Hydrock

Cardiff Sufficiency Schemes ’22- St Illtyds

Phase 2 Ground Investigation Report

Mace Group

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EXECUTIVE SUMMARY

SITE INFORMATION AND SETTING	
Objectives	The works have been commissioned to assist with the design of the development.
Client	Mace Group
Site name and location	St Illtyds, Newport Road, Rumney, Cardiff CF3 1XQ.
Proposed development	The site development proposals are understood to comprise the construction of a 3G sports pitch and a single-storey 2-classroom temporary unit in the south-east of the site.
GROUND MODEL	
Desk study summary	The site currently comprises school buildings and hardstanding with associated sports pitches, small areas of trees/grass and car parking. The site is square in shape and has an area of approximately 5.59ha. The areas of proposed development are found on existing hard and soft landscaped areas. The area of the site where the new developments are proposed are divided into two areas one for the classroom building and one for the sports pitch. The classroom building is to be located to the southeast of main complex of buildings and is on an existing hardstanding area. The sports pitch is in the south of the site on the existing grass sports pitch. Review of historical Ordnance Survey mapping indicates that, the site was open fields from 1882 until 1965. There is a Roman Camp noted in the south east of the site, named as Cae Castell. The construction of the St Illtyds College was in 1965.In the early 2000s there was the addition of the extra college building to the west. A non-specialist UXO assessment and pre desk study assessment has indicated a low bomb risk. The geology at the site consists of Raglan Mudstone formation consisting of red clays and sands in the weathered profile. The bedrock aquifer designation is secondary A.
Ground and groundwater conditions encountered by investigation	The ground conditions as proven by the investigation undertaken at the site comprise: • Made Ground – between 0.00m and 0.45m below ground level (bgl) in the proposed classroom unit area, comprising asphalt overlying sandy gravelly clay with brick. • Topsoil – between 0.00m and up to 0.30m bgl in the proposed sports pitch area, comprising slightly sandy clay. • Raglan Mudstone Formation – below the Topsoil and to at least 1.05m bgl in the proposed sports pitch area and below the Made Ground and to at least 6.10m bgl in the proposed classroom unit area, comprising slightly gravelly very sandy clay. Groundwater was not encountered, but the hand pit walls were noted to be wet at 0.45m bgl.
GEOTECHNICAL CONCLUSIONS	
Conclusions of geotechnical assessment	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 unexpected obstructions. Excavations during investigation were generally stable. Water seepages into excavations are likely to be adequately controlled by sump pumping. Foundations are recommended to comprise pad foundations, penetrating any Made Ground and founding in the firm to stiff clay of the Raglan Mudstone Formation at a depth of around 2.00m bgl. Allowable net bearing pressure of 125kN/m² should be available for trench fill/pad foundations up to 1m wide. A design CBR of 10% is recommended in the clay below any Made Ground or topsoil. Soakaway drainage is considered unsuitable for this site.

	Design Sulfate Class - DS-1 and ACEC Class AC-1. Equivalent to Design Chemical Class DC-1 for a 50 year design life.
GEO-ENVIRONMENTAL CONCLUSIONS	
Conclusions of contamination Generic risk assessment	No determinands were measured to be in excess of the General Acceptance Criteria (GAC). As such, the soils on site are not considered to present a risk to human health or plant growth. Made Ground was observed to be thin and did not contain organic material and therefore very low ground gas risk. The site is not in a Radon Affected Area. The site is brownfield and as such the presumption in the guidance for water supply pipework is that barrier pipe will be used. However, the investigation and assessment has indicated no significant Contaminants of Concern and as such standard pipework may be suitable for the site following negotiations with the supply company.
Proposed mitigation measures	No remedial measures are considered necessary at the site. The production of a Materials Management Plan and its approval by a Qualified Person may be required to allow reuse of suitable material at the site.
Waste management	Excavated soils to be disposed of as waste are likely to be classed as non-hazardous.
FUTURE CONSIDERATIONS	
Further work	Following the ground investigation works undertaken to date, the following further works will be required: • 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;

This Executive Summary forms part of Hydrock Consultants Limited report number 20700-HYD-XX-04-RP-GE-1001 and should not be used as a separate document.

1. INTRODUCTION

1.1 Terms of reference

In August 2021, Hydrock Consultants Limited (Hydrock) was commissioned by Mace Group (the Client) to undertake a Phase 1 desk study at St Illtyds, Newport Rd, Rumney, Cardiff CF3 1XQ. The Phase 1 desk study (Ref 20700-HYD-XX-04-RP-GE-1000, dated 29th September 2021) has been completed and issued to Mace Group. Hydrock were then requested to provide a proposal for a Phase 2 site investigation. The works have been undertaken in accordance with Hydrock's proposal (reference Geo Environmental Fee Proposal, Caroline Fazakerley, Mace Group, Meadowbank School, Cardiff 4th November 2021) and the client's instruction to proceed (via email from Rebecca Chantry at Mace Group on 16th November 2021).

The site is currently a school building with associated car parking, hard and soft landscaping and sports pitches.

Hydrock understands that the proposed development is to comprise the construction of a 3G football pitch on the existing sports pitches, and a single-storey 2-classroom temporary unit in the south east of the site. This classroom is adjacent to an off-site slope inclined at approximately 15-20 degrees. The proposed development layout is shown on drawing 05994_St Illtyds_Proposed Site Plan_Option, dated 03/10/2021.

1.2 Objectives

The works have been commissioned to assist with the design of the development.

The objective of the Phase 2 Ground Investigation is:

- to resolve uncertainties identified in the Phase 1 Desk Study by refining and updating the preliminary Ground Model, determining geo-environmental and geotechnical site conditions and identifying key contamination risks by updating and finalising the Conceptual Model in accordance with the principles of LCRM;
- to identify geo-environmental mitigation requirements to enable development; and
- to provide preliminary geotechnical recommendations for design.

1.3 Scope

The scope of the Phase 2 Ground Investigation comprises:

- a ground investigation including trial pitting, soakaway testing, CBR testing (TRL-DCP) and rotary 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;
- geotechnical and chemical laboratory analysis;
- A generic quantitative risk assessment (GQRA) considering the potential of harm to human health and plant life resulting from soil contamination in the context of the proposed end use. Provisional remediation advice would be provided where applicable;
- A semi-quantitative assessment of contamination risk to Controlled Waters;

- A qualitative assessment of ground gas risk;
- Preliminary waste classification using proprietary software HazWasteOnline™;
- Consideration of site preparation works, earthworks, foundation options and the provision of geotechnical foundation design advice
- Recommendations for soakaway feasibility and preliminary design based on the results of in-situ soil infiltration testing;
- Recommendations for use in preliminary road pavement and floor slab design based on CBR values obtained from in-situ testing; and
- Evaluation of the site's ACEC classification for buried concrete in accordance with BRE Special Digest 1.

1.4 Available information

The following documents, reports etc have been provided to Hydrock by Mace Group for use in the preparation of this report:

- Intrusive Geotechnical Survey Scope (CARIDFF 22 Intrusive Geotechnical Survey Scope Rev A 21/10/2021)
- 05994_St Illtyds_Proposed Site Plan (05994-A-I001, dated 01/12/2021)
- The Survey Association, Ysgol Uwchadd Gatholig Illtud sand; Newport Road, Rumney Cardiff, CF3 1XQ, Topographical Survey. Job no HY4058, DWG no. HY4058-07 Issued September 2021.

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

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 10.

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

2.1 Introduction

Hydrock has previously undertaken a Phase 1 desk study (Ref: 20700-HYD-XX-04-RP-GE-1000, dated 29 September 2021) for the site and should be read in conjunction with this report. The following is a summary of the pertinent information presented in the Desk Study:

2.2 Site Location

The site is located off Newport Road. Approximately 1.7Km southeast of the A48 Western Avenue. The site is roughly centred on National Grid Reference 322670E, 180460N. A Site Location Plan (Hydrock Drawing 20700-HYD-XX-04-DR-GE-1000) is presented in Appendix A.

2.3 Site Description

The site is roughly square in shape with some irregular site boundaries to the northeast and southwest. The site has an area of approximately 5.59ha. The areas of proposed development are found on hard and soft landscaped areas with the new classrooms located on hardstanding in the east of the site. The caretaker mentioned a spring in the southern corner of the site in the vicinity of the Roman Camp, however access was not possible to this area during the walkover.

The site is generally flat and drops to the southeast from 57m AOD to 50m AOD. There are gentle slopes surrounding the current gravel pitch. The existing grass sports pitches and RedGra pitch in the west of the site are set at an elevation of approximately 57m AOD and are generally flat. The elevation drops towards the east of the site to approximately 50m AOD and a series of slopes and embankments have been used in order to accommodate the existing school buildings. There is also a slope down to Greenway Road to the east of the site.

The school land is bounded by a palisade style fence on all boundaries with the access gates in the northern corner of the site. Mature trees are seen on the north west and southern boundaries of the site with a slope down Greenway Road. A chapel and catholic learning centre is present to the south of the site with residential housing located further out to the north south east and west.

2.4 Site history

Review of historical Ordnance Survey mapping indicates, that the site was open fields from 1882 until 1965. A Roman Camp is noted in the south-east of the site, named as Cae Castell. The construction of the St Illtyds College was in 1965. In the early 2000s there was the addition of the extra college building to the west.

2.5 Geology

The geology at the site indicates Raglan Mudstone Formation consisting of red clays and sands in a weathered profile. A thickness of Made Ground is anticipated on site due to the construction of the school and sport pitches and the area around the RedGra with associated slopes

2.6 Hydrogeology and hydrology

The Raglan Mudstone Formation is a Secondary A Aquifer.

There are no active licensed groundwater abstractions within 1km of the site.

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

Groundwater will likely be flowing through the Raglan Mudstone Formation towards the spring in the south of the site. Given the proximity of the source, it is considered that groundwater on the site is likely in continuity with this receptor and there is likely to be some groundwater recharge as a result of surface water infiltration.

3. OUTLINE CONCEPTUAL MODEL

3.1 Introduction

The outline Conceptual Site Model (oCSM) incorporates evidence from the site walkover, the Desk Study and previous investigations carried out at the site. The formulation of an outline Conceptual Site Model is a key component of the LCRM methodology. The oCSM 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.

The oCSM from Phase 1 desk study (Ref: 20700-HYD-XX-04-RP-GE-1000, dated 29 September 2021) for the site has been replicated below for reference.

3.2 Geotechnical hazard identification

3.2.1 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 the desk study for further information).

3.2.2 Plausible geotechnical hazards

Plausible geotechnical hazards identified at the site are:

- Uncontrolled Made Ground (variable strength and compressibility).
- Variable lateral and vertical changes in ground conditions.
- Attack of buried concrete by aggressive ground conditions within the Made Ground.
- Loose Made Ground, leading to difficulty with excavation and collapse of side walls.
- Slope stability issues – general slopes adjacent to the proposed classroom unit.
- Earthworks – unsuitability of site won material to be reused as fill.
- Unforeseen ground conditions - risk associated with limited data.

3.2.3 Potential development elements affected

Development elements potentially affected by geotechnical hazards are:

- Buildings – foundations.
- Buildings – floor Slabs
- Roads and pavements.
- Services.
- Construction staff, vehicles and plant operators.
- Concrete below ground.
- Earthwork control, inability to place and compact fill.

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.

3.3 Geo-environmental exposure model

3.3.1 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.

3.3.2 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 of the college and additional school buildings and imported fill, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S1).
- PCBs and oils from transformers in the electricity sub-station on site, on the southeast corner of the main buildings (S2).

Potential off-site sources of contamination

- None identified.

3.3.3 Potential receptors

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

- People (Site end users) (R1).
- Groundwater: Secondary A aquifer status of the Raglan Mudstone Formation (R2).
- Surface water: on-site boundary inland river to the south(R3).

3.3.4 Potential pathways

The following potential pathways have been identified.

- Ingestion, skin contact, inhalation of dust and outdoor air by people (P1).
- Migration of contaminant via leachate migration through the unsaturated zone in the Raglan Mudstone (P2).
- Surface water via overland flow and drainage discharge (P3).
- Surface water via base flow from groundwater (P4).

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 (2021), are considered to be plausible in the context of this site and have been carried forward for investigation and assessment. An assessment of the potential Source – Pathway – Receptor linkages is presented in the desk study appendices.

A summary of the plausible linkages is presented on the initial CSM provided in Appendix A (Ref: 20700-HYD-XX-04-DR-GE-1002).

4. GROUND INVESTIGATIONS

4.1 Investigation rationale

The ground investigation rationale was based on the findings of the preliminary risk assessment and is summarised in Table 4.1.

Table 4.1: Investigation rationale

Location	Purpose
Playing Field	
SA 01-03	To assess shallow ground conditions. To allow collection of samples for contamination and geotechnical testing. To undertake soakaway tests to inform drainage design. Spaced to obtain maximum coverage of the proposed pitch.
TRL-DCP 01-04	To assess the strength profile and calculate the CBR of the shallow strata. Spaced to obtain maximum coverage of the proposed pitch.
Classroom Unit	
BH01	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. Positioned in the location of the proposed classroom unit.

4.2 Constraints

No constraints were encountered.

4.3 Site works

The fieldwork took place between 18th and 19th January 2022 (soakaways and TRL-DCPs) and on 21st February 2022 (borehole) and is summarised in Table 4.2. The ground investigation locations were surveyed in using a topographic survey quality GPS and are shown on the Exploratory Hole Location Plan (Hydrock Drawing 20700-HYD-XX-04-DR-GE-1003) in Appendix A.

The logs, including details of ground conditions and soil sampling, are also presented in Appendix B.

The weather conditions during the Hydrock fieldwork and for the previous week were cold but mostly dry.

Table 4.2: Summary of site works

Activity	Method	No.	Depth Range (m bgl)	*In situ* tests	Notes (e.g. installations)
Boreholes	Rotary Cored	1	6.10	SPT	No install – shallow Made Ground and no groundwater.
Trial pits	Machine (JCB 48Z-1)	3	1.00-1.05	Soakaway testing	Indicative soakaway testing method.
Probes	TRL dynamic cone penetrometer	4	0.836-0.855	California Bearing Ratio (CBR)	TRL-DCP method

4.4 Geo-environmental testing

4.4.1 Sampling strategy and protocols

Exploratory hole positions were determined by reference to the site conditions and uncertainties identified in the outline Conceptual Site Model.

The soakaway test pits and the TRL-DCPs were evenly positioned to provide data for the extent of the proposed sports pitch.

The borehole was positioned at the proposed location of the new classroom.

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

4.4.2 Geo-environmental laboratory analyses

The chemical test certificates are provided in Appendix D. Wherever possible, UKAS and MCERTS accredited procedures have been used.

The geo-environmental analyses undertaken on soils are summarised in Table 4.3.

Table 4.3: Geo-environmental analyses of soils or other solids

Determinand Suite	Topsoil	Made Ground	Raglan Mudstone Formation
Hydrock minimum suite of determinands for solids*	3	1	4
Polychlorinated biphenyls (PCB, WHO 12)	0	1	1
*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), sulfide, pH, asbestos fibres, speciated polynuclear aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon			

The soils chemical test data are interpreted and assessed in Sections 7.3 and 7.4.

4.5 Geotechnical testing

The geotechnical tests undertaken by Hydrock are summarised in Table 4.4 and the test certificates are provided in Appendix C. Wherever possible, UKAS accredited procedures have been used.

Table 4.4: Summary of sample numbers for geotechnical tests

Test	Made Ground	Raglan Mudstone Formation
Natural moisture content	0	5
Atterberg limits	0	5
Sulfate and aggressive chemical environment classification for buried concrete classification (full BRE SD1 suite)	1	2

The geotechnical test data are summarised in Section 5.3 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 2 are used from this point forward.

Details are provided in the logs in Appendix B, 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)
Topsoil	0.00	0.20-0.30	0.20-0.30	0.23
Made Ground	0.00	0.45	0.45	0.45
Raglan Mudstone Formation	0.20-0.30	>1.00->6.10	>0.70->5.65	Not proven

5.1.2 Surface covering

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

- Proposed sports pitch:
  - Topsoil, covering 100% of the proposed sports pitch zone.
- Proposed classroom unit:
  - Asphalt, covering 100% of the proposed classroom unit zone. Noted to be in good condition.

5.1.3 Made Ground

Made Ground was not encountered in the proposed sports pitch area.

Made Ground in the proposed classroom unit area consists of bituminous bound pavement (around 10cm thick) overlying pale brown sandy clayey gravel of angular fine to coarse grey stone and brick, with angular fine to medium gravel of bitumen, to a maximum depth of 0.45m below ground level (bgl).

5.1.4 Topsoil

Topsoil was encountered across the entire proposed sports pitch area and was not encountered in the proposed classroom unit area.

Topsoil was between 0.20m and 0.30m thick, with an average thickness of 0.23m. The topsoil comprised firm brown slightly sandy clay with rootlets.

For the purposes of this report, topsoil is defined as the upper layer of an *in situ* soil profile, usually darker in colour and more fertile than the layer below (subsoil), which is a product of natural chemical, physical, biological and environmental processes, but does not imply compliance with BS 3882:2015.

Reuse of topsoil as a growing medium at the site should be determined by the landscape architect or the landscape Contractors.

5.1.5 Raglan Mudstone Formation

Raglan Mudstone Formation was encountered underlying the Made Ground or Topsoil in both zones of the site. The base of the stratum was not encountered. The greatest observed depth was 6.10m bgl.

This generally consisted of soft becoming firm to very stiff reddish brown slightly gravelly very sandy CLAY. Suspected gypsum crystals were encountered between 2.10 and 2.40m bgl. BRE SD1 testing indicates a low risk of aggressive conditions to concrete, so the crystals will be considered no further in this report.

5.2 Groundwater

5.2.1 Groundwater observations and levels

Groundwater was not encountered during the investigation, but the inspection pit walls of BH01 were wet at 0.45m bgl.

5.2.2 Infiltration tests

The results of the infiltration testing undertaken are summarised in Table 5.2. The results sheets are presented in Appendix CAppendix B.

Testing was carried out in accordance with Hydrock's 1-day assessment methodology. 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 5.2: Infiltration test results

Stratum	Location	Depth to base of pit (m bgl)	Infiltration rate (m/s)
			Run 1
Raglan Mudstone Formation	SA01	1.05	No infiltration over 21 hours.
	SA02	1.00	15mm of infiltration recorded over 4 hours.
	SA03	1.00	No infiltration recorded over 4 hours

Only one day of infiltration testing was allowed for due to the impermeable nature of the Raglan Mudstone Formation. The testing only ran into two days due to kit failure from the tractor supplier.

5.2.3 Groundwater summary

No groundwater was encountered during the site investigation, but the inspection pit walls of BH01 were wet below 0.45m bgl.

The Raglan Mudstone Formation consists primarily of clay and, as such, does not provide infiltration potential for the site.

5.3 Geotechnical data

5.3.1 Introduction

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

5.3.2 Plasticity

The volume change potentials in terms of BRE Digest 298 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 5.3.

Table 5.3: Volume change potential

Stratum	No. of tests	Plasticity Index			Modified Plasticity Index			Plasticity designation	Volume Change Potential
		Min.	Max.	Av.	Min.	Max.	Av.		
Raglan Mudstone Formation	5	11.00	15.00	13.80	10.01	15.00	12.82	Low	Low

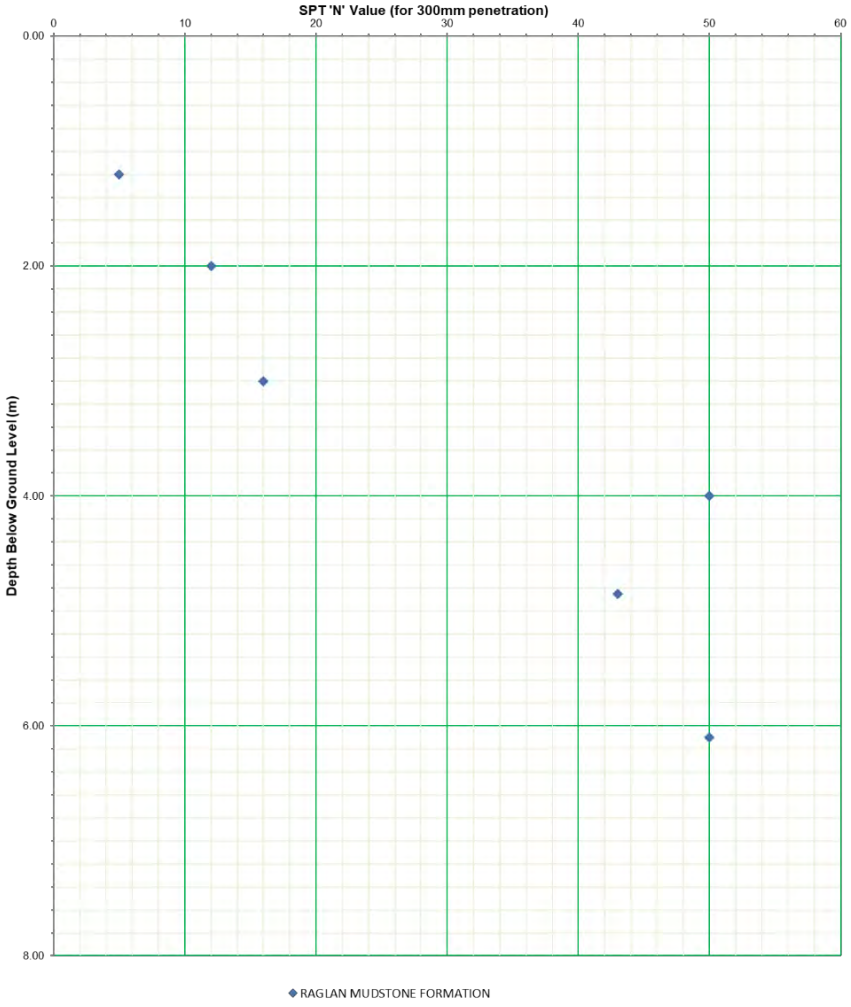
5.3.3 Soil strength

Table 5.4 summarises information pertaining to the shear strength of the soils according to geological stratum. Factual results are summarised for uncorrected Standard Penetration Tests (SPT). A SPT 'N' value versus depth profile is summarised in Figure 5.1. The values are presented on the logs in Appendix B.

Table 5.4: Soil strength results

Stratum	No. of tests	Method	SPT (N-value) (Range)
Raglan Mudstone Formation	6	SPT – cable percussion (Peck et. al. (1967).	5-50

Figure 5.1: SPT 'N' Value vs depth



The SPT 'N' values increase relatively smoothly with depth, other than at 4.00m bgl, which was registered as a refusal.

The data indicates that the density of Raglan Mudstone Formation increases linearly with depth if the anomaly at 4.00m bgl is discounted.

5.3.4 Compressibility

As the proposed development is relatively lightweight and the underlying Raglan Mudstone Formation has low plasticity, significant compression is not thought to present a risk and is therefore not considered further in this report.

5.3.5 Subgrade stiffness

The subgrade stiffness (CBR) results are summarised in Table 5.5 and the plots are presented in Appendix C. CBR testing was undertaken in the proposed sports pitch area. As it is recommended that topsoil be removed prior to construction of the 3G pitch, the CBR ranges quoted in the table below relate to the top of the Raglan Mudstone Formation. "Layer 1" as marked in the plots in Appendix C represents topsoil and can therefore be discounted.

Table 5.5: CBR results

Stratum	No. tests	Method	CBR (%) (Range)	CBR (%) (Average)
Raglan Mudstone Formation	4	TRL-DCP	11-34	18.25

5.3.6 Sulfate content

In accordance with BRE (Special Digest 1), the Design Sulfate (DS) classification and the Aggressive Chemical Environment for Concrete (ACEC) classification are presented in Table 5.6. The assessment summary sheets are presented in Appendix C.

Table 5.6: Aggressive chemical environment concrete classification

Stratum	No. tests	DS	ACEC
Made Ground	1	DS-1	AC-1
Raglan Mudstone Formation	2	DS-1	AC-1

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 temporary classroom unit and a 3G sports pitch with associated infrastructure. Minimal cut to fill will likely be required.

The nearby slope has an estimated angle of 15-20 degrees and is therefore not thought to require a geotechnical slope assessment.

Based on the above, for the purposes of this investigation, the proposed classroom structure and 3G sports pitch have been classed as Geotechnical Category 1.

Following ground investigation and as part of the assessment provided in the following section, the preliminary geotechnical hazard identification undertaken in the desk study 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 F (Table F.2) and will need to be updated during future design works.

6.2 Groundwork

6.2.1 Site preparation

Whilst no buried obstructions were encountered by this investigation in the proposed classroom unit area, the possibility of buried obstructions being encountered remains. Therefore, it is recommended that an allowance be considered for breaking out obstructions, for example provision of pneumatic breakers for site plant. If underground structures cannot be removed, they will need to be surveyed in three dimensions and the new structures will need to be designed to accommodate them.

The proposed sports pitch area of the site is previously undeveloped and only a terracotta land drain was encountered. The possibility of buried obstructions being encountered in this area is low.

Topsoil should be removed from beneath the pitch development area.

6.2.2 Groundworks

Following breaking out of hardstanding and potential obstructions, excavation of shallow soils should be readily undertaken by conventional plant and equipment. However, excavation through any buried construction/intact rock quality strata may require heavy-duty excavation plant/ripping plant/blasting/the use of specialist breaking equipment.

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.

However, the Raglan Mudstone Formation can be fissured, and whilst instability due to fissuring was not noted in the short trial pit excavations, fissuring can cause instability of longer excavations.

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 and adjoining existing structures, 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 proposed excavations is likely to be slow, if at all present. In these circumstances, groundwater control by sump pumping is likely to be sufficient.

However, 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.

6.2.3 Earthworks/reuse of site-won materials

At this stage, Hydrock is not aware of proposals for earthworks at the site.

Should earthworks be required, supplementary earthworks 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.

6.3 Slope stability

The existing slope to the south-east of the site has an angle of 15-20 degrees. Therefore, Hydrock does not believe the existing slope will present a significant constraint to the development. However, the above preliminary conclusions should be reviewed as part of the separate geotechnical design.

6.4 Foundation recommendations

6.4.1 Foundation Type/ Types

Due to the nature of the proposed development and on the basis of the ground conditions indicated from the current investigation, the foundations of the proposed classroom unit will likely comprise pads or trench-fill founded through the existing hardstanding.

The Made Ground is considered unsuitable 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 3G sports pitch should be founded onto the Raglan Mudstone Formation following removal of the topsoil, rolling and removal of any soft spots, which should be replaced with a granular fill.

6.4.2 Spread foundations

Pad or trench fill foundations are considered suitable to support the columns for the proposed classroom unit. The pad foundations should be founded within the firm to stiff clay of the Raglan Mudstone Formation at around 2.00m bgl. Groundwater is not anticipated to affect the foundations as it was not encountered in the borehole.

On this basis a permissible net bearing pressure for a pad foundation for the proposed buildings of 1m2 of 125kPa for the firm to stiff Raglan Mudstone Formation is recommended. This bearing pressure can also be applied to a 1m wide trench fill foundation solution if deemed more appropriate by the structural engineer.

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.

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.

6.5 Ground floor slabs

As the proposed development is a temporary, pre-fabricated unit, we are assuming that there will be no ground floor slab.

6.6 3G sports pitch

Based on the test results and subject to *in situ* testing during construction, it is considered likely an equilibrium CBR of at least 10% will be achievable over the proposed sports pitch area when the upper Topsoil has been stripped from the existing sports pitch.

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.

6.7 Drainage

Indicative infiltration rates for the ground investigation are presented in Appendix C and are summarised in Table 5.2.

Soakaways are considered unsuitable for the site based on the low infiltration rates obtained from testing. Based on the existing pitches being drained via terracotta pipes it is considered that the site would require a positive drainage scheme. However, attenuation features may assist with the drainage design as part of a Sustainable Urban Drainage System (SUDS).

6.8 Buried concrete

Based on guidelines provided in BRE Special Digest 1 (BRE 2005) and the information presented in Section 5.3.6 (Table 5.6):

- The shallow soils (Made Ground) can be classified as Design Sulfate Class DS-1 and ACEC Class AC-1.
- The deeper soils (Raglan Mudstone Formation) can be classified as Design Sulfate Class DS-1 and ACEC Class AC-1 for strip / trench fill / pad foundations.

This equates to a Design Chemical Class[1] of DC-1.

The designer should check and confirm the classification of concrete using the information presented in Appendix B and Appendix C 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

The following potential sources have been removed from the exposure model.

- PCBs from the transformers of the electricity sub-station on site, as laboratory testing results were all below the limit of detection.
- Made Ground has been removed as a potential source in the proposed sports pitch area. It remains a potential source in the proposed classroom unit area.

No sources have been 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.

However, as the classroom unit is proposed to be on hardstanding, the potential for infiltration leading to leachate generation and migration to controlled waters is considered to be very low.

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.

The data sets used in the assessment comprise the analytical results obtained by Hydrock 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 10.

7.3 Human health risk assessment

This is a Tier 2 assessment using soil screening values applicable to the residential without plant uptake and public open space (residential) CLEA land use scenarios; the former for the proposed classrooms zone and the latter for the proposed sports pitch zone.

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

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 D.

7.3.1 Risk estimation (without statistical testing)

Hydrock default list of determinands

No individual test results exceeded the GAC. As such, there are no chemicals of potential concern which require further assessment.

PCBs

Laboratory testing shows that PCB concentrations were below the limit of detection in all samples that were tested for them.

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 D. 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.

No individual test results exceeded the GAC. As such, there are no chemicals of potential concern which require further assessment.

7.5 Ground gases risk assessment

CL:AIRE RB17 (Card et al 2012) states that where there are natural soils with no credible methane source, with Made Ground less than 1 m thick, and no radon barrier is being provided, no gas protection is required as this represents CS1. This is the case in the area of the proposed classroom, with no entrained organic material in the thin veneer of Made Ground, therefore risk from ground gas accumulation is very low and no ground gas protection is required.

7.6 Construction materials risk assessment

7.6.1 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.

The site is brownfield. However, the investigation has not detected organic contamination in exceedance of the threshold values and Hydrock believes standard pipework may be suitable for the site. However, confirmation should be sought from the water supply company at the earliest opportunity.

7.6.2 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.

7.7 Contamination risks to ground workers

7.7.1 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 Findings of the generic contamination risk assessments

The potential sources, pathways and receptors identified in the desk study and repeated in Section 3 have been investigated (Sections 4 and 5) and assessed (Sections 7.2 to 7.6). A Source-Pathway-Receptor linkage assessment has been undertaken and is presented in Appendix G (Table G.2).

There are no Source-Pathway-Receptor contaminant linkages which require mitigation.

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 E and a summary of the preliminary waste classification is provided below in Section 8.2.4.

8.2.3 WAC Testing

The site is brownfield. However, WAC testing has not been undertaken to date but will be required on the excavated soils that are to be disposed of, to assist with waste disposal options prior to disposal. A summary of the preliminary waste disposal options is provided below in Section 9.2.4.

8.2.4 Preliminary waste disposal options

The site is brownfield and based on the site history 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:

- All soils (Made Ground, Topsoil and Raglan Mudstone Formation) are likely to be classified as non-hazardous waste for disposal at a non-hazardous landfill.
- Any soils containing > 0.1% asbestos or visible asbestos containing materials would be considered as hazardous.

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 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[2]:
  - 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.

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.

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

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.

Clean, naturally occurring materials – reused on the site of origin

Where soils are naturally occurring, uncontaminated and are reused on the site they are excavated (i.e. greenfield site with documented site history, with no Made Ground), they will fall outside the Waste Framework Directive (WFD) (i.e. they will not be a waste when reused on the site of origin).

However, there needs to be certainty of that reuse, and evidence is necessary to support this strategy, for example through information provided during the planning process. The onus is on the developer to demonstrate that the materials are not a waste and will never become a waste. As such, a Materials Re-use Strategy is recommended to show certainty. Alternatively, if the volume of material is under 1,000 tonnes, then a U1 waste exemption may be applied for from the Environment Agency.

It may be noted that some 'clean naturally occurring materials' may still fail the 'suitable for use' test, for example, soils with a naturally high organic content may not be suitable for use because of their propensity to produce ground gases such as methane. Rules regarding other more unusual circumstances such as where natural soils contain an unacceptably high mineral content are described in the DoWCoP.

Clean, naturally occurring materials – transferred to other sites

Where soils are naturally occurring, uncontaminated and are transferred to other sites (i.e. direct transfer), they will not become waste as long as the transfer is undertaken in accordance with the DoWCoP. A MMP must be prepared for the receiving site and the materials movement must be noted in the MMP of the Donor site. This movement must have been declared to CL:AIRE prior to the works commencing.

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.

Made Ground and other contaminated soils

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

Made Ground thickness may vary across the proposed classroom unit area. The extent of this is unknown as excavation only took place in one location.

9.2 General comments

Hydrock Consultants Limited (Hydrock) has prepared this report in accordance with the instructions of Mace Group (the Client), by e-mail Rebecca Chantry from Mace 16th November 2021under 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 January and February 2022. 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 existing reports 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. 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 and agreement with utility providers regarding the materials suitable for pipework; and
- discussions with regulatory bodies and the warranty provider regarding the conclusions of this report.

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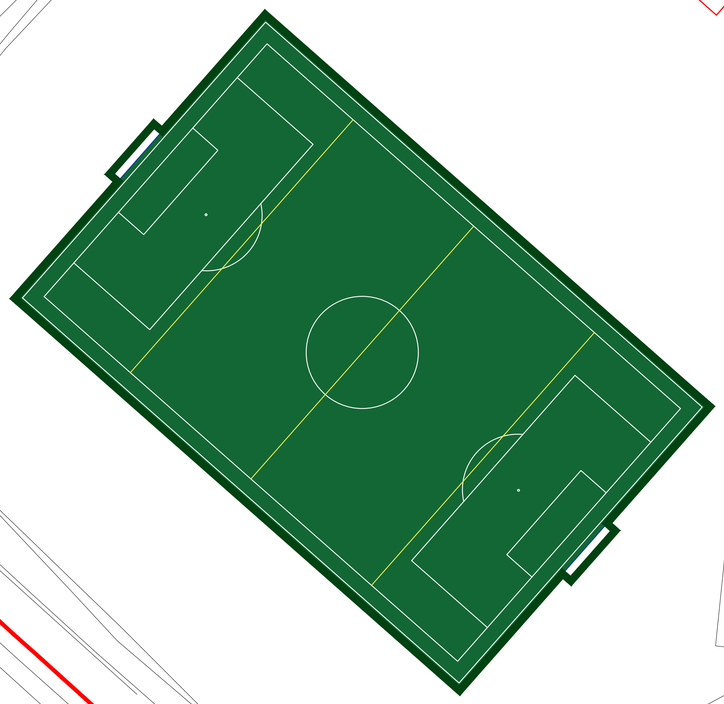
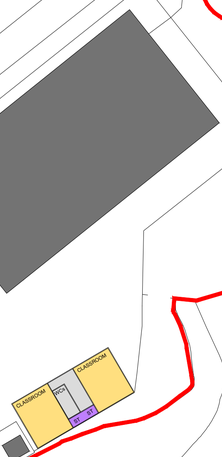
Appendix A

Drawings

N

0m 20m 40m





Rev	By	Description	Date	CHK'D
-	-	-	-	-

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PROJECT
CARDIFF
SUFFICIENCY SCHEMES
ST ILLTYDS

DRAWING TITLE
SITE PLAN
PITCH LOCATION 2

DRAWN BY	JHD	DATE	03/10/2021
CHECKED	HA	SCALE	1:500 @ A1

PROJECT No.	DISCI. Code.	SEQ. No.	REV.
05994	A	-	-

HCC ASSET CODE -

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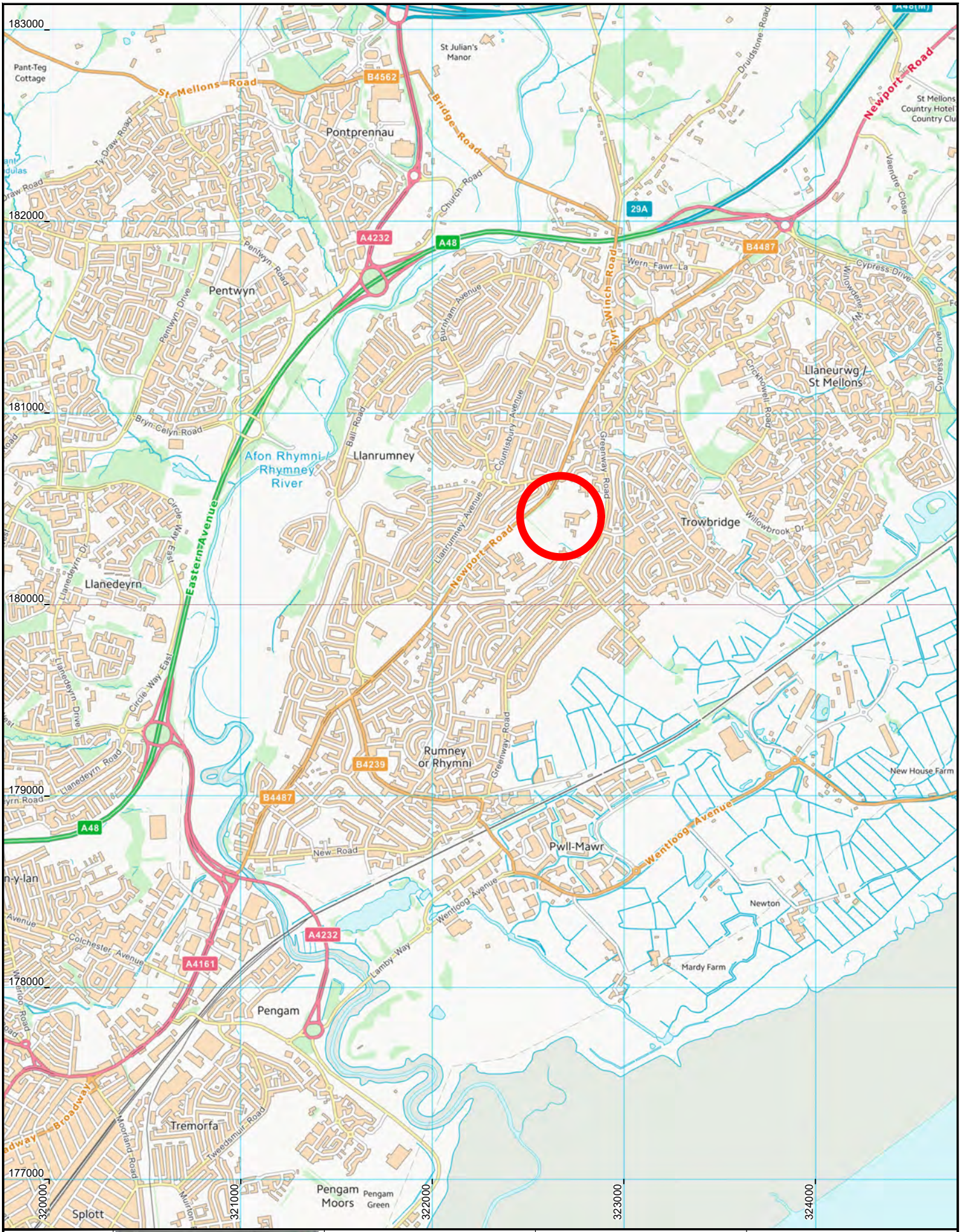

OS NORTH

Site Ref: ST28

0 500 Metres

REV.						
P1	FIRST ISSUE					
	EP	24/08/21	MH	24/08/21	MH	24/08/21
	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

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CLIENT

MACE GROUP

PROJECT

CCC SUFFICIENCY '22 - ST ILLTYDS

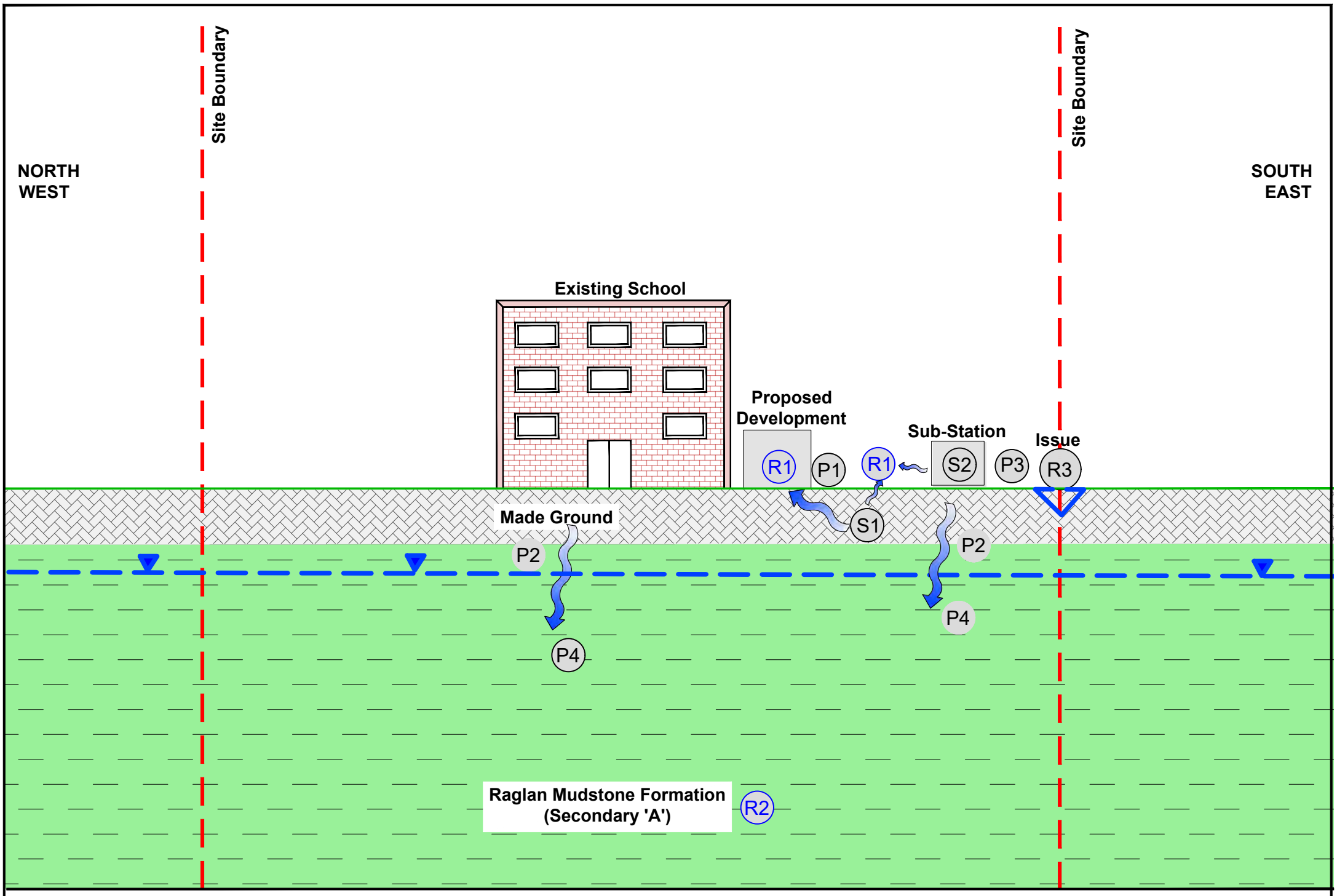
TITLE

SITE LOCATION PLAN

HYDROCK PROJECT NO.	SCALE @ A4
C-20700-C	1:25,000

PURPOSE OF ISSUE	STATUS
SUITABLE FOR INFORMATION	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
20700-HYD-XX-04-DR-GE-1000	P1



Potential on-site sources of contamination

Made Ground, associated with historical construction of the college and additional school buildings and imported fill, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S1).

PCBs and oils from transformers in the electricity sub-station on site southeast boundary of the site (S2).

Potential receptors

People (neighbours, site end users) (R1).

Groundwater: Secondary A aquifer status of the Raglan Mudstone Formation (R2).

Surface water: on-site boundary issue to south (R3)

Potential pathways

Ingestion, skin contact, inhalation of dust and outdoor air by people (P1).

Migration of contaminant via leachate migration though the unsaturated zone in the Raglan Mudstone Formation (P2).

Surface water via overland flow and drainage discharge (P3).

Surface water via base flow from groundwater (P4)

KEY

- Existing ground profile
- Conjectural geological boundary
- Made Ground
- Raglan Mudstone Formation (Secondary 'A')
- Approximate groundwater level

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.

REV.	REVISION NOTES/COMMENTS	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P1	FIRST ISSUE	AT	20/09/21	MH	23/09/21	AE	23/09/21

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CLIENT: MACE GROUP

PROJECT: CCC SUFFICIENCY '22 - ST. ILLTYDS

TITLE: OUTLINE CONCEPTUAL SITE MODEL

HYDROCK PROJECT NO.: C-20700-C

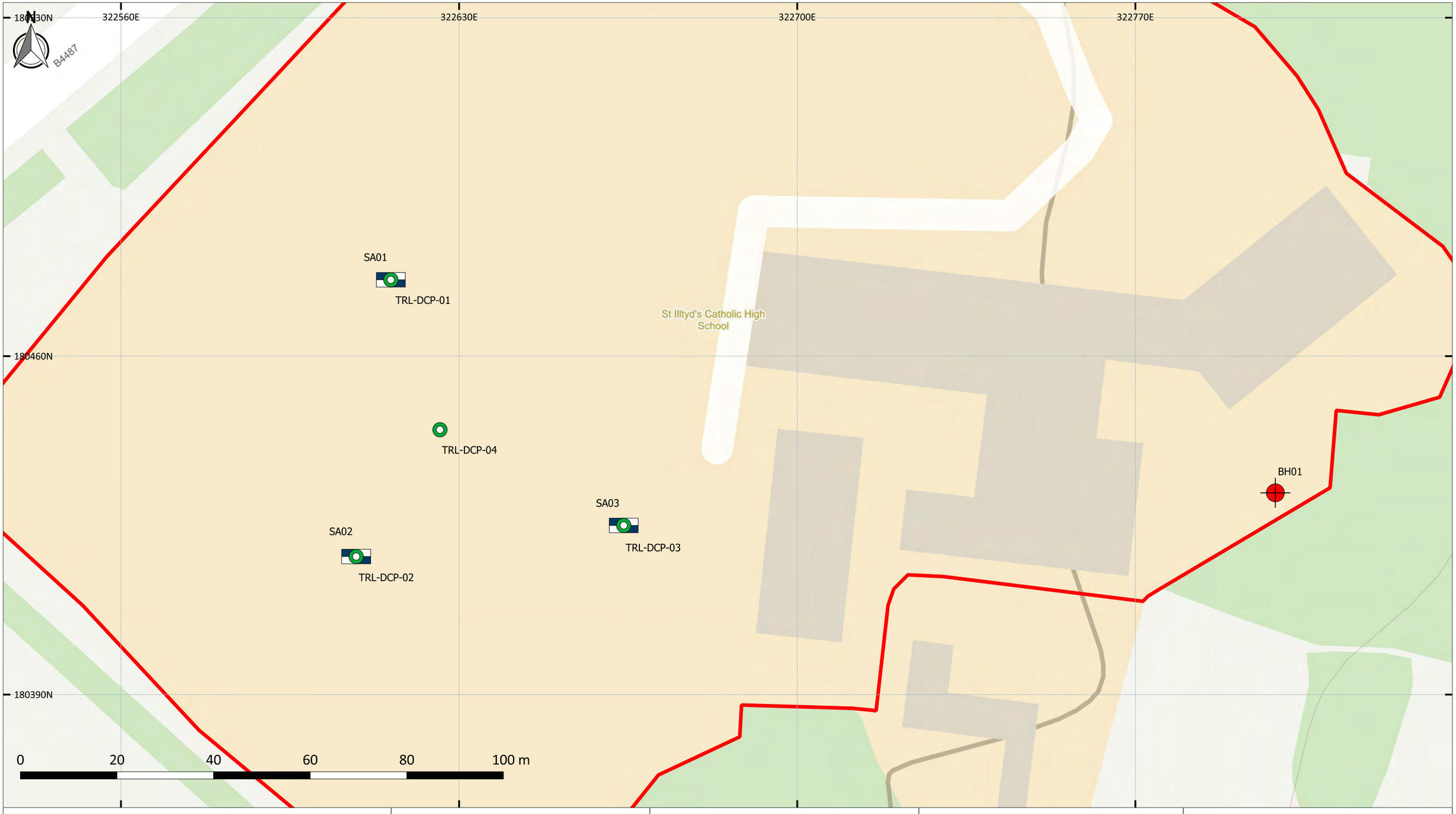
SCALE @ A3: NTS

PURPOSE OF ISSUE: SUITABLE FOR INFORMATION

STATUS: S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER): 20700-HYD-XX-04-DR-GE-1002

REVISION: P1



KEY PLAN

Exploratory Hole Locations [8]

- Borehole [1]
- Trial Pit [3]
- TRL Probe [4]

NOTES

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

REVISIONS

REV.	DRAWN BY INITIALS	CHECKED BY INITIALS	DATE	REVISION NOTES/COMMENTS
P01	MW	MH	20/01/22	First issue
P02	MW	MH	22/03/22	Updated following borehole GI

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TITLE: EXPLORATORY HOLE LOCATION PLAN

HYDROCK PROJECT NO.: 20700-04

SCALE @ A3: 1:750

CLIENT: MACE GROUP

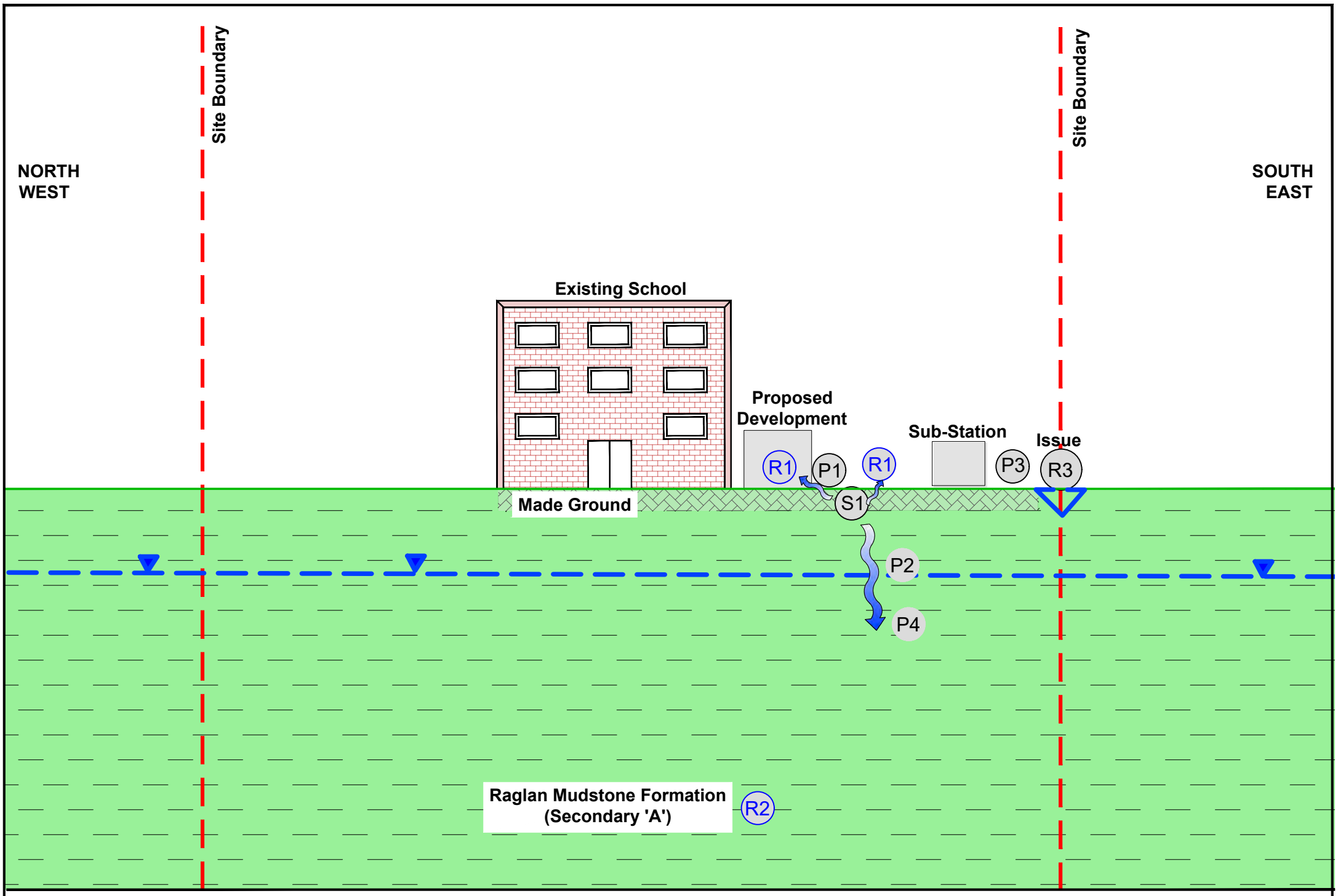
PURPOSE OF ISSUE: SUITABLE FOR INFORMATION

STATUS: S2

PROJECT: CCC SUFFICIENCY '22 - ST. ILLTYDS

DRAWING NO.: 20700-HYD-XX-04-DR-GE-1003

REVISION: P02



Potential on-site sources of contamination

Made Ground, associated with historical construction of the college and additional school buildings and imported fill, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials, PAH and petroleum hydrocarbons (S1).

Potential receptors

People (neighbours, site end users) (R1).

Groundwater: Secondary A aquifer status of the Raglan Mudstone Formation (R2).

Surface water: on-site boundary issue to south (R3)

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Ingestion, skin contact, inhalation of dust and outdoor air by people (P1).

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Surface water via overland flow and drainage discharge (P3).

Surface water via base flow from groundwater (P4)

KEY

- Existing ground profile
- Conjectural geological boundary
- Made Ground
- Raglan Mudstone Formation (Secondary 'A')
- Approximate groundwater level

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.

REV.	REVISION NOTES/COMMENTS	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P1	FIRST ISSUE	MW	25/03/22	MH	25/03/22	MH	25/03/22

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CLIENT: MACE GROUP

PROJECT: CCC SUFFICIENCY '22 - ST. ILLTYDS

TITLE: UPDATED CONCEPTUAL SITE MODEL

HYDROCK PROJECT NO.: C-20700-C

SCALE @ A3: NTS

PURPOSE OF ISSUE: SUITABLE FOR INFORMATION

STATUS: S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER): 20700-HYD-XX-04-DR-GE-1004

REVISION: P1

Appendix B

Exploratory Hole Logs and Photographs

Exploratory Hole Logs

Hydrock

Project: CCC Sufficiency '22 - St Illtyds

Borehole No
BH01
Page No. 1 of 1

Method: Dynamic Sampled & Rotary Cored	Date(s): 21/02/2022	Logged By: MW	Drilled By: CJ Associates
Client: Mace Group	Co-ords: 322798.98, 180431.72	Checked By: MH	Flush: Water
Hydrock Project No: 20700-04			Scale: 1:50

Sample/Core Run (m) Smpl. Ø (mm) Smpl. rec. %	Samples / Tests			Mechanical Log				Water Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
	Depth (m)	Type	Results	TCR	SCR	RQD	If: Min Mean Max							
	0.10 - 0.45	B							Asphalt (MADE GROUND)	0.10	(0.10)			
	0.30	D							Pale brown clayey sandy GRAVEL of angular fine to coarse grey stone and brick and angular fine to medium bitumen. Slight hydrocarbon odour. (MADE GROUND)	0.45	(0.35)			
	0.30	ES							Soft reddish brown sandy gravelly CLAY. Gravel of light grey very weak angular fine to coarse mudstone. Frequent fine to coarse gravel sized pieces of black petrified wood. (RAGLAN MUDSTONE FORMATION)	0.90	(0.45)			
	0.30	ES							*... From 0.45m bgl: hand pit walls are slightly wet.*					
	0.45 - 0.90	B							Soft becoming firm reddish brown sandy gravelly CLAY. Gravel of light grey very weak to moderately weak angular fine to coarse mudstone and occasional subangular fine to medium grey stone. Occasional fine to medium gravel sized pieces of black petrified wood. (RAGLAN MUDSTONE FORMATION)	2.30	(1.40)			
	0.65	D							*... From 1.20m bgl: no more gravel of grey stone.*					
	0.65	D							*... Between 1.80 and 2.00m bgl: small roots.*					
	0.65	ES							*... Between 2.10 and 2.50m bgl: frequent grey 1mm crystals (suspected gypsum). Grey mudstone gravel becoming rarer and finer.*					
	0.65	ES							Firm becoming very stiff brownish red sandy CLAY with occasional light grey mottling and gravelly bands. (RAGLAN MUDSTONE FORMATION)	5.55	(3.25)			
	0.90 - 1.20	B							Weak reddish brown with rare to occasional grey mottling MUDSTONE with closely to medium spaced (5/19/20) rough planar very tight (<1mm) fractures. (RAGLAN MUDSTONE FORMATION)	6.10	(0.55)			
	1.10	D							End of Borehole at 6.10m					
	1.20	SPT	N=5 (1,1,1,2,1,1)											
	1.20	D												
	1.20	D												
	1.40 - 1.75	B												
	1.40 - 1.75	B												
	1.85	D												
	1.85	ES												
	2.00	SPT	N=12 (1,1,1,3,4,4)											
	2.00	D												
	2.00	D												
	2.50 - 3.00	B												
	3.00	SPT	N=16 (1,2,3,4,4,5)											
	3.00	D												
	3.00	D												
	3.20	D												
	3.80	D												
	4.00	SPT	N=50 (4,11,12,15,11,12)											
4.85 - 6.10	4.00	D												
	4.20 - 4.85	B												
	4.85	SPT	N=43 (9,11,8,9,13,13)	100	71	71								
	4.85	D												
	5.10	D												
	5.55 - 5.74	C												
	6.10	SPT	50/210mm (7,9,8,20,22)											
	6.10	D												

Progress and Observations

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

General Remarks:
1. Cleared with CAT & Genny. 2. Hand pit dug to 1.20m bgl. 3. Dynamic sampling to refusal at 4.85m bgl. 4. Rotary coring to 6.10m bgl. 5. No groundwater encountered, but pit walls were wet below 0.45m bgl. 6. Backfilled with bentonite from the base of the hole to 1.00m bgl, arisings to 0.10m bgl, followed by concrete topped with cold-lay asphalt.

Logged in general accordance with BS5930:2015

Hydrock	Project: CCC Sufficiency '22 - St Illtyds	Trialpit No SA01 Page No. 1 of 1

Method: Trial Pit	Date(s): 18/01/2022 - 19/01/2022	Logged By: MW	Checked By: MH
Client: Mace Group	Co-ords: 322615.85, 180475.78	Stability: Stable	Dimensions: 1.20m x 0.65m; Scale: 1:25
Hydrock Project No: 20700-04	Ground Level: 54.09m OD	Plant: JCB 48Z-1	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.15 0.15	D ES			Firm brown slightly sandy CLAY with rootlets. (TOPSOIL)	0.20	(0.20)	53.89	
0.40 - 0.60 0.50 0.50	B D ES			Stiff reddish-brown CLAY with occasional fine to medium gravel-sized pockets of grey clay. (RAGLAN MUDSTONE FORMATION) *... At 0.50m bgl: terracotta land drain.*		(0.85)		
0.95 - 1.05 1.00 1.00	B D ES			*... At 0.95m bgl: becoming friable.*	1.05		53.04	
				Base of Excavation at 1.05m				

General Remarks:
1. Pit cleared with CAT & Genny. 2. Excavated to 1.05m bgl (depth required for soakaway testing). 3. Used for soakaway testing. 4. Backfilled with arisings.

Groundwater: None encountered

Logged in general accordance with BS5930:2015

Hydrock

Project: CCC Sufficiency '22 - St Illtyds

Trialpit No
SA02
Page No. 1 of 1

Method: Trial Pit	Date(s): 18/01/2022 - 19/01/2022	Logged By: MW	Checked By: MH
Client: Mace Group	Co-ords: 322608.67, 180418.54	Stability: Stable	Dimensions: 1.30m x 0.60m; Scale: 1:25
Hydrock Project No: 20700-04	Ground Level: 53.11m OD	Plant: JCB 48Z-1	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.15 0.15	D ES			Firm brown slightly sandy CLAY with rootlets. (TOPSOIL)	0.20	(0.20)	52.91	
0.50 0.50	D ES			Stiff reddish-brown slightly gravelly CLAY with occasional fine to medium gravel-sized pockets of grey clay. Gravel of rounded fine to medium quartz and grey stone. (RAGLAN MUDSTONE FORMATION)		(0.80)		
0.80 - 1.00	B							
1.00 1.00	D ES			Base of Excavation at 1.00m	1.00		52.11	

General Remarks:
1. Pit cleared with CAT & Genny. 2. Excavated to 1.00m bgl (depth required for soakaway testing). 3. Used for soakaway testing. 4. Backfilled with arisings.

Groundwater: None encountered

Logged in general accordance with BS5930:2015

Hydrock

Project: CCC Sufficiency '22 - St Illtyds

Trialpit No
SA03
Page No. 1 of 1

Method: Trial Pit	Date(s): 18/01/2022 - 19/01/2022	Logged By: MW	Checked By: MH
Client: Mace Group	Co-ords: 322664.07, 180424.97	Stability: Stable	Dimensions: 1.00m x 0.60m; Scale: 1:25
Hydrock Project No: 20700-04	Ground Level: 52.09m OD	Plant: JCB 48Z-1	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.15 0.15	D ES			Firm brown slightly sandy CLAY with rootlets. (TOPSOIL)	0.30	(0.30)	51.79	
0.40 - 0.60 0.50 0.50	B D ES			Stiff orangish-brown slightly gravelly CLAY. Gravel of subrounded to rounded fine to coarse grey stone. (RAGLAN MUDSTONE FORMATION) *... At 0.40m bgl: becoming reddish-brown.* *... From 0.50m bgl: no more gravel observed.* *... At 0.80m bgl: becoming friable.*		(0.70)		
0.90 - 1.00 1.00 1.00	B D ES			Base of Excavation at 1.00m	1.00		51.09	

General Remarks:
1. Pit cleared with CAT & Genny. 2. Excavated to 1.00m bgl (depth required for soakaway testing). 3. Used for soakaway testing. 4. Backfilled with arisings.

Groundwater: None encountered

Logged in general accordance with BS5930:2015

Exploratory Hole Photographs

Site Investigation Photograph 1	
Date: 18/01/22	
Direction Photograph Taken: n/a.	
Description: Spoil from SA01.	

Site Investigation Photograph 2	
Date: 18/01/22	
Direction Photograph Taken: n/a.	
Description: SA01.	

Site Investigation Photograph 3	
Date: 18/01/22	
Direction Photograph Taken: n/a.	
Description: Spoil from SA02.	

Site Investigation Photograph 4	
Date: 18/01/22	
Direction Photograph Taken: n/a.	
Description: SA02.	

Site Investigation Photograph 5	
Date: 18/01/22	
Direction Photograph Taken: n/a.	
Description: Spoil from SA03.	

Site Investigation Photograph 6	
Date: 18/01/22	
Direction Photograph Taken: n/a.	
Description: SA03.	

Site Investigation Photograph 7	
Date: 21/02/22	
Direction Photograph Taken: n/a.	
Description: Starter pit for BH01.	

Site Investigation Photograph 8	
Date: 21/02/22	
Direction Photograph Taken: n/a.	
Description: Core from BH01 (1.20-2.00m bgl).	

Site Investigation Photograph 9	
Date: 21/02/22	
Direction Photograph Taken: n/a.	
Description: Core from BH01 (2.00-3.00m bgl).	

Site Investigation Photograph 10	
Date: 21/02/22	
Direction Photograph Taken: n/a.	
Description: Core from BH01 (3.00-4.00m bgl).	

Site Investigation Photograph 11	
Date: 21/02/22	
Direction Photograph Taken: n/a.	
Description: Core from BH01 (4.00-4.85m bgl).	

Site Investigation Photograph 12	
Date: 21/02/22	
Direction Photograph Taken: n/a.	
Description: Core from BH01 (4.85-6.10m bgl).	

Appendix C

Geotechnical Test Results and Geotechnical Plots

Geotechnical Laboratory Test Results

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

UKAS TESTING 4041

Environmental Science

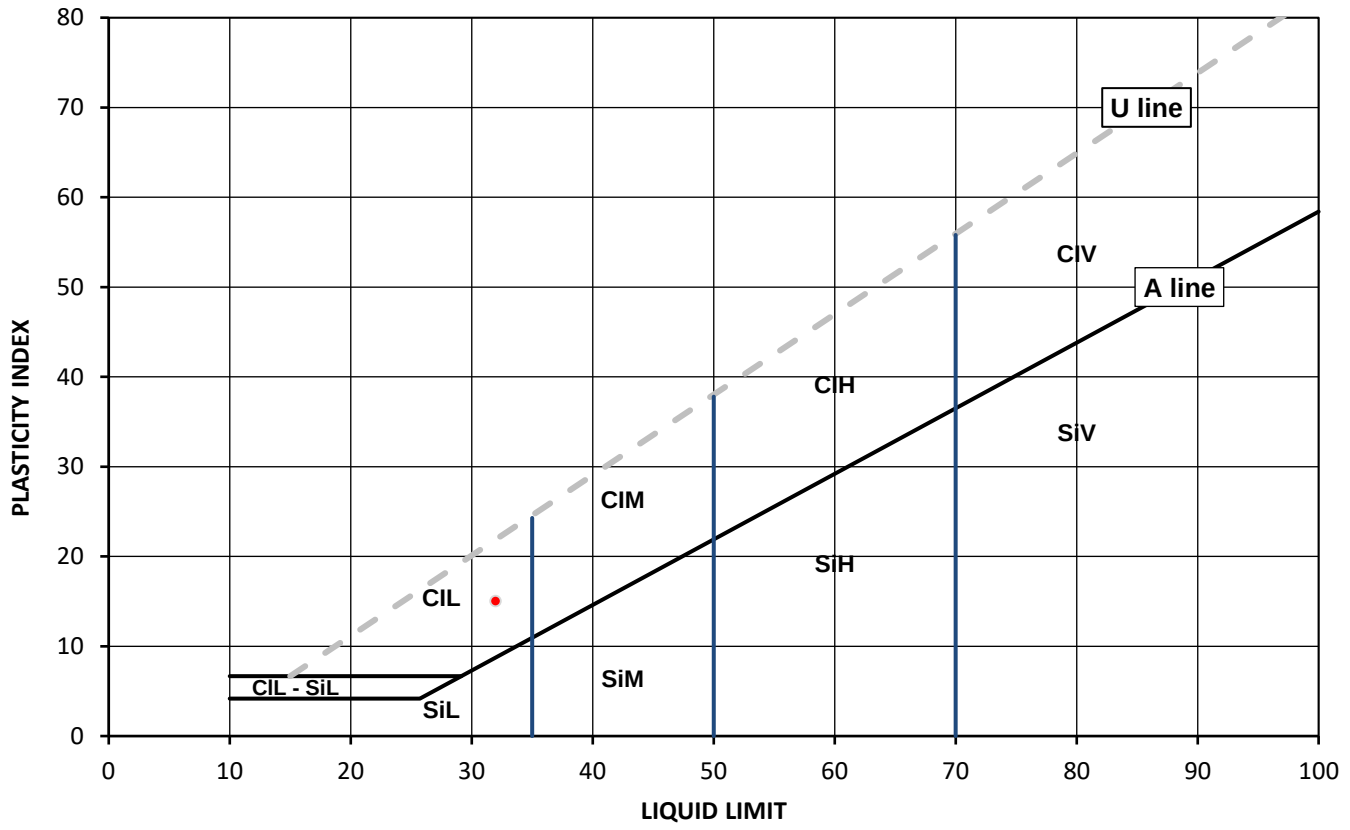
Client:	Hydrock Consultants Ltd	Client Reference:	20700 04
Client Address:	5-7 Tanner Street, London, SE1 3LE	Job Number:	22-41702
		Date Sampled:	21/02/2022
		Date Received:	23/02/2022
Contact:	Matt Wincott	Date Tested:	03/03/2022
Site Address:	Cardiff Schools 2022 Sufficiency Schemes St Illtyds	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2184504	Depth Top [m]:	0.65
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	2	Sample Type:	D
Sample Description:	Orangish brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
19	32	17	15	88



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

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

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

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Technical Reviewer
for and on behalf of i2 Analytical Ltd

Date Reported: 09/03/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

UKAS TESTING 4041

Environmental Science

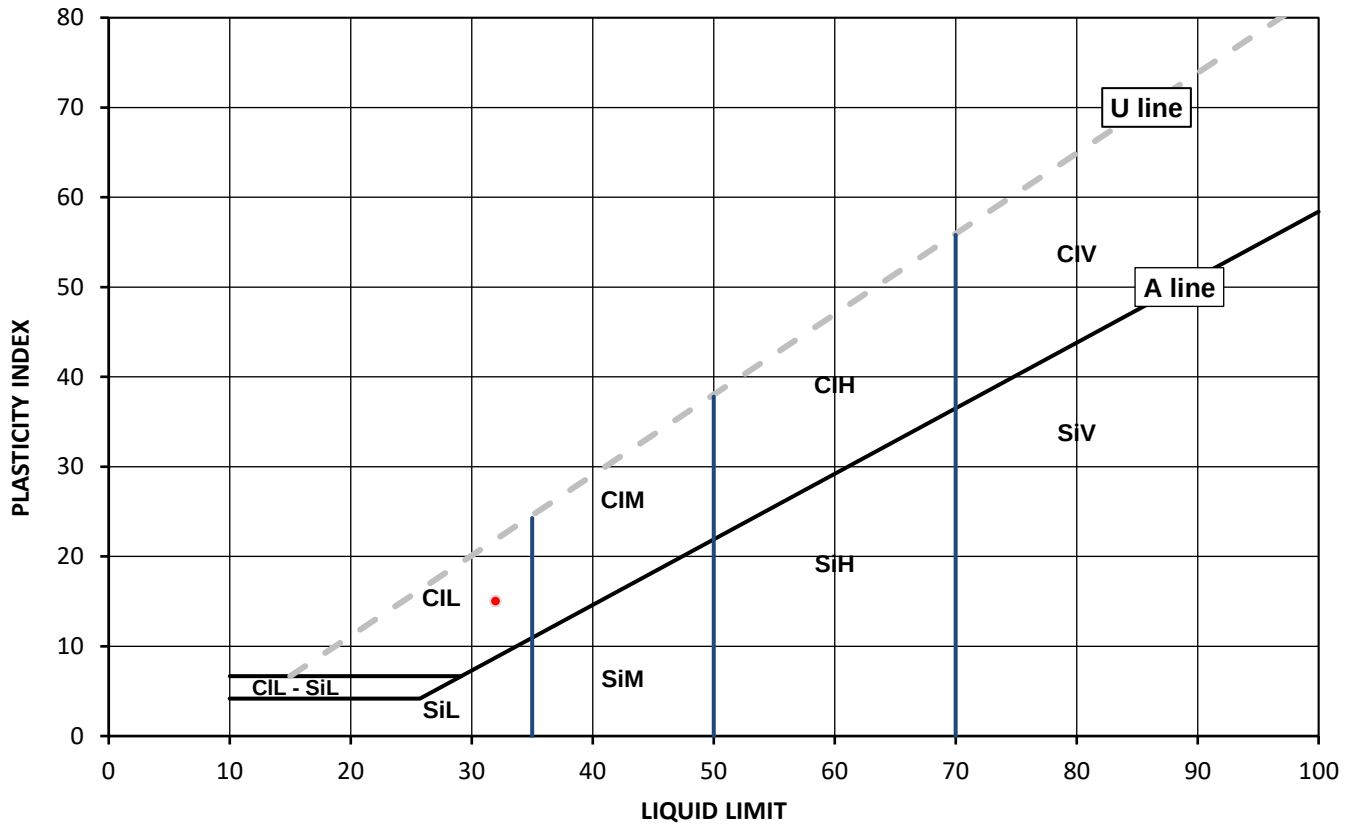
Client:	Hydrock Consultants Ltd	Client Reference:	20700 04
Client Address:	5-7 Tanner Street, London, SE1 3LE	Job Number:	22-41702
		Date Sampled:	21/02/2022
		Date Received:	23/02/2022
Contact:	Matt Wincott	Date Tested:	03/03/2022
Site Address:	Cardiff Schools 2022 Sufficiency Schemes St Illtyds	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2184505	Depth Top [m]:	1.20
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	1	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23	32	17	15	91



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

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

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

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Technical Reviewer
for and on behalf of i2 Analytical Ltd

Date Reported: 09/03/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

UKAS TESTING 4041

Environmental Science

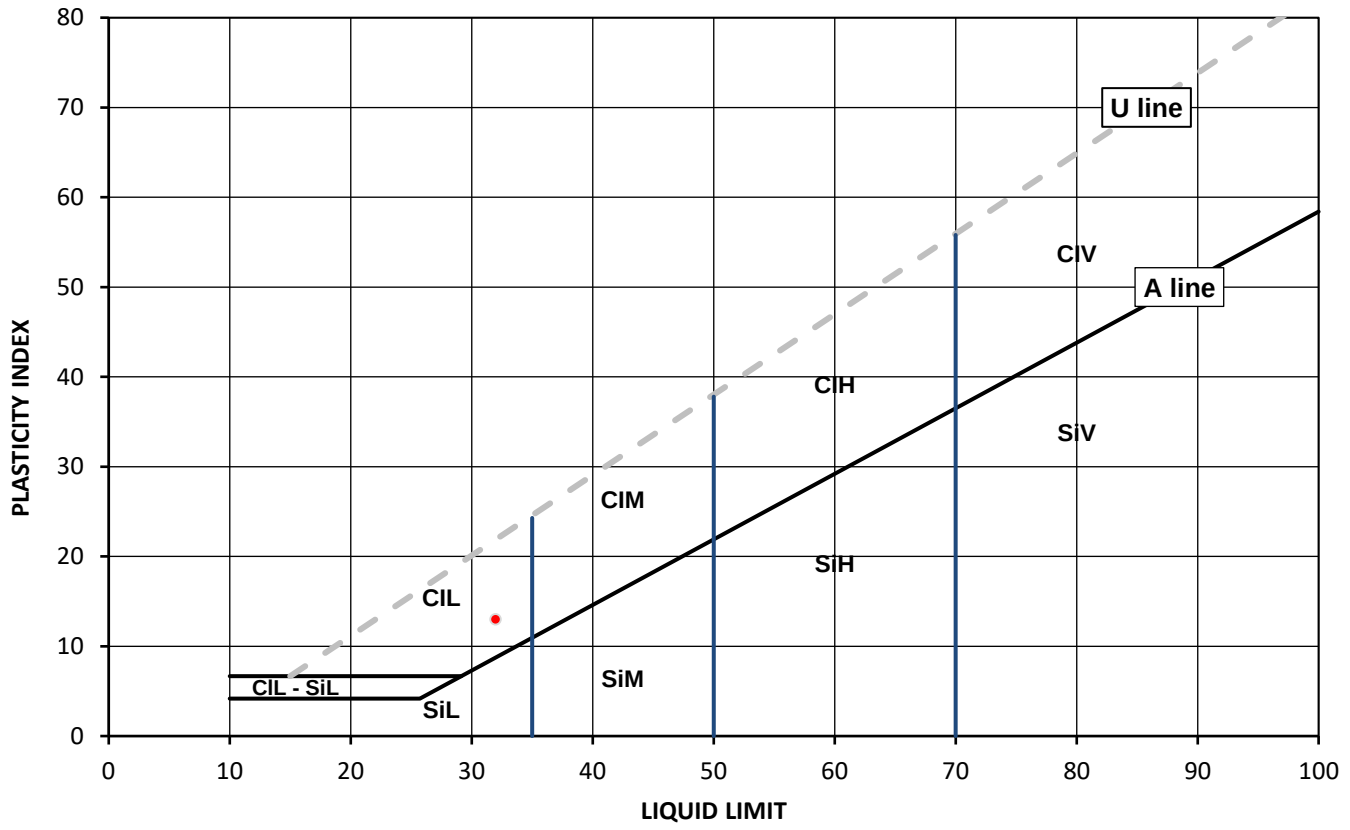
Client:	Hydrock Consultants Ltd	Client Reference:	20700 04
Client Address:	5-7 Tanner Street, London, SE1 3LE	Job Number:	22-41702
		Date Sampled:	21/02/2022
		Date Received:	23/02/2022
Contact:	Matt Wincott	Date Tested:	03/03/2022
Site Address:	Cardiff Schools 2022 Sufficiency Schemes St Illtyds	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2184506	Depth Top [m]:	2.00
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	2	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	32	19	13	94



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

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

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

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Technical Reviewer
for and on behalf of i2 Analytical Ltd

Date Reported: 09/03/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

UKAS TESTING 4041

Environmental Science

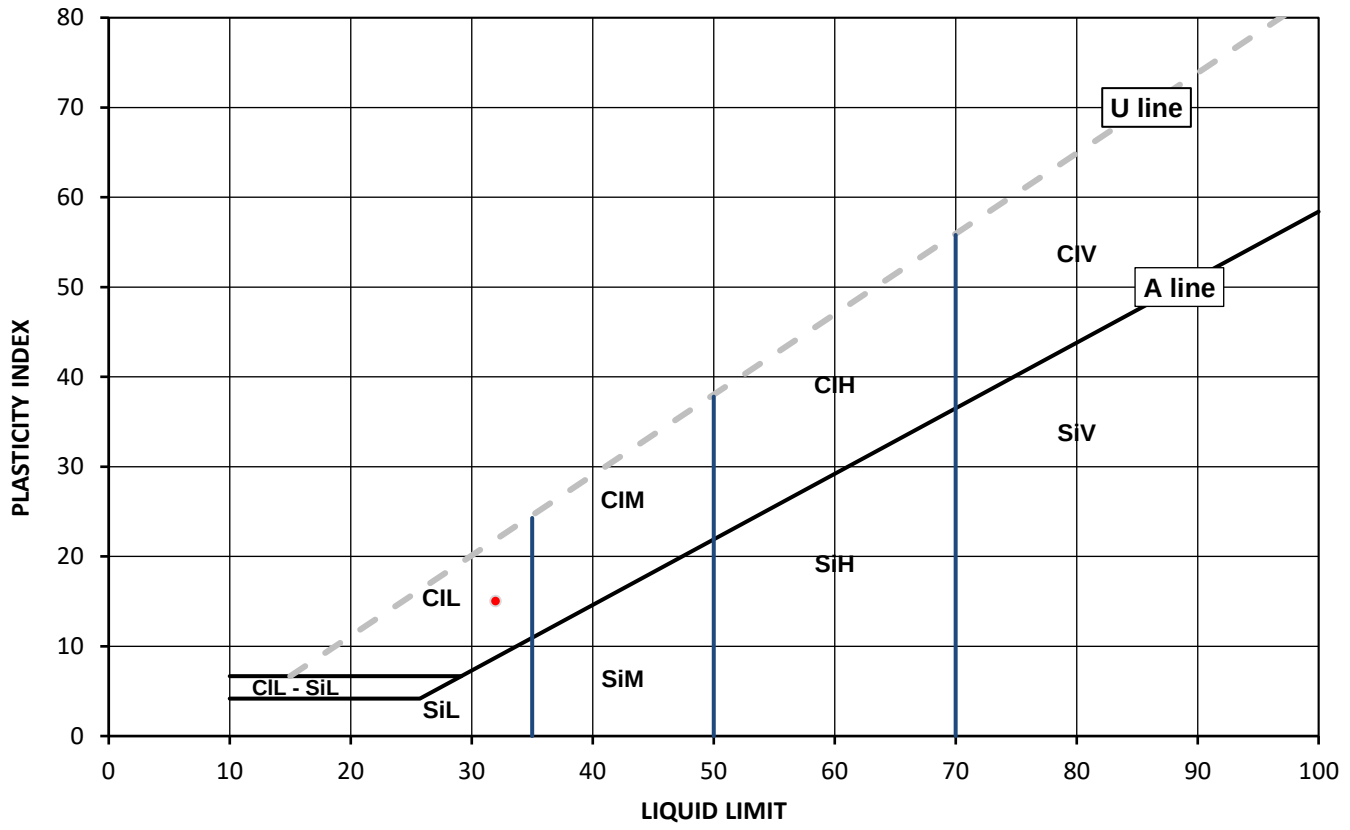
Client:	Hydrock Consultants Ltd	Client Reference:	20700 04
Client Address:	5-7 Tanner Street, London, SE1 3LE	Job Number:	22-41702
		Date Sampled:	21/02/2022
		Date Received:	23/02/2022
Contact:	Matt Wincott	Date Tested:	03/03/2022
Site Address:	Cardiff Schools 2022 Sufficiency Schemes St Illtyds	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2184507	Depth Top [m]:	3.00
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	3	Sample Type:	D
Sample Description:	Orangish brown very sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	32	17	15	100



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

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

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

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Technical Reviewer
for and on behalf of i2 Analytical Ltd

Date Reported: 09/03/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

UKAS TESTING 4041

Environmental Science

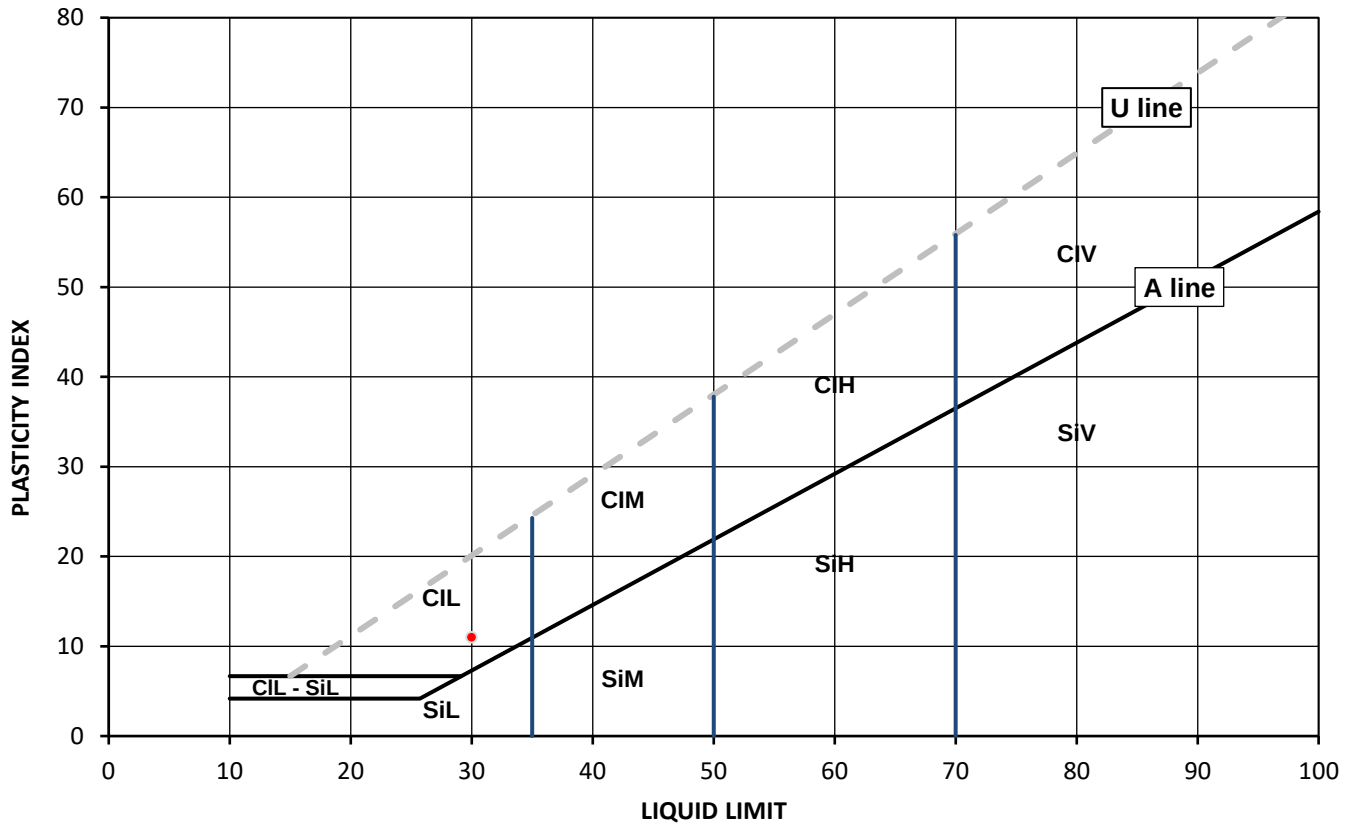
Client:	Hydrock Consultants Ltd	Client Reference:	20700 04
Client Address:	5-7 Tanner Street, London, SE1 3LE	Job Number:	22-41702
		Date Sampled:	21/02/2022
		Date Received:	23/02/2022
Contact:	Matt Wincott	Date Tested:	01/03/2022
Site Address:	Cardiff Schools 2022 Sufficiency Schemes St Illtyds	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2184508	Depth Top [m]:	1.40
Hole No.:	BH01	Depth Base [m]:	1.75
Sample Reference:	4	Sample Type:	B
Sample Description:	Brownish grey slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23	30	19	11	91



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

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

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

Remarks:

Signed: Katarzyna Koziel

Katarzyna Koziel
Technical Reviewer
for and on behalf of i2 Analytical Ltd

Date Reported: 09/03/2022

GF 236.12

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

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

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

4041

Client: Hydrock Consultants Ltd

Client Address: 5-7 Tanner Street, London, SE1 3LE

Contact: Matt Wincott

Site Address: Cardiff Schools 2022 Sufficiency Schemes St Illtyds

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

Client Reference: 20700 04
Job Number: 22-41702
Date Sampled: 21/02/2022
Date Received: 23/02/2022
Date Tested: 01/03 - 03/03/2022
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W]	Water Content BS EN ISO 17892-2 [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2184504	BH01	2	0.65	Not Given	D	Orangish brown slightly gravelly very sandy CLAY	Atterberg 4 Point	19		88	32	17	15						
2184505	BH01	1	1.20	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	23		91	32	17	15						
2184508	BH01	4	1.40	1.75	B	Brownish grey slightly gravelly very sandy CLAY	Atterberg 4 Point	23		91	30	19	11						
2184506	BH01	2	2.00	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	22		94	32	19	13						
2184507	BH01	3	3.00	Not Given	D	Orangish brown very sandy CLAY	Atterberg 4 Point	16		100	32	17	15						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Katarzyna Koziel
Technical Reviewer
for and on behalf of i2 Analytical Ltd

Date Reported: 09/03/2022

GF 238.14

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

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

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

4041

Client: Hydrock Consultants Ltd

Client Address: 5-7 Tanner Street, London, SE1 3LE

Contact: Matt Wincott

Site Address: Cardiff Schools 2022 Sufficiency Schemes St Illtyds

Client Reference: 20700 04
Job Number: 22-41702
Date Sampled: 21/02/2022
Date Received: 23/02/2022
Date Tested: 01/03 - 03/03/2022
Sampled By: Not Given

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

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type			%				
2184504	BH01	2	0.65	Not Given	D	Orangish brown slightly gravelly very sandy CLAY		19	Sample was quartered, oven dried at 108.8 °C			
2184505	BH01	1	1.20	Not Given	D	Brown slightly gravelly very sandy CLAY		23	Sample was quartered, oven dried at 108.8 °C			
2184508	BH01	4	1.40	1.75	B	Brownish grey slightly gravelly very sandy CLAY		23	Sample was quartered, oven dried at 109.0 °C			
2184506	BH01	2	2.00	Not Given	D	Brown slightly gravelly very sandy CLAY		22	Sample was quartered, oven dried at 108.8 °C			
2184507	BH01	3	3.00	Not Given	D	Orangish brown very sandy CLAY		16	Sample was quartered, oven dried at 108.8 °C			

Comments:

Signed:

Katarzyna Koziel
Technical Reviewer
for and on behalf of i2 Analytical Ltd

Date Reported: 09/03/2022

GF 099.16

Hydrock

Client	**Mace Group**	**Made Ground**
Project	**St Illtyds**	
Job number	**20700-04**	

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	1	1	0
No. tests in 20% data set	0	0	
No. tests with suspected pyrite		1	
Maximum value	121	0.5	
Mean of highest two values	121	1	
Mean of highest 20%			
Characteristic Value	**121**	**0.5**	
			Mg not required
	[no pyrite]	**[pyrite suspected]**	
DS Class	**DS-1**	**DS-2**	

If pyrite suspected, DS Class limited to **DS-2**

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	1	0
No. tests in 20% data set	0	
Lowest pH	9.6	
Mean of lowest 20%		
Characteristic value	**9.6**	
Design value	**9.6**	
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**

Hydrock

Client	**Mace Group**	**Natural soils**
Project	**St Illtyds**	
Job number	**20700-04**	

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	0
No. tests in 20% data set	0	0	
No. tests with suspected pyrite		2	
Maximum value	49.8	0.1	
Mean of highest two values	30	0	
Mean of highest 20%			
Characteristic Value	**49.8**	**0.1**	
			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	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	7.2	
Mean of lowest 20%		
Characteristic value	**7.2**	
Design value	**7.2**	

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**

Geotechnical Plots

Hydrock Consultants

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: MACE Group

Client Address:

Certificate Number:

Postcode:

Job Number: 20700-04

Site Name: St Illtyds

Site Address:

Date Received:

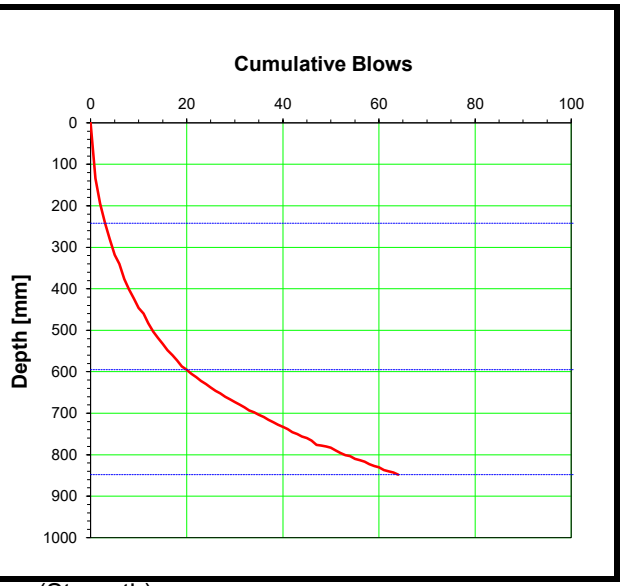
Date Tested: 19/01/2022

Test Results:

Start Depth [mm]: 0mm

Test Location: TRL-DCP-01

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Layer 1	3	3	3	242	242
Layer 2	17	20	12	353	595
Layer 3	44	64	48	253	848



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory: MH

Name: M Wincott

Signed: MW

Position: Geotechnical Engineer

for and behalf of
Hydrock

Date Reported: 20 January 2022

Form Number: HD-TRL-DCP ver1

Registered Office:
Hydrock Consultants Ltd
Over Court Barns
Over Lane Almondsbury
Bristol BS32 4DF U.K.

Hydrock Consultants

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: MACE Group

Client Address:

Certificate Number:

Postcode:

Job Number: 20700-04

Site Name: St Illtyds

Date Received:

Site Address:

Date Tested: 19/01/2022

Test Results:

Start Depth [mm]: 0mm

Test Location: TRL-DCP-02

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Layer 1	3	3	3	225	225
Layer 2	15	18	11	350	575
Layer 3	25	43	25	261	836

Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory: MH Name: M Wincott Signed: MW

Position: Geotechnical Engineer

for and behalf of
Hydrock

Date Reported: 20 January 2022 Page 1 of 1

Form Number: HD-TRL-DCP ver1

Registered Office:
Hydrock Consultants Ltd
Over Court Barns
Over Lane Almondsbury
Bristol BS32 4DF U.K.

Hydrock Consultants

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: MACE Group

Client Address:

Certificate Number:

Postcode:

Job Number: 20700-04

Site Name: St Illtyds

Date Received:

Site Address:

Date Tested: 19/01/2022

Test Results:

Start Depth [mm]: 0mm

Test Location: TRL-DCP-03

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Layer 1	5	5	4	290	290
Layer 2	14	19	34	111	401
Layer 3	17	36	9	454	855

Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory: MH Name: M Wincott Signed: MW

Position: Geotechnical Engineer

for and behalf of
Hydrock

Date Reported: 20 January 2022 Page 1 of 1

Form Number: HD-TRL-DCP ver1

Registered Office:
Hydrock Consultants Ltd
Over Court Barns
Over Lane Almondsbury
Bristol BS32 4DF U.K.

Registered in England No. 3118932

Hydrock Consultants

TEST CERTIFICATE

Determination of TRL Dynamic Cone Penetrometer

Tested in accordance with In TRL Road Note 31 & 8 and IAN 73/06 (2009 amendment)

Client: MACE Group

Client Address:

Certificate Number:

Postcode:

Job Number: 20700-04

Site Name: St Illtyds

Date Received:

Site Address:

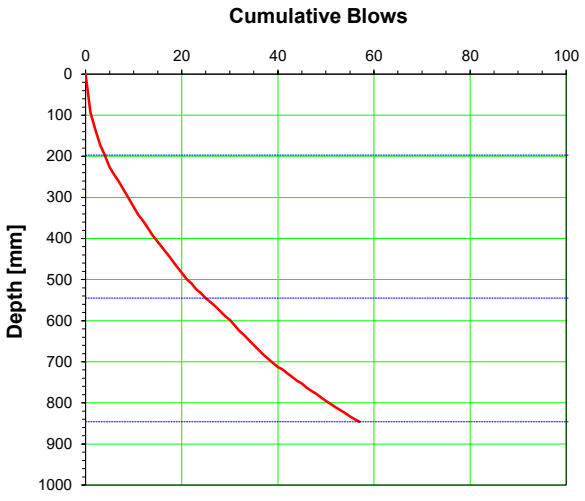
Date Tested: 19/01/2022

Test Results:

Start Depth [mm]: 0mm

Test Location: TRL-DCP-04

Layer	No of Blows	Cumulative Blows	CBR [%]	Layer Thickness [mm]	Total Depth [mm]
Layer 1	4	4	5	197	197
Layer 2	21	25	16	348	545
Layer 3	32	57	28	301	846



Comments: TRL Equation : $Log_{10}(CBR) = 2.480 - 1.057 \times Log_{10}(Strength)$

Approved Signatory: MH Name: M Wincott Signed: MW

Position: Geotechnical Engineer

for and behalf of
Hydrock

Date Reported: 20 January 2022 Page 1 of 1

Form Number: HD-TRL-DCP ver1

Registered Office:
Hydrock Consultants Ltd
Over Court Barns
Over Lane Almondsbury
Bristol BS32 4DF U.K.

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site: St Illtyds

Client: MACE Group

Test Location SA01 **Date of start** 18/01/2022 **Date at end** 19/01/2022

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	1.200m	Trial Pit Length (L)		Trial Pit Length (L)	
Trial Pit Breadth / Width (B)	0.650m	Trial Pit Breadth / Width (B)		Trial Pit Breadth / Width (B)	
Effective Depth (D)	1.050m	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})	0.650m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	0.400m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	0.312m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit		Gravel used to backfill Test Pit	
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	0.312m³	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	11.500	0.650	0								
1	11.510	0.650	60								
1	11.520	0.650	120								
1	11.530	0.650	180								
1	11.540	0.650	240								
1	11.550	0.650	300								
1	12.050	0.650	900								
1	12.350	0.650	2700								
1	13.230	0.650	5580								
1	13.400	0.650	6600								
2	9.300	0.650	78000								
			78000								
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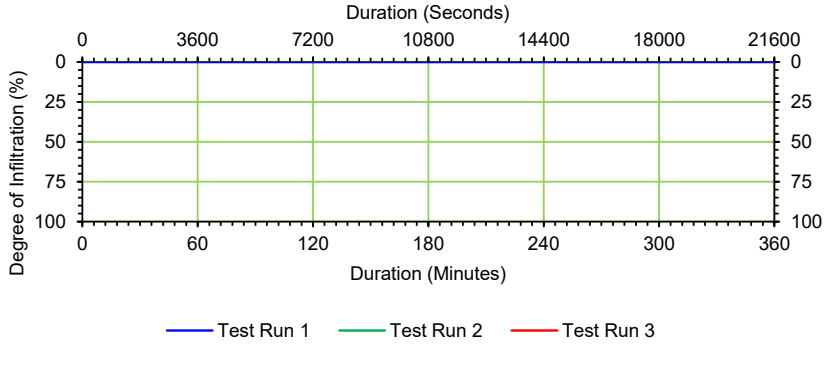
25% water loss (75% full)	0.750m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	0.850m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	0.950m	**75% water loss (25% full)**	-	**75% water loss (25% full)**	-
25% time (seconds)	-	**25% time (seconds)**	-	**25% time (seconds)**	-
75% time (seconds)	-	**75% time (seconds)**	-	**75% time (seconds)**	-
Vp 75-25	0.156m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	1.520m³	**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**	-



Form completed by		
Tested By	PRINT	Matt Wincott
	SIGN	MW
	DATE	19/01/2022
Calculated By	PRINT	Matt Wincott
	SIGN	MW
	DATE	19/01/2022
Checked by	PRINT	Matthew Holbourn
	SIGN	MH
	DATE	20/01/2022

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site: St Illtyds

Client: MACE Group

Test Location SA02 **Date of start** 19/01/2022 **Date at end** 19/01/2022

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	1.300m	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)	1.000m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	9.21	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	9.23	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	0.510m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	0.490m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	0.382m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit		Gravel used to backfill Test Pit	
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	0.382m³	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	9.230	0.510	0								
1	9.240	0.510	60								
1	9.250	0.510	120								
1	9.270	0.510	240								
1	9.320	0.510	540								
1	9.470	0.510	1440								
1	11.420	0.520	8340								
1	12.150	0.525	10320								
1	13.080	0.525	13500								
			13500								
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			13500								

25% water loss (75% full)	0.633m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	0.755m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	0.878m	**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	0.191m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	1.711m³	**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**	-

Form completed by		
Tested By	PRINT	Matt Wincott
	SIGN	MW
	DATE	19/01/2022
Calculated By	PRINT	Matt Wincott
	SIGN	MW
	DATE	19/01/2022
Checked by	PRINT	Matthew Holbourn
	SIGN	MH
	DATE	20/01/2022

1 DAY INFILTRATION ASSESSMENT - WORKSHEET

Site: St Illtyds

Client: MACE Group

Test Location SA03 **Date of start** 19/01/2022 **Date at end** 19/01/2022

Test Run 1		Test Run 2		Test Run 3	
Pit Dimensions (m)		**Pit Dimensions (m)**		**Pit Dimensions (m)**	
Trial Pit Length (L)	1.000m	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)	1.000m	Effective Depth (D)		Effective Depth (D)	
Time at Start of Filling	9.42	Time at Start of Filling		Time at Start of Filling	
Time at End of Filling	9.42	Time at End of Filling		Time at End of Filling	
Depth from Surface to Water (D_{TW})	0.520m	Depth below Surface to Water (D_{TW})		Depth below Surface to Water (D_{TW})	
Water Depth (W_D)	0.480m	Water Depth (W_D)	-	Water Depth (W_D)	-
Maximum Fill Volume (V_W)	0.288m³	Maximum Fill Volume (V_W)	-	Maximum Fill Volume (V_W)	-
Gravel used to backfill Test Pit	No	Gravel used to backfill Test Pit		Gravel used to backfill Test Pit	
Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)		Porosity of Gravel Backfill (P_t)	
Corrected Water Volume (V_{WC})	0.288m³	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	9.420	0.520	0								
1	9.440	0.520	120								
1	9.450	0.520	180								
1	9.470	0.520	300								
1	11.440	0.520	7320								
1	12.140	0.520	9120								
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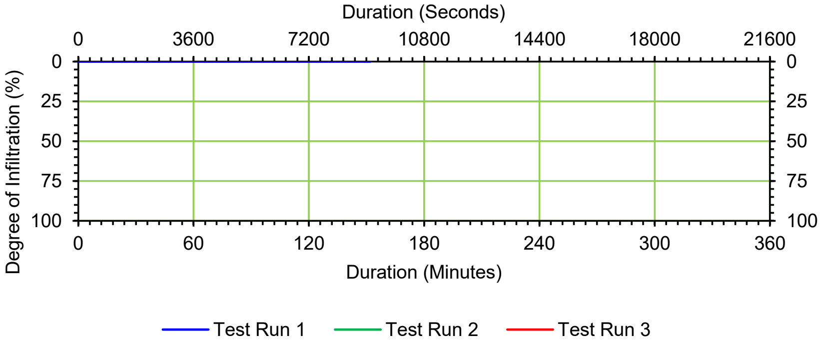
			9120								

25% water loss (75% full)	0.640m	**25% water loss (75% full)**	-	**25% water loss (75% full)**	-
50% water loss (50% full)	0.760m	**50% water loss (50% full)**	-	**50% water loss (50% full)**	-
75% water loss (25% full)	0.880m	**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	0.144m³	**Vp 75-25**	-	**Vp 75-25**	-
ap 50 (Actual area from test)	1.368m³	**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**	-



Form completed by		
Tested By	PRINT	Matt Wincott
	SIGN	MW
	DATE	19/01/2022
Calculated By	PRINT	Matt Wincott
	SIGN	MW
	DATE	19/01/2022
Checked by	PRINT	Matthew Holbourn
	SIGN	MH
	DATE	20/01/2022

Appendix D

Contamination Test Results and Statistical Analysis

Contamination Test Results

Matthew Holbourn
Hydrock Consultants Ltd
Over Court Barns
Over Lane
Bristol
BS32 4DF

t: 01454 619533
f: 01454 614125
e: Group Bristol cc engineer

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 22-36498

Project / Site name:	Ysgol St Illtyds	**Samples received on:**	25/01/2022
Your job number:	C-20700-C	**Samples instructed on/ Analysis started on:**	01/02/2022
Your order number:	PO13102	**Analysis completed by:**	07/02/2022
Report Issue Number:	1	**Report issued on:**	07/02/2022
Samples Analysed:	6 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.

Analytical Report Number: 22-36498
Project / Site name: Ysgol St Illtyds
Your Order No: PO13102

Lab Sample Number				2155626	2155627	2155628	2155629	2155630
Sample Reference				SA01	SA01	SA02	SA02	SA03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	0.50	0.15	0.50	0.15
Date Sampled				18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	16	26	15	33
Total mass of sample received	kg	0.001	NONE	1.1	1.0	1.1	1.0	1.1
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KSZ	KSZ	KSZ	KSZ	KSZ
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.2	7.8	6.5	6.8	6.6
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	0.014	0.015	0.018	0.019	0.045
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.025	0.0017	0.030	0.0045	0.045
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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.28	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.23	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80

Analytical Report Number: 22-36498
Project / Site name: Ysgol St Illtyds
Your Order No: PO13102

Lab Sample Number				2155626	2155627	2155628	2155629	2155630
Sample Reference				SA01	SA01	SA02	SA02	SA03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	0.50	0.15	0.50	0.15
Date Sampled				18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022
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	9.4	6.2	8.5	7.0	10
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.95	1.9	0.98	1.8	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.5	0.8	0.2	0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	27	47	28	37	33
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	47	28	37	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	22	21	38	19	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	37	13	50	17	56
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	20	39	22	38	26
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	33	46	37	36	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	150	110	130	140

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

Analytical Report Number: 22-36498
Project / Site name: Ysgol St Illtyds
Your Order No: PO13102

Lab Sample Number				2155631
Sample Reference				SA03
Sample Number				None Supplied
Depth (m)				1.00
Date Sampled				18/09/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	14
Total mass of sample received	kg	0.001	NONE	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KSZ

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.032
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0013

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.38
Pyrene	mg/kg	0.05	MCERTS	0.35
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80

Analytical Report Number: 22-36498
Project / Site name: Ysgol St Illtyds
Your Order No: PO13102

Lab Sample Number				2155631
Sample Reference				SA03
Sample Number				None Supplied
Depth (m)				1.00
Date Sampled				18/09/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.6
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.1
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2
Chromium (III)	mg/kg	1	NONE	48
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	48
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	42
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130

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

Analytical Report Number : 22-36498
Project / Site name: Ysgol St Illtyds

* 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 *
2155626	SA01	None Supplied	0.15	Brown loam and clay with vegetation and gravel
2155627	SA01	None Supplied	0.5	Brown clay with vegetation.
2155628	SA02	None Supplied	0.15	Brown loam and clay with vegetation.
2155629	SA02	None Supplied	0.5	Brown clay with vegetation.
2155630	SA03	None Supplied	0.15	Brown clay and loam with vegetation.
2155631	SA03	None Supplied	1	Brown clay and sand.

Analytical Report Number : 22-36498
Project / Site name: Ysgol St Illtyds

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
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	NONE
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
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
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS

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

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

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Analytical Report Number : 22-41469

Project / Site name:	Cardiff Schools 2022, Sufficiency Schemes - St Illtyds	**Samples received on:**	23/02/2022
Your job number:	20700-04	**Samples instructed on/ Analysis started on:**	24/02/2022
Your order number:	PO14179	**Analysis completed by:**	02/03/2022
Report Issue Number:	1	**Report issued on:**	02/03/2022
Samples Analysed:	3 soil samples		

Signed: Karolina Marek

Karolina Marek
PL Head of 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.

Analytical Report Number: 22-41469
Project / Site name: Cardiff Schools 2022, Sufficiency Schemes - St Illtyds
Your Order No: PO14179

Lab Sample Number				2182972	2182973	2182974
Sample Reference				BH01	BH01	BH01
Sample Number				1	2	None Supplied
Depth (m)				0.30	0.65	1.85
Date Sampled				21/02/2022	21/02/2022	21/02/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Stone Content	%	0.1	NONE	44	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	15	18
Total mass of sample received	kg	0.001	NONE	1.0	1.0	0.50
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-
Asbestos Analyst ID	N/A	N/A	N/A	JMA	JMA	
General Inorganics						
pH - Automated	pH Units	N/A	MCERTS	9.6	8.2	7.2
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	-
Total Sulphate as SO4	mg/kg	50	MCERTS	1600	130	270
Total Sulphate as SO4	%	0.005	MCERTS	0.159	0.013	0.027
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.0098	0.050
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	121	9.8	49.8
Total Sulphur	mg/kg	50	MCERTS	1800	90	290
Total Sulphur	%	0.005	MCERTS	0.175	0.009	0.029
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.012	0.0066	-
Total Phenols						
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	0.21	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	0.28	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	0.32	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.34	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	0.45	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.0	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.45	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.84	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.70	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	< 0.05	-
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.70	< 0.80	-

Analytical Report Number: 22-41469
Project / Site name: Cardiff Schools 2022, Sufficiency Schemes - St Illtyds
Your Order No: PO14179

Lab Sample Number				2182972	2182973	2182974
Sample Reference				BH01	BH01	BH01
Sample Number				1	2	None Supplied
Depth (m)				0.30	0.65	1.85
Date Sampled				21/02/2022	21/02/2022	21/02/2022
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	5.0	5.3	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.7	1.0	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.1	0.4	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	-
Chromium (III)	mg/kg	1	NONE	20	37	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	37	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	62	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	16	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	29	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	40	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	74	77	-
PCBs						
PCB Congener 077	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 081	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 105	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 114	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 118	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 123	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 126	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 156	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 157	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 167	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 169	mg/kg	0.001	NONE	< 0.001	< 0.001	-
PCB Congener 189	mg/kg	0.001	NONE	< 0.001	< 0.001	-
Total PCBs – WHO12						
Total PCBs	mg/kg	0.012	NONE	< 0.012	< 0.012	-

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

Analytical Report Number : 22-41469
Project / Site name: Cardiff Schools 2022, Sufficiency Schemes - St Illtyds

* 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 *
2182972	BH01	1	0.3	Brown clay and gravel with stones and brick.
2182973	BH01	2	0.65	Brown clay and loam with gravel.
2182974	BH01	None Supplied	1.85	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 22-41469
Project / Site name: Cardiff Schools 2022, Sufficiency Schemes - St Illtyds

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
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	NONE
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
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
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
PCBs WHO 12 in soil	Determination of PCBs (WHO-12 Congeners) by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	NONE
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 22-41469
Project / Site name: Cardiff Schools 2022, Sufficiency Schemes - St Illtyds

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil	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

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.

Statistical Analysis

Assessment of Chemicals of Potential Concern to Human Health

Hydrock

						Soil Type	MG												
All values in mg/kg unless otherwise stated						Location & Depth	BH01												
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.30**												
Arsenic	1	1	5	5	0	40	5												
Beryllium	0.06	1	2.7	2.7	0	73	2.7												
Boron	0.2	1	1.1	1.1	0	11000	1.1												
Cadmium	0.2	1	0.2	0.2	0	87	0.2												
Chromium (III)	1	1	20	20	0	890	20												
Chromium (VI)	1.2	1	1.2	1.2	0	6.1	1.2												
Copper	1	1	29	29	0	7300	29												
Lead	1	1	20	20	0	310	20												
Mercury, inorganic	0.3	1	0.3	0.3	0	240	0.3												
Nickel	1	1	10	10	0	180	10												
Selenium	1	1	1	1	0	600	1												
Vanadium	1	1	26	26	0	1200	26												
Zinc	1	1	74	74	0	40000	74												
Cyanide (free)	1	1	1	1	0	800	1												
Phenol (total)	1	1	1	1	0	750	1												
Acenaphthene	0.05	1	0.05	0.05	0	3000	0.05												
Acenaphthylene	0.05	1	0.05	0.05	0	2900	0.05												
Anthracene	0.05	1	0.05	0.05	0	31000	0.05												
Benz(a)anthracene	0.05	1	0.34	0.34	0	5.5	0.34												
Benzo(a)pyrene	0.05	1	0.84	0.84	0	1.5	0.84												
Benzo(b)fluoranthene	0.05	1	1	1	0	11	1												
Benzo(ghi)perylene	0.05	1	1.1	1.1	0	71	1.1												
Benzo(k)fluoranthene	0.05	1	0.45	0.45	0	15	0.45												
Chrysene	0.05	1	0.45	0.45	0	13	0.45												
Dibenz(a,h)anthracene	0.05	1	0.05	0.05	0	1.3	0.05												
Fluoranthene	0.05	1	0.28	0.28	0	1500	0.28												
Fluorene	0.05	1	0.05	0.05	0	2800	0.05												
Indeno(1,2,3,cd)pyrene	0.05	1	0.7	0.7	0	6.3	0.7												
Naphthalene	0.05	1	0.05	0.05	0	2.3	0.05												
Phenanthrene	0.05	1	0.21	0.21	0	1300	0.21												
Pyrene	0.05	1	0.32	0.32	0	3700	0.32												
Asbestos identified	Y/N						N												
FOC (dimensionless)	0.012	**(mean)**					0.012												
SOM (calculated)	2.07%	**(mean)**					2.07%												
pH (su)	9.6	**(mean)**					9.6												

Risk parameter: Human health - residential without plant uptake (1%SOM)
Data set: MG
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-41469-1

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	MG											
All values in mg/kg unless otherwise stated						Location & Depth	BH01											
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.30**											
Arsenic	1	1	5	5	0	250	5											
Boron	0.2	1	1.1	1.1	0	3	1.1											
Chromium (III)	1	1	20	20	0	400	20											
Chromium (VI)	1.2	1	1.2	1.2	0	25	1.2											
Copper	1	1	29	29	0	200	29											
Nickel	1	1	10	10	0	110	10											
Zinc	1	1	74	74	0	300	74											
	Mean																	
pH (su)	9.6						9.6											

Risk parameter: Plant life pH >7
Data set: MG
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-41469-1

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

						Soil Type	NAT												
All values in mg/kg unless otherwise stated						Location & Depth	BH01												
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.65**												
Arsenic	1	1	5.3	5.3	0	40	5.3												
Beryllium	0.06	1	1	1	0	73	1												
Boron	0.2	1	0.4	0.4	0	11000	0.4												
Cadmium	0.2	1	0.2	0.2	0	87	0.2												
Chromium (III)	1	1	37	37	0	890	37												
Chromium (VI)	1.2	1	1.2	1.2	0	6.1	1.2												
Copper	1	1	62	62	0	7300	62												
Lead	1	1	16	16	0	310	16												
Mercury, inorganic	0.3	1	0.3	0.3	0	240	0.3												
Nickel	1	1	29	29	0	180	29												
Selenium	1	1	1	1	0	600	1												
Vanadium	1	1	40	40	0	1200	40												
Zinc	1	1	77	77	0	40000	77												
Cyanide (free)	1	1	1	1	0	800	1												
Phenol (total)	1	1	1	1	0	750	1												
Acenaphthene	0.05	1	0.05	0.05	0	3000	0.05												
Acenaphthylene	0.05	1	0.05	0.05	0	2900	0.05												
Anthracene	0.05	1	0.05	0.05	0	31000	0.05												
Benz(a)anthracene	0.05	1	0.05	0.05	0	5.5	0.05												
Benzo(a)pyrene	0.05	1	0.05	0.05	0	1.5	0.05												
Benzo(b)fluoranthene	0.05	1	0.05	0.05	0	11	0.05												
Benzo(ghi)perylene	0.05	1	0.05	0.05	0	71	0.05												
Benzo(k)fluoranthene	0.05	1	0.05	0.05	0	15	0.05												
Chrysene	0.05	1	0.05	0.05	0	13	0.05												
Dibenz(a,h)anthracene	0.05	1	0.05	0.05	0	1.3	0.05												
Fluoranthene	0.05	1	0.05	0.05	0	1500	0.05												
Fluorene	0.05	1	0.05	0.05	0	2800	0.05												
Indeno(1,2,3,cd)pyrene	0.05	1	0.05	0.05	0	6.3	0.05												
Naphthalene	0.05	1	0.05	0.05	0	2.3	0.05												
Phenanthrene	0.05	1	0.05	0.05	0	1300	0.05												
Pyrene	0.05	1	0.05	0.05	0	3700	0.05												
Asbestos identified	Y/N						N												
FOC (dimensionless)	0.0066	**(mean)**					0.0066												
SOM (calculated)	1.14%	**(mean)**					1.14%												
pH (su)	8.2	**(mean)**					8.2												

Risk parameter: Human health - residential without plant uptake (1%SOM)
Data set: Nat - classrooms
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-41469-1

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	NAT											
All values in mg/kg unless otherwise stated						Location & Depth	BH01											
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.65**											
Arsenic	1	1	5.3	5.3	0	250	5.3											
Boron	0.2	1	0.4	0.4	0	3	0.4											
Chromium (III)	1	1	37	37	0	400	37											
Chromium (VI)	1.2	1	1.2	1.2	0	25	1.2											
Copper	1	1	62	62	0	200	62											
Nickel	1	1	29	29	0	110	29											
Zinc	1	1	77	77	0	300	77											
	Mean																	
pH (su)	8.2						8.2											

Risk parameter: Plant life pH >7
Data set: Nat - classrooms
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-41469-1

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

						Soil Type	NAT	NAT	NAT										
All values in mg/kg unless otherwise stated						Location & Depth	SA01	SA02	SA03										
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.50**	**0.50**	**1.00**										
Arsenic	1	3	6.2	7	0	79	6.2	7	6.6										
Beryllium	0.06	3	1.8	2.1	0	92	1.9	1.8	2.1										
Boron	0.2	3	0.2	0.5	0	21000	0.5	0.2	0.3										
Cadmium	0.2	3	0.2	0.2	0	120	0.2	0.2	0.2										
Chromium (III)	1	3	37	48	0	1500	47	37	48										
Chromium (VI)	1.2	3	1.2	1.2	0	7.7	1.2	1.2	1.2										
Copper	1	3	15	21	0	12000	21	19	15										
Lead	1	3	13	20	0	630	13	17	20										
Mercury, inorganic	0.3	3	0.3	0.3	0	470	0.3	0.3	0.3										
Nickel	1	3	38	42	0	290	39	38	42										
Selenium	1	3	1	1	0	1400	1	1	1										
Vanadium	1	3	36	46	0	2000	46	36	42										
Zinc	1	3	130	150	0	81000	150	130	130										
Cyanide (free)	1	3	1	1	0	1600	1	1	1										
Phenol (total)	1	3	1	1	0	760	1	1	1										
Acenaphthene	0.05	3	0.05	0.05	0	15000	0.05	0.05	0.05										
Acenaphthylene	0.05	3	0.05	0.05	0	15000	0.05	0.05	0.05										
Anthracene	0.05	3	0.05	0.05	0	74000	0.05	0.05	0.05										
Benz(a)anthracene	0.05	3	0.05	0.05	0	17	0.05	0.05	0.05										
Benzo(a)pyrene	0.05	3	0.05	0.05	0	2.6	0.05	0.05	0.05										
Benzo(b)fluoranthene	0.05	3	0.05	0.05	0	18	0.05	0.05	0.05										
Benzo(ghi)perylene	0.05	3	0.05	0.05	0	120	0.05	0.05	0.05										
Benzo(k)fluoranthene	0.05	3	0.05	0.05	0	26	0.05	0.05	0.05										
Chrysene	0.05	3	0.05	0.05	0	25	0.05	0.05	0.05										
Dibenz(a,h)anthracene	0.05	3	0.05	0.05	0	2.3	0.05	0.05	0.05										
Fluoranthene	0.05	3	0.05	0.38	0	3100	0.05	0.05	0.38										
Fluorene	0.05	3	0.05	0.05	0	9900	0.05	0.05	0.05										
Indeno(1,2,3,cd)pyrene	0.05	3	0.05	0.05	0	11	0.05	0.05	0.05										
Naphthalene	0.05	3	0.05	0.05	0	3900	0.05	0.05	0.05										
Phenanthrene	0.05	3	0.05	0.05	0	3100	0.05	0.05	0.05										
Pyrene	0.05	3	0.05	0.35	0	7400	0.05	0.05	0.35										
Asbestos identified	Y/N						N	N	N										
FOC (dimensionless)	0.0025	**(mean)**					0.0017	0.0045	0.0013										
SOM (calculated)	0.43%	**(mean)**					0.29%	0.78%	0.22%										
pH (su)	7.6	**(mean)**					7.8	6.8	8.2										

Risk parameter: Human health - POS resi (1%SOM)
Data set: Nat - pitches
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-36498-1

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	NAT	NAT	NAT										
All values in mg/kg unless otherwise stated						Location & Depth	SA01	SA02	SA03										
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.50**	**0.50**	**1.00**										
Arsenic	1	3	6.2	7	0	250	6.2	7	6.6										
Boron	0.2	3	0.2	0.5	0	3	0.5	0.2	0.3										
Chromium (III)	1	3	37	48	0	400	47	37	48										
Chromium (VI)	1.2	3	1.2	1.2	0	25	1.2	1.2	1.2										
Copper	1	3	15	21	0	200	21	19	15										
Nickel	1	3	38	42	0	110	39	38	42										
Zinc	1	3	130	150	0	300	150	130	130										
	Mean																		
pH (su)	7.6						7.8	6.8	8.2										

Risk parameter: Plant life pH >7
Data set: Nat - pitches
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-36498-1

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						Soil Type	TS	TS	TS									
						Location & Depth	SA01	SA02	SA03									
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.15**	**0.15**	**0.15**									
Arsenic	1	3	8.5	10	0	79	9.4	8.5	10									
Beryllium	0.06	3	0.95	1.2	0	92	0.95	0.98	1.2									
Boron	0.2	3	0.2	0.8	0	21000	0.3	0.8	0.2									
Cadmium	0.2	3	0.2	0.2	0	120	0.2	0.2	0.2									
Chromium (III)	1	3	27	33	0	1500	27	28	33									
Chromium (VI)	1.2	3	1.2	1.2	0	7.7	1.2	1.2	1.2									
Copper	1	3	22	38	0	12000	22	38	31									
Lead	1	3	37	56	0	630	37	50	56									
Mercury, inorganic	0.3	3	0.3	0.3	0	470	0.3	0.3	0.3									
Nickel	1	3	20	26	0	290	20	22	26									
Selenium	1	3	1	1	0	1400	1	1	1									
Vanadium	1	3	33	38	0	2000	33	37	38									
Zinc	1	3	100	140	0	81000	100	110	140									
Cyanide (free)	1	3	1	1	0	1600	1	1	1									
Phenol (total)	1	3	1	1	0	1500	1	1	1									
Acenaphthene	0.05	3	0.05	0.05	0	15000	0.05	0.05	0.05									
Acenaphthylene	0.05	3	0.05	0.05	0	15000	0.05	0.05	0.05									
Anthracene	0.05	3	0.05	0.05	0	74000	0.05	0.05	0.05									
Benz(a)anthracene	0.05	3	0.05	0.05	0	18	0.05	0.05	0.05									
Benzo(a)pyrene	0.05	3	0.05	0.05	0	2.6	0.05	0.05	0.05									
Benzo(b)fluoranthene	0.05	3	0.05	0.05	0	18	0.05	0.05	0.05									
Benzo(ghi)perylene	0.05	3	0.05	0.05	0	120	0.05	0.05	0.05									
Benzo(k)fluoranthene	0.05	3	0.05	0.05	0	26	0.05	0.05	0.05									
Chrysene	0.05	3	0.05	0.05	0	26	0.05	0.05	0.05									
Dibenz(a,h)anthracene	0.05	3	0.05	0.05	0	2.3	0.05	0.05	0.05									
Fluoranthene	0.05	3	0.05	0.28	0	3100	0.05	0.28	0.05									
Fluorene	0.05	3	0.05	0.05	0	9900	0.05	0.05	0.05									
Indeno(1,2,3,cd)pyrene	0.05	3	0.05	0.05	0	11	0.05	0.05	0.05									
Naphthalene	0.05	3	0.05	0.05	0	4100	0.05	0.05	0.05									
Phenanthrene	0.05	3	0.05	0.05	0	3100	0.05	0.05	0.05									
Pyrene	0.05	3	0.05	0.23	0	7400	0.05	0.23	0.05									
Asbestos identified	Y/N						N	N	N									
FOC (dimensionless)	0.033333	**(mean)**					0.025	0.03	0.045									
SOM (calculated)	5.75%	**(mean)**					4.31%	5.17%	7.76%									
pH (su)	6.8	**(mean)**					7.2	6.5	6.6									

Risk parameter: Human health - POS resi (2.5%SOM)
Data set: Topsoil
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-36498-1

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	TS	TS	TS										
All values in mg/kg unless otherwise stated						Location & Depth	SA01	SA02	SA03										
Chemical of Potential Concern	**Lab. RL**	**No. Samples**	**Min. Value**	**Max. Value**	**No. Samples > or = GAC**	**GAC**	**0.15**	**0.15**	**0.15**										
Arsenic	1	3	8.5	10	0	250	9.4	8.5	10										
Boron	0.2	3	0.2	0.8	0	3	0.3	0.8	0.2										
Chromium (III)	1	3	27	33	0	400	27	28	33										
Chromium (VI)	1.2	3	1.2	1.2	0	25	1.2	1.2	1.2										
Copper	1	3	22	38	0	135	22	38	31										
Nickel	1	3	20	26	0	75	20	22	26										
Zinc	1	3	100	140	0	300	100	110	140										
	Mean																		
pH (su)	6.8						7.2	6.5	6.6										

Risk parameter: Plant life pH 7
Data set: Topsoil
Client: Mace Group
Site: St Illtyds
Job no.: 20700-04
Lab. report no(s).: 22-36498-1

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

Appendix E

Waste Assessment

HazWasteOnline™ Assessment

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

1TAHA-35IE9-BLCVS

Job name

22-36498_HWOL_Results

Description/Comments

i2 certs: 22-36498 and 22-4169

Project

20700

Site

St Illtyds

Classified by

Name:
Matthew Keehn
Company:
Hydrock Consultants Ltd
Date:
17 Mar 2022 15:50 GMT
Telephone:

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	08 Sep 2020

Next 3 year Refresher due by Sep 2023

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	SA01--18092022-0.15		Non Hazardous		2
2	SA01--18092022-0.50		Non Hazardous		4
3	SA02--18092022-0.15		Non Hazardous		6
4	SA02--18092022-0.50		Non Hazardous		8
5	SA03--18092022-0.15		Non Hazardous		10
6	SA03--18092022-1.00		Non Hazardous		12

Related documents

#	Name	Description
1	22-36498_HWOL_Results.hwol	.hwol file used to create the Job
2	Hydrock Standard plus Cresol (ammended Lead)	waste stream template used to create this Job

Report

Created by: Matthew Keehn
Created date: 17 Mar 2022 15:50 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	14
Appendix B: Rationale for selection of metal species	15
Appendix C: Version	16

Classification of sample: SA01--18092022-0.15

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
SA01--18092022-0.15
Moisture content:
17%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 17% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.4	mg/kg	1.32	10.301	mg/kg	0.00103 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.95	mg/kg	2.775	2.188	mg/kg	0.000219 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.3	mg/kg	13.43	3.344	mg/kg	0.000334 %	✓	
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		27	mg/kg	1.462	39.462	mg/kg	0.00395 %		
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		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		22	mg/kg	1.126	20.559	mg/kg	0.00206 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
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		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
20		fluorene		201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
21		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	37 mg/kg		30.71 mg/kg	0.00307 %	✓	
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]		20 mg/kg	1.579	26.22 mg/kg	0.00262 %	✓	
26		pH			PH		7.2 pH		7.2 pH	7.2 pH		
27		phenanthrene		201-581-5	85-01-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
28		pyrene		204-927-3	129-00-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<**LOD**
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		100 mg/kg	1.245	103.311 mg/kg	0.0103 %	✓	
31		monohydric phenols			P1186		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
32		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		33 mg/kg	1.785	48.896 mg/kg	0.00489 %	✓	
									Total:	0.0293 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
	This determinand is defined in the EU CLP Table 3
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: SA01--18092022-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
SA01--18092022-0.50
Moisture content:
16%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		6.2	mg/kg	1.32	6.876	mg/kg	0.000688 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.9	mg/kg	2.775	4.429	mg/kg	0.000443 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.5	mg/kg	13.43	5.641	mg/kg	0.000564 %	✓	
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		47	mg/kg	1.462	68.693	mg/kg	0.00687 %		
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		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		21	mg/kg	1.126	19.861	mg/kg	0.00199 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
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		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
20		fluorene		201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
21		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	13 mg/kg		10.92 mg/kg	0.00109 %	✓	
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]		39 mg/kg	1.579	51.744 mg/kg	0.00517 %	✓	
26		pH			PH		7.8 pH		7.8 pH	7.8 pH		
27		phenanthrene		201-581-5	85-01-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
28		pyrene		204-927-3	129-00-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<**LOD**
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		150 mg/kg	1.245	156.834 mg/kg	0.0157 %	✓	
31		monohydric phenols			P1186		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
32		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		46 mg/kg	1.785	68.98 mg/kg	0.0069 %	✓	
									Total:	0.0402 %		

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
	This determinand is defined in the EU CLP Table 3
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: SA02--18092022-0.15

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
SA02--18092022-0.15
Moisture content:
26%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 26% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		8.5	mg/kg	1.32	8.305	mg/kg	0.00083 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.98	mg/kg	2.775	2.013	mg/kg	0.000201 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.8	mg/kg	13.43	7.951	mg/kg	0.000795 %	✓	
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		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
15		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		38	mg/kg	1.126	31.66	mg/kg	0.00317 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
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				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				0.28	mg/kg		0.207	mg/kg	0.0000207 %	✓	
			205-912-4	206-44-0									
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	50	mg/kg		37	mg/kg	0.0037 %	✓	
		082-001-00-6											
23		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									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel dihydroxide }				22	mg/kg	1.579	25.714	mg/kg	0.00257 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26		pH				6.5	pH		6.5	pH	6.5 pH		
				PH									
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-581-5	85-01-8									
28		pyrene				0.23	mg/kg		0.17	mg/kg	0.000017 %	✓	
			204-927-3	129-00-0									
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<**LOD**
		034-002-00-8											
30		zinc { zinc oxide }				110	mg/kg	1.245	101.32	mg/kg	0.0101 %	✓	
		030-013-00-7	215-222-5	1314-13-2									
31		monohydric phenols				<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
				P1186									
32		vanadium { divanadium pentaoxide; vanadium pentoxide }				37	mg/kg	1.785	48.878	mg/kg	0.00489 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.0312 %		

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
	This determinand is defined in the EU CLP Table 3
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: SA02--18092022-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
SA02--18092022-0.50
Moisture content:
15%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7	mg/kg	1.32	7.856	mg/kg	0.000786 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.8	mg/kg	2.775	4.246	mg/kg	0.000425 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.2	mg/kg	13.43	2.283	mg/kg	0.000228 %	✓	
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		37	mg/kg	1.462	54.078	mg/kg	0.00541 %		
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		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		19	mg/kg	1.126	18.183	mg/kg	0.00182 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
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				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-912-4	206-44-0									
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	17	mg/kg		14.45	mg/kg	0.00145 %	✓	
		082-001-00-6											
23		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									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel dihydroxide }				38	mg/kg	1.579	51.018	mg/kg	0.0051 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26		pH				6.8	pH		6.8	pH	6.8 pH		
				PH									
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-581-5	85-01-8									
28		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-927-3	129-00-0									
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<**LOD**
		034-002-00-8											
30		zinc { zinc oxide }				130	mg/kg	1.245	137.541	mg/kg	0.0138 %	✓	
		030-013-00-7	215-222-5	1314-13-2									
31		monohydric phenols				<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
				P1186									
32		vanadium { divanadium pentaoxide; vanadium pentoxide }				36	mg/kg	1.785	54.627	mg/kg	0.00546 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.0352 %		

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
	This determinand is defined in the EU CLP Table 3
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: SA03--18092022-0.15

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
SA03--18092022-0.15
Moisture content:
33%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 33% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10	mg/kg	1.32	8.846	mg/kg	0.000885 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1.2	mg/kg	2.775	2.231	mg/kg	0.000223 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.2	mg/kg	13.43	1.8	mg/kg	0.00018 %	✓	
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		33	mg/kg	1.462	48.231	mg/kg	0.00482 %		
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		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		31	mg/kg	1.126	23.385	mg/kg	0.00234 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
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				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-912-4	206-44-0									
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	56	mg/kg		37.52	mg/kg	0.00375 %	✓	
		082-001-00-6											
23		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									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel dihydroxide }				26	mg/kg	1.579	27.515	mg/kg	0.00275 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26		pH				6.6	pH		6.6	pH	6.6 pH		
				PH									
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-581-5	85-01-8									
28		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-927-3	129-00-0									
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<**LOD**
		034-002-00-8											
30		zinc { zinc oxide }				140	mg/kg	1.245	116.754	mg/kg	0.0117 %	✓	
		030-013-00-7	215-222-5	1314-13-2									
31		monohydric phenols				<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
				P1186									
32		vanadium { divanadium pentaoxide; vanadium pentoxide }				38	mg/kg	1.785	45.451	mg/kg	0.00455 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.032 %		

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
	This determinand is defined in the EU CLP Table 3
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: SA03--18092022-1.00

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
SA03--18092022-1.00
Moisture content:
14%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		6.6	mg/kg	1.32	7.494	mg/kg	0.000749 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		2.1	mg/kg	2.775	5.012	mg/kg	0.000501 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.3	mg/kg	13.43	3.465	mg/kg	0.000346 %	✓	
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		48	mg/kg	1.462	70.155	mg/kg	0.00702 %		
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		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		15	mg/kg	1.126	14.524	mg/kg	0.00145 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
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		0.38	mg/kg		0.327	mg/kg	0.0000327 %	✓	
20		fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
21		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }	082-001-00-6			1	20	mg/kg		17.2	mg/kg	0.00172 %	✓	
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]		42	mg/kg	1.579	57.052	mg/kg	0.00571 %	✓	
26		pH			PH		8.2	pH		8.2	pH	8.2 pH		
27		phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
28		pyrene		204-927-3	129-00-0		0.35	mg/kg		0.301	mg/kg	0.0000301 %	✓	
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<**LOD**
30		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		130	mg/kg	1.245	139.159	mg/kg	0.0139 %	✓	
31		monohydric phenols			P1186		<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
32		vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8	1314-62-1		42	mg/kg	1.785	64.481	mg/kg	0.00645 %	✓	
											Total:	0.0387 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
	This determinand is defined in the EU CLP Table 3
<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 GB MCL 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**

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - 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

GB MCL 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 MCL protocols, considers many simple lead compounds to be Carcinogenic category 2
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - 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

monohydric phenols (CAS Number: P1186)

Description/Comments: Combined hazards statements from harmonised entries in CLP for phenol, cresols and xylenols (604-001-00-2, 604-004-00-9, 604-006-00-X)
Data source: CLP combined data
Data source date: 26 Mar 2019
Hazard Statements: Muta. 2; H341 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , Acute Tox. 3; H301 , STOT RE 2; H373 , Skin Corr. 1B; H314 , Skin Corr. 1B; H314 >= 3 % , Skin Irrit. 2; H315 1 £ conc. < 3 % , Eye Irrit. 2; H319 1 £ conc. < 3 % , Aquatic Chronic 2; H411

divanadium pentaoxide; vanadium pentoxide (EC Number: 215-239-8, CAS Number: 1314-62-1)

EU CLP index number: 023-001-00-8
Description/Comments:
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Hazard Statements: Muta. 2; H341 , Repr. 2; H361d , STOT RE 1; H372 , Acute Tox. 4; H332 , Acute Tox. 4; H302 , STOT SE 3; H335 , 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

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on hazard statements

zinc {zinc oxide}

Worst case species based on hazard statements

vanadium {divanadium pentaoxide; vanadium pentoxide}

Worst case species based on hazard statements.

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2022.25.4995.9469 (25 Jan 2022)
HazWasteOnline Database: 2022.25.4995.9469 (25 Jan 2022)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
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 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
GB MCL List - version 1.1 of 09 June 2021

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

NXI99-OHMV1-Z4VXQ

Job name

22-41469_HWOL_Results

Description/Comments

i2 certs: 22-36498 and 22-4169

Project

20700

Site

St Illtyds

Classified by

Name:
Matthew Keehn
Company:
Hydrock Consultants Ltd
Date:
17 Mar 2022 15:48 GMT
Telephone:

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	08 Sep 2020

Next 3 year Refresher due by Sep 2023

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	BH01-1-21022022-0.30		Non Hazardous		2
2	BH01-2-21022022-0.65		Non Hazardous		4

Related documents

#	Name	Description
1	22-41469_HWOL_Results.hwol	.hwol file used to create the Job
2	Hydrock Standard plus Cresol (ammended Lead)	waste stream template used to create this Job

Report

Created by: Matthew Keehn
Created date: 17 Mar 2022 15:48 GMT

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Classification of sample: BH01-1-21022022-0.30

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH01-1-21022022-0.30
Moisture content:
12%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5	mg/kg	1.32	5.809	mg/kg	0.000581 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.34	mg/kg		0.299	mg/kg	0.0000299 %	✓	
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.84	mg/kg		0.739	mg/kg	0.0000739 %	✓	
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1	mg/kg		0.88	mg/kg	0.000088 %	✓	
8		benzo[ghi]perylene		205-883-8	191-24-2		1.1	mg/kg		0.968	mg/kg	0.0000968 %	✓	
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.45	mg/kg		0.396	mg/kg	0.0000396 %	✓	
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		2.7	mg/kg	2.775	6.594	mg/kg	0.000659 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1.1	mg/kg	13.43	13	mg/kg	0.0013 %	✓	
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		20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
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		0.45	mg/kg		0.396	mg/kg	0.0000396 %	✓	
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		29	mg/kg	1.126	28.733	mg/kg	0.00287 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
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				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				0.28	mg/kg		0.246	mg/kg	0.0000246 %	✓	
			205-912-4	206-44-0									
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				0.7	mg/kg		0.616	mg/kg	0.0000616 %	✓	
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	20	mg/kg		17.6	mg/kg	0.00176 %	✓	
		082-001-00-6											
23		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									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel dihydroxide }				10	mg/kg	1.579	13.9	mg/kg	0.00139 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26		pH				9.6	pH		9.6	pH	9.6 pH		
				PH									
27		phenanthrene				0.21	mg/kg		0.185	mg/kg	0.0000185 %	✓	
			201-581-5	85-01-8									
28		pyrene				0.32	mg/kg		0.282	mg/kg	0.0000282 %	✓	
			204-927-3	129-00-0									
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<**LOD**
		034-002-00-8											
30		zinc { zinc oxide }				74	mg/kg	1.245	81.056	mg/kg	0.00811 %	✓	
		030-013-00-7	215-222-5	1314-13-2									
31		monohydric phenols				<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
				P1186									
32		vanadium { divanadium pentaoxide; vanadium pentoxide }				26	mg/kg	1.785	40.845	mg/kg	0.00408 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.0249 %		

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
	This determinand is defined in the EU CLP Table 3
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH01-2-21022022-0.65

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH01-2-21022022-0.65
Moisture content:
15%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
2		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
3		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
4		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.3	mg/kg	1.32	5.948	mg/kg	0.000595 %	✓	
5		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
6		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
7		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
8		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
9		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
10		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		1	mg/kg	2.775	2.359	mg/kg	0.000236 %	✓	
11		boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.4	mg/kg	13.43	4.566	mg/kg	0.000457 %	✓	
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		37	mg/kg	1.462	54.078	mg/kg	0.00541 %		
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		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
16		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		62	mg/kg	1.126	59.334	mg/kg	0.00593 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
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				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-912-4	206-44-0									
20		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
21		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-893-2	193-39-5									
22		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	16	mg/kg		13.6	mg/kg	0.00136 %	✓	
		082-001-00-6											
23		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									
24		naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
25		nickel { nickel dihydroxide }				29	mg/kg	1.579	38.935	mg/kg	0.00389 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
26		pH				8.2	pH		8.2	pH	8.2 pH		
				PH									
27		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-581-5	85-01-8									
28		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-927-3	129-00-0									
29		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<**LOD**
		034-002-00-8											
30		zinc { zinc oxide }				77	mg/kg	1.245	81.467	mg/kg	0.00815 %	✓	
		030-013-00-7	215-222-5	1314-13-2									
31		monohydric phenols				<1	mg/kg		<1	mg/kg	<0.0001 %		<**LOD**
				P1186									
32		vanadium { divanadium pentaoxide; vanadium pentoxide }				40	mg/kg	1.785	60.696	mg/kg	0.00607 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
										Total:	0.0329 %		

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
	This determinand is defined in the EU CLP Table 3
<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 GB MCL 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**

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - 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

GB MCL 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 MCL protocols, considers many simple lead compounds to be Carcinogenic category 2
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - 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

monohydric phenols (CAS Number: P1186)

Description/Comments: Combined hazards statements from harmonised entries in CLP for phenol, cresols and xylenols (604-001-00-2, 604-004-00-9, 604-006-00-X)
Data source: CLP combined data
Data source date: 26 Mar 2019
Hazard Statements: Muta. 2; H341 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , Acute Tox. 3; H301 , STOT RE 2; H373 , Skin Corr. 1B; H314 , Skin Corr. 1B; H314 >= 3 % , Skin Irrit. 2; H315 1 £ conc. < 3 % , Eye Irrit. 2; H319 1 £ conc. < 3 % , Aquatic Chronic 2; H411

divanadium pentaoxide; vanadium pentoxide (EC Number: 215-239-8, CAS Number: 1314-62-1)

EU CLP index number: 023-001-00-8
Description/Comments:
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Hazard Statements: Muta. 2; H341 , Repr. 2; H361d , STOT RE 1; H372 , Acute Tox. 4; H332 , Acute Tox. 4; H302 , STOT SE 3; H335 , 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

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on hazard statements

zinc {zinc oxide}

Worst case species based on hazard statements

vanadium {divanadium pentaoxide; vanadium pentoxide}

Worst case species based on hazard statements.

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2022.25.4995.9469 (25 Jan 2022)
HazWasteOnline Database: 2022.25.4995.9469 (25 Jan 2022)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
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 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
GB MCL List - version 1.1 of 09 June 2021

Appendix F

Final Geotechnical Risk Register

Geotechnical Hazard Identification – Following Ground Investigation

The final Geotechnical Risk Register following Ground Investigation is set out in Table F.2.

The probability and impact of a hazard have been judged on a qualitative scale as set out in Table F.1. 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 F.1: 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 F.2: Final 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 construction of the playground at the proposed classroom unit area of the site. The Made Ground has been observed to be 0.45m thick and is likely due to levelling of the playground.	Structures (proposed classroom unit).	Bearing capacity failure, settlement (total and differential).	4	4	16	Design foundations to found below Made Ground into the firm to stiff clay of the Raglan Mudstone Formation.
		Services.	Settlement (differential), causing damage to services.	2	2	4	Anticipated settlements are not significant with regard to services.
		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-excavation and replacement with suitable fill.
Soft / loose ground (low strength and high settlement potential).	The shallow natural soils comprise weathered Raglan Mudstone Formation, which consist of soft clay.	Structures (proposed classroom unit).	Foundation bearing capacity failure, settlement (total and differential).	3	4	12	Design foundations to found below any soft clay.
		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. No additional design requirements envisaged.
		Sports pitch.	Settlement (differential), on pitch.	2	3	6	
		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-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.

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 may vary laterally and vertically, both in composition and strength.	Structures (proposed classroom unit).	Foundation bearing capacity failure, settlement (total and differential).	4	4	16	Design foundations to found below Made Ground and into the firm to stiff clay of the Raglan Mudstone Formation.
		Services.	Settlement (differential), causing damage to services.	2	3	6	Settlements are not anticipated to be significant with regard to services. No additional design requirements envisaged.
		Sports pitch.	Settlement (differential), on pitch.	2	3	6	It is unlikely that settlements will be significant with respect to the pitch.
		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 sulfates in the soils present a low risk.	Attack of buried concrete.	Damage to concrete and reduction in strength.	2	4	8	Classify concrete in accordance with BRE SD1 and design concrete accordingly.
Obstructions.	Obstructions have not been proven by the investigation, but there is a potential for 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.	2	3	6	Allow for a breaker to be present during construction and remove obstructions where encountered during construction.

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Shallow groundwater.	Ground investigations encountered no groundwater inflow, but wet pit walls were observed.	Construction staff, vehicles and plant operators.	Difficulty with excavation. Limit state failure, excessive deformation, trafficking of site plant, inability to place and compact fill.	3	2	6	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.
Changing groundwater conditions.	Whilst the current investigation encountered no groundwater, historic nearby borehole recorded groundwater at a depth of 1.50m bgl. Groundwater conditions may vary through time.	Construction staff, vehicles and plant operators.	Difficulty with excavation. Limit state failure, excessive deformation, trafficking of site plant, inability to place and compact fill.	3	2	6	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.
Subject to risk from erosion.	The proposed classroom unit area of the site is adjacent to a slope.	The proposed classroom unit development.	Damage to structures and services.	2	4	8	The slope is considered to be too shallow to warrant a geotechnical slope assessment and is not considered to present a significant risk.
Loose Made Ground, leading to difficulty with excavation and collapse of side walls.	The ground investigation has indicated that Made Ground is present at the site. There is a potential for loose Made Ground to be present.	Construction staff, vehicles and plant operators.	Ground failure, instability of plant and machinery.	2	4	8	The Made Ground encountered in this investigation was coherent. Further actions are not required unless loose Made Ground is encountered during further works.
			Risk of collapse of excavation.	2	3	6	

Hazard	Comments	Who is at Risk	Consequence	Risk Before Mitigation			Actions Required
				P	I	R	
Slope stability issues – General Slopes.	The proposed classroom unit area of the site is adjacent to a slope.	The proposed classroom unit development.	Damage to structures and services.	2	4	8	The slope is considered to be too shallow to warrant a geotechnical slope assessment and is not considered to present a significant risk.
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 G

Plausible Source-Pathway-Receptor Contaminant Linkages

Summary of Potential Contaminant Linkages

Table G.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 G.1).

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 G.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 G.2: Exposure model – final source-pathway-receptor contaminant linkages

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
Made Ground below the proposed classroom unit area of the site from development platform construction (metals, metalloids, PAH and petroleum hydrocarbons) (S1).	Ingestion, inhalation or direct contact.	Site users.	Unlikely	Medium	Very low	There is Made Ground below the proposed classroom unit area of the site, but no chemical determinands are at levels in excess of the GAC. The Made Ground is not considered to be a source and therefore no mitigation measures will be required.
	Inhalation of fugitive dust.	Neighbours.	Unlikely	Medium	Very low	
	Leaching through unsaturated zone.	Groundwater and possible abstractors.	Unlikely	Medium	Very low	
	Surface run-off.	Aquatic ecosystems.	Unlikely	Medium	Very low	
	Base flow from contaminated groundwater.	Surface water and possible abstractors.	Unlikely	Medium	Very low	
	Root uptake.	Landscape planting	Unlikely	Minor	Very low	
	Direct contact.	Water supply pipes.	Unlikely	Medium	Very low	

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
Made Ground below the proposed classroom unit area of the site from development platform construction (asbestos) (S1).	Inhalation of fugitive dust.	Site users.	Unlikely	Severe	Low	Made Ground has not shown any asbestos content and is not considered to be a source. Therefore, no mitigation is required.
		Neighbours.	Unlikely	Severe	Low	
Ground gases (carbon dioxide and methane) from organic materials in the Made Ground below the proposed classroom unit area of the site (S1).	Migration, build up and asphyxiation.	Site users.	Unlikely	Medium to Severe	Low to Very low	As the Made Ground had an observed thickness of just 0.45m, it is not thought to be a source of ground gas production and CS1 applies. Therefore gas mitigation measures are not required.
		Neighbours.		Medium	Very low	
	Migration, build up and explosion.	Site users.	Unlikely	Medium to Severe	Very low	
		Neighbours.				
		Buildings on site.				
		Buildings on adjacent sites.				