-EC16	2	4	1	1	0	59	1	1	1	1
Aliphatics >EC16-EC35	16	4	2	4.35	0	93000	2	3.71	4.35	2.72
Aliphatics >EC35-EC44	8.4	4	1	1	0	93000	1	1	1	1
Aromatics EC5-EC7	0.001	4	0.01	0.01	0	690	0.01	0.01	0.001	0.001
Aromatics >EC7-EC8	0.001	4	0.01	0.01	0	1800	0.01	0.01	0.001	0.001
Aromatics >EC8-EC10	0.001	4	0.01	0.0353	0	120	0.01	0.0353	0.001	0.001
Aromatics >EC10-EC12	1	4	1	2	0	590	2	1	1	1
Aromatics >EC12-EC16	2	4	1	7.28	0	2300	1	4.54	1	7.28
Aromatics >EC16-EC21	10	4	1	39.9	0	1900	8.99	30.9	1	39.9
Aromatics >EC21-EC35	10	4	4.64	88.5	0	1900	26.5	88.5	4.64	54.1
Aromatics >EC35-EC44	8.4	4	1	3.89	0	1900	1	3.42	1	3.89

	ADDITIVITY CHECK	HAZARD QUOTIENTS FOR EACH FRACTION			
	Aliphatics EC5-EC6	0.000	0.000	0.000	0.000
	Aliphatics >EC6-EC8	0.000	0.000	0.000	0.000
Considered additive	Aliphatics >EC8-EC10	0.000	0.001	0.000	0.000
Considered additive	Aliphatics >EC10-EC12	0.008	0.008	0.008	0.008
Considered additive	Aliphatics >EC12-EC16	0.017	0.017	0.017	0.017
	Aliphatics >EC16-EC35	0.000	0.000	0.000	0.000
	Aliphatics >EC35-EC44	0.000	0.000	0.000	0.000
	Aromatics EC5-EC7	0.000	0.000	0.000	0.000
	Aromatics >EC7-EC8	0.000	0.000	0.000	0.000
Considered additive	Aromatics >EC8-EC10	0.000	0.000	0.000	0.000
Considered additive	Aromatics >EC10-EC12	0.003	0.002	0.002	0.002
Considered additive	Aromatics >EC12-EC16	0.000	0.002	0.000	0.003
Considered additive	Aromatics >EC16-EC21	0.005	0.016	0.001	0.021
Considered additive	Aromatics >EC21-EC35	0.014	0.047	0.002	0.028
	Aromatics >EC35-EC44	0.001	0.002	0.001	0.002
	Hazard Index for ali>C8-C16	**0.025**	**0.026**	**0.025**	**0.025**
	Hazard Index for aro>C8-C16	**0.004**	**0.004**	**0.002**	**0.005**
	Hazard Index for aro>C16-C35	**0.019**	**0.063**	**0.003**	**0.049**

Risk parameter: **Human health - residential without plant uptake (2.5%SOM)**
Data set: Made Ground
Client: Sir Robert McAlpine
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: 21-62863 & 21-64528 & Arcadis Data

Legend:
Hazard Index table - HI or HQ greater than 1 highlighted with yellow shading.
Main table values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Main table alues in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test												
								Soil Type	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
								Location & Depth	HYD-BH02	HYD-CBR02	HYD-BH03	HYD-WS02	CP103	CP104	CP105	CP106	CP107	WS104	WS109	WS110
									0.7	0.35	1.10	0.80	1	0.08-0.9	0.5	0.6	0.3	1.5-1.6	0.5-0.6	1.1-1.2
Aliphatics EC5-EC6	0.001	17	0.001	0.0151	0	78	0.012714	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.01	0.0151	0.01	0.01	0.01	0.01	0.01	0.01
Aliphatics >EC6-EC8	0.001	17	0.001	0.0467	0	230	0.033499	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.0168	0.037	0.01	0.0136	0.01	0.034	0.026	0.04
Aliphatics >EC8-EC10	0.001	17	0.001	0.0578	0	65	0.040271	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.0204	0.0384	0.01	0.0203	0.01	0.0265	0.0283	0.045
Aliphatics >EC10-EC12	1	17	1	14	0	120	5.846782	POTENTIALLY SUITABLE FOR USE	3.5	1.9	3.6	14	5	1	2	1	1.79	1	1	1
Aliphatics >EC12-EC16	2	17	1	35	0	59	16.76967	POTENTIALLY SUITABLE FOR USE	19	11	16	35	13.3	1	2	2.83	6.92	1	1	1.23
Aliphatics >EC16-EC35	16	17	2	3105.9	0	93000	1009.591	POTENTIALLY SUITABLE FOR USE	98	61	58	240	51.6	3.66	20.78	3105.9	5.85	2.9	4.88	15.4
Aliphatics >EC35-EC44	8.4	17	1	132	0	93000	67.65333	POTENTIALLY SUITABLE FOR USE	11	34	8.4	120	5	1	48.7	132	2.4	1	2.95	1.19
Aromatics EC5-EC7	0.001	17	0.001	0.01	0	690	0.012044	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aromatics >EC7-EC8	0.001	17	0.001	0.01	0	1800	0.012044	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aromatics >EC8-EC10	0.001	17	0.001	0.0389	0	120	0.028224	POTENTIALLY SUITABLE FOR USE	0.001	0.001	0.001	0.001	0.026	0.026	0.01	0.0136	0.01	0.0176	0.0189	0.03
Aromatics >EC10-EC12	1	17	1	26	0	590	10.82692	POTENTIALLY SUITABLE FOR USE	3.7	9.9	26	12	1	1	2	1	1.03	1	1	1
Aromatics >EC12-EC16	2	17	1	120	0	2300	62.58755	POTENTIALLY SUITABLE FOR USE	10	33	120	79	95.4	1	2	4.73	16.2	2.65	1	6.41
Aromatics >EC16-EC21	10	17	1	694	0	1900	310.7968	POTENTIALLY SUITABLE FOR USE	36	220	330	310	694	1	2	19.9	162	11.2	8.57	55.6
Aromatics >EC21-EC35	10	17	1	1810	0	1900	735.1965	POTENTIALLY SUITABLE FOR USE	45	210	390	610	1810	1.55	43.8	391	538	19.7	28.1	128
Aromatics >EC35-EC44	8.4	17	1	170	0	1900	94.29113	POTENTIALLY SUITABLE FOR USE	14	26	39	170	153	1	90	4.26	82.4	1	4.19	7.17

ADDITIVITY CHECK		HAZARD QUOTIENTS FOR EACH FRACTION											
	Aliphatics EC5-EC6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aliphatics >EC6-EC8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aliphatics >EC8-EC10	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001
Considered additive	Aliphatics >EC10-EC12	0.029	0.016	0.030	0.117	0.042	0.008	0.017	0.008	0.015	0.008	0.008	0.008
	Aliphatics >EC12-EC16	0.322	0.186	0.271	0.593	0.225	0.017	0.034	0.048	0.117	0.017	0.017	0.021
	Aliphatics >EC16-EC35	0.001	0.001	0.001	0.003	0.001	0.000	0.000	0.033	0.000	0.000	0.000	0.000
	Aliphatics >EC35-EC44	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
	Aromatics EC5-EC7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aromatics >EC7-EC8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Aromatics >EC8-EC10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Considered additive	Aromatics >EC10-EC12	0.006	0.017	0.044	0.020	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002
	Aromatics >EC12-EC16	0.004	0.014	0.052	0.034	0.041	0.000	0.001	0.002	0.007	0.001	0.000	0.003
	Aromatics >EC16-EC21	0.019	0.116	0.174	0.163	0.365	0.001	0.001	0.010	0.085	0.006	0.005	0.029
Considered additive	Aromatics >EC21-EC35	0.024	0.111	0.205	0.321	0.953	0.001	0.023	0.206	0.283	0.010	0.015	0.067
	Aromatics >EC35-EC44	0.007	0.014	0.021	0.089	0.081	0.001	0.047	0.002	0.043	0.001	0.002	0.004
	Hazard Index for ali>C8-C16	**0.351**	**0.202**	**0.301**	**0.710**	**0.267**	**0.026**	**0.051**	**0.057**	**0.132**	**0.026**	**0.026**	**0.030**
	Hazard Index for aro>C8-C16	**0.011**	**0.031**	**0.096**	**0.055**	**0.043**	**0.002**	**0.004**	**0.004**	**0.009**	**0.003**	**0.002**	**0.005**
	Hazard Index for aro>C16-C35	**0.043**	**0.226**	**0.379**	**0.484**	**1.318**	**0.001**	**0.024**	**0.216**	**0.368**	**0.016**	**0.019**	**0.097**

Risk parameter: **Human health - residential without plant uptake (2.5%SOM)**
Data set: Made Ground
Client: Sir Robert McAlpine
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: 21-62863 & 21-64528 & Arcadis Data

Legend: Hazard Index table - HI or HQ greater than 1 highlighted with yellow shading.
Main table values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate.
Main table alues in red are equal to, or greater than, the generic assessment criterion (GAC).
MG denotes Made Ground
NAT denotes natural ground

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

All values in mg/kg unless otherwise stated

Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	US_{95}	Result of Significance Test	MG	MG	MG	MG	MG
								Soil Type	MG	MG	MG	MG	MG
								Location & Depth	WS111	WS112	WS114	WS115	WS116
									1-1.1	0.3-0.4	0.2-0.3	0.5-0.6	0.2-0.3
Aliphatics EC5-EC6	0.001	17	0.001	0.0151	0	78	0.012714	POTENTIALLY SUITABLE FOR USE	0.01	0.01	0.01	0.01	0.01
Aliphatics >EC6-EC8	0.001	17	0.001	0.0467	0	230	0.033499	POTENTIALLY SUITABLE FOR USE	0.0165	0.0248	0.0178	0.0467	0.01
Aliphatics >EC8-EC10	0.001	17	0.001	0.0578	0	65	0.040271	POTENTIALLY SUITABLE FOR USE	0.0578	0.0319	0.0167	0.0456	0.0135
Aliphatics >EC10-EC12	1	17	1	14	0	120	5.846782	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1
Aliphatics >EC12-EC16	2	17	1	35	0	59	16.76967	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1
Aliphatics >EC16-EC35	16	17	2	3105.9	0	93000	1009.591	POTENTIALLY SUITABLE FOR USE	2	51.33	9.65	10.72	16.47
Aliphatics >EC35-EC44	8.4	17	1	132	0	93000	67.65333	POTENTIALLY SUITABLE FOR USE	1	26	14.6	1	14
Aromatics EC5-EC7	0.001	17	0.001	0.01	0	690	0.012044	POTENTIALLY SUITABLE FOR USE	0.01	0.01	0.01	0.01	0.01
Aromatics >EC7-EC8	0.001	17	0.001	0.01	0	1800	0.012044	POTENTIALLY SUITABLE FOR USE	0.01	0.01	0.01	0.01	0.01
Aromatics >EC8-EC10	0.001	17	0.001	0.0389	0	120	0.028224	POTENTIALLY SUITABLE FOR USE	0.0389	0.0212	0.0115	0.0308	0.01
Aromatics >EC10-EC12	1	17	1	26	0	590	10.82692	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1
Aromatics >EC12-EC16	2	17	1	120	0	2300	62.58755	POTENTIALLY SUITABLE FOR USE	1	4.49	1	9.5	4.37
Aromatics >EC16-EC21	10	17	1	694	0	1900	310.7968	POTENTIALLY SUITABLE FOR USE	1	35.3	1	59.5	25.1
Aromatics >EC21-EC35	10	17	1	1810	0	1900	735.1965	POTENTIALLY SUITABLE FOR USE	1	92.6	12.6	155	71.8
Aromatics >EC35-EC44	8.4	17	1	170	0	1900	94.29113	POTENTIALLY SUITABLE FOR USE	1	6.43	14	11.1	9.36

ADDITIVITY CHECK

Aliphatics EC5-EC6	0.000	0.000	0.000	0.000	0.000
Aliphatics >EC6-EC8	0.000	0.000	0.000	0.000	0.000
Aliphatics >EC8-EC10	0.001	0.000	0.000	0.001	0.000
Aliphatics >EC10-EC12	0.008	0.008	0.008	0.008	0.008
Aliphatics >EC12-EC16	0.017	0.017	0.017	0.017	0.017
Aliphatics >EC16-EC35	0.000	0.001	0.000	0.000	0.000
Aliphatics >EC35-EC44	0.000	0.000	0.000	0.000	0.000
Aromatics EC5-EC7	0.000	0.000	0.000	0.000	0.000
Aromatics >EC7-EC8	0.000	0.000	0.000	0.000	0.000
Aromatics >EC8-EC10	0.000	0.000	0.000	0.000	0.000
Aromatics >EC10-EC12	0.002	0.002	0.002	0.002	0.002
Aromatics >EC12-EC16	0.000	0.002	0.000	0.004	0.002
Aromatics >EC16-EC21	0.001	0.019	0.001	0.031	0.013
Aromatics >EC21-EC35	0.001	0.049	0.007	0.082	0.038
Aromatics >EC35-EC44	0.001	0.003	0.007	0.006	0.005
Hazard Index for ali>C8-C16	**0.026**	**0.026**	**0.026**	**0.026**	**0.025**
Hazard Index for aro>C8-C16	**0.002**	**0.004**	**0.002**	**0.006**	**0.004**
Hazard Index for aro>C16-C35	**0.001**	**0.067**	**0.007**	**0.113**	**0.051**

Considered additive: Aliphatics >EC8-EC10, Aliphatics >EC10-EC12, Aliphatics >EC12-EC16

Considered additive: Aromatics >EC8-EC10, Aromatics >EC10-EC12, Aromatics >EC12-EC16

Considered additive: Aromatics >EC16-EC21, Aromatics >EC21-EC35

Risk parameter: **Human health - residential without plant uptake (2.5%SOM)**
Data set: Made Ground
Client: Sir Robert McAlpine
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no.: C-18170
Lab. report no(s).: 21-62863 & 21-64528 & Arcadis Data

Remedial Targets Methodology Data Table

Hydrock

Hydrock Scenario: Scenario D - DWS & EQS (inland)

RTM Level: RTM Level 2 - Groundwater Beneath Source Assessment - groundwater samples

Water body receptor(s): Groundwater and surface water
Secondary receptor(s): Human health (abstraction)
Data set: Groundwater
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no: C-18170
Test Certificates(s): 21-66207
Dataset ALL ZONES

PNEC calculated (inland EQS)

123* Exceeds solubility value
<1 Grey text and "<" sign if value <= LoD
999 Red text if value > DWS
Red fill if value > Inland Waters EQS

Surface Water Representative Hardness as mg/l $CaCO_3$ 10

								Strata / Zone	GT	GT	GT	MG
								Date sampled:	30/03/2021	30/03/2021	30/03/2021	23/07/2020
CAS / AGS Number	**Chemical of Potential Concern (µg/l)**	**WFD Designation**	**Hazardous Substance Status**	**Solubility Limit (µg/l)**	**No. of samples**	**Limit of Detection**	**DWS**	**Inland Waters EQS**	**HYD-BH02**	**HYD-BH03**	**HYD-WS03**	**CP104**
7440-22-4	Silver (Ag) (dissolved)				3	0.05	n/a	0.05	<0.05	<0.05	<0.05	
7429-90-5	Aluminium (Al) (dissolved)				3	1	200	n/a	290	140	2100	
7440-38-2	Arsenic (As) (dissolved)	SP	H		4	0.15	10	50	7.87	1.92	4.52	4.78
7440-42-8	Boron (B) (dissolved)		NP		4	10	1000	2000	240	120	130	171
7440-39-3	Barium (Ba) (dissolved)				4	0.06	1300	n/a	32	46	200	536
7440-43-9	Cadmium (Cd) (dissolved)	PH	NP		4	0.02	5	0.08	0.63	0.03	0.08	0.08
7440-48-4	Cobalt (Co) (dissolved)		NP		3	0.2	n/a	3	3.6	<0.2	7.1	
18540-29-9	Chromium (VI) (Cr) (dissolved)	SP	H		4	30	n/a	3.4	<5	<5	<5	<30
16065-83-1	Chromium (III) (Cr) (dissolved)	SP			3	1	n/a	4.7	4.2	4	3.8	
7440-47-3	Chromium (Cr) (total) (dissolved)				4	0.2	50	n/a	4.2	4	3.8	6.64
7440-50-8	Copper (Cu) (dissolved)	SP	NP		4	0.5	2000	1	14	6.6	16	<0.3
7439-89-6	Iron (Fe) (dissolved)	SP			3	4	200	1000	5.8	8.2	27	
7439-97-6	Mercury (Hg) (dissolved)	PH	H		4	0.05	1	0.07	<0.05	<0.05	<0.05	<0.01
P1286	Manganese (Mn) (dissolved)	SP			3	0.05	50	123	1400	1.9	110	
7440-23-5	Sodium (Na) (dissolved)				3	10	200000	n/a	800000	350000	150000	
7440-02-0	Nickel (Ni) (dissolved)	P	NP		4	0.5	20	4	9.7	1.7	23	1.75
7439-92-1	Lead (Pb) (dissolved)	P	H		4	0.2	10	1.2	0.3	0.3	<0.2	0.228
7440-36-0	Antimony (Sb) (dissolved)		NP		3	0.4	5	n/a	0.6	1.4	5.5	
7782-49-2	Selenium (Se) (dissolved)		NP		4	0.6	10	n/a	34	97	130	1
7440-31-5	Tin (Sn) (dissolved)				3	0.2	n/a	25	<0.2	<0.2	0.34	
7440-62-2	Vanadium (V) (dissolved)				4	0.2	n/a	20	6.7	1.7	3.5	1
7440-66-6	Zinc (Zn) (dissolved)	SP	NP		4	0.5	n/a	12.3	35	5.8	3.5	23.7
P1095	Cyanide (free) (hydrogen cyanide)	SP	NP		3	1	n/a	1	<1	<1	<1	
57-12-5	Cyanide (total)				3	1	50	n/a	<1	<1	<1	
P1140	Ammonium (NH_4^+)		NP		3	15	500	n/a	830	130	80	
P1238	Ammnoniacal Nitrogen (as N)		NP		3	15	n/a	300	650	100	62	
P1720	Ammonia (unionised) (NH_3 as N) {free ammonia}	SP	NP		3	15	n/a	n/a	790	120	75	
15541-45-4	Bromate (BrO_3)				3	2	10	n/a	<2	<2	<2	
16887-00-6	Chloride (Cl^-)				3	150	250000	250000	62000	39000	51000	
16984-48-8	Fluoride (F^-)				3	50	1500	1000	460	940	170	
P1348	Nitrate (NO_3^-)				3	50	50000	n/a	6540	570	1040	
P1349	Nitrite (NO_2^-)				3	5	500	n/a	1800	150	70	
14808-79-8	Sulfate (SO_4^{2-})				4	45	250000	400000	1390000	382000	197000	44700
P1134	pH (min.) (su)				4	0	6.5	6	7.5	7.9	7.7	7.25
P1134	pH (max.) (su)				4	0	9.5	9	7.5	7.9	7.7	7.25
P1287	Electrical conductivity (µS/cm)				3	10	2500	n/a	2600	1200	940	
120-12-7	Anthracene	PH	H	56	4	0.01	n/a	0.1	<0.01	<0.01	<0.01	<0.00527
50-32-8	Benzo(a)pyrene	PH	H	3.8	4	0.01	0.01	0.00017	<0.01	<0.01	<0.01	<0.00987
206-44-0	Fluoranthene	P	H	230	4	0.01	n/a	0.0063	<0.01	<0.01	<0.01	0.0177
91-20-3	Naphthalene	P	NP	19000	4	0.01	n/a	2	<0.01	<0.01	<0.01	<0.01
GRP01	PAHs = sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene	P	H		4	0.04	0.1	n/a	<0.04	<0.04	<0.04	<0.03367
P1877	Phenol	SP	NP	84100000	3	1	n/a	7.7	<1	<1	<1	
P1407	Ali EC5-EC6			35900	3	1	15000	10	<1	<1	<1	
P1408	Ali >EC6-EC8			5370	4	10	15000	10	<1	<1	<1	<10
P1409	Ali >EC8-EC10			427	4	10	300	10	<1	<1	<1	<10
P1410	Ali >EC10-EC12			33.9	4	10	300	10	<10	<10	<10	<10
P1411	Ali >EC12-EC16			0.759	4	10	300	10	<10	<10	<10	<10
P1938	Ali >EC16-EC35			0.00254	4	20	n/a	10	<10	<10	<10	<20
P1415	Ali >EC35-EC44			0.00254	4	10	n/a	10	<10	<10	<10	<10
P1441	Aro EC5-EC7			1780000	4	10	1	10	<1	<1	<1	<10
P1355	Aro >EC7-EC8			590000	4	10	700	10	<1	<1	<1	<10
P1356	Aro >EC8-EC10			64600	4	10	300	10	<1	<1	<1	<10
P1357	Aro >EC10-EC12			24500	4	10	90	10	<10	<10	<10	<10
P1358	Aro > EC12-EC16			5750	4	10	90	10	<10	<10	<10	<10
P1359	Aro >EC16-EC21			653	4	10	90	10	<10	<10	<10	<10
P1360	Aro >EC21-EC35			6.61	4	10	90	10	<10	<10	<10	<10
P1362	Aro >EC35-EC44			6.61	3	10	n/a	10	<10	<10	<10	

Remedial Targets Methodology Data Table

Hydrock

Water body receptor(s): Groundwater and surface water
Secondary receptor(s): Human health (abstraction)
Data set: Groundwater
Client: Sir Robert McAlpine Ltd
Site: Belle Vue Co-op Academy, Hyde Road, Manchester
Job no: C-18170
Test Certificates(s): 21-66207
Dataset ALL ZONES

PNEC calculated (inland EQS)

123* Exceeds solubility value
<1 Grey text and "<" sign if value <= LoD
999 Red text if value > DWS
Red fill if value > Inland Waters EQS

Surface Water Representative Hardness as mg/l $CaCO_3$ 10

								Strata / Zone	GT	GT	GT	MG										
								Date sampled:	30/03/2021	30/03/2021	30/03/2021	23/07/2020										
CAS / AGS Number	**Chemical of Potential Concern (µg/l)**	**WFD Designation**	**Hazardous Substance Status**	**Solubility Limit (µg/l)**	**No. of samples**	**Limit of Detection**	**DWS**	**Inland Waters EQS**	**HYD-BH02**	**HYD-BH03**	**HYD-WS03**	**CP104**										
71-43-2	Benzene	P	H	1780000	4	10	1	10	<1	<1	<1	<7										
108-88-3	Toluene	SP	H	590000	4	10	700	74	<1	<1	<1	<4										
100-41-4	Ethylbenzene		H	180000	4	10	300	20	<1	<1	<1	<5										
95-47-6	o-Xylene		H	173000	4	10	500	30	<1	<1	<1	<3										
P1374	m,p-Xylene		H	200000	4	10	500	30	<1	<1	<1	<8										
1634-04-04	Methyl tertiary butyl ether (MTBE)		NP	48000000	3	1	15	n/a	<1	<1	<1											

Appendix G

Waste Assessment

HazWasteOnline™ Assessment

Waste Classification Report

TDNJ2-GC4PD-KURGQ

Job name

Belle Vue Co-op Academy, Hyde Road, Manchester

Description/Comments

Project

C-18170

Site

Belle Vue Co-op Academy, Hyde Road, Manchester

Related Documents

#	Name	Description
None		

Waste Stream Template

Hydrock Standard plus Cresol (ammended Lead)

Classified by

Name:
Will Swinnerton
Date:
30 Apr 2021 16:47 GMT
Telephone:
(01782) 261919

Company:
Hydrock Consultants Ltd
4 Lakeside, Festival Park, Stoke-on-Trent.
ST1 5RY

HazWasteOnline™ Training Record:

Course	Date
Hazardous Waste Classification	07 Sep 2020
Advanced Hazardous Waste Classification	08 Sep 2020

Report

Created by: Will Swinnerton
Created date: 30 Apr 2021 16:47 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	HYD-BH01	0.5	Non Hazardous		3
2	HYD-BH02	0.45	Non Hazardous		5
3	HYD-BH02[2]	0.7	Non Hazardous		7
4	HYD-CBR02	0.35	Non Hazardous		10
5	HYD-CBR03	0.25	Non Hazardous		13
6	HYD-BH03	1.10	Hazardous	HP 7, HP 11	15
7	HYD-WS02	0.80	Hazardous	HP 3(i), HP 7, HP 11	18
8	HYD-WS03	0.30	Non Hazardous		21

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	23
Appendix B: Rationale for selection of metal species	24

Appendices	Page
Appendix C: Version	25

Classification of sample: HYD-BH01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
HYD-BH01		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.5 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		3.8	mg/kg		3.8	mg/kg	0.00038 %		
2		acenaphthylene		205-917-1	208-96-8		2.1	mg/kg		2.1	mg/kg	0.00021 %		
3		anthracene		204-371-1	120-12-7		8.2	mg/kg		8.2	mg/kg	0.00082 %		
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.7	mg/kg	1.32	10.167	mg/kg	0.00102 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		24	mg/kg		24	mg/kg	0.0024 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		18	mg/kg		18	mg/kg	0.0018 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		20	mg/kg		20	mg/kg	0.002 %		
8		benzo[ghi]perylene		205-883-8	191-24-2		7.4	mg/kg		7.4	mg/kg	0.00074 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		6	mg/kg		6	mg/kg	0.0006 %		
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		2.4	mg/kg	13.43	32.232	mg/kg	0.00322 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.5	mg/kg	1.285	0.643	mg/kg	0.00005 %		
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28	mg/kg	1.462	40.924	mg/kg	0.00409 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		16	mg/kg		16	mg/kg	0.0016 %		
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		43	mg/kg	1.126	48.413	mg/kg	0.00484 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19		fluoranthene		205-912-4	206-44-0		38	mg/kg		38	mg/kg	0.0038 %		
20		fluorene		201-695-5	86-73-7		4.1	mg/kg		4.1	mg/kg	0.00041 %		
21		indeno[123-cd]pyrene		205-893-2	193-39-5		6.1	mg/kg		6.1	mg/kg	0.00061 %		
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	100	mg/kg		100	mg/kg	0.01 %		
23		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		1.7	mg/kg		1.7	mg/kg	0.00017 %		
25		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		22	mg/kg	1.579	34.749	mg/kg	0.00347 %		
26		pH			PH		11.1	pH		11.1	pH	11.1 pH		
27		phenanthrene		201-581-5	85-01-8		32	mg/kg		32	mg/kg	0.0032 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29		pyrene		204-927-3	129-00-0		39	mg/kg		39	mg/kg	0.0039 %		
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		79	mg/kg	1.245	98.332	mg/kg	0.00983 %		
											Total:	0.06 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: HYD-BH02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
HYD-BH02		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.45 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		acenaphthene				0.45	mg/kg		0.45	mg/kg	0.000045 %		
			201-469-6	83-32-9									
2		acenaphthylene				0.16	mg/kg		0.16	mg/kg	0.000016 %		
			205-917-1	208-96-8									
3		anthracene				1	mg/kg		1	mg/kg	0.0001 %		
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				8	mg/kg	1.32	10.563	mg/kg	0.00106 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				5.1	mg/kg		5.1	mg/kg	0.00051 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				4.6	mg/kg		4.6	mg/kg	0.00046 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				4.3	mg/kg		4.3	mg/kg	0.00043 %		
		601-034-00-4	205-911-9	205-99-2									
8		benzo[ghi]perylene				2.7	mg/kg		2.7	mg/kg	0.00027 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				2.6	mg/kg		2.6	mg/kg	0.00026 %		
		601-036-00-5	205-916-6	207-08-9									
10		beryllium { beryllium oxide }				0.86	mg/kg	2.775	2.387	mg/kg	0.000239 %		
		004-003-00-8	215-133-1	1304-56-9									
11		boron { boron tribromide/trichloride/trifluoride (combined) }				2.6	mg/kg	13.43	34.918	mg/kg	0.00349 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12		cadmium { cadmium sulfide }			1	6.5	mg/kg	1.285	8.354	mg/kg	0.00065 %		
		048-010-00-4	215-147-8	1306-23-6									
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
			215-160-9	1308-38-9									
14		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		3.7	mg/kg		3.7	mg/kg	0.00037 %		
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		61	mg/kg	1.126	68.679	mg/kg	0.00687 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19		fluoranthene		205-912-4	206-44-0		8	mg/kg		8	mg/kg	0.0008 %		
20		fluorene		201-695-5	86-73-7		0.4	mg/kg		0.4	mg/kg	0.00004 %		
21		indeno[123-cd]pyrene		205-893-2	193-39-5		2.2	mg/kg		2.2	mg/kg	0.00022 %		
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	110	mg/kg		110	mg/kg	0.011 %		
23		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
25		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		19	mg/kg	1.579	30.01	mg/kg	0.003 %		
26		pH			PH		6.8	pH		6.8	pH	6.8 pH		
27		phenanthrene		201-581-5	85-01-8		4.1	mg/kg		4.1	mg/kg	0.00041 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29		pyrene		204-927-3	129-00-0		8	mg/kg		8	mg/kg	0.0008 %		
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		130	mg/kg	1.245	161.813	mg/kg	0.0162 %		
											Total:	0.0501 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: HYD-BH02[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
HYD-BH02[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.7 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		acenaphthene				1.5	mg/kg		1.5	mg/kg	0.00015 %		
			201-469-6	83-32-9									
2		acenaphthylene				0.18	mg/kg		0.18	mg/kg	0.000018 %		
			205-917-1	208-96-8									
3		anthracene				2.9	mg/kg		2.9	mg/kg	0.00029 %		
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				6.7	mg/kg		6.7	mg/kg	0.00067 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				5	mg/kg		5	mg/kg	0.0005 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				4.9	mg/kg		4.9	mg/kg	0.00049 %		
		601-034-00-4	205-911-9	205-99-2									
8		benzo[ghi]perylene				2.6	mg/kg		2.6	mg/kg	0.00026 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				2.9	mg/kg		2.9	mg/kg	0.00029 %		
		601-036-00-5	205-916-6	207-08-9									
10		beryllium { beryllium oxide }				0.95	mg/kg	2.775	2.637	mg/kg	0.000264 %		
		004-003-00-8	215-133-1	1304-56-9									
11		boron { boron tribromide/trichloride/trifluoride (combined) }				1.7	mg/kg	13.43	22.831	mg/kg	0.00228 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12		cadmium { cadmium sulfide }			1	72	mg/kg	1.285	92.538	mg/kg	0.0072 %		
		048-010-00-4	215-147-8	1306-23-6									
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				19	mg/kg	1.462	27.77	mg/kg	0.00278 %		
			215-160-9	1308-38-9									
14		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		4.6	mg/kg		4.6	mg/kg	0.00046 %		
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		540	mg/kg	1.126	607.98	mg/kg	0.0608 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.59	mg/kg		0.59	mg/kg	0.000059 %		
19		diesel petroleum group			68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9		152.533	mg/kg		152.533	mg/kg	0.0153 %		
20		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
21		fluoranthene		205-912-4	206-44-0		12	mg/kg		12	mg/kg	0.0012 %		
22		fluorene		201-695-5	86-73-7		1.8	mg/kg		1.8	mg/kg	0.00018 %		
23		indeno[123-cd]pyrene		205-893-2	193-39-5		2.2	mg/kg		2.2	mg/kg	0.00022 %		
24		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	220	mg/kg		220	mg/kg	0.022 %		
25		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
26		naphthalene	601-052-00-2	202-049-5	91-20-3		0.67	mg/kg		0.67	mg/kg	0.000067 %		
27		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		23	mg/kg	1.579	36.328	mg/kg	0.00363 %		
28		pH			PH		9.5	pH		9.5	pH	9.5 pH		
29		phenanthrene		201-581-5	85-01-8		9.7	mg/kg		9.7	mg/kg	0.00097 %		
30		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
31		pyrene		204-927-3	129-00-0		12	mg/kg		12	mg/kg	0.0012 %		
32		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
33		TPH (C6 to C40) petroleum group			TPH		408.2	mg/kg		408.2	mg/kg	0.0408 %		
34		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		310	mg/kg	1.245	385.861	mg/kg	0.0386 %		
											Total:	0.203 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Sample is not wet and unlikely to be hazardous

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinands:

diesel petroleum group: (conc.: 0.0153%)
TPH (C6 to C40) petroleum group: (conc.: 0.0408%)

Classification of sample: HYD-CBR02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
HYD-CBR02		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.35 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		acenaphthene	201-469-6	83-32-9		6.8	mg/kg		6.8	mg/kg	0.00068 %		
2		acenaphthylene	205-917-1	208-96-8		1.6	mg/kg		1.6	mg/kg	0.00016 %		
3		anthracene	204-371-1	120-12-7		17	mg/kg		17	mg/kg	0.0017 %		
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	18	mg/kg	1.32	23.766	mg/kg	0.00238 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	41	mg/kg		41	mg/kg	0.0041 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	31	mg/kg		31	mg/kg	0.0031 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	37	mg/kg		37	mg/kg	0.0037 %		
8		benzo[ghi]perylene	205-883-8	191-24-2		14	mg/kg		14	mg/kg	0.0014 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	12	mg/kg		12	mg/kg	0.0012 %		
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9	1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2	1.7	mg/kg	13.43	22.831	mg/kg	0.00228 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		chrysene				30	mg/kg		30	mg/kg	0.003 %		
		601-048-00-0	205-923-4	218-01-9									
16		copper { dicopper oxide; copper (I) oxide }				99	mg/kg	1.126	111.463	mg/kg	0.0111 %		
		029-002-00-X	215-270-7	1317-39-1									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
		006-007-00-5											
18		dibenz[a,h]anthracene				3.5	mg/kg		3.5	mg/kg	0.00035 %		
		601-041-00-2	200-181-8	53-70-3									
19		diesel petroleum group				386.467	mg/kg		386.467	mg/kg	0.0386 %		
				68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9									
20		ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		601-023-00-4	202-849-4	100-41-4									
21		fluoranthene				81	mg/kg		81	mg/kg	0.0081 %		
			205-912-4	206-44-0									
22		fluorene				8.3	mg/kg		8.3	mg/kg	0.00083 %		
			201-695-5	86-73-7									
23		indeno[123-cd]pyrene				12	mg/kg		12	mg/kg	0.0012 %		
			205-893-2	193-39-5									
24		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	580	mg/kg		580	mg/kg	0.058 %		
		082-001-00-6											
25		mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
		080-010-00-X	231-299-8	7487-94-7									
26		naphthalene				1.7	mg/kg		1.7	mg/kg	0.00017 %		
		601-052-00-2	202-049-5	91-20-3									
27		nickel { nickel dihydroxide }				27	mg/kg	1.579	42.646	mg/kg	0.00426 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
28		pH				8.3	pH		8.3	pH	8.3 pH		
				PH									
29		phenanthrene				57	mg/kg		57	mg/kg	0.0057 %		
			201-581-5	85-01-8									
30		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
31		pyrene				78	mg/kg		78	mg/kg	0.0078 %		
			204-927-3	129-00-0									
32		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		601-021-00-3	203-625-9	108-88-3									
33		TPH (C6 to C40) petroleum group				937.8	mg/kg		937.8	mg/kg	0.0938 %		
				TPH									
34		zinc { zinc oxide }				480	mg/kg	1.245	597.463	mg/kg	0.0597 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.318 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Samples are not wet and unlikely to be hazardous

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinands:

diesel petroleum group: (conc.: 0.0386%)
TPH (C6 to C40) petroleum group: (conc.: 0.0938%)

Classification of sample: HYD-CBR03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
HYD-CBR03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.25 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		0.3	mg/kg		0.3	mg/kg	0.00003 %		
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
3		anthracene		204-371-1	120-12-7		0.44	mg/kg		0.44	mg/kg	0.000044 %		
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		2	mg/kg		2	mg/kg	0.0002 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.9	mg/kg		1.9	mg/kg	0.00019 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.9	mg/kg		1.9	mg/kg	0.00019 %		
8		benzo[ghi]perylene		205-883-8	191-24-2		1.2	mg/kg		1.2	mg/kg	0.00012 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.1	mg/kg		1.1	mg/kg	0.00011 %		
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.6	mg/kg	2.775	1.665	mg/kg	0.000167 %		
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.8	mg/kg	13.43	10.744	mg/kg	0.00107 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.8	mg/kg	1.285	1.028	mg/kg	0.00008 %		
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		13	mg/kg	1.462	19	mg/kg	0.0019 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		1.7	mg/kg		1.7	mg/kg	0.00017 %		
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		50	mg/kg	1.126	56.294	mg/kg	0.00563 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19		fluoranthene		205-912-4	206-44-0		3.7	mg/kg		3.7	mg/kg	0.00037 %		
20		fluorene		201-695-5	86-73-7		0.29	mg/kg		0.29	mg/kg	0.000029 %		
21		indeno[123-cd]pyrene		205-893-2	193-39-5		0.98	mg/kg		0.98	mg/kg	0.000098 %		
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	310	mg/kg		310	mg/kg	0.031 %		
23		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		0.43	mg/kg		0.43	mg/kg	0.000043 %		
25		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		17	mg/kg	1.579	26.851	mg/kg	0.00269 %		
26		pH			PH		8.5	pH		8.5	pH	8.5 pH		
27		phenanthrene		201-581-5	85-01-8		2.2	mg/kg		2.2	mg/kg	0.00022 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29		pyrene		204-927-3	129-00-0		3.7	mg/kg		3.7	mg/kg	0.00037 %		
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		200	mg/kg	1.245	248.943	mg/kg	0.0249 %		
											Total:	0.0718 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: HYD-BH03

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:		LoW Code:	
HYD-BH03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.10 m		Entry:	17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.147%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.147%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		acenaphthene				9.8	mg/kg		9.8	mg/kg	0.00098 %		
			201-469-6	83-32-9									
2		acenaphthylene				3	mg/kg		3	mg/kg	0.0003 %		
			205-917-1	208-96-8									
3		anthracene				21	mg/kg		21	mg/kg	0.0021 %		
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				24	mg/kg	1.32	31.688	mg/kg	0.00317 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				59	mg/kg		59	mg/kg	0.0059 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				42	mg/kg		42	mg/kg	0.0042 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				36	mg/kg		36	mg/kg	0.0036 %		
		601-034-00-4	205-911-9	205-99-2									
8		benzo[ghi]perylene				16	mg/kg		16	mg/kg	0.0016 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				25	mg/kg		25	mg/kg	0.0025 %		
		601-036-00-5	205-916-6	207-08-9									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.8	mg/kg	2.775	4.996	mg/kg	0.0005 %		
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1.5	mg/kg	13.43	20.145	mg/kg	0.00201 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		21	mg/kg	1.462	30.693	mg/kg	0.00307 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**
15		chrysene	601-048-00-0	205-923-4	218-01-9		46	mg/kg		46	mg/kg	0.0046 %		
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		60	mg/kg	1.126	67.553	mg/kg	0.00676 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		4.4	mg/kg		4.4	mg/kg	0.00044 %		
19		diesel petroleum group			68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9		664.267	mg/kg		664.267	mg/kg	0.0664 %		
20		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
21		fluoranthene		205-912-4	206-44-0		94	mg/kg		94	mg/kg	0.0094 %		
22		fluorene		201-695-5	86-73-7		16	mg/kg		16	mg/kg	0.0016 %		
23		indeno[123-cd]pyrene		205-893-2	193-39-5		13	mg/kg		13	mg/kg	0.0013 %		
24		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	300	mg/kg		300	mg/kg	0.03 %		
25		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
26		naphthalene	601-052-00-2	202-049-5	91-20-3		7.2	mg/kg		7.2	mg/kg	0.00072 %		
27		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		38	mg/kg	1.579	60.021	mg/kg	0.006 %		
28		pH			PH		9.1	pH		9.1	pH	9.1 pH		
29		phenanthrene		201-581-5	85-01-8		88	mg/kg		88	mg/kg	0.0088 %		
30		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
31		pyrene		204-927-3	129-00-0		100	mg/kg		100	mg/kg	0.01 %		
32		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
33		TPH (C6 to C40) petroleum group			TPH		1469.6	mg/kg		1469.6	mg/kg	0.147 %		

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
34		zinc { zinc oxide }				120 mg/kg	1.245	149.366 mg/kg	0.0149 %		
		030-013-00-7	215-222-5	1314-13-2							
								Total:	0.338 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Sample is not wet and unlikely to be flammable

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinands:

diesel petroleum group: (conc.: 0.0664%)
TPH (C6 to C40) petroleum group: (conc.: 0.147%)

Classification of sample: HYD-WS02

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:	LoW Code:	
HYD-WS02	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.80 m	Entry:	17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.273%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.273%)

Hazard properties (substances considered hazardous until shown otherwise)

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinands:

diesel petroleum group: (conc.: 0.0813%)
TPH (C6 to C40) petroleum group: (conc.: 0.273%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		acenaphthene	201-469-6	83-32-9		8.8	mg/kg		8.8	mg/kg	0.00088 %		
2		acenaphthylene	205-917-1	208-96-8		1.4	mg/kg		1.4	mg/kg	0.00014 %		
3		anthracene	204-371-1	120-12-7		23	mg/kg		23	mg/kg	0.0023 %		

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		17	mg/kg	1.32	22.446	mg/kg	0.00224 %		
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		74	mg/kg		74	mg/kg	0.0074 %		
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		53	mg/kg		53	mg/kg	0.0053 %		
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		58	mg/kg		58	mg/kg	0.0058 %		
8		benzo[ghi]perylene		205-883-8	191-24-2		26	mg/kg		26	mg/kg	0.0026 %		
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		27	mg/kg		27	mg/kg	0.0027 %		
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.1	mg/kg	2.775	3.053	mg/kg	0.000305 %		
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1.5	mg/kg	13.43	20.145	mg/kg	0.00201 %		
12		cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
14		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**
15		chrysene	601-048-00-0	205-923-4	218-01-9		45	mg/kg		45	mg/kg	0.0045 %		
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		110	mg/kg	1.126	123.848	mg/kg	0.0124 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		6.3	mg/kg		6.3	mg/kg	0.00063 %		
19		diesel petroleum group			68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9		813.333	mg/kg		813.333	mg/kg	0.0813 %		
20		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
21		fluoranthene		205-912-4	206-44-0		130	mg/kg		130	mg/kg	0.013 %		
22		fluorene		201-695-5	86-73-7		9.3	mg/kg		9.3	mg/kg	0.00093 %		
23		indeno[123-cd]pyrene		205-893-2	193-39-5		22	mg/kg		22	mg/kg	0.0022 %		
24		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	800	mg/kg		800	mg/kg	0.08 %		
25		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.2	mg/kg	1.353	1.624	mg/kg	0.000162 %		
26		naphthalene	601-052-00-2	202-049-5	91-20-3		1.6	mg/kg		1.6	mg/kg	0.00016 %		
27		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		26	mg/kg	1.579	41.067	mg/kg	0.00411 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
28		pH				9.2	pH		9.2	pH	9.2 pH		
				PH									
29		phenanthrene				69	mg/kg		69	mg/kg	0.0069 %		
			201-581-5	85-01-8									
30		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
31		pyrene				120	mg/kg		120	mg/kg	0.012 %		
			204-927-3	129-00-0									
32		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		601-021-00-3	203-625-9	108-88-3									
33		TPH (C6 to C40) petroleum group				2730	mg/kg		2730	mg/kg	0.273 %		
				TPH									
34		zinc { zinc oxide }				350	mg/kg	1.245	435.65	mg/kg	0.0436 %		
		030-013-00-7	215-222-5	1314-13-2									
										Total:	0.57 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Potentially Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: HYD-WS03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
HYD-WS03		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.30 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		acenaphthene				5.2	mg/kg		5.2	mg/kg	0.00052 %		
			201-469-6	83-32-9									
2		acenaphthylene				0.24	mg/kg		0.24	mg/kg	0.000024 %		
			205-917-1	208-96-8									
3		anthracene				5.9	mg/kg		5.9	mg/kg	0.00059 %		
			204-371-1	120-12-7									
4		arsenic { arsenic trioxide }				4.8	mg/kg	1.32	6.338	mg/kg	0.000634 %		
		033-003-00-0	215-481-4	1327-53-3									
5		benzo[a]anthracene				11	mg/kg		11	mg/kg	0.0011 %		
		601-033-00-9	200-280-6	56-55-3									
6		benzo[a]pyrene; benzo[def]chrysene				7	mg/kg		7	mg/kg	0.0007 %		
		601-032-00-3	200-028-5	50-32-8									
7		benzo[b]fluoranthene				9	mg/kg		9	mg/kg	0.0009 %		
		601-034-00-4	205-911-9	205-99-2									
8		benzo[ghi]perylene				4.2	mg/kg		4.2	mg/kg	0.00042 %		
			205-883-8	191-24-2									
9		benzo[k]fluoranthene				3.2	mg/kg		3.2	mg/kg	0.00032 %		
		601-036-00-5	205-916-6	207-08-9									
10		beryllium { beryllium oxide }				0.43	mg/kg	2.775	1.193	mg/kg	0.000119 %		
		004-003-00-8	215-133-1	1304-56-9									
11		boron { boron tribromide/trichloride/trifluoride (combined) }				2.4	mg/kg	13.43	32.232	mg/kg	0.00322 %		
				10294-33-4, 10294-34-5, 7637-07-2									
12		cadmium { cadmium sulfide }			1	<0.2	mg/kg	1.285	<0.257	mg/kg	<0.00002 %		**<LOD**
		048-010-00-4	215-147-8	1306-23-6									
13		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				12	mg/kg	1.462	17.539	mg/kg	0.00175 %		
			215-160-9	1308-38-9									
14		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chrysene	601-048-00-0	205-923-4	218-01-9		7.5	mg/kg		7.5	mg/kg	0.00075 %		
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17	mg/kg	1.126	19.14	mg/kg	0.00191 %		
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
18		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
19		fluoranthene		205-912-4	206-44-0		22	mg/kg		22	mg/kg	0.0022 %		
20		fluorene		201-695-5	86-73-7		4	mg/kg		4	mg/kg	0.0004 %		
21		indeno[123-cd]pyrene		205-893-2	193-39-5		3.3	mg/kg		3.3	mg/kg	0.00033 %		
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	66	mg/kg		66	mg/kg	0.0066 %		
23		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		**<LOD**
24		naphthalene	601-052-00-2	202-049-5	91-20-3		4.6	mg/kg		4.6	mg/kg	0.00046 %		
25		nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		14	mg/kg	1.579	22.113	mg/kg	0.00221 %		
26		pH			PH		9.7	pH		9.7	pH	9.7 pH		
27		phenanthrene		201-581-5	85-01-8		22	mg/kg		22	mg/kg	0.0022 %		
28		phenol	604-001-00-2	203-632-7	108-95-2		<1	mg/kg		<1	mg/kg	<0.0001 %		**<LOD**
29		pyrene		204-927-3	129-00-0		20	mg/kg		20	mg/kg	0.002 %		
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		63	mg/kg	1.245	78.417	mg/kg	0.00784 %		
											Total:	0.0378 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **boron tribromide/trichloride/trifluoride (combined)** (CAS Number: 10294-33-4, 10294-34-5, 7637-07-2)

Description/Comments: Combines the hazard statements and the average of the conversion factors for boron tribromide, boron trichloride and boron trifluoride
Data source: N/A
Data source date: 06 Aug 2015
Hazard Statements: EUH014 , Acute Tox. 2 H330 , Acute Tox. 2 H300 , Skin Corr. 1A H314 , Skin Corr. 1B H314

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

- **lead compounds with the exception of those specified elsewhere in this Annex**

CLP index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following CLP protocols, considers many simple lead compounds to be Carcinogenic category 2
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **diesel petroleum group** (CAS Number: 68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Skin Irrit. 2 H315 , Acute Tox. 4 H332 , Carc. 2 H351 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Aquatic Chronic 2 H411

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on hazard statements

beryllium {beryllium oxide}

Worst case species based on hazard statements

boron {boron tribromide/trichloride/trifluoride (combined)}

Worst case species based on hazard statements

cadmium {cadmium sulfide}

Worst case species based on hazard statements

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Worst case species based on hazard statements

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case species based on hazard statements

copper {dicopper oxide; copper (I) oxide}

Most likely common species

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Worst case species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Worst case species based on hazard statements

mercury {mercury dichloride}

Worst case species based on hazard statements

nickel {nickel dihydroxide}

Worst case species based on hazard statements

zinc {zinc oxide}

Worst case species based on hazard statements

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2021.118.4757.9098 (28 Apr 2021)
HazWasteOnline Database: 2021.118.4757.9098 (29 Apr 2021)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019 - UK: 2019 No. 720 of 27th March 2019
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

WAC Data

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Analytical Report Number : 21-70136

Project / Site name:	Hyde Road School, Manchester	**Samples received on:**	22/04/2021
Your job number:	C-18170	**Samples instructed on/ Analysis started on:**	22/04/2021
Your order number:	PO06010	**Analysis completed by:**	28/04/2021
Report Issue Number:	1	**Report issued on:**	28/04/2021
Samples Analysed:	1 wac multi sample		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

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Waste Acceptance Criteria Analytical Results

Report No:	**21-70136**						
					Client:	**HYDROCK**	
Location	**Hyde Road School, Manchester**						
Lab Reference (Sample Number)	1845014				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	31/03/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	HYD-SAO5 01						
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	1.5				3%	5%	6%
Loss on Ignition (%) **	6.2				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) #	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	49.0				100	--	--
pH (units)**	8.2				--	>6	--
Acid Neutralisation Capacity (mol / kg)	10				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg			
Arsenic *	0.020	< 0.010		0.075	0.5	2	25
Barium *	0.21	0.39		3.7	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	< 0.0010	0.0011		0.011	0.5	10	70
Copper *	0.011	0.018		0.17	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.071	0.030		0.34	0.5	10	30
Nickel *	0.0041	0.0050		0.049	0.4	10	40
Lead *	0.0095	0.033		0.30	0.5	10	50
Antimony *	1.4	1.3		13	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.015	0.0242		0.23	4	50	200
Chloride *	6.1	< 4.0		32	800	15000	25000
Fluoride	1.1	0.71		7.5	10	150	500
Sulphate *	120	50		570	1000	20000	50000
TDS*	250	150		1600	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	15	10		110	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	2.0						
Dry Matter (%)	78						
Moisture (%)	22						
Stage 1							
Volume Eluate L2 (litres)	0.30						
Filtered Eluate VE1 (litres)	0.17						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 21-70136
Project / Site name: Hyde Road School, Manchester

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1845014	HYD-SAO5	1	1	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 21-70136
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Preparation WAC leachate		In-house method	L043-PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	MCERTS
Chloride in WAC leachate (BS EN 12457-3 Prep)	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride in WAC leachate (BS EN 12457-3 Prep)	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L033-PL	W	ISO 17025
Phenol Index in WAC leachate (BS EN 12457-3 Prep)	Determination of monohydric phenols in leachate by continuous flow analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Sulphate in WAC leachate (BS EN 12457-3 Prep)	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
TDS in WAC leachate (BS EN 12457-3 Prep)	Determination of total dissolved solids in leachate by electrometric measurement.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L031-PL	W	NONE
DOC in WAC leachate (BS EN 12457-3 Prep)	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L037-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil in Soil C10 - C40	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method based on USEPA 8270	L076-PL	D	NONE
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
Metals in WAC leachate (BS EN 12457-3 Prep)	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
PCB's by GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS

Analytical Report Number : 21-70136
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX (Sum of BTEX compounds) in soil	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS

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

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

Sample Deviation Report

Analytical Report Number : 21-70136
Project / Site name: Hyde Road School, Manchester

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
HYD-SAO5	1	M	1845014	bc	BTEX (Sum of BTEX compounds) in soil	L073B-PL	bc
HYD-SAO5	1	M	1845014	bc	BTEX in soil (Monoaromatics)	L073B-PL	bc
HYD-SAO5	1	M	1845014	bc	Mineral Oil in Soil C10 - C40	L076-PL	bc
HYD-SAO5	1	M	1845014	bc	Organic Matter (Raw data) in soil	L023-PL	c
HYD-SAO5	1	M	1845014	bc	PCB's by GC-MS in soil	L027-PL	bc
HYD-SAO5	1	M	1845014	bc	Speciated WAC-17 PAHs in soil	L064-PL	bc

Key: **a** - No sampling date **b** - Incorrect container
c - Holding time **d** - Headspace **e** - Temperature

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Analytical Report Number : 21-66484

Project / Site name:	Hyde Road School, Manchester	**Samples received on:**	22/03/2021
Your job number:	C-18170	**Samples instructed on/ Analysis started on:**	01/04/2021
Your order number:	PO06010	**Analysis completed by:**	12/04/2021
Report Issue Number:	1	**Report issued on:**	12/04/2021
Samples Analysed:	1 wac multi sample		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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Waste Acceptance Criteria Analytical Results

Report No:	**21-66484**						
					Client: HYDROCK		
Location	**Hyde Road School, Manchester**						
Lab Reference (Sample Number)	1824738				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	19/03/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	HYD-WS01 1						
Depth (m)	0.40						
Solid Waste Analysis							
TOC (%)**	0.6				3%	5%	6%
Loss on Ignition (%) **	3.3				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) #	79				500	--	--
Total PAH (WAC-17) (mg/kg)	54.5				100	--	--
pH (units)**	10.4				--	>6	--
Acid Neutralisation Capacity (mol / kg)	26				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg			
Arsenic *	< 0.010	< 0.010		< 0.050	0.5	2	25
Barium *	0.030	0.029		0.29	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	0.0079	0.0034		0.040	0.5	10	70
Copper *	0.021	0.011		0.12	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.011	< 0.0030		< 0.020	0.5	10	30
Nickel *	0.0071	0.0041		0.045	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.033	0.5	10	50
Antimony *	0.0099	0.0055		0.061	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.013	0.0084		0.091	4	50	200
Chloride *	15	< 4.0		44	800	15000	25000
Fluoride	0.44	0.27		2.9	10	150	500
Sulphate *	92	46		520	1000	20000	50000
TDS*	310	170		1900	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	9.6	5.4		60	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.2						
Dry Matter (%)	94						
Moisture (%)	5.9						
Stage 1							
Volume Eluate L2 (litres)	0.33						
Filtered Eluate VE1 (litres)	0.24						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
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Analytical Report Number : 21-66484
Project / Site name: Hyde Road School, Manchester

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1824738	HYD-WS01	1	0.4	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 21-66484
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Preparation WAC leachate		In-house method	L043-PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	MCERTS
Chloride in WAC leachate (BS EN 12457-3 Prep)	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride in WAC leachate (BS EN 12457-3 Prep)	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L033-PL	W	ISO 17025
Phenol Index in WAC leachate (BS EN 12457-3 Prep)	Determination of monohydric phenols in leachate by continuous flow analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Sulphate in WAC leachate (BS EN 12457-3 Prep)	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
TDS in WAC leachate (BS EN 12457-3 Prep)	Determination of total dissolved solids in leachate by electrometric measurement.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L031-PL	W	NONE
DOC in WAC leachate (BS EN 12457-3 Prep)	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L037-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil in Soil C10 - C40	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method based on USEPA 8270	L076-PL	D	NONE
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
Metals in WAC leachate (BS EN 12457-3 Prep)	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
PCB's by GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS

Analytical Report Number : 21-66484
Project / Site name: Hyde Road School, Manchester

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX (Sum of BTEX compounds) in soil	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS

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

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

Sample Deviation Report

Analytical Report Number : 21-66484
Project / Site name: Hyde Road School, Manchester

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
HYD-WS01	1	M	1824738	c	BTEX (Sum of BTEX compounds) in soil	L073B-PL	c
HYD-WS01	1	M	1824738	c	BTEX in soil (Monoaromatics)	L073B-PL	c
HYD-WS01	1	M	1824738	c	Mineral Oil in Soil C10 - C40	L076-PL	c
HYD-WS01	1	M	1824738	c	Organic Matter (Raw data) in soil	L023-PL	c

Key: **a** - No sampling date **b** - Incorrect container
c - Holding time **d** - Headspace **e** - Temperature

Appendix H

Preliminary Geotechnical Risk Register

Geotechnical Hazard Identification – Desk Study Stage

Potential geotechnical hazards have been assessed in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622. The following pages set out the identified geotechnical risks and hazards which are associated with the proposed development and establish the approach which is to be taken to manage the risks including the geotechnical input and analysis.

Table J.1 is a preliminary assessment of possible geotechnical hazards at the site at Desk Study stage. This information is used to assist with ground investigation design.

Table J.1: Possible geotechnical hazards

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Uncontrolled Made Ground (variable strength and compressibility).	Deep Made ground has been encountered on the site associated with the historical development.	✓	
Soft / loose compressible ground (low strength and high settlement potential).	Loose Made Ground soils have been encountered at the site.	✓	
Shrink swell of the clay fraction of soils under the influence of vegetation.	The clay soils have a medium volume change potential	✓	
Variable lateral and vertical changes in ground conditions.	There will be variable Made Ground laterally and vertically across the site.	✓	
High sulfates present in the soils.	There is the potential for elevated sulphates to be present within the Made Ground	✓	
Obstructions.	Concrete obstructions have been encountered during the ground investigation works.	✓	
Existing below ground structures to remain	Hydrock have not been made aware of any below ground structures remaining on the site.		✓
Shallow groundwater.	Shallow Groundwater has been encountered in a number of exploratory holes	✓	
Changing groundwater conditions.	The shallow groundwater is likely to vary seasonally and could be effected by recharge from rainfall.	✓	
Risk from erosion.	Not envisaged.		✓
Risk from flooding.	The environmental data report indicates a moderate	✓	

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
	to high risk of groundwater flooding.		
Running sands and / or loose Made Ground, leading to difficulty with excavation and collapse of side walls.	Loose Made Ground has been encountered on the site with shallow groundwater.	✓	
Slope stability issues – general slopes.	No slopes present on site		✓
Slope stability issues – retaining walls.	Hydrock are not aware ow the requirement for retaining walls	✓	
Earthworks – settlement (due to placement of fill on soft / loose ground).	Loose made Ground present	✓	
Earthworks – unsuitability of site won material to be reused as fill.	Made Ground may be unsuitable for reuse	✓	
Problematic soils (silts and rewetting etc.).		✓	

Geotechnical Hazard Identification – Following Ground Investigation

The preliminary Geotechnical Risk Register following Ground Investigation is set out in Table J.3.

The probability and impact of a hazard have been judged on a qualitative scale as set out in Table J.2. The degree of risk (R) is determined by combining tan assessment of the probability (P) of the hazard occurring with an assessment of the impact (I) of the hazard and associated mitigation it will require if it occurs (R = P x I).

Table J.2: Qualitative assessment of hazards and risks

P = Probability			I = Impact			R = Risk Rating (P x I)	
1	Very unlikely (VU)		1	Very Low		1 – 4	None / negligible
2	Unlikely (U)		2	Low		5 – 9	Minor
3	Plausible(P)		3	Medium		10 – 14	Moderate
4	Likely (Lk)		4	High		15 – 19	Substantial
5	Very Likely (VLk)		5	Very High		20 - 25	Severe

Table J.3: Preliminary geotechnical risk register

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Uncontrolled Made Ground (variable strength and compressibility).	There is Made Ground due to historical construction activity at the site. The Made Ground is proven to be greater than 3m thick and could be thicker	School building.	Bearing capacity failure, settlement (total and differential).	3	4	12	Design foundations to found below Made Ground or on Made Ground which has been improved.
			Floor slab failure.	3	4	12	Design floor slabs as suspended.
		Roads and Pavements.	Settlement (total and differential) of roads and pavements.	3	2	6	All Made Ground to be removed from below the roads and pavements. Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids if necessary. If anticipated settlements are significant, and cannot be mitigated by design, over-excavate and replace unsuitable soils.
		Services.	Settlement (differential), causing damage to services.	3	2	6	Anticipated settlements are significant with regard to services. There is a requirement to improve the Made Ground prior to installation of services. It is also advisable to steepen falls in drainage to prevent back fall and use rocker boxes and flexible couplings.
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	2	3	6	Where soft spots encountered, over-excavation and replacement with suitable fill. Outline design of working platform to include geo-grid. Site inspection and watching brief by Contractor to review working platform frequently and regularly.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Soft / loose ground (low strength and high settlement potential).	The shallow natural soils comprise firm to stiff Glacial Till.	School building.	Foundation bearing capacity failure, settlement (total and differential).	3	4	12	Design foundations to found below any loose relative density sand and gravel or soft clay, or improve the River Terrace Deposits prior to founding.
			Floor slab failure.	3	4	12	Design floor slab as suspended.
		Roads and Pavements.	Settlement (total and differential), of roads and pavements.	3	3	9	Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate. If anticipated settlements are significant, and cannot be mitigated by design, over-excavate and replace soft soils.
		Services.	Settlement (differential), causing damage to services.	2	3	6	Ground levels are remaining at approximately current levels. Settlements are not anticipated to be significant.
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	3	3	9	Where soft spots encountered, over-excavate and replace with suitable fill. Design working platform to suit the ground conditions. Outline design of working platform to include geo-grid if necessary. Site inspection and watching brief by Contractor to review working platform frequently and regularly.
Shrinkage / swelling of the clay fraction of soils under the influence of vegetation.	The clays of the Glacial Till are medium heave potential.	Foundations.	Shrinkage or heave of soils and associated damage to foundations.	3	3	9	Deepen foundations due to trees as appropriate.
		Floor slabs.	Floor slab failure.	3	4	12	Design floor slab as suspended with a void, unless the warranty provider is satisfied the soil is not desiccated, or slabs are constructed when soils are not seasonally desiccated (i.e. during winter and spring).

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Variable lateral and vertical changes in ground conditions.	The Made Ground soils vary laterally and vertically, both in composition and strength. The natural soils comprise consistent firm to stiff Glacial Till.	School buildings.	Foundation bearing capacity failure, settlement (total and differential).	3	4	12	Design foundations to found below Made Ground or on Made Ground which has been improved.
			Floor slab failure.	3	4	12	Design floor slab as suspended.
		Roads and Pavements.	Settlement (total and differential), of roads and pavements.	3	3	9	Design roads and pavements using suitable geotechnical parameters and increase the sub-base and use geo-grids as appropriate. If anticipated settlements are significant, and cannot be mitigated by design, over-excavate and replace unsuitable soils.
		Services.	Settlement (differential), causing damage to services.	3	3	9	Settlements are not anticipated to be significant with regard to services. No additional design requirements envisaged.
		Construction staff, vehicles and plant operators.	Trafficking of the site in temporary conditions. Overturning of plant during construction.	3	3	9	Where soft spots encountered, over-excavate and replace with suitable fill. Design working platform to suit the ground conditions. Outline design of working platform to include geo-grid if necessary. Site inspection and watching brief by Contractor to review working platform frequently and regularly.
Sulfates present in the soils.	The ground investigation has proven that there is the potential for expansive sulfate bearing soils to be present.	Attack of buried concrete.	Damage to concrete and reduction in strength.	3	4	12	Classify concrete in accordance with BRE SD1 and design concrete accordingly.
		Earthworks.	Sulfate heave following the use of hydraulic binders.	3	4	12	Supplementary sulfate testing in accordance with BRE guidelines to be undertaken during earthworks. Before the use of hydraulic binders is approved, comprehensive testing and design will need to be completed by a Specialist Contractor to satisfy both themselves and the Engineer of the suitability of the soils for treatment, and confirm that the requisite end-performance of the material is achievable.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
							The use of modification / stabilisation to be restricted to suitable materials following laboratory trials. In all instances where improvement by the inclusion of binders is considered, a mix design is required and as part of this design, samples should be checked for swelling, even where very low sulfate values are recorded.
Obstructions.	Obstructions have been proven by the investigation and there is a potential for additional obstructions to be present due to historical construction activity, or unknown fill in Made Ground.	Construction staff, vehicles and plant operators.	Risk of collapse of excavation as obstructions are pulled out.	3	3	9	Undertake Enablement Works and remove all obstructions and allow for a breaker to be present during construction and remove obstructions where encountered during construction.
		Roads and Pavements.	Hard spots in externals and roads / pavements.	3	2	6	
		School buildings	Impact on piling / VSC, resulting in additional piles / columns and re-design of foundations.	3	3	9	
Shallow groundwater.	Monitoring during the ground investigations has proven a shallow groundwater, with relatively fast inflows of water seen during the ground investigation.	Construction staff, vehicles and plant operators.	Difficulty with excavation. Limit state failure, excessive deformation, trafficking of site plant, inability to place and compact fill.	4	2	8	Contractor to appoint competent Temporary Works Designer to design temporary works, in accordance with BS 5975:2008+A1:2011. Temporary Works Designer to consider in their analysis the impact of, and requirements for, de-watering of excavations. Any water that collects at the base of excavations to be removed as soon as practicable.
		Slopes and Retaining.	Serviceability issues.	4	2	8	Contractor to appoint competent Temporary Works Designer to design temporary works, as required in accordance with BS 5975:2008+A1:2011. The shallow groundwater is to be taken into account during geotechnical design of the permanent works.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Changing groundwater conditions.	Monitoring during the ground investigations has proven that the groundwater table is highly variable.	Construction staff, vehicles and plant operators.	Difficulty with excavation. Limit state failure, excessive deformation, trafficking of site plant, inability to place and compact fill.	4	2	8	Contractor to appoint competent Temporary Works Designer to design temporary works as required, in accordance with BS 5975:2008+A1:2011. Temporary Works Designer to consider in their analysis the impact of a variable water table.
		Slopes and Retaining.	Serviceability issues.	4	2	8	Contractor to appoint competent Temporary Works Designer to design temporary works, as required in accordance with BS 5975:2008+A1:2011. Design drainage for retaining walls to account for fluctuating groundwater levels. The shallow groundwater is to be taken into account during geotechnical design of the permanent works.
Loose Made Ground, leading to difficulty with excavation and collapse of side walls.	The ground investigation has indicated that there is a potential for loose soils and Made Ground to be present at the site.	Construction staff, vehicles and plant operators.	Ground failure, instability of plant and machinery.	4	4	16	As instability has been noted in all pits from surface, foundation options should be reviewed to ensure minimal excavation (e.g. piles). Contractor to appoint competent Temporary Works Designer to design temporary works, in accordance with BS 5975:2008+A1:2011. Temporary Works Design to include recommendations for inspection of excavations. No person entry to unsupported excavations.
			Risk of collapse of excavation.	4	3	12	
		Roads and Pavements.	Serviceability issues.	4	3	12	
		Gardens.	Serviceability issues.	4	2	8	
		Pavement construction and long-term durability highways and	Serviceability issues.	4	3	12	

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
		external areas.					
		Gardens.	Serviceability issues.	4	2	8	
Unforeseen ground conditions - risk associated with limited data.	Ground investigation has been undertaken. However, additional information will be obtained during construction. Ground conditions are only defined at exploratory hole locations.	All aspects of the development		3	4	12	Designers to be contacted if conditions encountered are different to those identified during investigation. Regular inspections of excavations and earthworks for evidence of stability. Adequate investigation required to characterise the site and understand the potential risks.

Whilst the probability and impact of the hazard occurring can be reduced to a minimum by geotechnical design, the impact cannot be reduced below very low. The risk register will need to be up-dated, as necessary, to reflect design, additional information, data and experience as it is gained through the construction process.

Impacts of the design with regard to health and Safety considerations will need to be included by the designer at design stage.

Appendix I

Plausible Source-Pathway-Receptor Contaminant Linkages

Summary of Potential Contaminant Linkages

Table K.2 lists the plausible contaminant linkages which have been identified. These are considered as potentially unacceptable risks in line with guidelines published in LCRM (2019) and additional risk assessment is required.

Source – Pathway – Receptor Linkages have been assessed in general accordance with guidance in CIRIA Report C552 (Rudland et al 2001) but modified to add a 'no linkage' category and to remove low/moderate risk (See Table K.1). Further information is given in the relevant Hydrock methodology, referenced in Appendix J, including descriptions of typical examples of probability and consequences.

It should be noted that whilst the risk assessment process undertaken in this report may identify potential risks to site demolition and redevelopment workers, consideration of occupational health and safety issues is beyond the scope of this report and need to be considered separately in the Construction Phase Health and Safety Plan.

Table K.1: Consequence versus probability assessment.

		Consequence			
Probability		Severe	Medium	Mild	Minor
	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Very low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Very low risk	Very low risk	Very low risk
	No Linkage	No risk			

Table K.2: Exposure model – final source-pathway-receptor contaminant linkages

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
Pervasive lead, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene and indeno(1,2,3,cd)pyrene in the Made Ground	Ingestion, inhalation or direct contact	Site users	Likely	Medium	Moderate	There is Made Ground below the entire site, and there are metals, and PAH at levels in excess of the GAC. Contact with these materials is likely in landscaped areas and play areas. Mitigation measures will be required to break the SPR linkage in the form of an engineered cover system.
Asbestos present in the Made Ground	Inhalation	Site users	Likely	Severe	High	Mitigation required in the form of an engineered cover system. Any ACM encountered during construction will need to be handpicked and removed from site. An asbestos management plan should be produced.
Ground gases (methane and carbon dioxide)	Ingress into buildings or inhalation	Site users	Likely	Medium	Moderate	CIRIA C665 characteristic situation 2. Mitigation required by the installation of suitable gas resistant membrane. To be installed by trained installer. To be validated and verified.
		Building infrastructure	Likely	Medium	Moderate	
Pervasive PAH in soils	Direct contact	Infrastructure	Likely	Medium	Moderate	Installation of “Protectaline” (or similar) pipework .

Appendix J

Hydrock Methodologies

This report uses Hydrock Desk Study and Ground Investigation template V47.1.

This appendix provides additional background information on certain approaches and methods used by Hydrock Consultants Limited in the preparation of this report.

The following Hydrock Methodologies apply to this report. These are not included, but are available on request by quoting the methodology reference, revision and date.

Reference	Name	Revision	Date
001	Desk Study	001	30/07/2018
002	Ground Investigation	001	30/07/2018
003	Preliminary Geo-environmental Risk Assessment Rationale	001	30/07/2018
004	Preliminary geotechnical Risk Register	001	30/07/2018
005	Generic Risk Assessment for Human Health (Soils)	001	30/07/2018
006	Generic Risk Assessment for Pollution of Controlled Waters	001	30/07/2018
007	Detailed Quantitative Risk Assessment for Risk to Controlled Waters	001	30/07/2018
008	Generic Risk Assessment for Risk to Plants	001	30/07/2018
009	Generic Risk Assessment for Water Supply Pipes	001	30/07/2018
010	Generic Ground Gas Risk Assessment	001	30/07/2018
011	Determination of Contaminated Land Under Part 2A of the Environmental Protection Act 1990	001	30/07/2018
012	Waste Management	001	30/07/2018
013	Materials Management	001	30/07/2018
014	Asbestos in Soils	001	30/07/2018
015	Remediation and Mitigation (New Methodology)	001	30/07/2018
016	Geotechnical Categorization and Characteristic Design Values	001	30/07/2018
018	Foundation and Floor Slab Recommendations – Commercial / Distribution	001	30/07/2018
019	Earthworks Suitability Recommendations	001	30/07/2018
020	Pavements and Pavement Foundations	001	30/07/2018
021	Slope Stability Recommendations	001	30/07/2018
023	Sulphate Recommendations	001	30/07/2018
025	Settlement Assessment	001	30/07/2018