



Phase II Geo-environmental Site Assessment

Knowsley, Prescot
Land Off Villiers Road
Knowsley
Prescot
L34 9ET

31st January 2022

465346.0001.0000

Prepared For:

Pembury Developments Limited
Liberty House
222 Regent Street
London
W1B 5TR

Prepared By:

TRC Companies Limited
2 Mount Street
Manchester
M2 5WQ

Registered office: 150 Minories, London EC3N 1LS | Company number: 06749633

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Prepared by:		 <i>P.A. Welburn</i>		
	Ashley Standen-Howard/ Pamela Welburn	Ashley Standen-Howard/ Pamela Welburn		
Reviewed by:				
	Jonathon Sander	Jonathon Sander		
Approved by:				
	Stephanie Nichols	Stephanie Nichols		

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Executive Summary

TRC Companies Limited (TRC) was commissioned by Pembury Developments Limited to under a Phase II Geo-environmental and Geotechnical Site Assessment at a Site off Villiers Road, Knowsley, Prescott, L34 9ET (hereafter referred to as the 'Site'). This Executive Summary is part of the complete report; and findings, opinions or conclusions in this Executive Summary are made in context with the complete report. TRC recommends that the user reads the entire report for all supporting information related to findings opinions and conclusions.

Executive Summary	
Site Details	
Client	Pembury Developments Limited
Site Address & Grid Reference	Land off Villiers Road, Knowsley, Prescott, L34 9ET Easting (343010) & Northing (396580)
Site Area	2.25 ha
Current Site Use	The Site is currently an inactive plot of land. The Site is currently a disused, heavily vegetated plot of land, with no buildings on Site.
Proposed Development	Development comprising the erection of a new building for Class E (industrial), B2 general industrial and B8 storage/distribution including ancillary offices, landscaping, yards, access points off Villiers Road, car parking, cycle parking and associated engineering works. The car parking (103 spaces) will also have a 68m service yard.
Phase I Summary	
Site History	Earliest available mapping (1850) shows that the Site was undeveloped land. The Site was briefly developed in 1966 when St Jude's hall and chapel were built in the southeast corner. These buildings are expected to have been demolished around 1974 and the Site has remained undeveloped since. The surrounding areas were largely open farmland until 1966 when the area underwent significant industrial and residential development. Contract Chemicals was previously situated directly north of the Site. The associated buildings and infrastructure are currently being demolished. Historical mapping also noted pits and quarries to the south from 1956 which have since been infilled and redeveloped. The historical maps indicate that there was a watercourse (Knowsley Brook) located approximately 80m to the north, flowing to the west. A second watercourse was located approximately 250m to the south of the Site flowing to the west-northwest. The maps also indicate that the Site was at an elevation of approximately 30mAOD and sloped down to the northwest towards Knowsley Brook. The historical map from 1978 indicated that Knowsley Brook was no longer present, possibly as a result of being culverted. In addition, contours shown on the 1:10,000 map from 1990 indicated that ground levels to the north of the Site (and possibly in the northwestern part of the Site) had been raised.
Initial Conceptual Site Model	On Site: The Made Ground expected at the Site could be a source of asbestos fibres in soil, heavy metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons, and ground gases. The sources at the Site are considered to present a low to moderate risk to the Site. Off Site: The historical and current industrial works and historical pits and quarries are potential sources of asbestos fibres in soil, heavy metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons, polychlorinated biphenyls and ground gases. The sources off Site are considered to pose a low to moderate risk to the Site.
Investigation Findings	

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	densities/consistencies. The anticipated Shirdley Hill Sand Formation was only identified in some of the exploratory holes with the majority of the encountered deposits more consistent with materials of a glacial origin. Weathered bedrock was encountered at depths of between 1.8m to 3.35m (both investigations) with the rock surface encountered at depths of between 3.0 and 5.0m
Groundwater Conditions	During the Site investigation groundwater was encountered in borehole BH01 at a depth of 2.0m rising to 1.8m after 20 minutes. In borehole BH02 groundwater was struck at 3.2m rising to 2.6m after 20 minutes. During the monitoring groundwater in BH01 ranged between 2.14 and 2.4mbgl and in WS01 groundwater was resting at between 1.06 and 1.20m. BH01 and WS01 were both located on the northern side of the Site. Within BH02 groundwater was typically resting at between 1.34 and 1.68mbgl, although it is noted that groundwater was recorded at 0.2mbgl during the first monitoring visit. With respect to WS03, groundwater was recorded at depths of 0.1 to 0.5mbgl. It is recommended that further groundwater monitoring is undertaken in order to provide further information on groundwater occurrence.
Contaminated Land Risk Assessment	
Human Health	No soil samples exceeded the GAC for a commercial end use.
Controlled Waters	Groundwater samples obtained identified exceedances of the EQS for heavy metals (Chromium, Copper, Nickel). However, the exceedances are marginal and TRC consider it unlikely that the Site poses a significant risk to controlled waters.
Ground Gas Risk Assessment	Gas monitoring indicates that the Site would be classified as Characteristic Situation 2 (very low risk)
Geotechnical Assessment	
Foundation Design	The superficial deposits encountered beneath the Site were highly variable and contained both granular and cohesive materials. The superficial deposits also included Shirdley Hill Sand, a windblown deposit, that is particularly prone to consolidation/settlement due to its open fabric. Given this high variability it is considered that shallow foundations would potentially be subject to unacceptable amounts of settlement. It is therefore recommended that in order to obtain more uniform ground conditions, consideration should be given to undertaking ground improvement at the Site. If the ground improvement is extended beneath the entire building footprint this would also enable a ground bearing floor slab to be constructed. Ground improvement techniques such as vibro-compaction or vibro-replacement stone or concrete columns could be considered for the Site. In order for stone/concrete columns to work effectively they will need to penetrate the full thickness of the Made Ground and variable superficial deposits. In some cases, the stone/concrete columns will also need to extend through the highly weathered Chester Formation. More competent bedrock has been identified at depths of 3 and 5mbgl. Therefore, column depths in the order of 3 to 5mbgl should be anticipated across the Site.
Buried Concrete	Information within the AMEC Phase 1 report indicated that a previous assessment undertaken at the Site identified that the concrete classification should be DC-3z. The raw data to which this conclusion was based was not provided. It is noted that the inclusion of the 'z' in the classification is primarily used to resist acid conditions. While low pH values were recorded in two of the soil samples analysed by TRC, the presence of low pH conditions was not found to be widespread.

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	TRC has undertaken pH and sulphate analysis on one sample of Made Ground, which indicates that a concrete classification of DS-2 is applicable. Assuming mobile groundwater conditions this would place the Site into ACEC Class AC-2. TRC has undertaken pH and sulphate analysis on three samples of Chester Formation which indicates a concrete classification of DS-1 is applicable. Assuming mobile groundwater conditions this would place the Site into ACEC Class AC-1. TRC has undertaken pH and sulphate analysis on three samples of groundwater that are consistent with a DS-1 class. Assuming mobile groundwater conditions this would place the Site into ACEC Class AC-1. It is noted that the AMEC phase 2 investigation also found that their results placed the Site into DS-1 and AC-1. It is also noted that the DC-3z classification identified by previous investigations would have identified elevated concentrations of either sulphates or sulphides (that could oxidize to form sulphates). While the AMEC and TRC investigations have not identified elevated concentrations of sulphates it is considered that there is the potential for sulphides to be present. Further testing is recommended should earthworks be required at the Site that could oxidize potential sulphides to form sulphates.
Conclusions and Recommendations	
With regards to environmental liability on the Site, TRC deem the Site to have a low-risk rating. This is based on no soil samples exceeded the GAC for commercial end use, minor exceedances of groundwater threshold which TRC deem to not warrant remediation. However, gas monitoring has indicated that the Site would be classified as Characteristic Situation 2 (very low risk), but this risk would be mitigated by implementing gas protection measures. With regards to the geotechnical characteristics on Site, TRC recommend in order to obtain more uniform ground conditions, consideration should be given to undertaking ground improvement at the Site, consultation with a specialist ground improvement contractor is recommended. In addition, the use of ground-bearing floor slabs following ground improvement treatment by a combination of vibro-compaction and vibro-replacement is likely to be the most cost-effective solution for the proposed warehouses. TRC recommend that additional gas monitoring is undertaken to possibly reduce the characteristic situation from CS2 to CS1. In addition, TRC recommend that additional water monitoring/levelling is undertaken to characterise the groundwater regime in more detail.	

1.0 Introduction

1.1 Purpose

TRC Companies Limited (TRC) was commissioned by Pembury Developments Limited (the 'Client') to undertake a Phase II Environmental & Geotechnical Site Assessment for a plot of land off Villiers Rd, Knowsley, Prescot L34 9ET (hereafter referred to as the 'Site').

A Site location plan is presented as Figure 1 in Annex A.

The purpose of this Phase II Environmental & Geotechnical Site Assessment is to assess environmental and geotechnical considerations with respect to ground conditions at Site. This Phase II will use intrusive investigation methodologies to aid Site characterisation and to inform the Client of potential environmental liabilities and geotechnical parameters.

It is expected that this report will support the Client with the future planning application for development of the Site for a proposed commercial development.

1.2 Proposed Development

TRC were provided with a preliminary Site layout plan by the client. The proposed development comprises the erection of a new building for Class E (industrial), B2 general industrial and B8 storage/distribution including ancillary offices, landscaping, yards, access points off Villiers Road, car parking, cycle parking and associated engineering works. The car parking (103 spaces) will also have a 68m service yard. As far as TRC are aware, there are no areas of soft landscaping proposed and the entire Site will be covered in hardstanding. TRC have not been made aware of anticipated loads.

TRC have prescribed the proposed development as a commercial land use scenario.

A Proposed Development Plan is presented as Figure 2 in Annex A.

1.3 Scope of Services

This report presents the findings of a Phase II Geo-environmental Site Assessment (ESA), based on the following information:

- Historical uses of the Site and surroundings;
- Current use and condition of the Site;
- Environmental setting in terms of geology, hydrogeology, hydrology and surrounding land uses;
- Relevant publicly available environmental records; and,
- Intrusive investigation including environmental and geotechnical sampling and testing.

The Phase II ESA was conducted with due regard to the following guidance:

- The National Planning Policy Framework;
- BS5930:2015 (+A1:2020) Code of Practice for Ground Investigations;
- BS EN 1997 Eurocode 7;
- BS10175:2011 (+A2:2017) Investigation of Potentially Contaminated Sites – Code of Practice; and,
- Contaminated Land Report (CLRM) Model Procedures for the Management of Land Contamination.
- BS8485 (2019) Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings; and
- BS8676:2013 'Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (VOCs).

1.4 Significant Assumptions

This report presents TRC's observations, findings, and conclusions as they existed on the date that this report was issued. This report is subject to modification if TRC becomes aware of additional information after the date of this report that is material to its findings and conclusions.

The reliability of information provided by others to TRC cannot be guaranteed to be accurate or complete. Performance of this Phase II Geo-environmental Site Assessment is intended to reduce, but not eliminate, uncertainty of environmental conditions associated with the subject Site; therefore, the findings and conclusions made in this report should not be construed to warrant or guarantee the subject Site, or express or imply, including without limitation, warranties as to its marketability for a particular use. TRC found no reason to question the validity of information received unless explicitly noted elsewhere in this report.

1.5 User Reliance

This report was prepared for Pembury Developments Limited. Reliance on the Report by any other third party is subject to requesting and fully executing a reliance letter between TRC and the third party that acknowledges the TRC Standard Terms and Conditions with the Client, to the same extent as if they were the Client thereunder.

TRC has been provided with information from third parties for information purposes only and without representation or warranty, express or implied as to its accuracy or completeness and without any liability on such third parties part to revise or update the information. Where reliance has been provided by third parties to potential purchasers this is noted in our report.

2.0 Site Description

2.1 Location

The Site comprises an approximate 2.25ha plot of land centred on National Grid Reference 343010, 396580 approximately 1km north of Knowsley town centre. The Site address is land off Villiers Road, Knowsley, Prescot, L34 9ET.

The Site is bounded by Villiers Road to the south and east and by Penrhyn Road to the north and west. The Site is currently a disused, heavily vegetated plot of land, with no buildings on Site. The Site is accessed via Villiers Road to the south.

The Site has an average elevation of approximately 30m above Ordnance Datum (aOD). Topographically the Site slightly slopes gently downwards west to east.

The Site location is presented as Figure 1 in Annex A.

2.2 Subject and Surrounding Area

The Site is located within an area of predominantly industrial and commercial land use. Land uses in the immediate vicinity include the following principal features:

Table 1: Summary of Surrounding Land Use

Direction	Land Use
North	The Site is bounded by Penrhyn Road to the north. Further north are industrial and commercial buildings associated with Algal Omega 3, Direct Vehicle Glass and Arra Distribution Centre. Further north are more commercial and industrial buildings.
West	The Site is bounded by Penrhyn Road to the west. Further west are industrial and commercial buildings associated with Beverston Engineering and Knowsley Business Park.
South	The Site is bounded by Villiers Road to the south. Further south are industrial and commercial buildings associated with Precision Pneumatics and others. .
East	The Site is bounded by Villiers Road to the east. Further east are industrial and commercial buildings associated with 5750 Components and R&H Site Services.

3.0 Previous Assessment, Investigations or Remediation

The following Site-specific assessments have been reviewed and are referred to:

- AMEC Environment & Infrastructure UK Limited, Energy from Waste Plant, Knowsley: Phase 1, Geo-environmental Desk Study, ref. 29848, dated February 2012; and,
- AMEC Environment & Infrastructure UK Limited, Energy from Waste Plant, Knowsley: Phase 2, Geo-environmental Interpretative Report, ref. 12055IL, dated February 2012

Table 2: Summary of Previous Site Assessments

Report Title	Summary of Findings
AMEC Environment & Infrastructure UK Limited, Energy from Waste Plant, Knowsley: Phase 1, Geo-environmental Desk Study	This report was a desk study for the eastern part of Site. The western half was not included within the findings of this report. The report had the following findings; - Review of historical maps indicated that there has been no development on the Site, with the exception of St Jude's Hall and Chapel which were present in the south-eastern corner of Site from 1959 to 1985. - Historical maps also indicated that the surrounding land has been developed with a large number of industrial units being developed from the late 1970s. - One previous assessment was used within this Phase I report, which found that no soil contamination was found to present risks to human health, piled ground beam foundations should be adopted, and concrete classification should be DC-3z. - Geology across Site consisted of topsoil to 0.30m overlying brown sandy clay (Till) to c.1.5mbgl, overlying brown silty sand (Shirdley Hill Sand) to c.1.40 to 3.0mbgl. Beneath the superficial deposits was sandstone (Chester Formation). It should be noted that TRC do not agree with these findings and the geological sequence identified within the most recent ground investigation indicates Shirdley Hill Sands overlie the glacial deposits. - The superficial deposits are classified as a Secondary A Aquifer (Shirdley Hill Sands) and Unproductive Aquifer (Till). The bedrock is classified as a Principal Aquifer. - The Site is located within a Zone 2 and Zone 3 source protection zone (SPZ) - Groundwater was struck at 1.40m to 2.80mbgl. - There are a number of surface water courses in the area, the nearest is the Knowsley Brook which is located 250m north of Site. The river quality was assessed using the General Quality Assessment scheme and classified as Grade C- Fairly Good. - The Site is in an area that is not at risk of flooding. - There are 3 discharge consents within 1km of Site. - There are numerous Integrated Pollution Control authorisations within 1km of Site, these are all related to Contract Chemicals located 60m north of Site. - There are two water abstraction licenses located within 1km of Site (nearest 700m northwest). - There are two waste management facilities located within 1km of Site. - The Site is within the lowest band of radon potential with less than 1% of homes being above the Action Level. - No invasive species were noted during the Site walkover.

Report Title	Summary of Findings
	The report concluded that there are two main potential sources of contamination on Site; Made Ground along the western boundary and chemical works to the north of Site. The risk ratings were generally prescribed as low, with the exception of contamination derived from off-Site sources. The report recommends a Phase 2 investigation.
AMEC Environment & Infrastructure UK Limited, Energy from Waste Plant, Knowsley: Phase 2, Geo-environmental Interpretative Report	This report was a Phase 2 interpretive report, based on an investigation undertaken in July 2011. The investigation consisted of four cable percussive boreholes with rotary follow on, six machine excavated trial pits, 12 dynamic probes and a suite of soil and groundwater testing for environmental and geotechnical purposes. The investigation had the following findings; - The ground conditions found were Made Ground to a maximum depth of 0.85mbgl overlying clay (Till) and sand (Shirdley Hill Sand) superficial deposits. Bedrock (Chester Sandstone Formation) was encountered at depths of 2.0mbgl and 5.08mbgl. It should be noted that TRC do not agree with these findings and the geological sequence identified within the most recent ground investigation indicates Shirdley Hill Sands overlie the glacial deposits. - The results of the chemical analysis indicated no exceedances of the commercial criteria. - No asbestos was identified on Site. - Groundwater was encountered at a depth of 8.70m and 10.47mbgl. - Groundwater samples were collected, and the results showed slightly elevated metal concentrations above the GAC but not elevated enough to warrant remediation. - Concrete classification was deduced as DS1 and AC1s.

In addition, TRC produced a Phase I report (ref. 465346.0001.0000) which has been used to develop this Phase II report and the following sections.

3.1 Summary of history of the Site and the Surrounding Area

A review of publicly available historical maps has been undertaken by TRC within the Phase I report (465346.0000.0000). The findings are presented in subsequent sections below.

- The historical maps have indicated that the Site has remained largely undeveloped, with the exception of St Jude's Hall and Chapel being developed in the south-eastern corner of Site from 1959 to 1985. In addition, the north-eastern corner was developed into a car park in 2006 but this has since been demolished.
- The historical maps have indicated that the surrounding area has undergone extensive development, with particular focus on the unlabelled works c.150m north of Site.
- The historical maps indicate that there was a watercourse (Knowsley Brook) located approximately 80m to the north, flowing to the west. A second watercourse was located approximately 250m to the south of the Site flowing to the west-northwest. The maps also indicate that the Site was at an elevation of approximately 30maOD and sloped down to the northwest towards Knowsley Brook. The historical map from 1978 indicated that Knowsley Brook was no longer present, possibly as a result of being culverted. In addition, contours shown on the 1:10,000 map from 1990 indicated that ground levels to the north of the Site (and possibly in the north-western part of the Site) had been raised.

3.2 Summary of Site Sensitivity

- The published geology indicates that the Site is underlain by superficial deposits of Till and Shirdley Hill Sands. The bedrock is the Chester Formation;

- The EA has classified the superficial deposits as Unproductive (Till) and Secondary A aquifer classifications (Shirdley Hill Sands). The EA has classified the bedrock deposits as Principal Aquifer classification;
- The nearest surface watercourse is located c.250m north of Site;
- There are no groundwater abstractions located within 500m of Site; and,
- There are no sensitive land uses on or within 500m of Site.

3.3 Summary of Phase I Conclusions

TRC considered the Site to be of low to moderate risk with respect to contaminated land liability. Made Ground was believed to be present at the Site which could contain contaminants such as asbestos, depending on where the Made Ground material was sourced. The historical industrial land use of the surrounding area has been identified by the initial desk based review as a potential source of contamination, most notably the Contract Chemicals facility directly north of the Site. TRC indicated that this potentially contaminative land use may have impacted underlying soils and groundwater quality.

TRC recommended a Phase II intrusive ground investigation to further appraise underlying soil and groundwater quality and to provide information for a geotechnical assessment.

4.0 Ground Investigation Scope of Works

4.1 Scope

The TRC Phase II Geo-environmental and Geotechnical investigation was conducted at the Site between the 25th and 27th November 2021. The purpose of the investigation was to characterise underlying ground conditions and investigate the potential presence of contamination that may present a risk to the proposed development at the Site. Additionally, a geotechnical investigation was undertaken to aid future foundation design.

The scope of works comprised:

- Supervision of drilling contractors during the advancement of two cable percussive boreholes (BH01, BH02) to a maximum depth of 5.40mbgl with in-situ geotechnical testing (Standard Penetration Testing (SPT));
- Supervision of drilling contractors during the advancement of five window sample boreholes (WS01 to WS05) to a maximum depth of 3.80mbgl with in-situ geotechnical testing (Standard Penetration Testing (SPT). It should be noted that dynamic probing was used to continue all of the window sample boreholes after the sampler refused at depths of c.3.80mbgl due to dense sand);
- Supervision of contractors during the advancement of two trial pits (TP01, TP02) to a maximum depth of 2.80mbgl;
- Soakaway testing in accordance with BRE365 within both trial pits to determine soakaway potential on Site;
- In-situ DCP Penetrometer testing at eight locations to determine in-situ CBR values across Site;
- Inspection of soils within boreholes to facilitate geological logging;
- Collection of soil samples for third party environmental and geotechnical laboratory testing;
- Field monitoring for permanent ground gases and groundwater levels; and,
- Collection of groundwater samples on one occasion.

4.2 Investigation Rationale

The ground investigation was designed by TRC on behalf of the Client to gather information on the environmental and geotechnical ground conditions, groundwater and ground-borne gas conditions at the Site. The TRC investigation aimed to gain good general coverage of the Site.

The Exploratory Hole Location Plan is presented as Figure 3 in Annex A.

Table 3: Summary of Exploratory Hole Locations

Exploratory Hole	Location
WS01	Located along the northern Site boundary and within the footprint of the proposed industrial unit
WS02	Located centrally and within the footprint of the proposed industrial unit
WS03	Located centrally and within the footprint of the proposed industrial unit
WS04	Located along the southern portion of the footprint of the proposed industrial unit
WS05	Located within the south-eastern corner of Site
BH01	Located within the north-western corner of the footprint of the proposed industrial unit
BH02	Located within the north-eastern corner of the footprint of the proposed industrial unit
TP01	Located centrally on Site, within the proposed footprint of the building
TP02	Located centrally on Site, within the proposed footprint of the building
TRL01 to TRL08	Located west and east of the footprint of the proposed industrial unit, where the proposed development plan indicates car parking and roadways

4.3 Methodology

4.3.1 Ground Investigation

TRC commissioned DMW Drilling (drilling contractor) to undertake the drilling works (cable percussive and window sampling) at the Site. Two boreholes were advanced using cable percussive drilling techniques and five of the boreholes were advanced using window sample techniques. The drilling works were overseen by a TRC engineer who performed field assessment and logging of soil arisings.

TRC commissioned a subcontractor to undertake the trial pitting works on Site. The trial pits were advanced using a 6T tracked excavator under the guidance and supervision of a TRC engineer who performed field assessment and logging of soil arisings, with subsequent soakaway testing undertaken.

The works included the following key actions:

- Each of the proposed exploratory hole locations was cleared using a Cable Avoidance Tool (CAT) and ground penetrating radar (GPR);
- Cable Percussive Drilling was performed at two locations by the drilling contractor, including in-situ geotechnical testing (Standard / Cone Penetration Testing);
- Window Sample Drilling was performed at five locations by the drilling contractor, including in-situ geotechnical testing (Standard / Cone Penetration Testing);
- Trial pitting was undertaken at two locations;
- TRL DCP penetrometer testing was undertaken at eight locations;
- On-Site field assessment and recording of soil type and potential indicators of contamination;
- Collection of soil samples for environmental and geotechnical laboratory analysis;
- Construction of gas and groundwater monitoring wells in five borehole locations (BH01, BH02, WS01, WS03, WS05); and,
- The remaining locations were backfilled with arisings.

4.3.2 Groundwater and Ground Gas Monitoring

Groundwater and ground gas monitoring was conducted by a TRC technician on four occasions. The dates of the monitoring visits were between the 3rd December 2021 and the 5th January 2021.

During each visit, groundwater elevation and potential presence of any free phase oils was measured using an oil/water interface probe. Gas monitoring was undertaken using a portable gas analyser at each monitoring well head. The field assessment gathered data relating to the concentrations of permanent ground gases (e.g., methane, carbon dioxide, carbon monoxide and oxygen).

Groundwater sampling was also undertaken in the boreholes that detected groundwater (WS01, WS03, WS05). During the first monitoring round, a TRC engineer purged the wells to dry and then subsequently visited Site again to collect a grab sample of the water contained within wells that had recharged.

4.4 Environmental Laboratory Analysis

A total of 14 soil samples were collected for environmental analysis during the investigation works. All soil samples were packed in laboratory provided containers and delivered to I2 Analytical (I2) for chemical analysis.

All soil samples were collected in order to provide environmental data on the quality of near surface and shallow soils beneath the Site. Representative samples of Made Ground and natural deposits were collected where feasible. The analytical suite of soils included the following parameters:

- Asbestos (Made Ground materials only);
- Heavy metals suite;
- Polycyclic aromatic hydrocarbons (PAH);
- Total petroleum hydrocarbons – Criteria Working Group (TPH-CWG);

- TRC Waste Suite; and,
- Single stage Waste Acceptance Criteria (WAC) testing

Groundwater samples were collected from three of the monitoring wells. The samples were sent to I2 Analytical (I2) and analysed for the following:

- Heavy metals suite;
- pH and Sulphate;
- Polycyclic aromatic hydrocarbons (PAH); and,
- Total petroleum hydrocarbons – Criteria Working Group (TPH-CWG).

The full set of chemical results are presented in Annex F.

4.5 Geotechnical Laboratory Analysis

Soil sampling for geotechnical testing was undertaken via disturbed and bulk sampling. The geotechnical testing was performed by PSL laboratories and comprised the following:

- 7 Moisture Content;
- 5 Atterberg Limits (4 point);
- 3 PSD by wet sieve;
- 3 Hydrometer/Pipette;
- 2 Quick Undrained Triaxials;
- 2 Dry Density/Moisture Content 2.5kg rammer;
- 2 Particle Densities; and
- 5 pH and water-soluble sulphate.

The full set of geotechnical results is presented in Annex H.

5.0 Factual Summary of Investigation Findings

5.1 Historical and Archive Information

The following information was reviewed by TRC:

- The BGS website;
- The BGS historical boreholes with reference no. SJ49NW141, SJ49NW142, SJ49NW143, SJ49NW146, SJ49NW147, SJ49NW147
- Various publicly available information, such as the coal authority, radon and UXO databases;
- The historic Site investigation / assessment report discussed previously; and,
- Reports issued to TRC produced by AMEC.

The BGS website indicates the Site to be underlain by superficial deposits comprising Shirdley Hill Sand Formation overlying bedrock comprising Chester Formation. Immediately to the south of the Site, the BGS maps indicate that there is a zone where no superficial deposits are present and further to the south Glacial Till is indicated. This suggests that the Shirdley Hill Sand Formation is likely to thin from north to south across the Site. It is also feasible that Glacial Till may be present below the Shirdley Hill Sand Formation. The BGS maps also indicate that to the north of the Site there is an area of undivided Made Ground present. It is considered that this is likely to be associated with the raising of ground level that has been identified from inspection of the historical OS maps.

The Shirdley Hill Sand Formation is a well-sorted, fine grained sand with peat layers in the lower part. The formation is divisible into an upper 'white' sand and lower 'brown' sand that is olive grey and brown. The sediments are interpreted as a coastal brown sand. The Shirdley Hill Sand Formation stratigraphically overlies the Caledonia Glaciogenic Group.

The Chester Formation predominantly comprises a sandstone but can also include pebbly sandstone layers.

The historical BGS boreholes located to the north of the Site (SJ49NW141, SJ49NW142 and SJ49NW143) encountered the following:

- SJ49NW141 (drilled in 1969, possibly prior to raising ground levels) encountered sand and gravel to a depth of 0.8m overlying compact red coarse silt (weathered marl) to 1.7m overlying fine red shaley sandstone with yellow bands;
- SJ49NW142 (drilled in 1969, possibly prior to raising ground levels) encountered brown sand with traces of gravel to a depth of 2.4m overlying hard red sandy marl with bands of weathered red sandstone;
- SJ49NW143 (drilled in 1969, possibly prior to raising ground levels) encountered slightly organic sand to a depth of 1.2m overlying firm to stiff red very sandy boulder clay to 3.1m resting upon hard red sandy marl.

Interpretation of these borehole logs suggest that the Shirdley Hill Sand Formation was only encountered in borehole SJ49NW143 (slightly organic sand). Beneath the Shirdley Hill Sand Formation, Glacial Till was encountered and near surface in the other boreholes deposits that suggest a glacial origin were encountered. Weathered bedrock was encountered at depths of between 0.8m and 3.1m increasing from west to east. It is noted that as these boreholes were drilled in 1969 this is likely to have been before ground levels were raised.

The historical BGS boreholes located to the south of the Site (SJ49NW146, SJ49NW147 and SJ49NW148)

- SJ49NW146 (drilled in 1969) encountered organic sand to a depth of 2.4m overlying over lying soft brown clay with sandstone fragments to 9.5m resting upon pink sandstone.
- SJ49NW147 (drilled in 1969) encountered compact sand and gravel to a depth of 3.4m overlying firm to stiff brown boulder clay to 4.4m resting upon compact red sand.
- SJ49NW148 (drilled in 1969) encountered fine/medium brown sand to a depth of 2.1m overlying stiff red boulder clay to 3.4m resting upon compact red sand and hard red fine shaley sandstone.

Within these boreholes Shirdley Hill Sand Formation deposits were encountered in SJ49NW146 and SJ49NW148 to depths of 2.4m and 2.1m respectively. Glacial materials were identified in all of the exploratory holes overlying weathered bedrock that varied from between 2.4 to 4.4mbgl. It is noted that the depth to bedrock was greater to the south of the Site which is contrary to the BGS map.

A previous investigation was undertaken at the Site in 2011 in the eastern half of the Site. It is noted that the interpretation of ground conditions given in the supplied reports suggest that the Shirdley Hill Sand Formation was identified beneath glacial deposits. It should be noted that this is not feasible as the Shirdley Hill Sand Formation was deposited after the glacial period and therefore would be found to overlie the glacial materials. A review of the encountered ground conditions has therefore been undertaken here. The historic locations are shown on Figure 4.

Made Ground was found to extend to depths of between 0.25m and 0.85mbgl. The majority of the near surface deposits were found to contain gravel. As the Shirdley Hill Sand Formation is a windblown deposit, this means that the encountered ground conditions are more indicative of glacial deposits. Only two exploratory holes (1_2011 and 2_2011) encountered deposits that are typical of the Shirdley Hill Sand.

As well as the exploratory holes drilled, a number of dynamic probes were conducted across the Site. These indicated that the near surface deposits (regardless of origin) were variable with zones of soft and/or loose deposits. The weathered bedrock surface was typically encountered at depths of between 2.0 and 3.3mbgl with intact bedrock encountered at depths of between 2.5m and 5mbgl, although this was typically between 3.6 and 4.6mbgl.

The anticipated Site geology is summarised in Table 4.

Table 4: Summary of Anticipated Geology

Strata	Depth to Base (m bgl)	Elevation of Base (m aOD)	Thickness (m)	Typical Description
Made Ground	0.25 to 0.85	29.17 to 30.43	0.85	Stiff brown sandy CLAY with brick fragments.
Shirdley Hill Sand Formation	Up to 2.00 (where present)	28.54 to 29.16	Up to 2.00	Loose slightly clayey fine to medium SAND with occasional bands of soft sandy clay
Glacial Deposits	2.00 to 3.35	26.80 to 28.70	Up to 3.00	Variable deposits including: - Firm/stiff brown sandy gravelly CLAY with occasional cobbles. Gravel is subrounded to subangular, fine to coarse of sandstone and diorite. - Greyish brown SAND with occasional bands of stiff brown sandy slightly gravelly clay. - Soft to very soft sandy slightly gravelly clay
Weathered Chester Formation	3.20 to 5.00	25.00 to 27.50	Up to 2.20	Weathered to a medium dense orange reddish brown fine to coarse grained SAND, sometimes with sandstone gravel.
Chester Formation	Not proven	Not proven	Not proven	Reddish brown or pinkish brown SANDSTONE or brownish red MUDSTONE

5.2 Ground Conditions

The investigation observed that the soils underlying the Site generally comprised the following:

Table 5: Summary of Ground Conditions

Strata	Description	Observed Thickness (m)	Range of Depth to top of Strata (m)	Maximum recorded depth (m)
Made Ground (Topsoil)	Soft dark brown sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Gravel consists of brick and mudstone	0.10 to 0.40	GL	0.40 (TP02)
Made Ground (soils)	Soft dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse, Gravel is angular to rounded, fine to coarse grained. Gravel consists of brick and mudstone.	0.30 to 1.40	GL to 0.40	1.40 (BH01)
Shirdley Hill Sand Formation	Brown slightly clayey fine to medium SAND or silty sandy CLAY	0.60 to 1.40	0.60 to 1.40	2.40 (BH01)
Glacial Deposits	Firm light greyish brown sandy slightly gravelly CLAY. Gravel is sub-rounded to rounded, fine to coarse grained. Gravel consists of mudstone and sandstone. OR Light orangish brown, sometimes gravelly fine to coarse SAND.	Up to 1.40	0.40 to 2.40	>2.50 (TP02)
Chester Formation (weathered)	Firm becoming stiff light reddish brown or orangish brown silty variably sandy CLAY OR Light reddish-brown fine to coarse SAND.	0.60 to 2.00	1.80 to >2.50	Not proven
Chester Formation (rock)	Red weathered MUDSTONE or SANDSTONE	>2.00	3.00 to 3.80	Not proven

The borehole logs are presented in full within Annex C.

The ground conditions encountered generally correspond with the publicly available records of ground conditions published by the British Geological Survey (BGS) and with the reinterpretation of the previous exploratory holes drilled at the Site.

Generally, the near surface superficial deposits were found to be highly variable, comprising granular as well as cohesive materials of varying densities/consistencies. The anticipated Shirdley Hill Sand Formation was only identified in some of the exploratory holes with the majority of the encountered deposits more consistent with materials of a glacial origin. Weathered bedrock was encountered at depths of between 1.8m to 3.35m (both investigations) with the rock surface encountered at depths of between 3.0 and 5.0m

5.2.1 Made Ground Topsoil

Made Ground topsoil was encountered within all exploratory hole locations, described as a soft dark brown slightly sandy gravelly clay with frequent rootlets. The gravel comprised brick and mudstone fragments. The topsoil was encountered at ground level to a maximum depth of 0.40mbgl at TP02. Any description of Topsoil within this report does not imply compliance with BS3382.

5.2.2. Made Ground

Made Ground was encountered within all exploratory hole locations, generally described as a soft dark brown slightly sandy slightly gravelly clay with anthropogenic inclusions (brick). The Made Ground was encountered to depths of between 0.6 and 1.4mbgl.

One sample was tested for aqueous extract Sulphate (SO_4) and pH, at a depth of 0.20mbgl. Water soluble sulphate contents was at 646mg/l. On this basis the Design Sulphate Class would be DS-2. The pH values in the soil sample was 8.1. Mobile groundwater conditions have been assumed and, on this basis, the Aggressive Chemical Environment for Concrete (ACEC) class for the Site is AC-2.

5.2.3. Shirdley Hill Sand Formation

The Shirdley Hill Sand Formation (SHSF) was encountered in exploratory holes BH01, BH02, WS04, TP01 and TP02 to depths of between 1.0m and 2.4mbgl. The SHSF generally comprised brown slightly clayey fine to medium SAND or silty sandy CLAY.

One SPT was undertaken in the SHSF in BH01 at 2.0mbgl which recorded an N value of 10 indicative of firm conditions.

One unconsolidated undrained shear strength test was undertaken in the SHSF (BH01 at 1.2m) which determined an undrained shear strength of 56kPa.

A single Atterberg limit test was carried out on a sample of SHSF (BH02 at 0.6m). The result indicated that the SHSF can be classified as clay of moderate plasticity, with a plasticity index of 15% and in accordance with NHBC guidelines, the clay is of low volume change potential.

5.2.4. Glacial Deposits

Glacial Deposits were encountered within six exploratory hole location, described as either a firm light greyish brown sandy slightly gravelly CLAY or light orangish brown, sometimes gravelly fine to coarse SAND. The Glacial Deposits were encountered either beneath the SHSF or directly beneath the Made Ground and extended to depths of 1.8m to in excess of 2.5m.

Three Atterberg limit tests were carried on samples of cohesive Glacial Deposits. The result indicated that the cohesive Glacial Deposits can be classified as clay of low to moderate plasticity, with a maximum plasticity index of 19% and in accordance with NHBC guidelines, the clay is of low volume change potential.

Three SPTs were performed within the cohesive Glacial Deposits which recorded uncorrected SPT 'N' values of 10 to 12. Undrained shear strengths have been estimated from the SPT 'N' values using the relationship developed by Stroud where mass shear strength equals the SPT 'N' value multiplied by a factor (f_1), which is based on the plasticity of the clay. f_1 for the Glacial Deposits has been taken as 5. Generally, the Glacial deposits are indicative of a firm clay.

Five SPTs were undertaken within the granular Glacial Deposits which recorded uncorrected SPT 'N' values of between 6 and 12 indicative of loose to medium dense conditions.

A Particle Size Distribution (PSD) analysis was undertaken on one sample of Glacial Till. BH02 at 2.0mbgl returned a composition of 16% gravel, 53% sand, 17% silt and 14% clay which classifies as a slightly fine to medium gravelly clayey silty SAND.

Two compaction test undertaken using the 2.5kg rammer method on the Till (TP02, 1.00mbgl and 2.00mbgl) which indicated maximum dry density of 1.87mg/m³ and 1.70mg/kg respectively. The results yielded optimum moisture content values of 14% and 18% respectively. The natural moisture content was 14 % and 24%, which is equal to and above the optimum moisture content of the sample tested

5.2.5. Chester Formation

The Chester Formation was encountered within all the exploratory hole locations with the exception of TP02 at depths of between 1.8mbgl to in excess of 2.5mbgl. Near surface the Chester Formation was found to be weathered and generally comprised either firm becoming stiff light reddish brown or orangish brown silty variably sandy CLAY or light reddish-brown fine to coarse SAND. The weathered zone was generally between 0.6m and 2m in thickness before more competent rock (described as red weathered MUDSTONE or SANDSTONE) was encountered.

Fourteen SPTs were undertaken within the Chester Formation which recorded uncorrected SPT 'N' values of between 11 to in excess of 50.

One Atterberg limit test was carried on samples of cohesive Chester Formation. The result indicated that the Chester Formation can be classified as clay of moderate plasticity, with a plasticity index of 17% and in accordance with NHBC guidelines, the clay is of low volume change potential.

Particle Size Distribution (PSD) analysis was undertaken on two samples between depths of 2.5mbgl and 3.0mbgl. WS02 at 2.5mbgl returned a composition of 7% gravel, 41% sand and 28% silt and 24% clay; and BH02 at 3.0mbgl returned a composition of 1% gravel, 29% sand, 37% silt and 33% clay. These results indicate that the samples tested were a slightly gravelly slightly sandy silty CLAY.

Three samples were tested for aqueous extract Sulphate (SO₄) and pH, at depths ranging from 2.60m to 4.00mbgl. Water soluble sulphate contents ranged between 10mg/l and 32mg/l. In accordance with BRE guidelines, the characteristic value for a dataset of less than five samples is taken as the highest concentrations; in this case, the characteristic value would be 32mg/l. On this basis the Design Sulphate Class would be DS-1. The pH values in the soil samples varied between 7.6 and 8.4. Mobile groundwater conditions have been assumed and, on this basis, the Aggressive Chemical Environment for Concrete (ACEC) class for the Site is AC-1.

5.2.6. Summary of SPTs/CPTs

Table 7 (overleaf) presents a summary of the SPT/CPT testing undertaken at the Site.

5.3 Groundwater

During the Site investigation groundwater was encountered in borehole BH01 at a depth of 2.0m rising to 1.8m after 20 minutes. In borehole BH02 groundwater was struck at 3.2m rising to 2.6m after 20 minutes.

Groundwater resting levels were recorded during the four monitoring visits. A summary of the results is included in the following table:

Table 6: Summary of Resting Groundwater Depths

Exploratory Hole	Screened Section	Screened Strata	Groundwater Depth Over Monitoring Period (mbgl)
BH01	1.5 to 3.0	SHSF and Chester Formation	2.14 - 2.40
BH02	2.0 to 5.0	Chester Formation	0.20 – 1.68
WS01	1.0 to 3.0	Glacial and Chester Formation	1.06 – 1.20
WS03	1.0 to 3.1m	Glacial and Chester Formation	0.10 - 0.50

Field monitoring data for groundwater monitoring is presented in Annex D.

Three groundwater sample was collected and tested for SO_4 and pH. The water-soluble sulphate contents were recorded between 21.4mg/l and 96.5mg/l. In accordance with BRE guidelines the Design Sulphate Class is DS-1. The pH value of the samples varied between 6.5 and 7.1. On this basis, the ACEC class for the groundwater is AC-1.

5.4 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was encountered during the Site investigation.

Table 7: SPT Data Summary

SPT N Values																			
Borehole Reference	Depth (m)	Strata	Cohesive/ Granular	1 st Seating Blows	1 st Seating Penetration (mm)	2 nd Seating Blows	2 nd Seating Penetration (mm)	1 st Increment Blows	1 st Increment Penetration (mm)	2 nd Increment Blows	2 nd Increment Penetration (mm)	3 rd Increment Blows	3 rd Increment Penetration (mm)	4 th Increment Blows	4 th Increment Penetration (mm)	N Value	Total Test Penetration (mm)	N Value for full 300mm Penetration	Corrected N Value (N ₆₀)
BH01	2	Shirdley	Cohesive	1	75	2	75	2	75	2	75	3	75	3	75	10	300	10	11
BH01	3	Chester	Granular	19	75	6	10	32	75	18	20					50	95	158	168
BH02	2	Chester	Cohesive	1	75	1	75	2	75	2	75	3	75	4	75	11	300	11	12
BH02	3	Chester	Cohesive	3	75	3	75	5	75	5	75	6	75	7	75	23	300	23	25
BH02	4	Chester	Cohesive	6	75	7	75	11	75	11	75	14	75	14	66	50	291	52	55
BH02	5	Chester	Cohesive	25	60			50	50							50	50	300	320
WS01	1.2	Glacial	Cohesive	2	75	3	75	3	75	2	75	3	75	2	75	10	300	10	14
WS01	2	Chester	Granular	2	75	3	75	3	75	3	75	3	75	3	75	12	300	12	16
WS01	2.9	Chester	Cohesive	2	75	2	75	2	75	2	75	6	75	7	75	17	300	17	88
WS01	3.8	Chester	Cohesive	12	75	12	75	15	75	16	75	25	60			56	210	80	14
WS02	1.2	Glacial	Granular	2	75	2	75	2	75	1	75	2	75	1	75	6	300	6	13
WS02	2	Chester	Cohesive	2	75	2	75	2	75	3	75	3	75	3	75	11	300	11	37
WS02	3	Chester	Cohesive	2	75	2	75	3	75	3	75	3	75	3	75	12	300	12	146
WS03	1.2	Glacial	Granular	2	75	2	75	2	75	3	75	3	75	2	75	10	300	10	12
WS03	2	Glacial	Granular	2	75	2	75	3	75	3	75	3	75	3	75	12	300	12	35
WS03	2.8	Chester	Cohesive	2	75	3	75	2	75	2	75	4	75	6	75	14	300	14	120
WS03	3.1	Chester	Cohesive	6	75	8	75	10	75	18	75	25	60			53	210	76	14
WS04	1.2	Glacial	Granular	3	75	3	75	2	75	4	75	3	75	3	75	12	300	12	7
WS04	2	Glacial	Granular	2	75	2	75	2	75	2	75	3	75	3	75	10	300	10	13
WS04	2.8	Chester	Cohesive	7	75	7	75	7	75	8	75	7	75	8	75	30	300	30	14
WS04	3.6	Chester	Cohesive	14	75	14	75	18	75	25	50					43	125	103	12
WS05	1.2	Glacial	Cohesive	4	75	3	75	3	75	3	75	3	75	3	75	12	300	12	12
WS05	2	Glacial	Cohesive	3	75	3	75	3	75	2	75	3	75	3	75	11	300	11	14
WS05	2.8	Chester	Granular	4	75	6	75	7	75	9	75	8	75	8	75	32	300	32	20
WS05	3.8	Chester	Granular	12	75	16	75	25	60							25	60	125	93

NB:

- I. The Corrected N Value (N₆₀) value displayed in Table 6 requires rounding to the nearest whole value for design assessment.
- II. The determined value is referred to as N as N, the Standard Penetration Test resistance, is defined as the number of blows for 300mm penetration.
- III. The Corrected N Value (N₆₀) is the equivalent Standard Penetration Test resistance corrected to energy losses, which is defined by the following equation: $N_{60} = (E_r/60) \times N$. Where E_r is the Energy Ratio for the drilling rigs SPT hammer equipment and N is the SPT N Value. See the drillers certificate in Annex C for the E_r adopted.
- IV. The N₆₀ value should be used with caution when the strata recorded is granular.

6.0 Soil and Groundwater Assessment

6.1 Soil Assessment

In order to appraise the significance of the concentrations reported by laboratory testing, TRC has assessed each contaminant species that is elevated above the laboratory LOD against published screening criteria referred to as Generic Assessment Criteria (GAC). GACs are derived from the following reference material:

- Land Quality Management Limited and Chartered Institute of Environmental Health (November 2014), the LQM/CIEH S4ULs for Human Health Risk Assessment. Document reference: S4UL3435;
- Development of Category 4 Screening Levels for assessment of land affected by contamination – SP1010 (September 2014);
- LQM S4ULs: evaluation of 2017USEPA Toxicological Review of Benzo(a)pyrene; and,
- LQM/CIEH S4ULs for Nickel according to land use (Revised August 2015).

TRC has selected GACs for a commercial end use, based on the proposed development which comprises one large warehouse, labelled as a distribution centre, with a small area of first floor offices along the north-western corner of the building. There will be carparking (100 spaces) and a 71m service area within the outside areas. In addition, there will be two level access doors and ten dock loading doors along the eastern building boundary. As far as TRC are aware, there are no areas of soft landscaping proposed and the entire Site will be covered in hardstanding. A summary of the laboratory data and the screening tables with relevant GACs is presented in Annex F.

6.1.1 Asbestos

No asbestos was identified in any of the samples tested.

6.1.2 Heavy Metals

Minor concentrations of heavy metals were detected in soil samples (both Made Ground and natural soils). None of the concentrations exceeded the GACs.

6.1.3 Hydrocarbons

Minor concentrations of hydrocarbons were detected in soil samples (both Made Ground and natural soils). None of the concentrations exceed the GACs.

6.2 Groundwater Assessment

In order to appraise the significance of the groundwater concentrations recorded, TRC has assessed each contaminant species that is elevated above the laboratory LOD against the following published guidance values:

- Drinking Water Standards England and Wales (2000) (amended);
- Environmental Quality Standards (EQS) for freshwater; and,
- SoBRA, Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater, Version 1 (2017).

Groundwater monitoring recorded groundwater in all three monitoring wells ranging from 0.1mbgl and 2.4mbgl. No free phase oils or hydrocarbons odours were identified. Groundwater samples were taken from each borehole was sent to I2 Analytical for laboratory analysis.

The laboratory analysis reported elevated concentrations of heavy metals (Chromium, Copper, Nickel) exceeding the EQS criteria in the three samples collected. The exceedances are summarised in the below table.

Table 8: Summary of Groundwater Exceedances

Contaminant	EQS (µg/l)	Maximum Concentration (mg/kg)	Location of Maximum Concentration	No. of exceedances
Chromium	4.7	5	WS03	1
Copper	1	9.7	WS03	3
Nickel	4	11	WS01	3

As shown above, there are some very minor exceedances of the EQS criteria due to elevated Chromium, Copper and Nickel within the groundwater samples obtained from Site. TRC deem the exceedances fairly marginal and unlikely to pose a significant risk to controlled waters.

7.0 Ground Gas Assessment

Field monitoring for permanent ground gases was performed at five monitoring well locations on four occasions from the 3rd December 2021 to 5th January 2022. The maximum concentrations are summarised in the table below and the complete monitoring data are provided within Annex D.

Table 9: Summary of Gas Monitoring Results

Location	Methane (%v/v)		CO ₂ (%v/v)		CO (ppmv)		Oxygen		Flow Rate (l/hr)		PID (ppm)
	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak
BH01	0	0	6.1	4.2	0	0	14.7	16.3	1.2	0	1
BH02	0	0	0.5	0.4	10	10	19.3	19.4	0.5	0.1	1
WS01	0	0	2.2	1.7	0	0	19.0	19.3	0.1	0	1
WS03	0	0	7.3	6.7	0	0	16.4	16.4	0.1	0	1
WS05	0	0	2.3	2.2	10	10	5	6.8	0.3	0.3	1

Methane was not detected within any of the exploratory hole locations. Carbon dioxide concentrations were detected in all of the monitoring wells with concentrations ranging from 0.1% to 7.3%. Flow was detected in most exploratory hole locations, ranging from 0.2 l/hr to 1.2 l/hr.

TRC has assessed the bulk ground gas concentrations in accordance with current guidance (BS8485:2015). Based on the results, a gas screening value (GSV) of 0.08765 l/hr was calculated, which would classify the Site as Characteristic Situation 2 (very low risk). In addition, due to the carbon dioxide concentrations exceeding 5.0% in two locations guidance documents state that a precautionary approach should be adopted, which would result in a classification of Characteristic Situation 2 (low risk). Subject to further gas monitoring it may be possible to downgrade the risk rating to CS1 (very low risk), as the CS2 classification is based off a flow reading of 1.2l/hr which only occurred during one round of monitoring and did not correlate with the previous rounds of data.

Field monitoring detected slightly elevated PID readings in the borehole. The concentrations within all exploratory hole locations never exceeded 1ppm.

Based on the results, it is considered that gas protection is required at the proposed development.

8.0 Geotechnical Assessment

8.1 Summary of TRC Investigation

The following section provides a summary of the intrusive investigation geotechnical parameters. During the intrusive investigation, TRC gathered both in-situ and laboratory geotechnical data for each of the exploratory hole locations at the Site. In addition, a previous investigation drilling a number of exploratory holes across the eastern half of the Site.

The investigations have identified that there was a relatively thin layer of Made Ground (less than 1m) across the majority of the Site. The Made Ground generally appeared to be thicker in the western part of the Site. A maximum thickness of 1.4m was recorded in BH01.

The superficial deposits encountered across the Site were found to be highly variable and included a mixture of cohesive and granular materials. Deposits that could be interpreted as the Shirdley Hill Sand Formation were identified in some locations to depths of between 0.8m and 2.4m, but was not present in all locations. The Shirdley Hill Sand Formation is a windblown deposit that can have an open fabric making it prone to settlement. It generally comprises a sandy silty clay or a clayey fine to medium sand but can also include layers of peat.

Many of the superficial deposits encountered beneath the Site were found to contain gravel and therefore are more indicative of a glacial origin rather than a windblown deposit. The Glacial Deposits extended to depths of 1.8mbgl and 3.35mbgl and included cohesive and granular materials.

Beneath the superficial deposits, the Chester Formation was encountered. Near surface the Chester Formation was found to be weathered to a residual cohesive or granular soil. The weathered zone generally extended to depths of between 3 and 5mbgl beneath which more competent rock was encountered.

Groundwater strikes in boreholes BH01 and BH02 indicated that groundwater was encountered at depths of 2.0 and 3.2m respectively. Groundwater rose to depths of 1.8m and 2.6m respectively after 20 minutes.

During the monitoring groundwater in BH01 ranged between 2.14mbgl and 2.4mbgl and in WS01 groundwater was resting at between 1.06 and 1.20m. BH01 and WS01 were both located on the northern side of the Site. Within BH02 groundwater was typically resting at between 1.34mbgl and 1.68mbgl, although it is noted that groundwater was recorded at 0.2mbgl during the first monitoring visit. With respect to WS03, groundwater was recorded at depths of 0.1mbgl to 0.5mbgl. It is recommended that further groundwater monitoring is undertaken in order to provide further information on groundwater occurrence.

The borehole logs are presented in Annex C.

The proposed development comprises a single large distribution centre building with associated service yard and car parking areas. No proposed loadings were made available to TRC at the time of writing this report.

8.2 Geotechnical Assessment

8.2.1 General

This geotechnical assessment is based on the parameters determined from the field work and laboratory analysis described within this report. This geotechnical assessment provides an overview of possible foundation solutions and infrastructure design and does not constitute a detailed design report for the proposed development.

For the purposes of this assessment, TRC has assumed that finished ground levels will be at, or close to, existing ground levels. In the event that these levels are changed, then TRC would recommend that this assessment is revisited to examine potential changes in recommendations.

Based on the ground investigation results the site-won materials seem appropriate for use as a general fill, should minor earthworks be required across the site. Moisture conditioning of soils may be required to achieve the desired densities and engineering properties. The recommendations of the Specification for Highway Works (SHW 600 series) or another appropriate earthworks' specification should be followed, for any minor earthworks proposed at this Site.

8.2.2 Foundations

The superficial deposits encountered beneath the Site were highly variable and contained both granular and cohesive materials. The superficial deposits also included Shirdley Hill Sand, a windblown deposit, that is particularly prone to consolidation/settlement due to its open fabric. Given this high variability it is considered that shallow foundations would potentially be subject to unacceptable amounts of settlement. Also, shallow groundwater was encountered near the ground surface during our latest monitoring readings which will make any shallow excavations difficult to manage.

It is therefore recommended that in order to obtain more uniform ground conditions, consideration should be given to undertaking ground improvement at the Site. If the ground improvement is extended beneath the entire building footprint this would also enable a ground bearing floor slab to be constructed.

Ground improvement techniques such as vibro-compaction or vibro-replacement stone or concrete columns could be considered for the Site. Both ground improvement techniques involve inserting a vibrating poker into the ground, which displaces the soil. The resultant void is then infilled with either stone or concrete. Vibrostone columns (VSC) may not be feasible at this Site due to some soft clay soils being present at depth.

In order for stone/concrete columns to work effectively they will need to penetrate the full thickness of the Made Ground and variable superficial deposits. In some cases, the stone/concrete columns will also need to extend through the highly weathered Chester Formation. More competent bedrock has been identified at depths of 3mbgl and 5mbgl. Therefore, column depths in the order of 3 to 5mbgl should be anticipated across the Site.

It is recommended that specialist advice is sought from a ground improvement contractor with regard to the suitability of this technique in these ground conditions and the anticipated achievable bearing capacities. If either of these techniques is selected, it is recommended that appropriate in-situ testing is specified in order to assess the performance of these foundations.

Consideration could also be given to utilising a piled foundation solution, although it is considered that this will be a more costly solution than ground improvement and therefore has not been considered further.

8.2.3 Excavations

Excavations for foundations above vibro columns, pile caps and groundbeams, floor slabs, and laying services should be readily achievable using standard excavation plant. The developer should consider the potential for random and sudden falls from the faces of near vertically sided excavations at the Site. This may be prevalent in the Made Ground soils, sandy layers, and in low strength natural strata. Potential for excavation collapse may be exacerbated by water inflows.

A risk assessment on the stability of any open excavation should be undertaken by a competent person and appropriate measures employed to ensure safe working practice in and around open excavations. Temporary trench support or battering of excavation sides should be considered for all excavations, particularly where personnel are required to enter the excavations.

As detailed in Section 8.1, groundwater depths were found to vary considerably across the Site with very high groundwater levels (0.1 to 0.5mbgl) were recorded in WS03. Due to the variation in groundwater levels recorded across the Site it is recommended that further groundwater monitoring is undertaken. In addition, it should be noted that groundwater levels vary seasonally, and timing of the construction programme may influence the volumes of groundwater that need to be managed. The developer should also consider the impact of weather and potential for rainwater and surface run-off to accumulate within excavations.

Water pumped from excavations may require pre-treatment prior to discharge. This could include settlement tanks to reduce silt and suspended solids. No significant contamination has been identified at the Site, therefore further filtration or other such treatment stage is considered unlikely. However, the developer should consult with the local water authority and/or Environment Agency to obtain necessary discharge consents and agree the scope of pre-treatment prior to discharge.

8.2.4 Ground Floor Slabs

As discussed in Section 7.4.2, use of ground-bearing floor slabs following ground improvement treatment by a combination of vibro-compaction and vibro-replacement is likely to be the most cost-effective solution for the proposed warehouses, provided that the required settlement tolerances can be achieved. In order for this to be achievable it will be necessary to undertake ground improvement across the entire building footprint. Advice from a specialist ground treatment contractor should be sought once the required floor loadings and settlement tolerances are known.

If high floor loadings and/or tight floor tolerances (e.g.: super flat floors) are required, then the warehouse floors will need to be suspended.

Slightly elevated ground gas concentrations have been encountered, as detailed in Section 7.0. Gas protection measures should be incorporated into the proposed floor slab.

8.2.5 Below Ground Concrete

One sample was tested for aqueous extract Sulphate (SO_4) and pH, at a depth of 0.20mbgl. Water soluble sulphate contents was at 646mg/l. On this basis the Design Sulphate Class would be DS-2. The pH values in the soil sample was 8.1. Mobile groundwater conditions have been assumed and, on this basis, the Aggressive Chemical Environment for Concrete (ACEC) class for the Site is AC-2.

Three samples were tested for aqueous extract Sulphate (SO_4) and pH, at depths ranging from 2.60m to 4.00mbgl. Water soluble sulphate contents ranged between 10mg/l and 32mg/l. In accordance with BRE guidelines, the characteristic value for a dataset of less than five samples is taken as the highest concentrations; in this case, the characteristic value would be 32mg/l. On this basis the Design Sulphate Class would be DS-1. The pH values in the soil samples varied between 7.6 and 8.4. Mobile groundwater conditions have been assumed and, on this basis, the Aggressive Chemical Environment for Concrete (ACEC) class for the Site is AC-1.

Information within the AMEC Phase 1 report indicated that a previous assessment undertaken at the Site identified that the concrete classification should be DC-3z. The raw data to which this conclusion was based was not provided. It is noted that the inclusion of the 'z' in the classification is primarily used to resist acid conditions.

Nineteen samples of soil were tested for pH during the TRC investigation with the results varying between 6.2 and 9.0. In addition, the three groundwater samples analysed had pH values that varied between 6.5 and 7.1. pH values of less than 6.5 (in a brownfield setting) are sufficient to require buried concrete to resist acidic conditions. With respect to natural ground pH values need to be lower before requiring protection measures with a limit of 5.5. Only two of the soil samples had a pH marginally below the value of 6.5 for brownfield Sites. These were WS05 at 1.6m (Glacial Deposits) and WS04 at 0.9m (Made Ground).

Given the limited number of samples that were below this value and the fact that one of these was associated with natural ground it is considered that the need to protect against acid condition is not required.

This is also supported by the findings of the AMEC Phase 2 investigation with encountered pH and sulphate concentrations consistent with DS-1 and AC-1.

TRC has undertaken pH and sulphate analysis on three samples of groundwater that are consistent with a DS-1 class. Assuming mobile groundwater conditions this would place the Site into ACEC Class AC-1. Further analysis of soil is ongoing in order to provide further information.

It is also noted that the DC-3z classification identified by previous investigations would also have identified elevated concentrations of either sulphates or sulphides (that could oxidise to form sulphates). While the AMEC and TRC investigations have not identified elevated concentrations of sulphates it is considered that there is the potential for sulphides to be present.

Further testing is recommended should earthworks be required at the Site that could oxidise potential sulphides to form sulphates.

8.2.6 Pavement Construction

Eight in-situ DCP tests were carried out in order to determine an estimate of CBR value for near surface soils. Results are summarised in the table below.

Table 10: Summary of DCP Results

Location	Depth (m)	CBR Value Range (%)
TRL01	0 to 0.95	3.8 to 55.1
TRL02	0 to 0.95	1.8 to 55.1
TRL03	0 to 0.95	2.9 to 43.5
TRL04	0 to 0.88	3.5 to 114.7
TRL05	0 to 0.91	2.1 to 29.6
TRL06	0 to 0.93	1.8 to 114.7
TRL07	0 to 0.73	3.5 to 176
TRL08	0 to 0.95	2.3 to 14.7

The results of the DCP tests indicate that the near surface soils were highly variable with CBR values ranging from less than 2% to greater than 100%. It is considered that the high results are probably due to the presence of large gravel fragments or possibly cobbles that the probe would not be able to penetrate through. The results have indicated that the lower bound values that were typically found at depths of less than 0.5m were less than approximately 5%. It is recommended that for preliminary design purposes a CBR value of 2% is adopted.

Where the long-term groundwater level might rise to within 600mm of the pavement formation level, land drainage must be installed at appropriate levels to ensure that the groundwater levels always remain at least 600mm below the formation level.

9.0 Soakaway Assessment

Testing was not completed due to the slow fall in water level, indicating a very low infiltration rates which is typical and reflective of the natural ground conditions encountered i.e., clay. Therefore, the Site is not considered suitable for conventional depth soakaway drainage design.

9.1 Best Practice Guidance

Reference to the SUDS Manual (CIRIA C697, 2007) provides the following salient information, which should be considered within the subsequent drainage design:

- The SUDS manual suggests that SUDS should be designed to ensure infiltration and storage systems operate during periods of extreme (up to 1% annual probability) groundwater levels.
- The SUDS manual also provides the following advice *inter alia* in relation to infiltration criteria:
'Groundwater levels must be checked to ensure that the infiltration surface is at least 1m above the maximum anticipated level. Infiltration systems require an unsaturated soil to provide effective pollution protection.'

10.0 Waste and Materials Management

10.1 Waste

10.1.1 Introduction

Soils excavated at the Site may be reused subject to appropriate chemical testing and necessary treatment prior to relaying the soils. This re-use materials would be carried out under a Materials Management Plan (MMP) in accordance with the Definition of Waste Code of Practice (DoWCoP) or a waste exemption. In the event that soil treatment is necessary, an environmental permit will be required.

For the proposed cut and fill earthworks at the Site, it is recommended that an MMP is produced for the Site in order to ensure that reuse of soils at the Site is carried out in accordance with the DoWCoP. The MMP is a mechanism by which those who are developing a Site can comply with Environment Agency regulations for excavated ground materials. The MMP sets out how environmental and geotechnical quality should be monitored when reusing soils under the DoWCoP.

TRC recommend that materials are balanced to avoid additional development costs through the removal of surplus soils. If materials are to be removed as surplus, the waste material must be classified as being either hazardous or non-hazardous, using the characterisation assessment and analysis described by the WM3 technical guidance. Then, if a waste hierarchy assessment determines that disposal to landfill is the appropriate option for the waste, chemical WAC testing must be undertaken on the actual soils designated as waste and destined for inert, stable non-reactive hazardous or hazardous classes of landfill.

The following section is a preliminary classification of waste based on the Site investigation data. However, the actual classification can only be undertaken by the receiving landfill as licence conditions vary from landfill to landfill. If material is to be removed from the Site, prior to export, the data in this report should be presented to the proposed receiving landfill Site for it to confirm that it is suitably licensed to accept them. Additional testing on the actual excavated soils to be disposed of may be necessary at the time of disposal.

10.1.2 Preliminary Waste Classifications

Soil samples were scheduled for basic chemical testing and select samples were assessed using HazWasteOnline™ classification tool in order to determine the waste classification of the soils. TRC analysed the one sample from the natural glacial deposits and one sample from Made Ground. In addition, TRC undertook Waste Acceptance Criteria (WAC) testing on the two samples to determine the appropriate landfill facility that the soils could be disposed to. The results are contained within Annex E and the hazardous waste assessments are found within Annex H.

Made Ground

The sample obtained from the Made Ground was determined to be non-hazardous. The WAC testing indicated an exceedance of the Inert landfill threshold due to elevated Mercury (concentration of 0.0122mg/kg against a threshold of 0.01mg/kg). Therefore, indicating that the Made Ground deposits are suitable for disposal at a non-hazardous landfill facility. It should be noted that the exceedance is very minor so liaison with the receiving landfill facility should be undertaken as they may accept it as inert waste.

Natural (Glacial)

The sample obtained from the natural deposits was determined to be non-hazardous. The WAC testing indicated an exceedance of the Inert landfill threshold due to elevated Mercury (concentration of 0.0159mg/kg against a threshold of 0.01mg/kg). Therefore, indicating that the Made Ground deposits are suitable for disposal at a non-hazardous landfill facility. It should be noted that the exceedance is very minor so liaison with the receiving landfill facility should be undertaken as they may accept it as inert waste.

Based on the Site history and the HazWasteOnline™ assessment (see Annex I), if suitable segregation of different types of waste is put in place, for soils to be disposed of, it is considered that:

- Natural soils are likely to be classified as non-hazardous waste and may be able to be disposed of at a non-hazardous or inert landfill.
- The Made Ground is likely to be classified as non-hazardous waste and may be able to be disposed of at a non-hazardous landfill or inert landfill subject to liaison with the receiving facility.

It should be noted that:

- The above preliminary assessment has been made on the basis of the soils tested as part of the ground investigation. Prior to disposal, the characteristics of the actual soils to be disposed of will need testing and classification in consultation with landfill Sites and waste disposal Contractors. The receiving landfill will make the final decision on the classification and acceptability of the waste.
- Non-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 may be applicable. There are soil treatment facilities that may be able to treat and re use the soils. This process is generally charged at a lower tax rate and may provide a more cost-effective route for disposal.

10.2 Materials Management

10.2.1 Introduction

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. Full details are available at: <https://www.gov.uk/government/publications/landfill-tax-disposals-not-made-at-landfill-Sites/landfill-tax-disposals-not-made-at-landfill-Sites>.

HM Revenue and Customs (HMRC) will be charging landfill tax on illegal waste deposits on construction Sites and HMRC also has the ability to prosecute for landfill tax evasion fines for any illegal deposits. However, where an operator can demonstrate they are compliant with a recognised waste exemption, Code of Practice, or Quality Protocol, they will remain outside the scope of the tax.

In summary, if non-natural or contaminated soils are excavated and reused on Sites (or soils are moved to or from another Site for reuse), without an MMP 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. It is worth noting that the legislation covering waste management has not changed. However, the mechanism that the Environment Agency and HMRC will use to enforce it has changed. However, provided that soils are managed in accordance with 'The Definition of Waste: Development Industry Code of Practice', Version 2 (CL:AIRE), known as the DowCoP, the soils will never become a waste.

8.2.2 Materials Management Scenario

Naturally occurring, uncontaminated soils:

Where soils are naturally occurring, uncontaminated and are reused on the Site they are excavated (i.e., completely uncontaminated greenfield Site, 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. As such, TRC would recommend that a Materials Management Strategy document is prepared to prove certainty.

Where soils are naturally occurring and uncontaminated, they only become a waste on leaving the Site. When moving uncontaminated, naturally occurring soils between Sites, it must be ensured they are being transferred under an MMP.

Made Ground or contaminated soils:

On Sites where Made Ground or contaminated (including by naturally occurring chemicals) soils are present, any soils excavated may be a waste.

As such, for any Site where Made Ground is present and soils are being moved and reused on, or off Site, it could be deemed a waste, and subject to either:

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

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.

All recycled materials (6F2 etc.) must be produced under the 2013 Aggregates Protocol, whether on Site or off Site. If it is not, then it 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-from-inert-waste>. If materials are not managed as above, all materials placed would be deemed a waste and subject to Landfill Tax.

Where required, to prevent soils being classified as waste, all materials / soils movements should be managed under the CLAIRE Definition of Waste: Development Industry Code of Practice (DoWCoP) and a Materials Management Plan (MMP).

Under DoWCoP, to prevent materials being classified as waste, the following factors need to be proven to ensure the soils to be excavated are not waste:

- 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: Quantity of Material.

TRC recommend that the reuse of soils at Sites should be considered during the planning and development process.

Under the DoWCoP, all soils reused must be tested post-excavation to prove they are fit for use. 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. 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.

Once the MMP is collated, it must be declared by a Qualified Person:

- before soils are placed (where soils are naturally occurring, uncontaminated and reused on the Site of origin); or

- before excavation of soils is undertaken (on Sites where Made Ground or contaminated soils are present, or soils are to be imported).

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.

11.0 Environmental Risk Assessment

11.1 Conceptual Site Model

The ground investigation performed at the Site by TRC identified minor concentrations of heavy metals, speciated PAHs and hydrocarbons in Made Ground soils. However, none of the concentrations exceeded the GAC's. Groundwater was detected at depths of between 0.1mbgl and 2.4mbgl in the monitoring wells. The ground gas assessment for the Site identified that the Site would be classified as Characteristic Situation 2 (low risk).

The methodology of this risk assessment uses the source-pathway-receptor pollutant linkage to provide a qualitative appraisal of environmental risks and potential liabilities associated with soil and groundwater contamination at the Site. The conceptual Site model (CSM) has been prepared considering the proposed end use as commercial.

The following CSM has been prepared to take into consideration the findings from the intrusive investigation.

Table 11: Revised Conceptual Site Model

Source	Pathway	Receptor	Risk
On-Site Sources			
Made Ground at the Site from previous phases of development. Former use as car park. Potential contaminants include asbestos fibres in soil, heavy metals, PAH's, total petroleum hydrocarbons, and ground gases.	Dermal contact, ingestion and inhalation pathways	Future Site users	Low The soil results indicate that all ground conditions are suitable for reuse under a commercial development.
		Neighbouring residents	Low The soil results indicate that all ground conditions are suitable for reuse under a commercial development.
		Construction workers	Low Risk pathway to be mitigated via Personal Protective Equipment (PPE), good hygiene practices and construction Site management. The soil results indicate that all ground conditions are suitable for reuse under a commercial development.
	Leaching of contaminants and	Controlled waters	Low The soil results indicate that all ground

Source	Pathway	Receptor	Risk
	vertical migration into groundwater		conditions are suitable for reuse under a commercial development. In addition, the groundwater results, although showing fairly marginal exceedances, it is considered unlikely to pose a significant risk to controlled waters.
	Contact with buried services	Buried services	Low Proposed development to consider risk of residual contamination and incorporate protective measures as appropriate. Examples may include barrier pipe or clean service corridors. The soil results indicate that all ground conditions are suitable for reuse under a commercial development.
	Migration of ground gases onto Site and ingress into buildings	Future Site users	Low The gas monitoring indicates that there is potential for Made Ground on Site and from nearby developments which could present a source of hazardous ground gas. The results of the gas monitoring have indicated that the gas regime is characterised with a Characteristic Situation 2 (low risk) classification, for which basic gas protection measures are required. Therefore, the risks will be mitigated by development led solutions such as protective gas

Source	Pathway	Receptor	Risk
			membranes or suspended floor slabs.
		Construction workers	Low Protective Equipment (PPE), good hygiene practices and construction Site management.
Off-Site Sources			
Historical and current industrial works, notably Contract Chemicals to the north, and historical pits and quarries. Potential contaminants include asbestos fibres in soil, heavy metals, PAH's, total petroleum hydrocarbons and ground gases.	Dermal contact, ingestion and inhalation pathways	Future Site users	Low The soil results indicate that all ground conditions are suitable for reuse under a commercial development.
		Construction workers	Low Risk pathway to be mitigated via Personal Protective Equipment (PPE), good hygiene practices and construction Site management. The soil results indicate that all ground conditions are suitable for reuse under a commercial development.
	Migration via groundwater	Controlled waters	Low The soil results indicate that all ground conditions are suitable for reuse under a commercial development. In addition, the groundwater results, although showing fairly marginal exceedances, it is considered unlikely to pose a significant risk to controlled waters.
	Leaching of contaminants and infiltration into groundwater	Controlled waters	Low The soil results indicate that all ground conditions are suitable for reuse under a

Source	Pathway	Receptor	Risk
			commercial development. In addition, the groundwater results, although showing fairly marginal exceedances, it is considered unlikely to pose a significant risk to controlled waters.

The updated CSM above has found that there are no sources presenting a risk level above low to the proposed development if gas protection measures are implemented within buildings.

12.0 Conclusions

12.1 Findings

TRC Companies Limited (TRC) was commissioned by Pembury Developments Limited (the 'Client') to undertake a Phase II Environmental & Geotechnical Site Assessment (ESA) for land off Villiers Rd, Knowsley, Prescot L34 9ET (hereafter referred to as the 'Site').

The proposed development comprises a single large warehouse, labelled as a distribution centre, with a small area of first floor offices along the north-western corner of the building. There will be carparking (100 spaces) and a 71m service area within the outside areas. In addition, there will be two level access doors and ten dock loading doors along the eastern building boundary. As far as TRC are aware, there are no areas of soft landscaping proposed and the entire Site will be covered in hardstanding. TRC have not been made aware of anticipated loads.

The TRC Phase II Geo-environmental and Geotechnical investigation was conducted at the Site between the 25th and 27th November 2021.

Generally, the near surface superficial deposits were found to be highly variable, comprising granular as well as cohesive materials of varying densities/consistencies. The anticipated Shirdley Hill Sand Formation was only identified in some of the exploratory holes with the majority of the encountered deposits more consistent with materials of a glacial origin. Weathered bedrock was encountered at depths of between 1.8m to 3.35m (both investigations) with the rock surface encountered at depths of between 3.0m and 5.0m.

During the monitoring groundwater in BH01 ranged between 2.14mbgl and 2.4mbgl and in WS01 groundwater was resting at between 1.06m and 1.20m. BH01 and WS01 were both located on the northern side of the Site. Within BH02 groundwater was typically resting at between 1.34mbgl and 1.68mbgl, although it is noted that groundwater was recorded at 0.2mbgl during the first monitoring visit. With respect to WS03, groundwater was recorded at depths of 0.1 to 0.5mbgl. It is recommended that further groundwater monitoring is undertaken in order to provide further information on groundwater occurrence.

With regards to the chemical quality of the soils, no soil samples exceeded the GAC for a commercial end use.

Groundwater samples obtained identified exceedances of the EQS for heavy metals (Chromium, Copper, Nickel). However, the exceedances are minor and TRC deem the water quality within the samples obtained from Site to be satisfactory and no remediation is required.

Gas monitoring indicates that the Site would be classified as Characteristic Situation 2 (very low risk)

12.2 Summary of Environmental Risk

The updated CSM has found that there are no sources presenting a risk level above low to the proposed development if gas protection measures are implemented within buildings.

12.3 Summary of Geotechnical Assessment

The superficial deposits encountered beneath the Site were highly variable and contained both granular and cohesive materials. The superficial deposits also included Shirdley Hill Sand, a windblown deposit, that is particularly prone to consolidation/settlement due to its open fabric. Given this high variability it is considered that shallow foundations would potentially be subject to unacceptable amounts of settlement. It is therefore recommended that in order to obtain more uniform ground conditions, consideration should be given to undertaking ground improvement at

the Site. If the ground improvement is extended beneath the entire building footprint this would also enable a ground bearing floor slab to be constructed.

Ground improvement techniques such as vibro-compaction or vibro-replacement stone or concrete columns could be considered for the Site. In order for stone/concrete columns to work effectively they will need to penetrate the full thickness of the Made Ground and variable superficial deposits. In some cases, the stone/concrete columns will also need to extend through the highly weathered Chester Formation. More competent bedrock has been identified at depths of 3 and 5mbgl. Therefore, column depths in the order of 3 to 5mbgl should be anticipated across the Site.

Information within the AMEC Phase 1 report indicated that a previous assessment undertaken at the Site identified that the concrete classification should be DC-3z. The raw data to which this conclusion was based was not provided. It is noted that the inclusion of the 'z' in the classification is primarily used to resist acid conditions. While low pH values were recorded in two of the soil samples analysed by TRC, the presence of low pH conditions was not found to be widespread.

One sample was tested for aqueous extract Sulphate (SO_4) and pH, at a depth of 0.20mbgl. Water soluble sulphate content was 646mg/l. On this basis the Design Sulphate Class would be DS-2. The pH values in the soil sample was 8.1. Mobile groundwater conditions have been assumed and, on this basis, the Aggressive Chemical Environment for Concrete (ACEC) class for the Site is AC-2.

Three samples were tested for aqueous extract Sulphate (SO_4) and pH, at depths ranging from 2.60m to 4.00mbgl. Water soluble sulphate contents ranged between 10mg/l and 32mg/l. In accordance with BRE guidelines, the characteristic value for a dataset of less than five samples is taken as the highest concentrations; in this case, the characteristic value would be 32mg/l. On this basis the Design Sulphate Class would be DS-1. The pH values in the soil samples varied between 7.6 and 8.4. Mobile groundwater conditions have been assumed and, on this basis, the Aggressive Chemical Environment for Concrete (ACEC) class for the Site is AC-1.

TRC has undertaken pH and sulphate analysis on three samples of groundwater that are consistent with a DS-1 class. Assuming mobile groundwater conditions this would place the Site into ACEC Class AC-1. It is noted that the AMEC phase 2 investigation also found that their results placed the Site into DS-1 and AC-1.

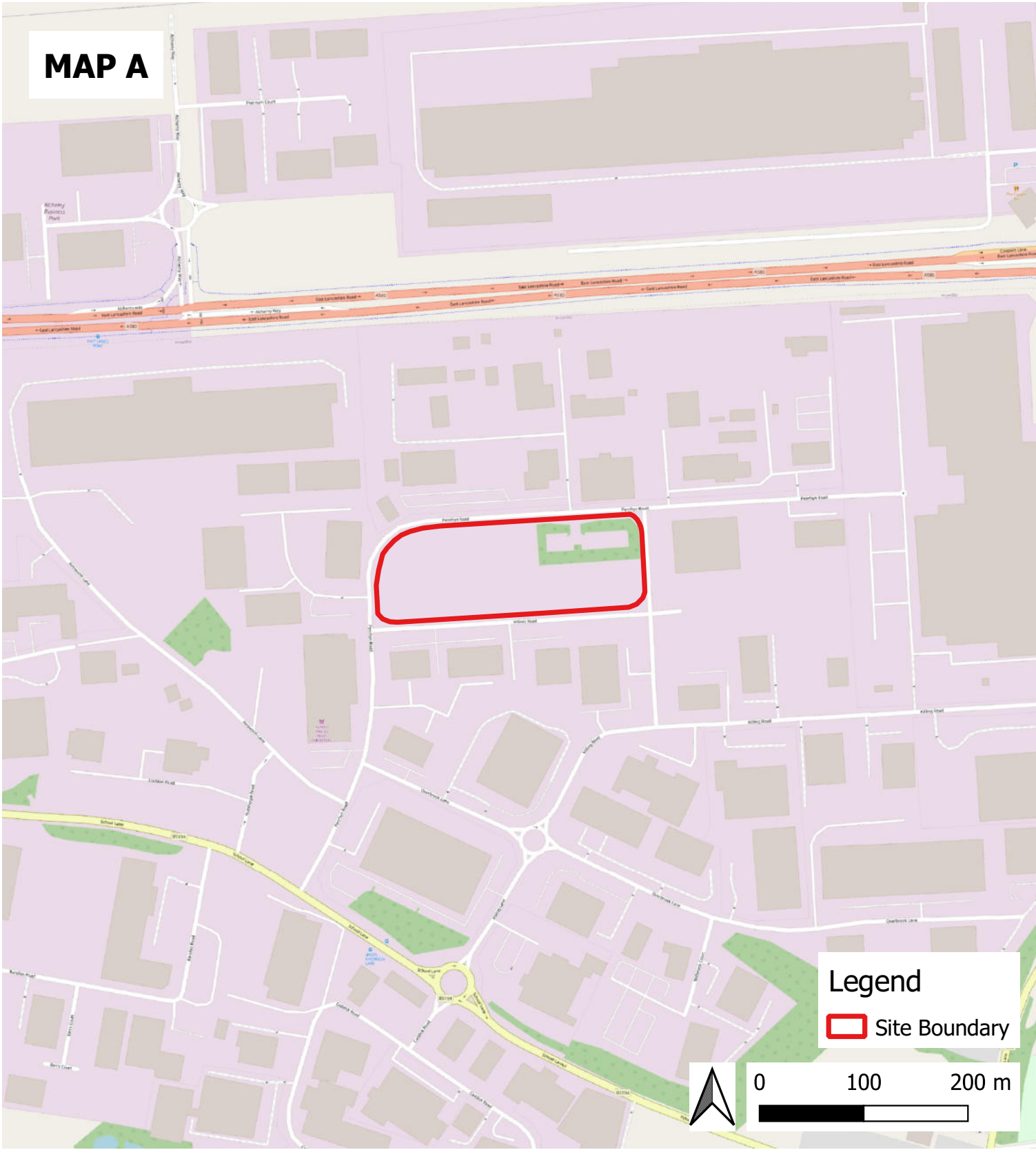
It is also noted that the DC-3z classification identified by previous investigations would also have identified elevated concentrations of either sulphates or sulphides (that could oxidise to form sulphates). While the AMEC and TRC investigations have not identified elevated concentrations of sulphates it is considered that there is the potential for sulphides to be present.

Further testing is recommended should earthworks be required at the Site that could oxidise potential sulphides to form sulphates.

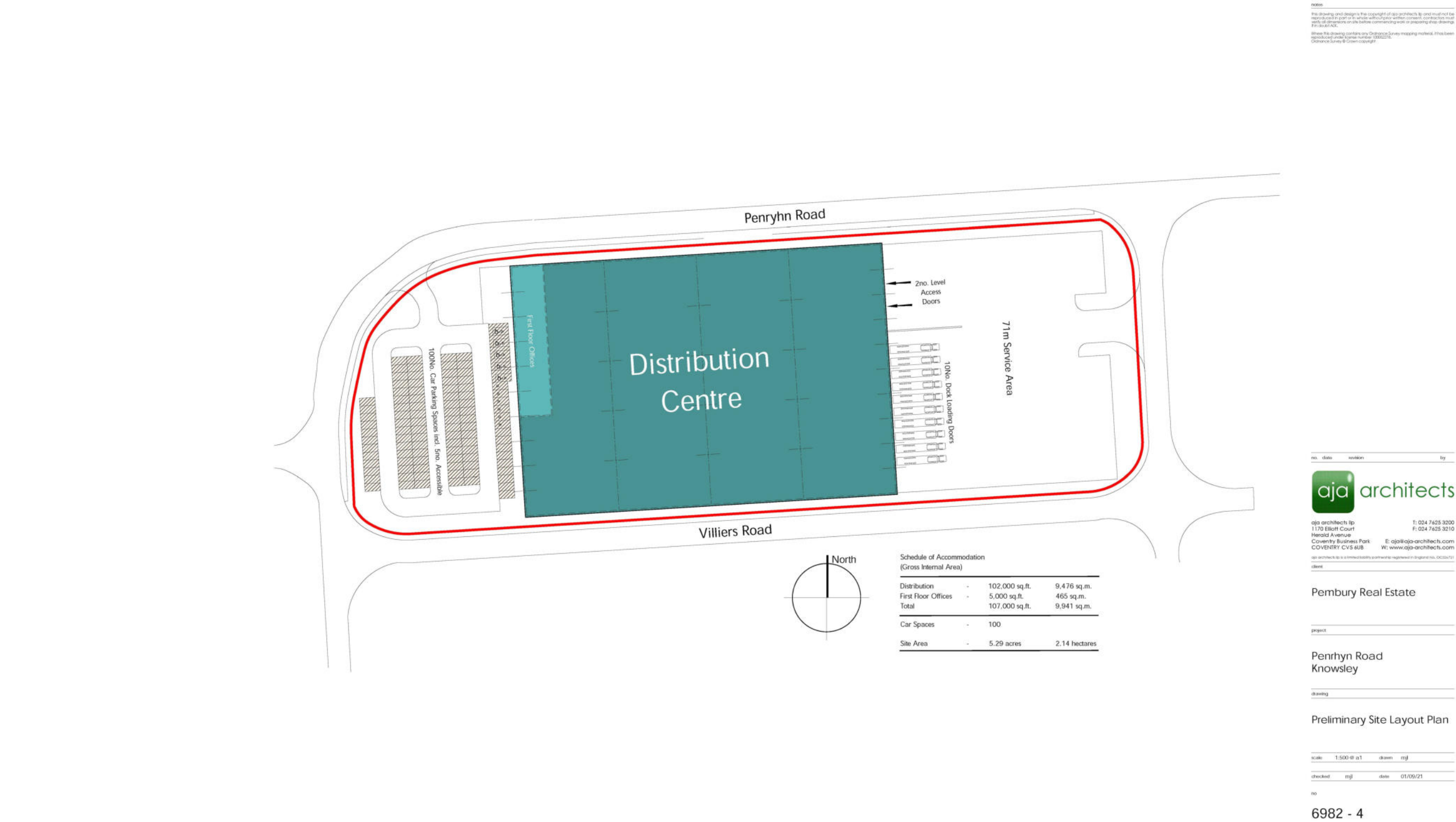
12.4 Conclusions and recommendations

TRC deem the environmental risk associated with the Site to be low. However, gas monitoring has indicated that there are slightly elevated concentrations which result in a classification as CS2, which may be reduced with further monitoring. In addition, it is recommended that additional groundwater monitoring/levelling is undertaken to determine the groundwater regime on Site.

Annex A: Figures

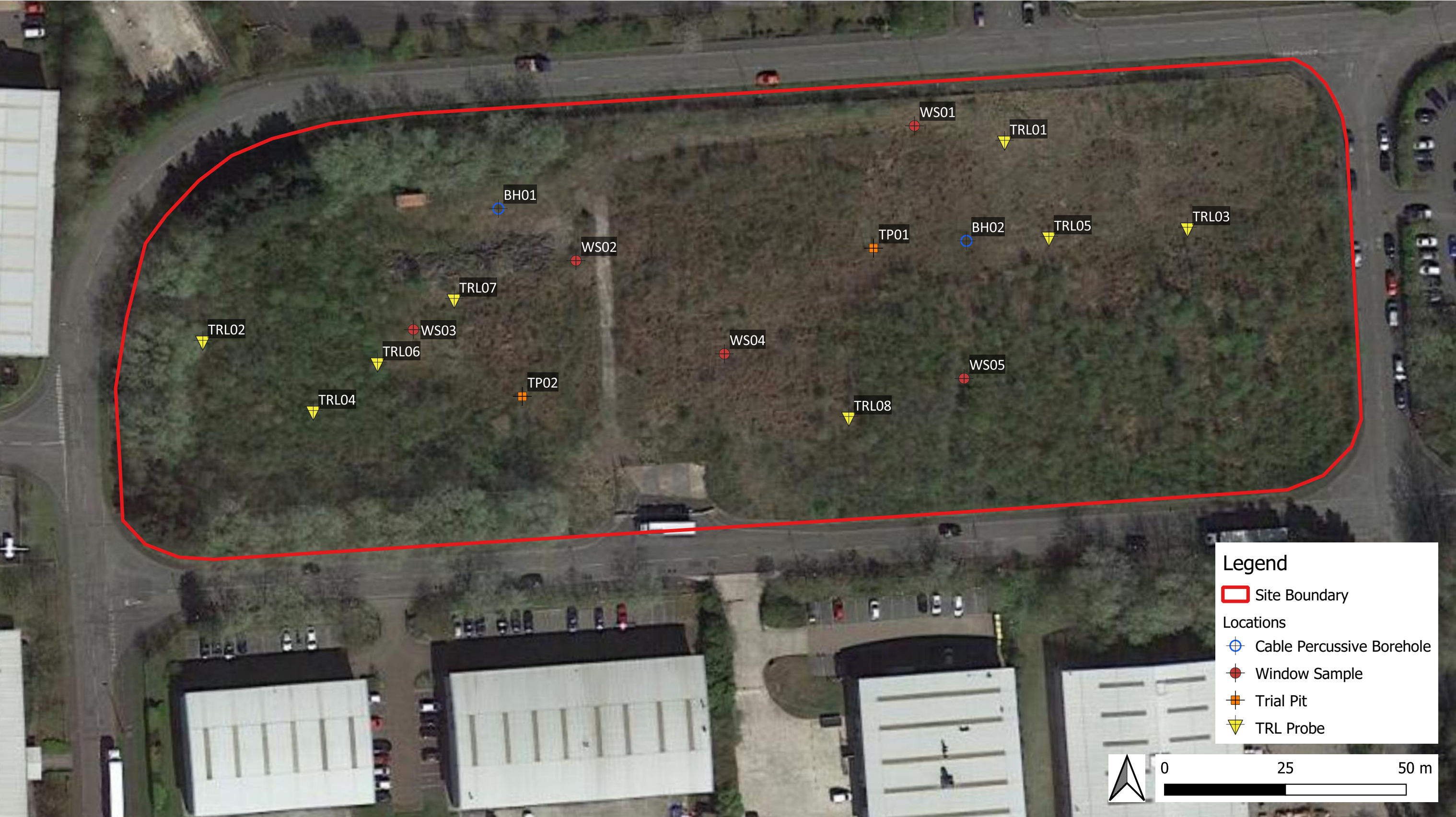


NOTES	COPYRIGHT NOTES				REVISIONS	TRC Headspace 2 Mount Street Manchester M2 5WQ		TITLE			
	Google imagery June 2018							SITE LOCATION PLAN			
	© OpenStreetMap contributors- data is available under the Open Database License. Cartography licensed as CC BY-SA.						TRC PROJECT NO.	SCALE			
							465346	MAP A- 1:5000 @ A3 MAP B- 1:1500 @ A3			
					P01	FIRST ISSUE		PURPOSE OF ISSUE		STATUS	
					Initials	NJ	NJ	22/11/21	PEMBURY DEVELOPMENTS LIMITED		SUITABLE FOR INFORMATION
				REV.	REVISION NOTES/COMMENTS		PROJECT		DRAWING NO	REVISION	
					Initials				PEMBURY, KNOWSLEY	FIGURE 01	PO1

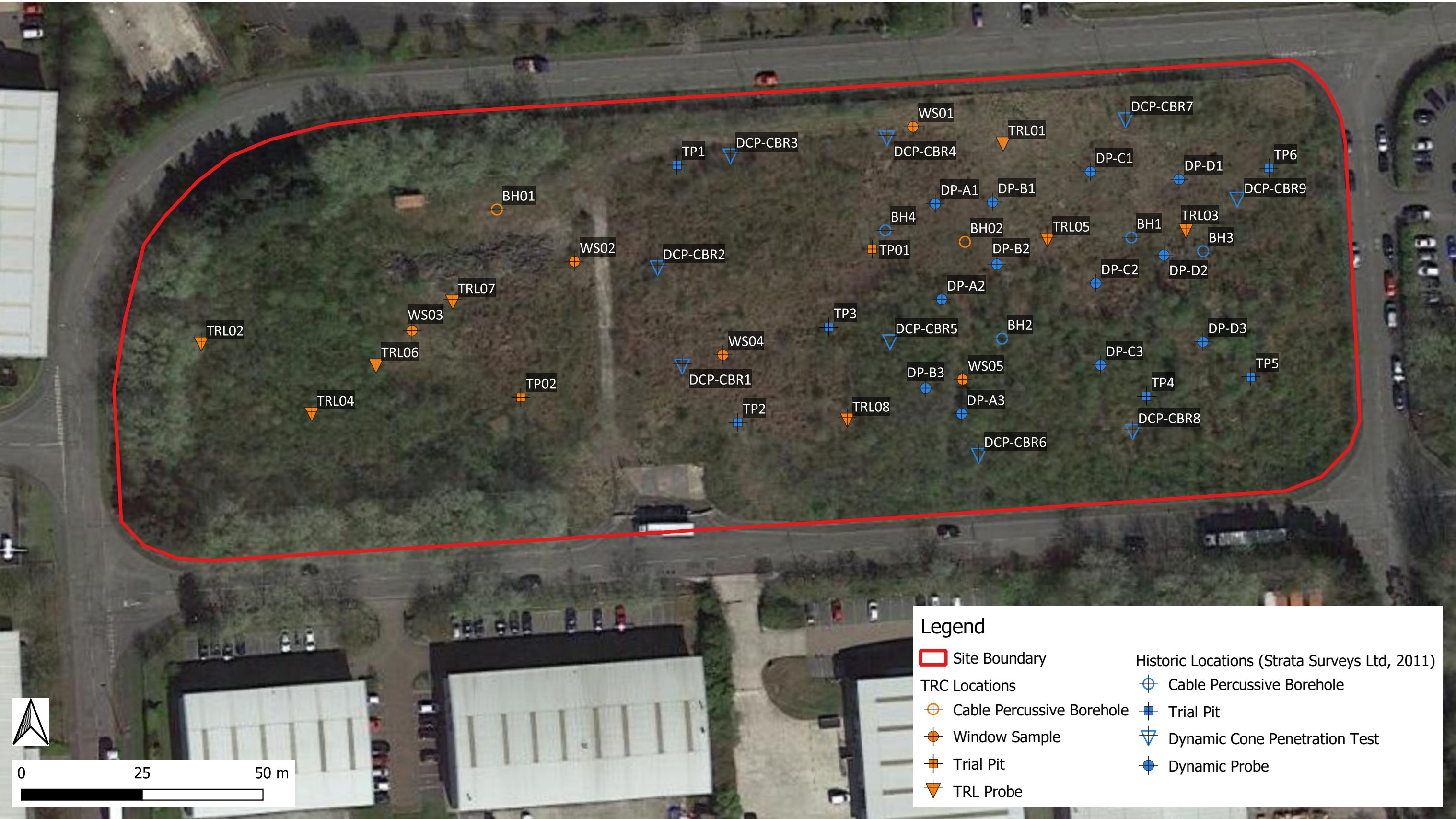


no.	date	revision	by
aja architects llp			
T: 024 7425 3200			
F: 024 7425 3210			
1170 Elliott Court			
Herold Avenue			
Coventry Business Park			
COVENTRY CV5 6UB			
E: aja@aja-architects.com			
W: www.aja-architects.com			
aja architects llp is a limited liability partnership registered in England no. 06324721			
client			
Pembury Real Estate			
project			
Penrhyn Road			
Knowsley			
drawing			
Preliminary Site Layout Plan			
scale 1:500 @ a1			
drawn mjl			
checked mjl			
date 01/09/21			
no			
6982 - 4			

NOTES	COPYRIGHT NOTES Google imagery June 2018	REVISIONS				 Headspace 2 Mount Street Manchester M2 5WQ	TITLE		
							PROPOSED DEVELOPMENT PLAN		
		TRC PROJECT NO.		SCALE					
		465346		N/A					
		P01	FIRST ISSUE				PEMBURY DEVELOPMENTS LIMITED	PURPOSE OF ISSUE	
Initials	NJ		NJ	22/11/21	SUITABLE FOR INFORMATION				
REV.	REVISION NOTES/COMMENTS				PROJECT	DRAWING NO		REVISION	
	Initials				PEMBURY, KNOWSLEY	FIGURE 02			
								PO1	



NOTES	COPYRIGHT NOTES Google imagery June 2018				REVISIONS				Headspace 2 Mount Street Manchester M2 5WQ		TITLE EXPLORATORY HOLE LOCATION PLAN			
											TRC PROJECT NO. 465346		SCALE 1:750 @ A3	
					P01		PEMBURY DEVELOPMENTS LIMITED				PURPOSE OF ISSUE		STATUS	
											SUITABLE FOR INFORMATION			
									REV.		PROJECT PEMBURY, KNOWSLEY			
FIGURE 03		PO1												



NOTES	COPYRIGHT NOTES Google imagery June 2018				REVISIONS				Headspace 2 Mount Street Manchester M2 5WQ		TITLE EXPLORATORY HOLE LOCATION PLAN WITH HISTORIC LOCATIONS			
											TRC PROJECT NO. 465346	SCALE 1:750 @ A3		
					P01	FIRST ISSUE				PEMBURY DEVELOPMENTS LIMITED		PURPOSE OF ISSUE		STATUS
						Initials	NJ	NJ	28/01/22			SUITABLE FOR INFORMATION		
					REV.	REVISION NOTES/COMMENTS				PROJECT PEMBURY, KNOWSLEY		DRAWING NO		REVISION
Initials				FIGURE 04		PO1								

Annex B: Site Photographs

Photographic Log

Client Name:		Site Location:	Project No.:
Pembury Developments Limited		Knowsley	465346.0001.0000
Photo No.	Date		
1	25 November 2021		
Description: Clay arisings from TP01			
Photo No.	Date		
2	25 November 2021		
Description: TP02 arisings (sand)			

Photographic Log

Client Name: Pembury Developments Limited		Site Location: Knowsley	Project No.: 465346.0001.0000
Photo No. 3	Date 25 November 2021		
Description: TP02			

Photographic Log

Client Name:		Site Location:	Project No.:
Pembury Developments Limited		Knowsley	465346.0001.0000
Photo No.	Date		
4	26 November 2021		
Description:			
WS01			

Photographic Log

Client Name: Pembury Developments Limited		Site Location: Knowsley	Project No.: 465346.0001.0000
Photo No. 5	Date 26 November 2021		
Description: WS02			

Photographic Log

Client Name: Pembury Developments Limited		Site Location: Knowsley	Project No.: 465346.0001.0000
Photo No. 6	Date 26 November 2021		
Description: WS03			

Photographic Log

Client Name:	Site Location:	Project No.:
Pembury Developments Limited	Knowsley	465346.0001.0000
Description: WS04		

Photo No.	Date	
8	27 November 2021	
Description: WS05		

Annex C: Exploratory Hole Logs



TRIAL PITTING LOG

TRIAL PIT NO. TP01

Page 1 of 1

Facility/Project Name: Knowsley, Prescott		Date Trial Pit Started: 25/11/21	Date Trial Pit Completed: 25/11/21	Project Number: 465346
Contractor: TRC	Excavation Method: Mechanical Excavation	Surface Elev. (m) 29.9	TOC Elevation (m) ---	Total Depth (m bgs) 2.8
Trial Pit Location: N: 343033.00000 E: 396599.00000		Personnel Logged By - Ashley Standen-Howard Trial Pitter - Subcontractor		Excavation Equipment: JCB 3CX
Civil Town/City/or Village: Knowsley	County: Prescot	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time		Depth (m bgs) Depth (m bgs)

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
	ENV				MADE GROUND: Soft dark brown slightly sandy CLAY with frequent rootlets. Sand is fine to coarse. (MADE GROUND TOPSOIL)			
	ENV				MADE GROUND: Dark brown clayey slightly gravelly SAND. Sand is fine to coarse, Gravel is angular to sub-rounded, fine to coarse grained. Gravel consists of brick, mudstone and sandstone. (MADE GROUND)			
	Bulk			1	Firm dark redish brown silty sandy CLAY. Sand is fine to coarse grained. (SHIRDLEY HILL SAND FORMATION)			
	Bulk			2	Light redish brown slightly gravelly SAND. Sand is fine to coarse, Gravel is sub-rounded to well rounded, fine to coarse grained. Gravel consists of sandstone. With infrequent sandstone boulders. (GLACIAL DEPOSITS)			
	Bulk			3	Firm light redish brown sandy CLAY. Sand is fine to coarse grained. (WEATHERED CHESTER FORMATION)			
				4	Light redish brown slightly clayey gravelly SAND. Sand is fine to coarse, Gravel is angular to rounded, fine to coarse grained. Gravel consists of sandstone. (WEATHERED CHESTER FORMATION)			

Signature:	Firm: TRC Companies	Fax
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TRIAL PITTING LOG (METRIC) 465346-PEMBURY KNOWSLEY.GPJ 465346 11/1/22



TRIAL PITTING LOG

TRIAL PIT NO. TP02

Page 1 of 1

Facility/Project Name: Knowsley, Prescot		Date Trial Pit Started: 25/11/21		Date Trial Pit Completed: 25/11/21		Project Number: 465346			
Contractor: TRC		Excavation Method: Mechanical Excavation		Surface Elev. (m) 29.5		TOC Elevation (m) ---		Total Depth (m bgs) 2.5	
Trial Pit Location: N: 342973.00000 E: 396564.00000				Personnel Logged By - Ashley Standen-Howard Trial Pitter - Subcontractor				Excavation Equipment: JCB 3CX	
Civil Town/City/or Village: Knowsley		County: Prescot		Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time				Depth (m bgs) Depth (m bgs)	

SAMPLE		RECOVERY (%)	SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE								
					MADE GROUND: Soft dark brown very sandy silty CLAY with frequent rootlets. Sand is fine to coarse. (MADE GROUND TOPSOIL)			
ENV					MADE GROUND: Dark brown very clayey slightly gravelly SAND. Sand is fine to coarse, Gravel is sub-angular to well rounded, fine to coarse grained. Gravel consists of brick, mudstone and sandstone. (MADE GROUND)			
				1	Light orangeish brown slightly clayey SAND. Sand is fine to coarse grained. (SHIRDLEY HILL SAND FORMATION)			
Bulk ENV					Firm greyish brown slightly sandy CLAY. Sand is fine to coarse grained. (GLACIAL DEPOSITS)			
				2				
Bulk								
				3				
				4				

Signature:	Firm: TRC Companies	Fax
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TRIAL PITTING LOG (METRIC) 465346-PEMBURY KNOWSLEY.GPJ 465346 11/1/22



WINDOW SAMPLE LOG

WINDOW SAMPLE NO. WS01

Page 1 of 1

Facility/Project Name: Knowsley, Prescott		Date Drilling Started: 26/11/21	Date Drilling Completed: 26/11/21	Project Number: 465346	
Drilling Firm: DMW Drilling	Drilling Method: Window Sampling	Surface Elev. (m) 29.8	TOC Elevation (m) ---	Total Depth (m bgs) 3.8	Borehole Dia. (cm)
Window Sample Location: N: 343040.0000 E: 396613.0000		Personnel Logged By - Ashley Standen-Howard Driller - DMW Drilling		Drilling Equipment: Window Sampler	
Civil Town/City/or Village: Knowsley	County: Prescot	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time		Depth (m bgs) Depth (m bgs)	

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
ENV					MADE GROUND: Soft dark brown sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Gravel consists of brick and mudstone. (MADE GROUND TOPSOIL)				
ENV					MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse, Gravel is angular to rounded, fine to coarse grained. Gravel consists of brick and mudstone. (MADE GROUND)				
			10	1	Firm light greyish brown sandy slightly gravelly CLAY. Sand is fine to coarse, Gravel is sub-rounded to rounded, fine to coarse grained. Gravel consists of mudstone and sandstone. (GLACIAL DEPOSITS)				
				2	Light redish brown slightly clayey SAND. Sand is fine to coarse grained. (WEATHERED CHESTER FORMATION)				
			17	3	Firm light redish brown slightly silty CLAY. (WEATHERED CHESTER FORMATION)				Sampler refused at 2.90m, dynamic probing continued
			>50	4					Terminated at 3.80m due to refusal

WINDOW SAMPLE LOG (METRIC) 465346- PEMBURY KNOWSLEY.GPJ 465346 12/1/22

Signature:	Firm: TRC Companies	Fax
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Facility/Project Name: Knowsley, Prescott		Date Drilling Started: 26/11/21	Date Drilling Completed: 26/11/21	Project Number: 465346
Drilling Firm: DMW Drilling	Drilling Method: Window Sampling	Surface Elev. (m) 28.8	TOC Elevation (m) ---	Total Depth (m bgs) 3.0
Window Sample Location: N: 342901.0000 E: 396574.0000		Personnel Logged By - Ashley Standen-Howard Driller - DMW Drilling		Drilling Equipment: Window Sampler
Civil Town/City/or Village: Knowsley	County: Prescot	Water Level Observations: While Drilling: Date/Time Depth (m bgs) After Drilling: Date/Time Depth (m bgs)		

SAMPLE		SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE	RECOVERY (%)						
				MADE GROUND: Soft dark brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse.			
				MADE GROUND: Dark brown very clayey slightly gravelly SAND. Sand is fine to coarse, Gravel is angular to sub-rounded, fine to medium grained. Gravel consists of brick and mudstone. (MADE GROUND)			
ENV							
SPT	ENV	6	1	Firm light orangeish brown sandy slightly gravelly CLAY. Sand is fine to coarse, Gravel is sub-rounded to well rounded, fine to coarse grained. Gravel consists of mudstone and sandstone. (GLACIAL DEPOSITS)			
				Light orangeish brown SAND. Sand is fine to coarse grained. (GLACIAL DEPOSITS)			
SPT		11	2	Stiff light orangeish brown slightly gravelly sandy CLAY. Sand is fine to coarse grained. (WEATHERED CHESTER FORMATION)			
D							
			3				Sampler refused at 2.90m, dynamic probing continued until refusal
SPT		12					
			4				Dynamic probe refusal at 3.30m

WINDOW SAMPLE LOG (METRIC) 465346- PEMBURY KNOWSLEY.GPJ 465346 12/1/22

Signature:	Firm: TRC Companies	Fax
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WINDOW SAMPLE LOG

WINDOW SAMPLE NO. WS03

Page 1 of 1

Facility/Project Name: Knowsley, Prescott		Date Drilling Started: 26/11/21		Date Drilling Completed: 26/11/21		Project Number: 465346	
Drilling Firm: DMW Drilling		Drilling Method: Window Sampling		Surface Elev. (m) 29.1		TOC Elevation (m) ---	
Window Sample Location: N: 342920.0000 E: 396557.0000		Personnel Logged By - Ashley Standen-Howard Driller - DMW Drilling		Total Depth (m bgs) 3.1		Borehole Dia. (cm)	
Civil Town/City/or Village: Knowsley		County: Prescot		Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time		Drilling Equipment: Window Sampler	

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
ENV					MADE GROUND: Soft dark brown sandy silty CLAY with frequent rootlets. Sand is fine to coarse. (MADE GROUND TOPSOIL)				
					MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse, Gravel is sub-angular to rounded, fine to coarse grained. Gravel consists of brick and mudstone. (MADE GROUND)				
SPT			10	1	Dark brown clayey gravelly SAND. Sand is fine to coarse grained. Gravel is subangular to subrounded, fine to coarse. gravel consists of sandstone. (SHIRDLEY HILL SAND FORMATION)				
D									
SPT			12	2					
D									
SPT			14	3	Stiff light redish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse, Gravel is sub-rounded to well rounded, fine to medium grained. Gravel consists of mudstone and sandstone. (WEATHERED CHESTER FORMATION)				
SPT									
			>50						
				4					

Sampler refused at 2.80m, dynamic probing continued until refusal
Terminated at 3.10m due to refusal

Signature:	Firm: TRC Companies	Fax
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WINDOW SAMPLE LOG (METRIC) 465346- PEMBURY KNOWSLEY.GPJ 465346 12/1/22



WINDOW SAMPLE LOG

WINDOW SAMPLE NO. WS04

Page 1 of 1

Facility/Project Name: Knowsley, Prescott		Date Drilling Started: 26/11/21		Date Drilling Completed: 26/11/21		Project Number: 465346					
Drilling Firm: DMW Drilling		Drilling Method: Window Sampling		Surface Elev. (m) 29.8		TOC Elevation (m) ---		Total Depth (m bgs) 3.6		Borehole Dia. (cm)	
Window Sample Location: N: 343010.0000 E: 396580.0000				Personnel Logged By - Ashley Standen-Howard Driller - DMW Drilling				Drilling Equipment: Window Sampler			
Civil Town/City/or Village: Knowsley		County: Prescot		Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time				Depth (m bgs) Depth (m bgs)			

SAMPLE		RECOVERY (%)	SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
NUMBER AND TYPE								
ENV					MADE GROUND: Soft dark brown sandy silty CLAY with frequent rootlets. Sand is fine to coarse. (MADE GROUND TOPSOIL)			
ENV					MADE GROUND: Soft dark brown slightly gravelly sandy silty CLAY. Sand is fine to coarse, Gravel is very angular to sub-rounded, fine to medium grained. Gravel consists of brick and mudstone. (MADE GROUND)			
SPT			12	1	Firm redish brown slightly sandy CLAY. Sand is fine to coarse grained. (SHIRDLEY HILL SAND FORMATION)			
D SPT			10	2	Light pinkish brown slightly clayey gravelly SAND. Sand is fine to coarse, Gravel is sub-rounded to rounded, fine to coarse grained. Gravel consists of sandstone. (GLACIAL DEPOSITS)			
D					Stiff brown slightly silty slightly gravelly CLAY. Gravel is sub-rounded to well rounded, fine to coarse grained. Gravel consists of mudstone. (WEATHERED CHESTER FORMATION)			
SPT			30	3				Window sample refusal at 2.80m, dynamic probing continued until further refusal
SPT			>50	4				Terminated at 3.60m due to refusal

Signature:	Firm: TRC Companies	Fax
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WINDOW SAMPLE LOG (METRIC) 465346- PEMBURY KNOWSLEY.GPJ 465346 12/1/22



BOREHOLE LOG

BH NO. BH01

Page 1 of 1

Facility/Project Name: Knowsley, Prescott		Date Borehole Started: 27/11/21	Date Borehole Completed: 27/11/21	Project Number: 465346	
Drilling Firm: DMW Drilling	Drilling Method: Cable Percussive	Surface Elev. (m) 28.7	TOC Elevation (m) ---	Total Depth (m bgs) 3.0	Borehole Dia. (cm)
Boring Location: N: 342952.00000 E: 396601.00000		Personnel Logged By - Ashley Standen-Howard Driller - DMW Drilling		Drilling Equipment: Cable percussive	
Civil Town/City/or Village: Knowsley	County: Prescot	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time		Depth (m bgs) Depth (m bgs)	

SAMPLE		SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
ENV D				MADE GROUND: dark brown slightly clayey very gravelly SAND. Sand is fine to coarse, Gravel is angular to sub-rounded, fine to coarse grained. Gravel consists of brick and sandstone. (MADE GROUND)				
U100			1					
D				Firm brown slightly sandy CLAY. Sand is fine to coarse grained. (SHIRDLEY HILL SAND FORMATION)				
SPT Bulk		10	2					
				Dense light reddish brown silty gravelly SAND. Sand is fine to coarse grained. Gravel is subangular to subrounded, fine to coarse. Gravel consists of sandstone. (WEATHERED CHESTER FORMATION)				
SPT		>50	3					
			4					

Groundwater strike recorded at 2.00m, rising to 1.80m after 20 minutes

METRIC BOREHOLE LOG (NON-U.S.) 465346- PEMBURY KNOWSLEY.GPJ 465346 12/1/22

Signature:	Firm: TRC Companies	Fax
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BOREHOLE LOG

BH NO. BH02

Page 1 of 1

Facility/Project Name: Knowsley, Prescott		Date Borehole Started: 27/11/21	Date Borehole Completed: 27/11/21	Project Number: 465346	
Drilling Firm: DMW Drilling	Drilling Method: Cable Percussive	Surface Elev. (m) 30.7	TOC Elevation (m) ---	Total Depth (m bgs) 5.0	Borehole Dia. (cm)
Boring Location: N: 343107.00000 E: 396609.00000		Personnel Logged By - Ashley Standen-Howard Driller - DMW Drilling		Drilling Equipment: Cable percussive	
Civil Town/City/or Village: Knowsley	County: Prescot	Water Level Observations: While Drilling: Date/Time After Drilling: Date/Time		▽ Depth (m bgs) <u>2</u> ▽ Depth (m bgs) <u>1.8</u>	

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	SPT N VALUE	DEPTH IN METERS	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
	D				MADE GROUND: Dark grey silty sandy GRAVEL. Sand is fine to coarse, Gravel is angular to rounded, fine to coarse grained. Gravel consists of limestone hardcore and brick. (MADE GROUND)				
	ENV								
	D								
				1	Firm light redish brown sandy CLAY. Sand is fine to coarse grained. (SHIRDLEY HILL SAND FORMATION)				
	J100								
	D								
				2	Medum dense brown clayey silty gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Gravel consists of sandstone. (GLACIAL DEPOSITS)				
	SPT Bulk		11		Firm light redish brown slightly sandy CLAY. Sand is fine to coarse grained. (WEATHERED CHESTER FORMATION)				
				3	Very stiff red slightly gravelly sandy CLAY (WEATHERED CHESTER FORMATION)				
	SPT Bulk		23						
				4					
	SPT Bulk		>50						
				5					
	SPT		>50						
									...Groundwater encountered at 3.2m rising to 2.60m after 20 minutes

METRIC BOREHOLE LOG (NON-U.S.) 465346- PEMBURY KNOWSLEY.GPJ 465346 12/1/22

Signature:	Firm: TRC Companies	Fax
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Annex D: Field Data

TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 134 (mm)																																								
0	0	134				Estimated CBR Value (%) <table><tr><th>Depth (mm)</th><th>CBR Value (%)</th></tr><tr><td>134</td><td>3.8</td></tr><tr><td>196</td><td>4.2</td></tr><tr><td>253</td><td>4.1</td></tr><tr><td>312</td><td>4.5</td></tr><tr><td>365</td><td>8.0</td></tr><tr><td>396</td><td>17.3</td></tr><tr><td>411</td><td>20.1</td></tr><tr><td>437</td><td>29.6</td></tr><tr><td>455</td><td>38.6</td></tr><tr><td>469</td><td>43.5</td></tr><tr><td>494</td><td>49.8</td></tr><tr><td>516</td><td>55.1</td></tr><tr><td>546</td><td>37.7</td></tr><tr><td>589</td><td>25.2</td></tr><tr><td>652</td><td>13.2</td></tr><tr><td>768</td><td>7.5</td></tr><tr><td>834</td><td>12.7</td></tr><tr><td>874</td><td>13.3</td></tr><tr><td>951</td><td>13.3</td></tr></table>	Depth (mm)	CBR Value (%)	134	3.8	196	4.2	253	4.1	312	4.5	365	8.0	396	17.3	411	20.1	437	29.6	455	38.6	469	43.5	494	49.8	516	55.1	546	37.7	589	25.2	652	13.2	768	7.5	834	12.7	874	13.3	951	13.3
Depth (mm)	CBR Value (%)																																													
134	3.8																																													
196	4.2																																													
253	4.1																																													
312	4.5																																													
365	8.0																																													
396	17.3																																													
411	20.1																																													
437	29.6																																													
455	38.6																																													
469	43.5																																													
494	49.8																																													
516	55.1																																													
546	37.7																																													
589	25.2																																													
652	13.2																																													
768	7.5																																													
834	12.7																																													
874	13.3																																													
951	13.3																																													
1	62	196	1.8	0.585	3.8																																									
1	57	253	1.8	0.624	4.2																																									
1	59	312	1.8	0.608	4.1																																									
1	53	365	1.7	0.657	4.5																																									
1	31	396	1.5	0.904	8.0																																									
1	15	411	1.2	1.237	17.3																																									
2	13	437	1.1	1.303	20.1																																									
2	9	455	1.0	1.471	29.6																																									
2	7	469	0.8	1.587	38.6																																									
4	6.25	494	0.8	1.639	43.5																																									
4	5.5	516	0.7	1.697	49.8																																									
6	5	546	0.7	1.741	55.1																																									
6	7.166666667	589	0.9	1.576	37.7																																									
6	10.5	652	1.0	1.401	25.2																																									
6	19.33333333	768	1.3	1.120	13.2																																									
2	33	834	1.5	0.875	7.5																																									
2	20	874	1.3	1.105	12.7																																									
4	19.25	951	1.3	1.122	13.3																																									

Remarks:
Project Number: 465346
Project: Pembury, Knowsley

Date: 03.12.21
Reference: TRL01

TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 170 (mm)
0	170	170				
1	130	300	2.1	0.246	1.8	
1	31	331	1.5	0.904	8.0	
1	22	353	1.3	1.061	11.5	
1	25	378	1.4	1.002	10.1	
2	14.5	407	1.2	1.252	17.9	
2	13.5	434	1.1	1.285	19.3	
2	20.5	475	1.3	1.093	12.4	
2	27	529	1.4	0.967	9.3	
2	21	571	1.3	1.082	12.1	
2	26.5	624	1.4	0.976	9.5	
2	18	660	1.3	1.153	14.2	
2	18.5	697	1.3	1.141	13.8	
4	5	717	0.7	1.741	55.1	
4	6.75	744	0.8	1.603	40.1	
4	11.25	789	1.1	1.369	23.4	
4	16	853	1.2	1.207	16.1	
4	23.75	948	1.4	1.026	10.6	

Remarks: Project Number: 465346 Project: Pembury, Knowsley	Date: 03.12.21 Reference TRL02
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TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 170 (mm)
0	0	170				
1	74	244	1.9	0.504	3.2	
1	39	283	1.6	0.798	6.3	
1	66	349	1.8	0.557	3.6	
1	80	429	1.9	0.468	2.9	
1	46	475	1.7	0.722	5.3	
1	35	510	1.5	0.848	7.0	
1	26	536	1.4	0.984	9.6	
1	30	566	1.5	0.919	8.3	
1	19	585	1.3	1.128	13.4	
1	14	599	1.1	1.269	18.6	
2	11	621	1.0	1.379	23.9	
2	10	641	1.0	1.423	26.5	
2	9.5	660	1.0	1.447	28.0	
4	7.5	690	0.9	1.555	35.9	
4	7.75	721	0.9	1.540	34.7	
4	6.5	747	0.8	1.621	41.8	
4	6.75	774	0.8	1.603	40.1	
4	6.25	799	0.8	1.639	43.5	
4	7	827	0.8	1.587	38.6	
4	7.75	858	0.9	1.540	34.7	
4	12.75	909	1.1	1.311	20.5	
4	10.75	952	1.0	1.390	24.5	

Remarks: Project Number: 465346 Project: Pembury, Knowsley	Date: 03.12.21 Reference TRL03
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TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 141 (mm)
0	141	141				
1	68	209	1.8	0.543	3.5	
1	25	234	1.4	1.002	10.1	
1	37	271	1.6	0.822	6.6	
1	39	310	1.6	0.798	6.3	
1	11	321	1.0	1.379	23.9	
1	19	340	1.3	1.128	13.4	
1	24	364	1.4	1.021	10.5	
1	32	396	1.5	0.889	7.7	
2	19	434	1.3	1.128	13.4	
2	17.5	469	1.2	1.166	14.7	
2	11	491	1.0	1.379	23.9	
2	11	513	1.0	1.379	23.9	
2	10.5	534	1.0	1.401	25.2	
2	17	568	1.2	1.179	15.1	
2	23	614	1.4	1.041	11.0	
2	7.5	629	0.9	1.555	35.9	
4	5	649	0.7	1.741	55.1	
4	4	665	0.6	1.844	69.8	
4	4.75	684	0.7	1.765	58.2	
4	5	704	0.7	1.741	55.1	
4	3.5	718	0.5	1.905	80.3	
6	3.833333333	741	0.6	1.863	73.0	
6	4.333333333	767	0.6	1.807	64.1	
6	2.5	782	0.4	2.059	114.7	
6	3.833333333	805	0.6	1.863	73.0	
6	2.666666667	821	0.4	2.030	107.1	
6	2.166666667	834	0.3	2.125	133.4	
6	4	858	0.6	1.844	69.8	
6	4.333333333	884	0.6	1.807	64.1	

Remarks: Project Number: 465346 Project: Pembury, Knowsley	Date: 03.12.21 Reference TRL04
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TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 125 (mm)
0	125	125				Estimated CBR Value (%) GL0 10 20 30 40 Depth (mm) 0 100 200 300 400 500 600 700 800 900 1000
1	111	236	2.0	0.318	2.1	
1	18	254	1.3	1.153	14.2	
1	19	273	1.3	1.128	13.4	
1	9	282	1.0	1.471	29.6	
2	9	300	1.0	1.471	29.6	
2	15	330	1.2	1.237	17.3	
2	24	378	1.4	1.021	10.5	
2	29	436	1.5	0.934	8.6	
2	35	506	1.5	0.848	7.0	
2	40.5	587	1.6	0.781	6.0	
2	37	661	1.6	0.822	6.6	
2	34.5	730	1.5	0.855	7.2	
2	38.5	807	1.6	0.804	6.4	
2	32	871	1.5	0.889	7.7	
2	20	911	1.3	1.105	12.7	

Remarks:
Project Number: 465346
Project: Pembury, Knowsley

Date: 03.12.21
Reference: TRL05

TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 176 (mm)
0	176	176				Estimated CBR Value (%) Depth (mm)
1	129	305	2.1	0.249	1.8	
2	10	325	1.0	1.423	26.5	
2	13	351	1.1	1.303	20.1	
1	44	395	1.6	0.743	5.5	
1	60	455	1.8	0.600	4.0	
1	69	524	1.8	0.536	3.4	
1	42	566	1.6	0.764	5.8	
1	15	581	1.2	1.237	17.3	
2	6.5	594	0.8	1.621	41.8	
2	4.5	603	0.7	1.790	61.6	
4	2.75	614	0.4	2.016	103.7	
4	3.75	629	0.6	1.873	74.7	
4	3	641	0.5	1.976	94.6	
4	2.5	651	0.4	2.059	114.7	
6	5.5	684	0.7	1.697	49.8	
6	10.83333333	749	1.0	1.386	24.3	
6	8.83333333	802	0.9	1.480	30.2	
6	7	844	0.8	1.587	38.6	
6	7	886	0.8	1.587	38.6	
6	7.16666667	929	0.9	1.576	37.7	
Remarks:						Date: 03.12.21
Project Number: 465346						Reference: TRL06
Project: Pembury, Knowsley						

TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 216 (mm)																																
0	216	216				Estimated CBR Value (%) <table><tr><th>Depth (mm)</th><th>CBR Value (%)</th></tr><tr><td>216</td><td>3.5</td></tr><tr><td>284</td><td>7.0</td></tr><tr><td>319</td><td>7.5</td></tr><tr><td>352</td><td>5.8</td></tr><tr><td>394</td><td>7.0</td></tr><tr><td>429</td><td>9.6</td></tr><tr><td>455</td><td>13.4</td></tr><tr><td>474</td><td>8.3</td></tr><tr><td>504</td><td>6.3</td></tr><tr><td>582</td><td>12.1</td></tr><tr><td>624</td><td>11.0</td></tr><tr><td>670</td><td>17.3</td></tr><tr><td>700</td><td>176.0</td></tr><tr><td>710</td><td>159.1</td></tr><tr><td>721</td><td>5908.7</td></tr></table>	Depth (mm)	CBR Value (%)	216	3.5	284	7.0	319	7.5	352	5.8	394	7.0	429	9.6	455	13.4	474	8.3	504	6.3	582	12.1	624	11.0	670	17.3	700	176.0	710	159.1	721	5908.7
Depth (mm)	CBR Value (%)																																					
216	3.5																																					
284	7.0																																					
319	7.5																																					
352	5.8																																					
394	7.0																																					
429	9.6																																					
455	13.4																																					
474	8.3																																					
504	6.3																																					
582	12.1																																					
624	11.0																																					
670	17.3																																					
700	176.0																																					
710	159.1																																					
721	5908.7																																					
1	68	284	1.8	0.543	3.5																																	
1	35	319	1.5	0.848	7.0																																	
1	33	352	1.5	0.875	7.5																																	
1	42	394	1.6	0.764	5.8																																	
1	35	429	1.5	0.848	7.0																																	
1	26	455	1.4	0.984	9.6																																	
1	19	474	1.3	1.128	13.4																																	
1	30	504	1.5	0.919	8.3																																	
2	39	582	1.6	0.798	6.3																																	
2	21	624	1.3	1.082	12.1																																	
2	23	670	1.4	1.041	11.0																																	
2	15	700	1.2	1.237	17.3																																	
6	1.666666667	710	0.2	2.246	176.0																																	
6	1.833333333	721	0.3	2.202	159.1																																	
50	0.06	724	-1.2	3.771	5908.7																																	

Remarks:
Project Number: 465346
Project: Pembury, Knowsley

Date: 03.12.21
Reference: TRL07

TRC - In situ CBR by DCP Probe

Number of Blows	Penetration Per Blow (mm)	Depth from GL (mm)	Log P	2.48-1.057 Log P	CBR Value (%)	Remarks: Tests commenced from ground level Zero reading = start depth below ground surface Zero reading at start of test: 156 (mm)																																						
0	156	156				Estimated CBR Value (%) <table><tr><th>Depth (mm)</th><th>Estimated CBR Value (%)</th></tr><tr><td>156</td><td>2.3</td></tr><tr><td>255</td><td>2.7</td></tr><tr><td>341</td><td>3.4</td></tr><tr><td>411</td><td>5.0</td></tr><tr><td>459</td><td>4.1</td></tr><tr><td>517</td><td>9.3</td></tr><tr><td>544</td><td>5.4</td></tr><tr><td>589</td><td>5.4</td></tr><tr><td>634</td><td>7.5</td></tr><tr><td>667</td><td>7.7</td></tr><tr><td>699</td><td>7.7</td></tr><tr><td>731</td><td>8.0</td></tr><tr><td>762</td><td>7.7</td></tr><tr><td>794</td><td>10.5</td></tr><tr><td>818</td><td>10.1</td></tr><tr><td>868</td><td>14.7</td></tr><tr><td>903</td><td>9.8</td></tr><tr><td>954</td><td>9.8</td></tr></table>	Depth (mm)	Estimated CBR Value (%)	156	2.3	255	2.7	341	3.4	411	5.0	459	4.1	517	9.3	544	5.4	589	5.4	634	7.5	667	7.7	699	7.7	731	8.0	762	7.7	794	10.5	818	10.1	868	14.7	903	9.8	954	9.8
Depth (mm)	Estimated CBR Value (%)																																											
156	2.3																																											
255	2.7																																											
341	3.4																																											
411	5.0																																											
459	4.1																																											
517	9.3																																											
544	5.4																																											
589	5.4																																											
634	7.5																																											
667	7.7																																											
699	7.7																																											
731	8.0																																											
762	7.7																																											
794	10.5																																											
818	10.1																																											
868	14.7																																											
903	9.8																																											
954	9.8																																											
1	99	255	2.0	0.371	2.3																																							
1	86	341	1.9	0.435	2.7																																							
1	70	411	1.8	0.530	3.4																																							
1	48	459	1.7	0.703	5.0																																							
1	58	517	1.8	0.616	4.1																																							
1	27	544	1.4	0.967	9.3																																							
1	45	589	1.7	0.733	5.4																																							
1	45	634	1.7	0.733	5.4																																							
1	33	667	1.5	0.875	7.5																																							
1	32	699	1.5	0.889	7.7																																							
1	32	731	1.5	0.889	7.7																																							
1	31	762	1.5	0.904	8.0																																							
1	32	794	1.5	0.889	7.7																																							
1	24	818	1.4	1.021	10.5																																							
2	25	868	1.4	1.002	10.1																																							
2	17.5	903	1.2	1.166	14.7																																							
2	25.5	954	1.4	0.993	9.8																																							

Remarks: Project Number: 465346 Project: Pembury, Knowsley	Date: 03.12.21 Reference: TRL08
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Ground Gas and Groundwater Monitoring Record Sheet

Site: Knowsley
Date: 03.12.21

Visit No: 1 of 4
Operator: NJ

Project Manager: JS

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA			WELL AND WATER DATA		Comments	
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)		Depth of well (m)
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
BH01	0.0	0.0	NR	NR	2.5	0.8	0	0	0	0	18.1	19.5	1.0	ND	-4.2	-4.5	1.00	120	2.22	2.50	Well bailed after monitoring
BH02	0.0	0.0	NR	NR	0.0	0.0	0	0	0	0	20.0	20.0	1.0	ND	-4.2	-4.2	1.00	120	0.20	2.30	Well bailed after monitoring
WS01	0.0	0.0	NR	NR	2.2	1.7	0	0	0	0	19.0	19.3	1.0	ND	-4.2	-4.2	0.00	120	1.15	2.24	Well bailed after monitoring
WS03	0.0	0.0	NR	NR	2.5	0.4	0	0	0	0	18.8	19.7	1.0	ND	-4.3	-4.0	0.00	120	0.50	2.24	Well bailed after monitoring
WS05	0.0	0.0	NR	NR	2.3	2.2	10	10	0	0	6.6	6.8	1.0	ND	-4.0	-4.2	-2.00	120	1.89	3.02	Well bailed after monitoring
Max	0.0	0.0	ND	ND	2.5	2.2	10	10	0	0	20.0	20.0	65	ND	-4.0	-4.0	1.0	120	2.22	3.02	
Min	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	6.6	6.8	10.1	ND	-4.3	-4.5	-2.0	120	0.20	2.24	

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☒ Dry ☐ Moist ☐ Wet ☐ Snow ☐ Frozen
Wind: ☐ Calm ☒ Light ☐ Moderate ☐ Strong
Cloud cover: ☐ None ☒ Slight ☒ Cloudy ☐ Overcast
Precipitation: ☐ None ☒ Slight ☐ Moderate ☐ Heavy
Time monitoring performed: ☐ 11:00 Start ☐ 15:00 End
Barometric pressure (mbar): ☐ 996 Start ☐ 997 End
Pressure trend (Daily): ☐ Falling ☒ Steady ☐ Rising
Source: ☐ ☐ ☐
Air Temperature (Deg. C): ☐ 7 Before ☐ 7 After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%
Gas Flow range: +100/-50 l/hour
Differential Pressure: (+/-) 1000 Pa
Date of last calibration:
Date of next calibration:

Ambient air check: CH₄ CO₂ O₂

Ground Gas and Groundwater Monitoring Record Sheet

Site: Knowsley
Date: 17.12.21

Visit No: 3 of 4
Operator: NJ

Project Manager: JS

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA			WELL AND WATER DATA		Comments	
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)		Depth of well (m)
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
BH01	0.0	0.0	NR	NR	3.6	0.6	0	0	0	0	15.5	19.0	1.0	ND	0.2	0.0	0.00	120	2.40	2.45	
BH02	0.0	0.0	NR	NR	0.5	0.4	0	0	0	0	19.3	19.4	1.0	ND	0.1	0.1	0.00	120	1.34	2.04	
WS01	0.0	0.0	NR	NR	0.2	0.1	0	0	0	0	19.6	19.6	1.0	ND	0.1	0.0	0.00	120	1.06	2.54	
WS03	0.0	0.0	NR	NR	0.0	0.0	0	0	0	0	19.5	19.5	1.0	ND	0.1	0.0	0.00	120	0.10	2.00	
WS05	0.0	0.0	NR	NR	2.3	1.6	0	0	0	0	5.0	10.6	1.0	ND	0.3	0.3	3.00	120	1.78	2.04	
Max	0.0	0.0	ND	ND	3.6	1.6	0	0	0	0	19.6	19.6	65	ND	0.3	0.3	3.0	120	2.40	2.54	
Min	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	5.0	10.6	10.1	ND	0.1	0.0	0.0	120	0.10	2.00	

ND - Not detected

NR - Not recorded

NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☒ Dry ☐ Moist ☐ Wet ☐ Snow ☐ Frozen
Wind: ☐ Calm ☒ Light ☐ Moderate ☐ Strong
Cloud cover: ☐ None ☒ Slight ☒ Cloudy ☐ Overcast
Precipitation: ☐ None ☒ Slight ☐ Moderate ☐ Heavy
Time monitoring performed: ☐ 11:00 Start ☐ 15:00 End
Barometric pressure (mbar): ☐ 1039 Start ☐ 1037 End
Pressure trend (Daily): ☒ Falling ☐ Steady ☐ Rising
Source: ☐ ☐
Air Temperature (Deg. C): ☐ 4 Before ☐ 4 After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%
Gas Flow range: +100/-50 l/hour
Differential Pressure: (+/-) 1000 Pa
Date of last calibration:
Date of next calibration:

Ambient air check: CH₄ CO₂ O₂

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				WELL AND WATER DATA	
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady				
BH01	0.0	0.0	NR	NR	1.1	0.4	0	0	0	0	18.4	19.6	1.0	ND	0.1	-0.1	0.00	120	Dry	2.42
BH02	0.0	0.0	NR	NR	0.4	0.0	0	0	0	0	19.8	19.9	1.0	ND	1.2	-0.1	0.00	120	1.47	2.27
WS01	0.0	0.0	NR	NR	0.3	0.0	0	0	0	0	19.9	19.9	1.0	ND	0.4	0.3	0.00	120	1.20	2.53
WS03	0.0	0.0	NR	NR	0.3	0.0	0	0	0	0	19.9	19.9	1.0	ND	0.1	0.0	0.00	120	0.10	2.00
WS05	0.0	0.0	NR	NR	0.4	0.1	0	0	0	0	19.8	19.9	1.0	ND	0.2	0.1	3.00	120	1.06	3.10
Max	0.0	0.0	ND	ND	1.1	0.4	0	0	0	0	19.9	19.9	65	ND	1.2	0.3	3.0	120	1.47	3.10
Min	0.0	0.0	0.0	0.0	0.3	0.0	0	0	0	0	18.4	19.6	10.1	ND	0.1	-0.1	0.0	120	DRY	2.00

ND - Not detected
NR - Not recorded
NA - Non applicable

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:

Dry

Moist

X

Wet

Snow

Frozen

Wind:

Calm

X

Light

Moderate

Strong

Cloud cover:

None

X

Slight

X

Cloudy

Overcast

Precipitation:

None

X

Slight

Moderate

Heavy

Time monitoring performed:

11:45

Start

12:45

End

Barometric pressure (mbar):

1010

Start

1009

End

Pressure trend (Daily):

X

Falling

Steady

Rising

Source:

Air Temperature (Deg. C):

4

Before

4

After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter:

GA5000

Gas Range:

CH₄ 0 - 100%

CO₂ 0 - 100%

O₂ 0 - 25%

Gas Flow range:

+100/-50 l/hour

Differential Pressure:

(+/-) 1000 Pa

Date of last calibration:

Date of next calibration:

Ambient air check:

CH₄ 0.0

CO₂ 0.0

O₂ 20.5

Annex E: Laboratory Chemical Data



Ashley Standen-Howard
TRC Companies Ltd
2 John Street
London
WC1N 2ES

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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

e: astanden-howard@trccompanies.com

Analytical Report Number : 21-26226

Project / Site name:	Knowlsey, Prescott	Samples received on:	01/12/2021
Your job number:	465346	Samples instructed on/ Analysis started on:	01/12/2021
Your order number:	465346	Analysis completed by:	13/12/2021
Report Issue Number:	1	Report issued on:	13/12/2021
Samples Analysed:	14 soil samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 21-26226
Project / Site name: Knowlsey, Prescot
Your Order No: 465346

Lab Sample Number	2101109	2101110	2101111	2101112	2101113	2101114
Sample Reference	TP02	TP02	TP01	TP01	WS05	WS05
Sample Number	ENV	ENV	ENV	ENV	ENV	ENV
Depth (m)	0.50	1.20	0.10	0.90	0.60	1.60
Date Sampled	25/11/2021	25/11/2021	25/11/2021	25/11/2021	26/11/2021	26/11/2021
Time Taken	None Supplied	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
Moisture Content	%	0.01	NONE	11	11	14
Total mass of sample received	kg	0.001	NONE	0.80	0.80	0.80

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	7.8	8.0	7.6	7.4	6.3
Total Cyanide	mg/kg	1	MCERTS	-	-	-	< 1.0	-	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	-	52	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	0.026	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	25.8	-	-
Organic Matter (automated)	%	0.1	MCERTS	-	-	-	< 0.1	-	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	-	-	< 0.1	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.31	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.50	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	0.81	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	2.9	1.9	5.6	9.6	6.6	7.6
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.2	0.2	0.2	0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	6.4	15	27	38	18	43
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	7.0	17	28	39	18	44
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	8.2	17	22	25	27
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17	5.4	17	7.7	31	10
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	5.2	10	21	46	16	43
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	18	19	39	45	50	57

Analytical Report Number: 21-26226
 Project / Site name: Knowlsey, Prescot
 Your Order No: 465346

Lab Sample Number	2101109	2101110	2101111	2101112	2101113	2101114
Sample Reference	TP02	TP02	TP01	TP01	WS05	WS05
Sample Number	ENV	ENV	ENV	ENV	ENV	ENV
Depth (m)	0.50	1.20	0.10	0.90	0.60	1.60
Date Sampled	25/11/2021	25/11/2021	25/11/2021	25/11/2021	26/11/2021	26/11/2021
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-	-
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TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10

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

Analytical Report Number: 21-26226
Project / Site name: Knowlsey, Prescot
Your Order No: 465346

Lab Sample Number				2101115	2101116	2101117	2101118	2101119	2101120
Sample Reference				WS04	WS04	WS01	WS01	WS02	WS02
Sample Number				ENV	ENV	ENV	ENV	ENV	ENV
Depth (m)				0.40	0.90	0.10	0.70	0.60	1.20
Date Sampled				26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status						
	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	27	< 0.1
	%	0.01	NONE	16	14	12	12	13	12
	kg	0.001	NONE	0.80	0.60	0.80	0.80	0.80	0.80

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.8	6.2	8.8	7.7	7.0	8.7
Total Cyanide	mg/kg	1	MCERTS	-	-	-	-	< 1.0	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	-	-	15	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	-	0.0073	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	-	7.3	-
Organic Matter (automated)	%	0.1	MCERTS	-	-	-	-	3.3	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	-	-	-	1.9	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.52	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.54	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.33	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.31	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.33	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.21	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.35	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 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	2.59	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.6	13	4.5	8.5	4.2	1.1
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	< 0.2	0.3	0.2	0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.2	< 0.2	0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	33	42	22	32	12	4.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	35	43	23	33	14	6.4
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	20	16	17	27	6.8
Lead (aqua regia extractable)	mg/kg	1	MCERTS	12	9.5	23	7.7	32	2.4
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	27	19	16	13	5.9
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	46	35	45	25	59	9.1

Analytical Report Number: 21-26226
 Project / Site name: Knowlsey, Prescot
 Your Order No: 465346

Lab Sample Number				2101115	2101116	2101117	2101118	2101119	2101120
Sample Reference				WS04	WS04	WS01	WS01	WS02	WS02
Sample Number				ENV	ENV	ENV	ENV	ENV	ENV
Depth (m)				0.40	0.90	0.10	0.70	0.60	1.20
Date Sampled				26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status			
Monoaromatics & Oxygenates									
Benzene				µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Toluene				µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Ethylbenzene				µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
p & m-xylene				µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
o-xylene				µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)				µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1	-
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TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10

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

Analytical Report Number: 21-26226
Project / Site name: Knowlsey, Prescot
Your Order No: 465346

Lab Sample Number				2101121	2101122
Sample Reference				WS03	BH02
Sample Number				ENV	ENV
Depth (m)				0.30	0.30
Date Sampled				26/11/2021	26/11/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	23
Moisture Content	%	0.01	NONE	15	5.3
Total mass of sample received	kg	0.001	NONE	0.80	0.80

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	9.0
Total Cyanide	mg/kg	1	MCERTS	-	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-
Organic Matter (automated)	%	0.1	MCERTS	-	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	-

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	0.26	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.45	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.44	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.28	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.24	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.21	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.27	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.29	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.44	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.2	4.6
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	20	7.5
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	7.7
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	9.4
Lead (aqua regia extractable)	mg/kg	1	MCERTS	50	8.3
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	5.1
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	72	14

Analytical Report Number: 21-26226
Project / Site name: Knowlsey, Prescot
Your Order No: 465346

Lab Sample Number				2101121	2101122
Sample Reference				WS03	BH02
Sample Number				ENV	ENV
Depth (m)				0.30	0.30
Date Sampled				26/11/2021	26/11/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Monoaromatics & Oxygenates					
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	-	-
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TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	MCERTS	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	MCERTS	< 10	< 10

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

Analytical Report Number : 21-26226
Project / Site name: Knowlsey, Prescott

* 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 *
2101109	TP02	ENV	0.5	Brown loam and clay with gravel.
2101110	TP02	ENV	1.2	Brown sandy clay with gravel.
2101111	TP01	ENV	0.1	Brown clay and loam with gravel and vegetation.
2101112	TP01	ENV	0.9	Brown clay and sand with gravel.
2101113	WS05	ENV	0.6	Brown loam and clay with stones and vegetation.
2101114	WS05	ENV	1.6	Brown clay with gravel and vegetation.
2101115	WS04	ENV	0.4	Brown clay and loam with gravel and vegetation.
2101116	WS04	ENV	0.9	Brown clay with vegetation.
2101117	WS01	ENV	0.1	Brown loam and clay with gravel and vegetation.
2101118	WS01	ENV	0.7	Brown loam and clay with gravel.
2101119	WS02	ENV	0.6	Brown loam and clay with stones and vegetation.
2101120	WS02	ENV	1.2	Brown sand with gravel.
2101121	WS03	ENV	0.3	Brown loam and clay with gravel and vegetation.
2101122	BH02	ENV	0.3	Beige clay and sand with gravel and stones.

Analytical Report Number : 21-26226
Project / Site name: Knowlsey, Prescot

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	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	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 cyanide in soil	Determination of total 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
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

Analytical Report Number : 21-26226
Project / Site name: Knowlsey, Prescot

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	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.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



Ashley Standen-Howard
TRC Companies Ltd
2 John Street
London
WC1N 2ES

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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

e: astanden-howard@trccompanies.com

Analytical Report Number : 21-26233

Project / Site name:	Knowlsey, Prescott	Samples received on:	01/12/2021
Your job number:	465346	Samples instructed on/ Analysis started on:	01/12/2021
Your order number:	465346	Analysis completed by:	07/12/2021
Report Issue Number:	1	Report issued on:	07/12/2021
Samples Analysed:	2 10:1 WAC 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.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results								
Report No:	21-26233							
					Client: TRC COMP			
Location	Knowlsey, Prescott							
Lab Reference (Sample Number)	2101145 / 2101146				Landfill Waste Acceptance Criteria			
					Limits			
Sampling Date	25/11/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID	TP01 ENV							
Depth (m)	0.90							
Solid Waste Analysis								
TOC (%)**	< 0.1				3%	5%	6%	
Loss on Ignition (%) **	1.5				--	--	10%	
BTEX (µg/kg) **	< 10				6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007				1	--	--	
Mineral Oil (mg/kg) EH, ID, CU, AL	< 10				500	--	--	
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--	
pH (units)**	7.1				--	>6	--	
Acid Neutralisation Capacity (mmol / kg)	0.84				--	To be evaluated	To be evaluated	
Eluate Analysis								
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test			
	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *	0.0020			0.0170	0.5	2	25	
Barium *	0.0026			0.0223	20	100	300	
Cadmium *	< 0.0001			< 0.0008	0.04	1	5	
Chromium *	0.0006			0.0049	0.5	10	70	
Copper *	0.0059			0.051	2	50	100	
Mercury *	0.0014			0.0122	0.01	0.2	2	
Molybdenum *	0.0004			< 0.0040	0.5	10	30	
Nickel *	0.0034			0.030	0.4	10	40	
Lead *	0.0028			0.024	0.5	10	50	
Antimony *	< 0.0017			< 0.017	0.06	0.7	5	
Selenium *	< 0.0040			< 0.040	0.1	0.5	7	
Zinc *	0.0028			0.025	4	50	200	
Chloride *	1.4			12	800	15000	25000	
Fluoride	0.21			1.8	10	150	500	
Sulphate *	2.8			24	1000	20000	50000	
TDS*	14			120	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-	
DOC	10.5			90.4	500	800	1000	
Leach Test Information								
Stone Content (%)	< 0.1							
Sample Mass (kg)	0.80							
Dry Matter (%)	86							
Moisture (%)	14							
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					*= UKAS accredited (liquid eluate analysis only)			
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** - MCERTS accredited			

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results							
Report No:	21-26233						
					Client: TRC COMP		
Location	Knowlsey, Prescott						
Lab Reference (Sample Number)	2101147 / 2101148				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	26/11/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS02 ENV						
Depth (m)	0.60						
Solid Waste Analysis							
TOC (%)**	1.9				3%	5%	6%
Loss on Ignition (%) **	3.9				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_ID_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	4.27				100	--	--
pH (units)**	7.3				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	1.5				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test		
	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0028			0.0241	0.5	2	25
Barium *	0.0111			0.0943	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0023			0.019	0.5	10	70
Copper *	0.028			0.24	2	50	100
Mercury *	0.0019			0.0159	0.01	0.2	2
Molybdenum *	0.0024			0.0202	0.5	10	30
Nickel *	0.0038			0.032	0.4	10	40
Lead *	0.010			0.086	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.011			0.097	4	50	200
Chloride *	1.4			12	800	15000	25000
Fluoride	0.31			2.7	10	150	500
Sulphate *	1.8			16	1000	20000	50000
TDS*	19			160	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	13.7			116	500	800	1000
Leach Test Information							
Stone Content (%)	27						
Sample Mass (kg)	0.80						
Dry Matter (%)	87						
Moisture (%)	13						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					*= UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCFRTS accredited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



Analytical Report Number : 21-26233
Project / Site name: Knowlsey, Prescott

* 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 *
2101145	TP01	ENV	0.9	Brown clay and sand with gravel.
2101147	WS02	ENV	0.6	Brown loam and clay with stones and vegetation.

Analytical Report Number : 21-26233
Project / Site name: Knowlsey, Prescot

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
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	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 organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 21-26233
Project / Site name: Knowlsey, Prescot

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
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

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.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Annex F: Screened Data

TRC Environmental - Chemical Assessment Record

Contract Engineer	Nyemh Johnson
Project/Site Name	Knowsley
Project Number	465346

[illegible]

Analytical Parameter (Soil Analysis)	Units	C4SL														
Stone Content	%		< 0.1	< 0.1	< 0.1	< 0.1	21	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	27	< 0.1	< 0.1	23
Moisture Content	%		11	11	14	14	15	17	16	14	12	12	13	12	15	5.3

Speciated PAHs															
Naphthalene	mg/kg	190	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	83000	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	84000	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	63000	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	22000	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.26	< 0.05
Anthracene	mg/kg	520000	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	23000	< 0.05	< 0.05	< 0.05	< 0.05	0.31	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.52	< 0.05	0.45
Pyrene	mg/kg	54000	< 0.05	< 0.05	< 0.05	< 0.05	0.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.54	< 0.05	0.44
Benzo(a)anthracene	mg/kg	170	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.33	< 0.05	0.28
Chrysene	mg/kg	350	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.31	< 0.05	0.24
Benzo(b)fluoranthene	mg/kg	44	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.33	< 0.05	0.21
Benzo(k)fluoranthene	mg/kg	1200	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.21	< 0.05	0.27
Benzo(a)pyrene	mg/kg	36	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.35	< 0.05	0.29
Indeno(1,2,3-cd)pyrene	mg/kg	500	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	3.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	3900	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH															
Speciated Total EPA-16 PAHs	mg/kg	N/A	< 0.80	< 0.80	< 0.80	< 0.80	0.81	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	2.59	< 0.80	2.44

Heavy Metals / Metalloids																
Arsenic	mg/kg	640	2.9	1.9	5.6	9.6	6.6	7.6	4.6	13	4.5	8.5	4.2	1.1	7.2	4.6
Boron	mg/kg	240000	< 0.2	0.2	0.2	0.2	0.2	< 0.2	0.3	< 0.2	0.3	0.2	0.2	< 0.2	0.7	0.5
Cadmium	mg/kg	190	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2	< 0.2	0.2	< 0.2	0.5	0.3
Chromium (hexavalent)	mg/kg	33	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	8600	6.4	15	27	38	18	43	33	42	22	32	12	4.8	20	7.5
Copper	mg/kg	68000	15	8.2	17	22	25	27	24	20	16	17	27	6.8	37	9.4
Lead	mg/kg	2300	17	5.4	17	7.7	31	10	12	9.5	23	7.7	32	2.4	50	8.3
Elemental Mercury	mg/kg	58	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Inorganic Mercury	mg/kg	1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl Mercury	mg/kg	320	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	mg/kg	980	5.2	10	21	46	16	43	30	27	19	16	13	5.9	19	5.1
Selenium	mg/kg	12000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	mg/kg	730000	18	19	39	45	50	57	46	35	45	25	59	9.1	72	14

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TRC Companies Ltd - Chemical Assessment Record												
Contract Engineer				Ash Standen-Howard								
Project/Site Name				Knowsley								
Project Number				465346.0000.0000								

Sample Reference	WS01	WS03	WS05	0	0	0	0	0	0	0	0	0
Depth	BM	None Supplied	None Supplied	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Date Sampled	09/12/2021	09/12/2021	09/12/2021	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan
Time Taken	None Supplied	None Supplied	None Supplied	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Determinand	Unit	Source	Screening Criteria	Min	Max										
General Inorganics															
pH	Units	N/A	N/A	0.00	0.00	6.5	6.7	7.1	0	0	0	0	0	0	0
Electrical Conductivity at 20 °C	µS/cm	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0
Total Cyanide	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Complex Cyanide	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Free Cyanide	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Thiocyanate as SCN	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Sulphate as SO ₄	µg/l	N/A	N/A	0	97	44.9	96.5	21.4	0	0	0	0	0	0	0
Sulphate as SO ₃	mg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Total Sulphur	µg/l	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0
Sulphide	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Chloride	mg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Ammonium as NH ₄	µg/l	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved Organic Carbon (DOC)	mg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Total Suspended Solids	mg/l	N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0

Phenols by HPLC															
Catechol	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Resorcinol	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Ethylphenol & Dimethylphenol	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Cresols	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Naphthols	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Isopropylphenol	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Phenol	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Trimethylphenol	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0

Total Phenols															
Total Phenols (HPLC)	µg/l	N/A	N/A	0.00	0.00	0	0	0	0	0	0	0	0	0	0

Speciated PAHs															
Naphthalene (aq)	ug/l	GUI 18	2	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Acenaphthene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Acenaphthylene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Fluoranthene (aq)	ug/l	GUI 18	0.0063	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Anthracene (aq)	ug/l	GUI 18	0.1	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Phenanthrene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Fluorene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Chrysene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Pyrene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Benzo[a]anthracene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Benzo[b]fluoranthene (aq)	ug/l	GUI 18	0.00017	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Benzo[k]fluoranthene (aq)	ug/l	GUI 18	0.00017	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Benzo[a]pyrene (aq)	ug/l	GUI 18	0.00017	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Dibenz[a,h]anthracene (aq)	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Benzo[g,h,i]perylene (aq)	ug/l	GUI 18	0.00017	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene (aq)	ug/l	GUI 18	0.00017	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0
Total EPA-16 PAHs	ug/l	N/A	N/A	0.00	0.00	<0.01	<0.01	<0.01	0	0	0	0	0	0	0

Heavy Metals / Metalloids															
Arsenic (dissolved)	ug/l	WFD 14	50	0.00	1.03	0.37	1.03	0.41	0	0	0	0	0	0	0
Boron (dissolved)	ug/l	EQ5 Annex VIII	2,000	0.00	48.00	29	48	28	0	0	0	0	0	0	0
Calcium (dissolved)	ug/l	DEP DB	0.08	0.00	0.06	0.03	0.06	0.03	0	0	0	0	0	0	0
Chromium (hexavalent)	ug/l	WFD 14	3.4	0.00	0.00				0	0	0	0	0	0	0
Chromium (dissolved)	ug/l	WFD 14	4.7	0.00	5.00	3.8	5	2	0	0	0	0	0	0	0
Copper (dissolved)	ug/l	WFD 14	1	0.00	9.76	4.8	9.7	9.1	0	0	0	0	0	0	0
Lead (dissolved)	ug/l	GUI 18	1.2	0.00	0.30	<0.2	0.3	<0.2	0	0	0	0	0	0	0
Mercury (dissolved)	ug/l	DEP DB MAC	0.07	0.00	0.00		<0.01	<0.01	0	0	0	0	0	0	0
Nickel (dissolved)	ug/l	GUI 18	4	0.00	11.00	11	6.4	5.8	0	0	0	0	0	0	0
Selenium (dissolved)	ug/l	N/A	N/A	0.00	1.50	1.4	1.9	0.8	0	0	0	0	0	0	0
Zinc (dissolved)	ug/l	WFD 14	10.9	0.00	8.90	8.6	6.3	4.9	0	0	0	0	0	0	0

Monoaromatics															
Benzene	ug/l	GUI 18	10	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Toluene	ug/l	WFD 14	74	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Ethylbenzene	ug/l	EQ5 R&D	20	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
p & m-xylene	ug/l	R&D	30	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
o-xylene	ug/l	R&D	30	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
MTBE	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0

Petroleum Hydrocarbons															
Aliphatic >C5 - C8	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aliphatic >C8 - C8	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aliphatic >C8 - C10	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aliphatic >C10 - C12	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aliphatic >C12 - C16	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aliphatic >C16 - C21	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aliphatic >C21 - C35	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aliphatic (C5 - C35)	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0

Petroleum Hydrocarbons															
Aromatic >C5 - C7	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aromatic >C7 - C8	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aromatic >C8 - C10	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aromatic >C10 - C12	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aromatic >C12 - C16	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aromatic >C16 - C21	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Aromatic >C21 - C35	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0
Total >C5 - C35	ug/l	N/A	N/A	0.00	0.00	<1.0	<1.0	<1.0	0	0	0	0	0	0	0

Contract Engineer	Ash Standen-Howard
Project/Site Name	Knowsley
Project Number	465346.0000.0000

Sample Reference	WS01	WS03	WS05	0	0	0	0	0	0	0
Depth	None Supplied	None Supplied	None Supplied	0.0	0.00	0.00	0.00	0.00	0.00	0.00
Date Sampled	09/12/2021	09/12/2021	09/12/2021	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan	0/Jan
Time Taken	None Supplied	None Supplied	None Supplied	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Speciated PAHs														
Naphthalene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Acenaphthene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Acenaphthylene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Fluoranthene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Anthracene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Phenanthrene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Fluorene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Chrysene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Pyrene (aq)	ug/l	DWI 17	0.01	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Benz(a)anthracene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Benz(b)fluoranthene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Benz(k)fluoranthene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Benz(a)pyrene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Dibenz(a,h)anthracene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Benz(e,h)pyrene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene (aq)	ug/l	DWI 17	0.1	0.00	0.00	< 0.01	< 0.01	< 0.01	0	0	0	0	0	0
Total EPA-16 PAHs	ug/l	DWI 17	0.1	0.00	0.00	< 0.16	< 0.16	< 0.16	0	0	0	0	0	0

Heavy Metals / Metalloids													
Arsenic (dissolved)	ug/l	WSR 18	10	0.00	1.03	0.37	1.03	0.41	0	0	0	0	0
Boron (dissolved)	ug/l	WSR 18	5	0.00	48.00	29	48	28	0	0	0	0	0
Calcium (dissolved)	ug/l	WSR 18	1,000	0.00	6.06	0.03	0.06	0.03	0	0	0	0	0
Chromium (hexavalent)	ug/l	WHO CCACD / US EPA RfD	5.4	0.00	0.00	<0.0	<0.0	<0.0	0	0	0	0	0
Chromium (dissolved)	ug/l	WSR 18	50	0.00	5.00	3.8	5	2	0	0	0	0	0
Copper (dissolved)	ug/l	WSR 18	2,000	0.00	6.70	4.8	6.7	9.1	0	0	0	0	0
Lead (dissolved)	ug/l	WSR 18	1	0.00	0.30	<0.2	0.3	<0.2	0	0	0	0	0
Mercury (dissolved)	ug/l	WSR 18	1	0.00	0.00	<0.00	0.00	<0.00	0	0	0	0	0
Nickel (dissolved)	ug/l	WSR 18	20	0.00	11.00	1.4	11	5.8	0	0	0	11	14
Selenium (dissolved)	ug/l	WSR 18	10	0.00	1.50	1.4	1.9	0.8	0	0	0	0	0
Zinc (dissolved)	ug/l	US EPA	5,000	0.00	8.60	8.6	6.3	6.3	0	0	0	0	0

Monocaromatics														
Benzene	ug/l	PHG 1.7	10	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0
Toluene	ug/l	PHG 1.7	700	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0
Phenylbenzene	ug/l	PHG 1.7	250	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0
p- m-xylene	ug/l	PHG 1.7	500	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0
o-xylene	ug/l	PHG 1.7	500	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0
mTBE	ug/l	N/A	N/A	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0

Petroleum Hydrocarbons															
Aliphatic C3 - C6	ug/l	PHG 17	15000	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0
Aliphatic C8 - C9	ug/l	PHG 17	15000	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0
Aliphatic C10 - C13	ug/l	PHG 17	300	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0
Aliphatic >C10 - C13	ug/l	PHG 17	300	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0
Aliphatic >C12 - C16	ug/l	PHG 17	300	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0
Aliphatic C18 - C21	ug/l	N/A	N/A	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0
Aliphatic >C21 - C35	ug/l	N/A	N/A	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0
Aliphatic (C3 - C35)	ug/l	N/A	N/A	0.00	0.00	< 1.0	< 1.0	< 1.0	0	0	0	0	0	0	0

Petroleum Hydrocarbons													
Aromatic C3 - C7	ug/l	PHG 17	10	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0
Aromatic C7 - C8	ug/l	PHG 17	700	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0
Aromatic C9 - C10	ug/l	PHG 17	500	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0
Aromatic C10 - C11	ug/l	PHG 17	90	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0
Aromatic C10 - C16	ug/l	PHG 17	90	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0
Aromatic C16 - C21	ug/l	PHG 17	90	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0
Aromatic C21 - C35	ug/l	PHG 17	90	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0
Total C3 - C35	ug/l	N/A	N/A	0.00	0.00	< 0.10	< 0.10	< 0.10	0	0	0	0	0

Annex G: Laboratory Geotechnical Data



LABORATORY REPORT



4043

Contract Number: PSL21/9523

Report Date: 04 January 2022
Client's Reference: 465346
Client Name: TRC Companies Ltd
20 Red Lion Street
London
WC1R 4PQ

For the attention of: Ashley Standen-Howard

Contract Title: Knowsley, Prescott
Date Received: 3/12/2021
Date Commenced: 3/12/2021
Date Completed: 4/1/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)


S Eyre
(Senior Technician)

T Watkins
(Senior Technician)

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

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP02		B	1.00		Brown very sandy CLAY.
TP02		B	2.00		Brown mottled grey sandy CLAY.
WS05		D	2.50		Brown slightly gravelly very sandy CLAY.
WS04		D	2.00		Brown silty SAND.
WS01		D	1.50		Brown slightly gravelly sandy CLAY.
WS02		D	2.50		Brown slightly gravelly very sandy CLAY.
WS03		D	1.50		Brown gravelly clayey silty SAND.
WS03		D	2.50		Brown slightly gravelly very sandy CLAY.
BH01		U100	1.20		Firm brown sandy CLAY.
BH01		SPT	3.00		Reddish brown gravelly silty SAND.
BH02		D	0.60		Brown slightly gravelly very sandy CLAY.
BH02		B	2.00		Brown gravelly clayey silty SAND.
BH02		B	3.00		Reddish brown slightly gravelly very sandy CLAY.
BH02		SPT	5.00		Brown slightly clayey SAND.



4043

PSL

Professional Soils Laboratory

Knowsley, Prescot

Contract No:

PSL21/9523

Client Ref:

465346

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

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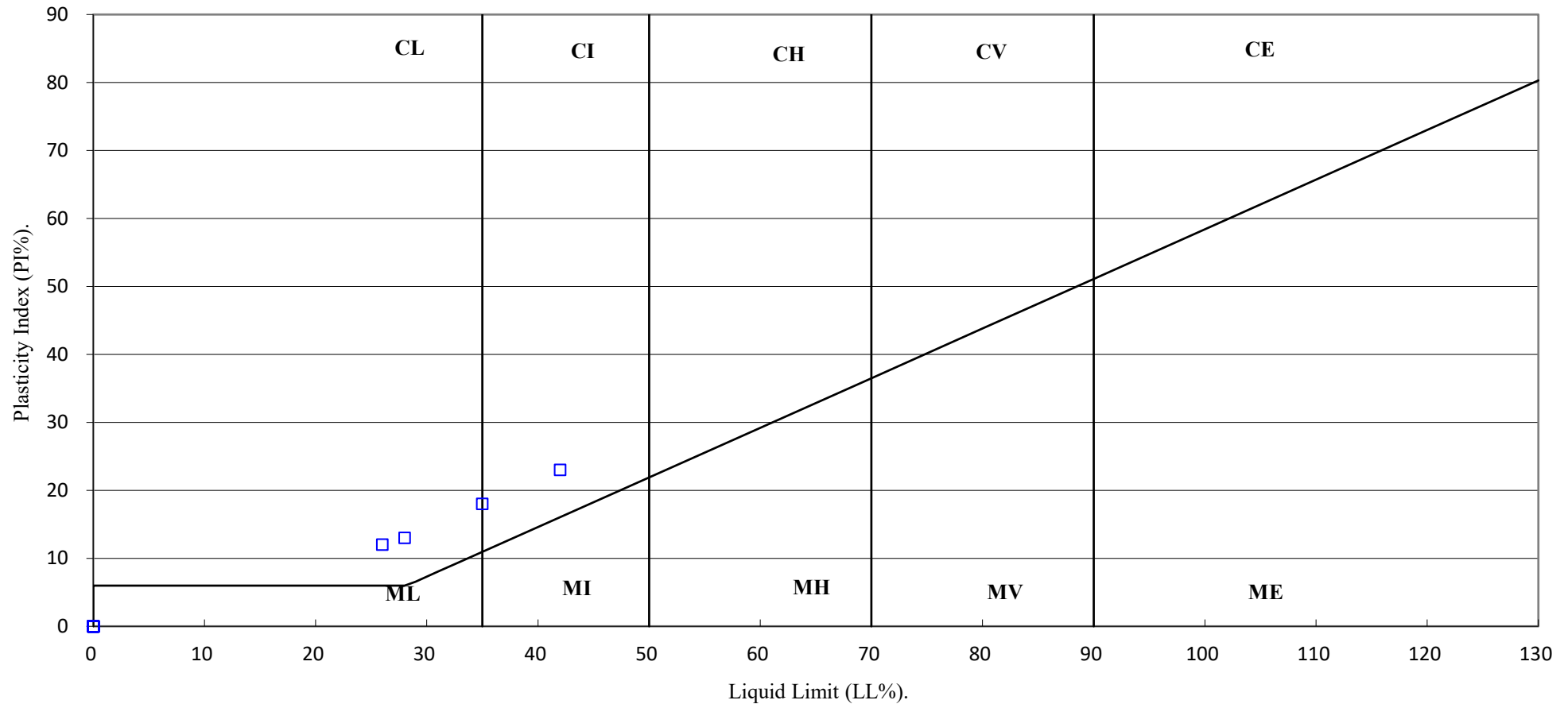
Knowsley, Prescott**Contract No:**

PSL21/9523

Client Ref:

465346

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

Knowsley, Prescot

Contract No:

PSL21/9523

Client Ref:

465346

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

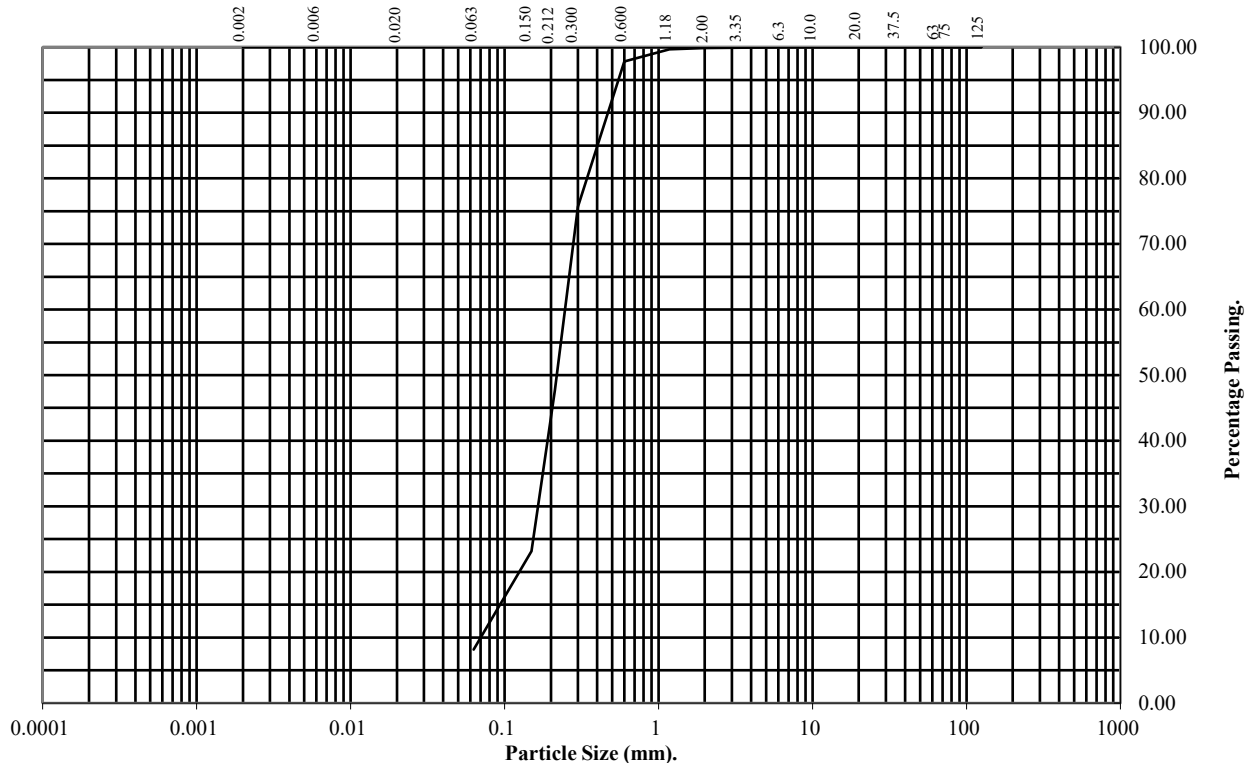
Hole Number: WS04

Top Depth (m): 2.00

Sample Number:

Base Depth(m):

Sample Type: D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	98
0.3	76
0.212	48
0.15	23
0.063	8

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	92
Silt/Clay	8

Remarks:

See Summary of Soil Descriptions



PSL
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Knowsley, Prescot

Contract No:
PSL21/9523
Client Ref:
465346

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WS02

Top Depth (m):

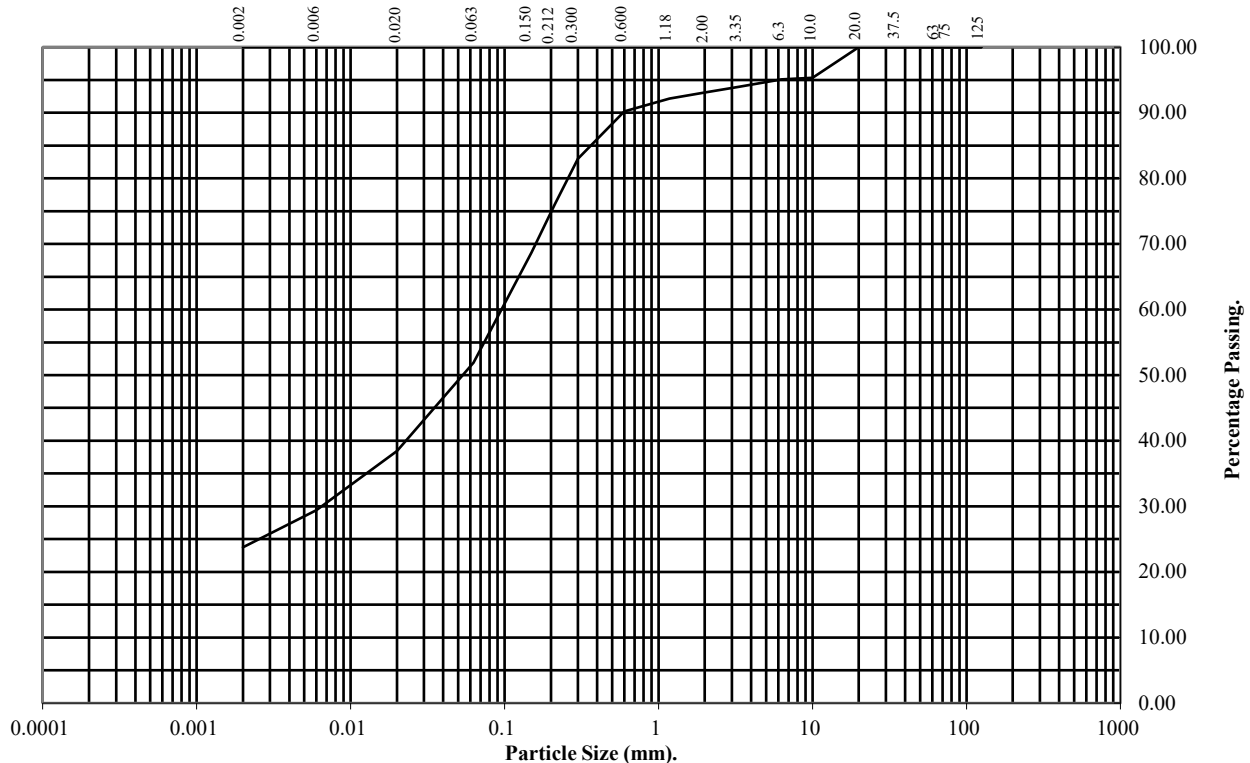
2.50

Sample Number:

Base Depth(m):

Sample Type:

D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	95
6.3	95
3.35	94
2	93
1.18	92
0.6	90
0.3	83
0.212	76
0.15	69
0.063	52

Particle Diameter	Percentage Passing
0.02	38
0.006	29
0.002	24

Soil Fraction	Total Percentage
Cobbles	0
Gravel	7
Sand	41
Silt	28
Clay	24

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

Knowsley, Prescot

Contract No:
PSL21/9523
Client Ref:
465346

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WS03

Top Depth (m):

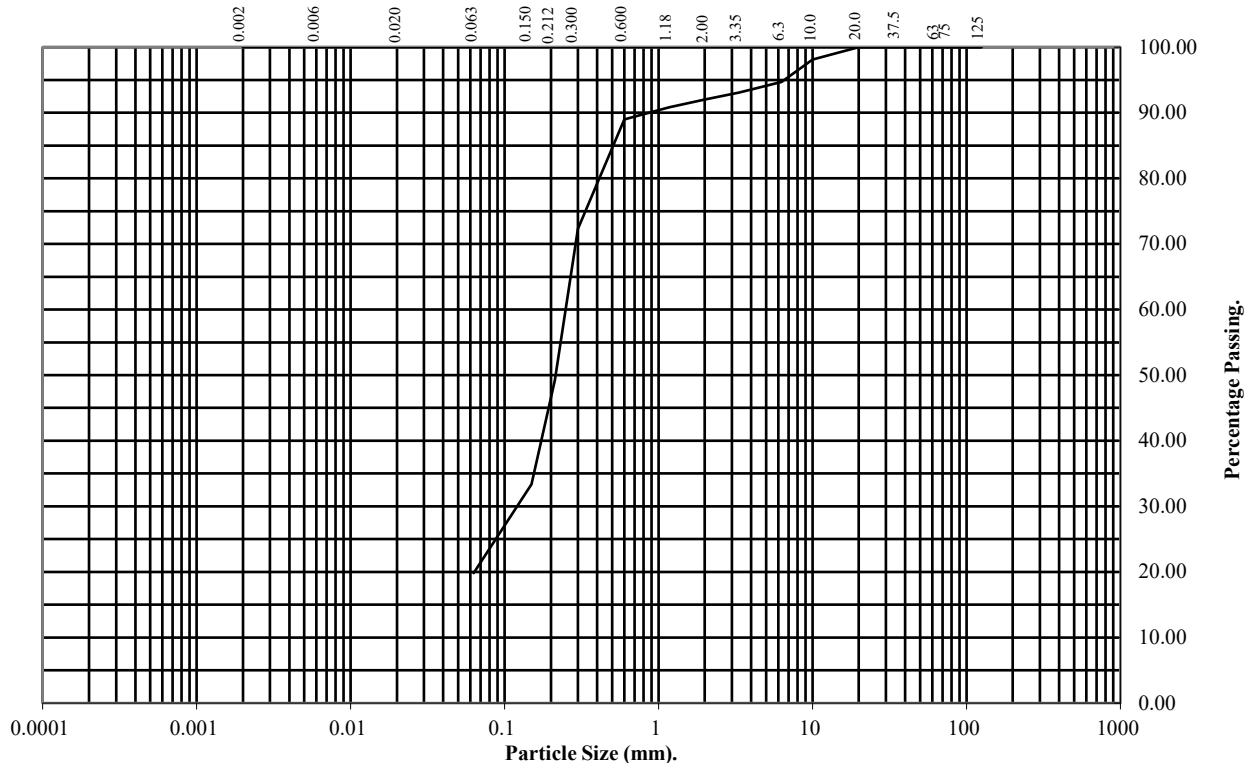
1.50

Sample Number:

Base Depth(m):

Sample Type:

D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	98
6.3	95
3.35	93
2	92
1.18	91
0.6	89
0.3	72
0.212	49
0.15	33
0.063	20

Soil Fraction	Total Percentage
Cobbles	0
Gravel	8
Sand	72
Silt/Clay	20

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

Knowsley, Prescot

Contract No:

PSL21/9523

Client Ref:

465346

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

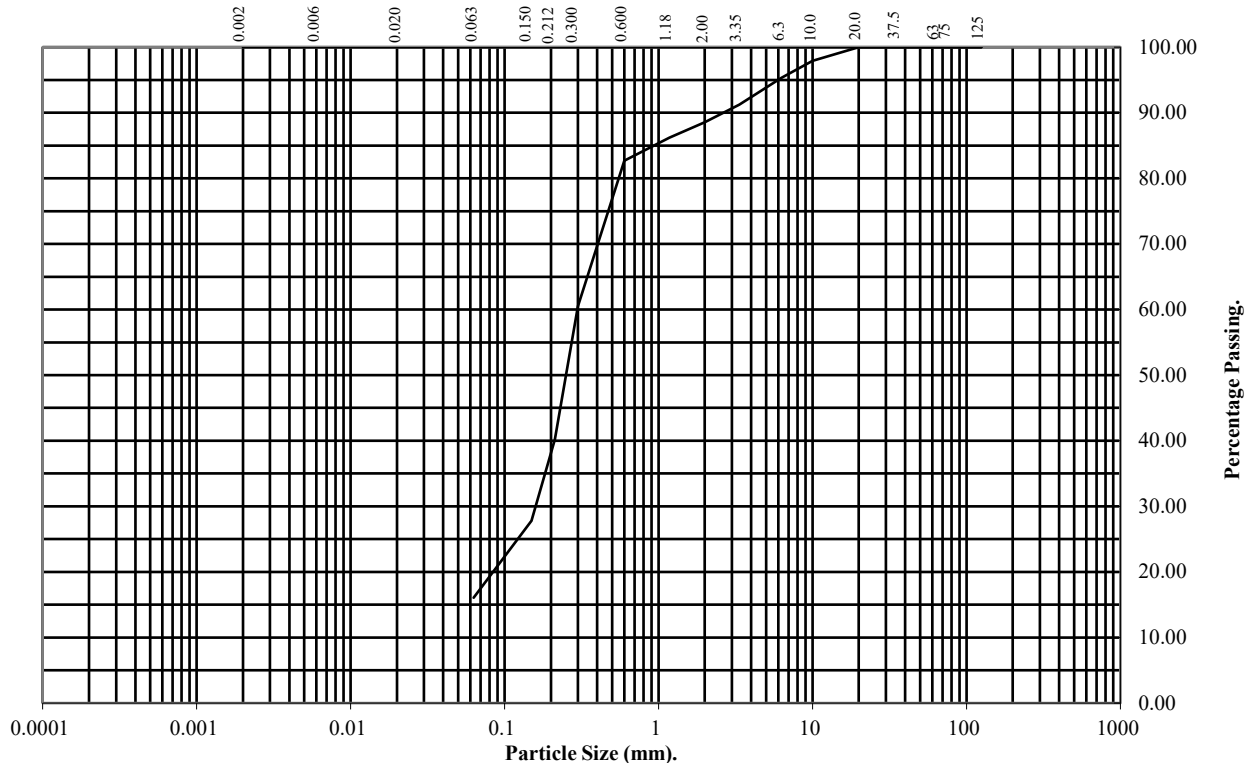
Hole Number: BH01

Top Depth (m): 3.00

Sample Number:

Base Depth(m):

Sample Type: SPT



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	98
6.3	95
3.35	91
2	89
1.18	86
0.6	83
0.3	60
0.212	40
0.15	28
0.063	16

Soil Fraction	Total Percentage
Cobbles	0
Gravel	11
Sand	73
Silt/Clay	16

Remarks:

See Summary of Soil Descriptions



PSL
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Knowsley, Prescot

Contract No:
PSL21/9523
Client Ref:
465346

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

BH02

Top Depth (m):

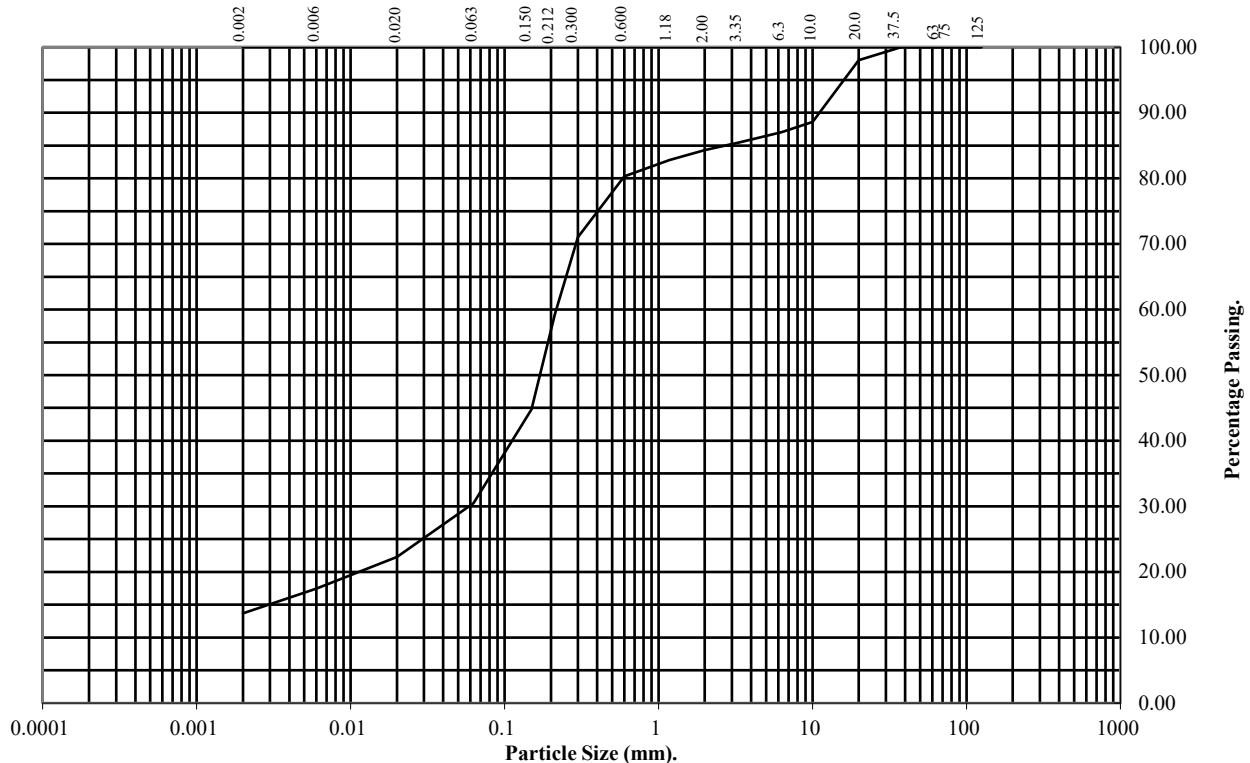
2.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	89
6.3	87
3.35	85
2	84
1.18	83
0.6	80
0.3	71
0.212	59
0.15	45
0.063	31

Particle Diameter	Percentage Passing
0.02	22
0.006	17
0.002	14

Soil Fraction	Total Percentage
Cobbles	0
Gravel	16
Sand	53
Silt	17
Clay	14

Remarks:

See Summary of Soil Descriptions



PSL
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Knowsley, Prescot

Contract No:
PSL21/9523
Client Ref:
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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

BH02

Top Depth (m):

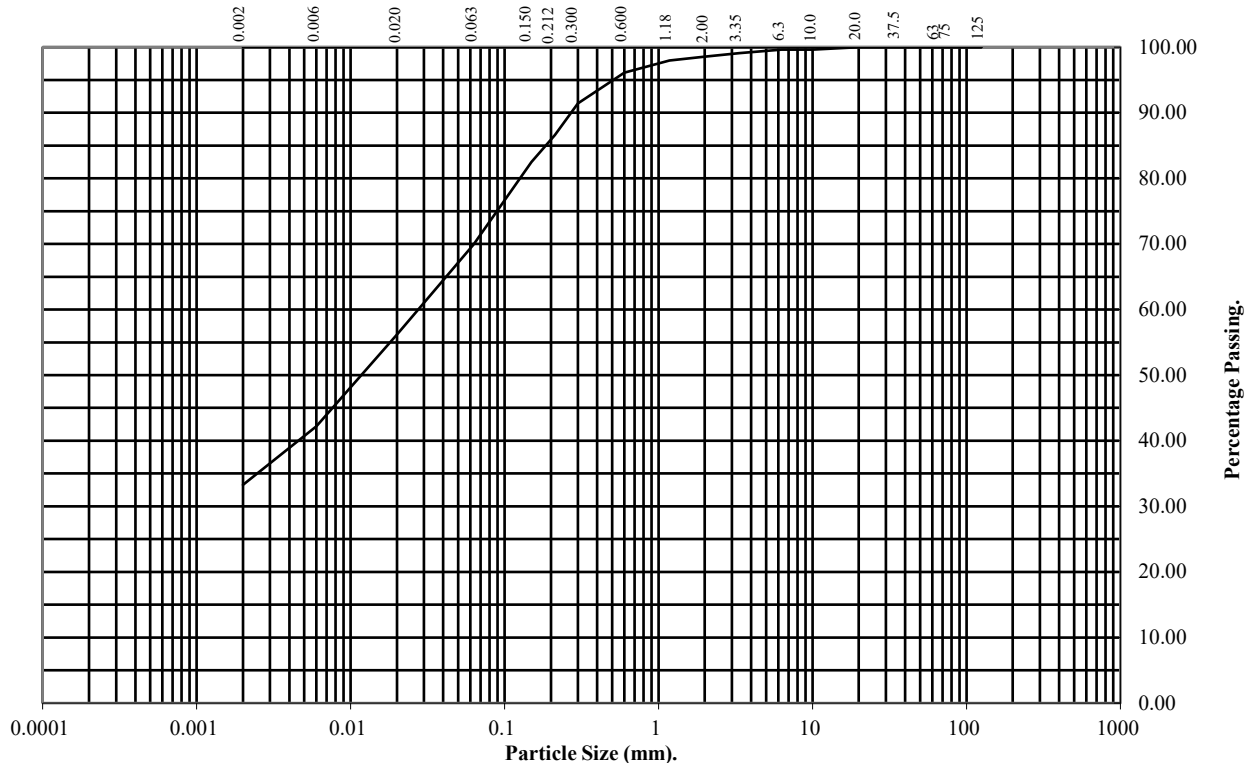
3.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	98
0.6	96
0.3	91
0.212	87
0.15	82
0.063	70

Particle Diameter	Percentage Passing
0.02	56
0.006	42
0.002	33

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	29
Silt	37
Clay	33

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

Knowsley, Prescot

Contract No:

PSL21/9523

Client Ref:

465346

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

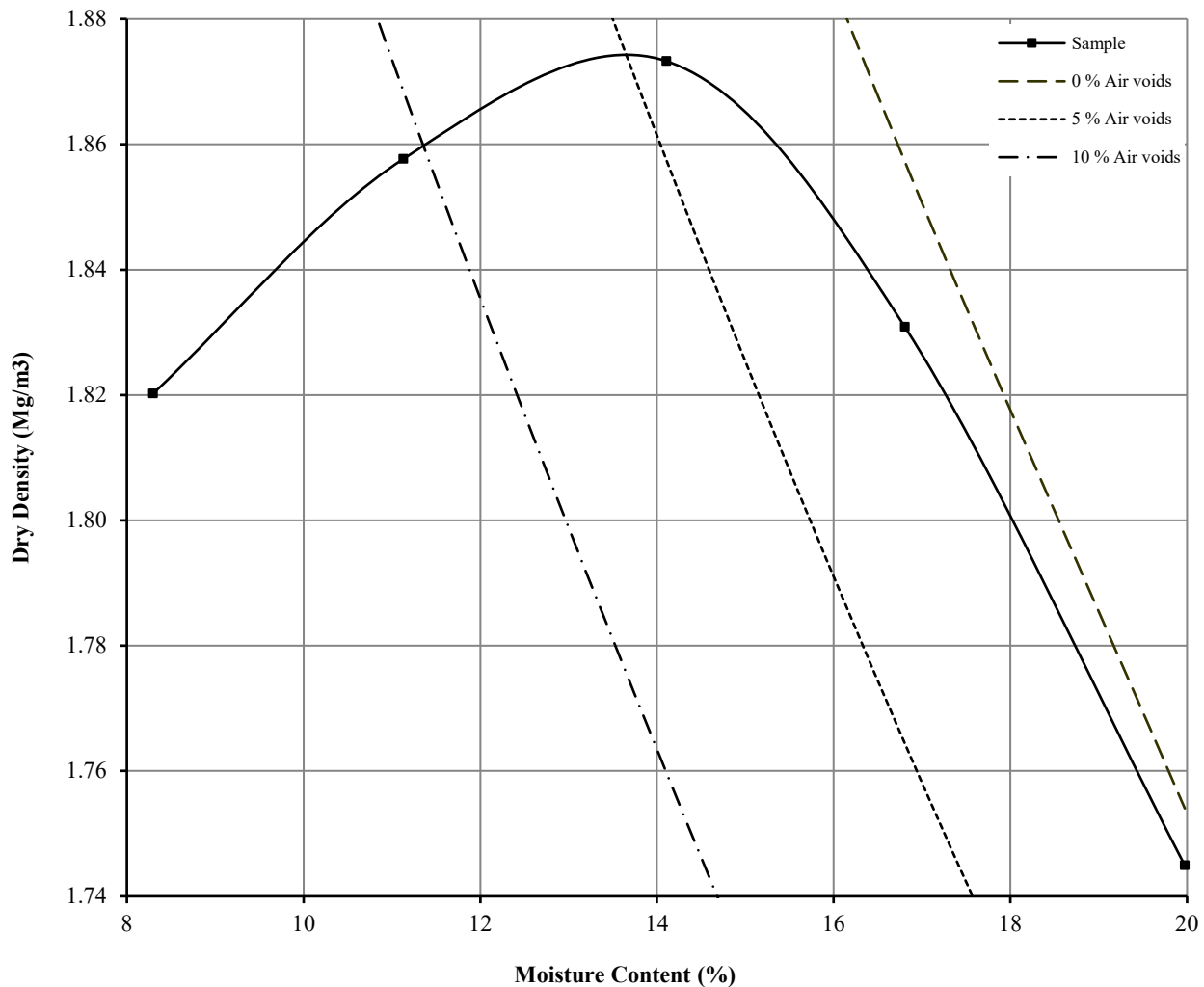
Hole Number: TP02

Top Depth (m) : 1.00

Sample Number:

Base Depth (m) :

Sample Type: B



Initial Moisture Content:	14	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m ³):	2.7	Measured	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.87		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	14			
Remarks See summary of soil descriptions				



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Contract
PSL21/9523
Client Ref
465346

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

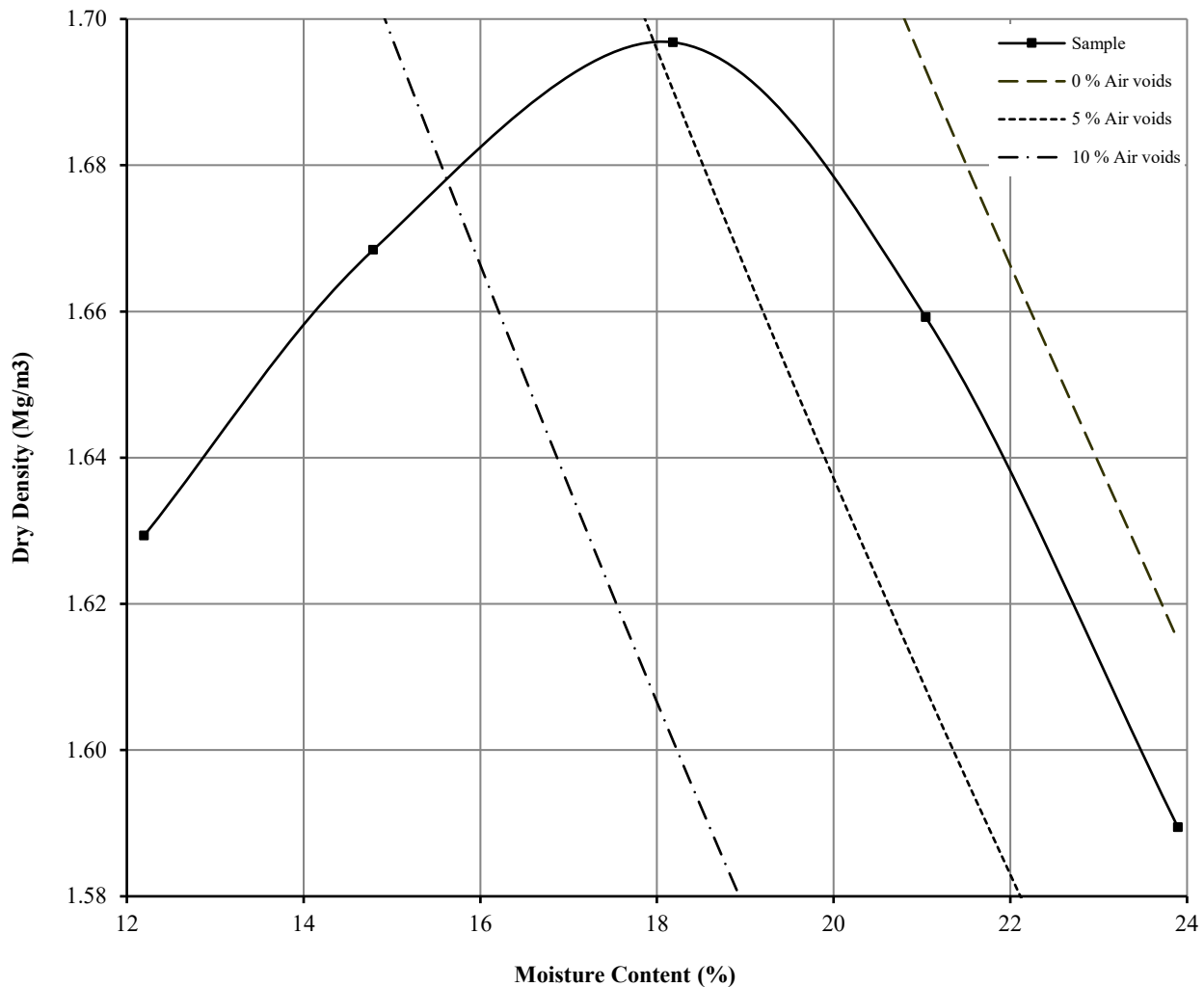
Hole Number: TP02

Top Depth (m) : 2.00

Sample Number:

Base Depth (m) :

Sample Type: B



Initial Moisture Content:	24	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m ³):	2.63	Measured	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.70		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	18			
Remarks See summary of soil descriptions				



PSL
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Knowsley, Prescot

Contract
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Client Ref
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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

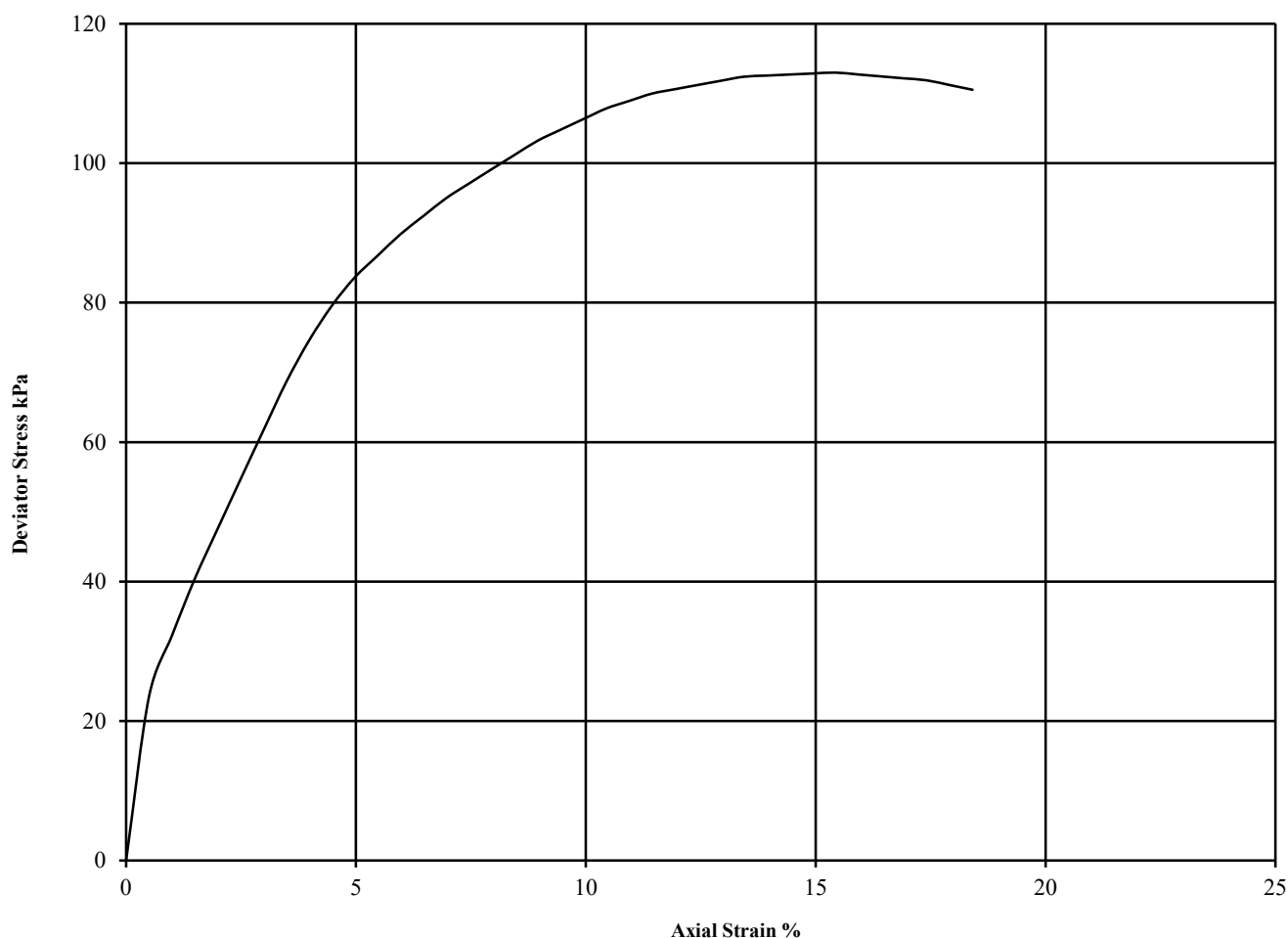
Hole Number: BH01

Top Depth (m): 1.20

Sample Number:

Base Depth (m):

Sample Type U100



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	18	2.09	1.77	48	113	56	15.4	Plastic	



4043

PSL
Professional Soils Laboratory

Knowsley, Prescott

Contract No:

PSL21/9523

Client Ref:

465346



ANALYTICAL TEST REPORT

Contract no: 104042(1)

Contract name: Knowsley, Prescott

Client reference: PSL21/9523

Clients name: Professional Soils Laboratory

Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 20 December 2021

Analysis started: 20 December 2021

Analysis completed: 11 January 2022

Report issued: 11 January 2022

This is a supplementary report to report number 104042 issued 05 January 2021.

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:

Rachael Burton

Reporting Team Lead

Chemtech Environmental Limited

SOILS

Lab number			104042-1	104042-2	104042-3	104042-4	104042-5
Sample id			BH01	BH01	BH02	WS01	WS04
Depth (m)			0.20	0.20	4.00	2.80	2.60
Sample Type			D	SPT	SPT	D	D
Date sampled			27/11/2021	-	-	26/11/2021	26/11/2021
Test	Method	Units					
pH	CE004 ^U	units	8.1	8.2	8.4	7.9	7.6
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	648	-	12	10	32
Sulphate (total)	CE062 ^U	mg/kg SO ₄	1557	224	<100	<100	<100

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	U	100	mg/kg SO ₄

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
104042-1	BH01	0.20	Y	pH (EHT)
104042-2	BH01	0.20	Y	All (NSD)
104042-3	BH02	4.00	Y	All (NSD)
104042-4	WS01	2.80	Y	pH (EHT)
104042-5	WS04	2.60	Y	pH (EHT)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

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

Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones, where applicable.



ANALYTICAL TEST REPORT

Contract no: 104042(1)

Contract name: Knowsley, Prescot

Client reference: PSL21/9523

Clients name: Professional Soils Laboratory

Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 20 December 2021

Analysis started: 20 December 2021

Analysis completed: 11 January 2022

Report issued: 11 January 2022

This is a supplementary report to report number 104042 issued 05 January 2021.

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:

Rachael Burton

Reporting Team Lead

Chemtech Environmental Limited

SOILS

Lab number			104042-1	104042-2	104042-3	104042-4	104042-5
Sample id			BH01	BH01	BH02	WS01	WS04
Depth (m)			0.20	0.20	4.00	2.80	2.60
Sample Type			D	SPT	SPT	D	D
Date sampled			27/11/2021	-	-	26/11/2021	26/11/2021
Test	Method	Units					
pH	CE004 ^U	units	8.1	8.2	8.4	7.9	7.6
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	648	-	12	10	32
Sulphate (total)	CE062 ^U	mg/kg SO ₄	1557	224	<100	<100	<100

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	U	100	mg/kg SO ₄

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
104042-1	BH01	0.20	Y	pH (EHT)
104042-2	BH01	0.20	Y	All (NSD)
104042-3	BH02	4.00	Y	All (NSD)
104042-4	WS01	2.80	Y	pH (EHT)
104042-5	WS04	2.60	Y	pH (EHT)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

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Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

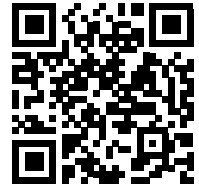
Analytical results are inclusive of stones, where applicable.

Annex H: Hazwaste 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:

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



VQIL1-9UDQQ-LL87J

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

Job name

Knowsley

Description/Comments

Project

465346

Site

Knowsley

Classified by

Name: **Ashley Standen-Howard**
Date: **12 Jan 2022 14:36 GMT**
Telephone: **07572 100076**
Company: **TRC Companies Ltd**
Work.Life
Brown Street, ,
Manchester
M2 1DH

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:

Course
Hazardous Waste Classification

Date

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP01	0.9	Non Hazardous		2
2	WS02	0.6	Non Hazardous		4

Related documents

#	Name	Description
1	TRC Waste	waste stream template used to create this Job

Report

Created by: Ashley Standen-Howard

Created date: 12 Jan 2022 14:36 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	6
Appendix B: Rationale for selection of metal species	7
Appendix C: Version	7

Classification of sample: TP01


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

Sample details

Sample name:	LoW Code:
TP01	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.9 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
14%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

#	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								
1	arsenic { arsenic trioxide }				9.6 mg/kg	1.32	10.901 mg/kg	0.00109 %		✓	
	033-003-00-0	215-481-4	1327-53-3								
2	boron { diboron trioxide; boric oxide }				0.2 mg/kg	3.22	0.554 mg/kg	0.0000554 %		✓	
	005-008-00-8	215-125-8	1303-86-2								
3	cadmium { cadmium oxide }				<0.2 mg/kg	1.142	<0.228 mg/kg	<0.0000228 %			<LOD
	048-002-00-0	215-146-2	1306-19-0								
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				38 mg/kg	1.462	47.764 mg/kg	0.00478 %		✓	
		215-160-9	1308-38-9								
5	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<4 mg/kg	2.27	<9.08 mg/kg	<0.000908 %			<LOD
	024-017-00-8										
6	copper { dicopper oxide; copper (I) oxide }				22 mg/kg	1.126	21.302 mg/kg	0.00213 %		✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead chromate }			1	7.7 mg/kg	1.56	10.329 mg/kg	0.000662 %		✓	
	082-004-00-2	231-846-0	7758-97-6								
8	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								
9	nickel { nickel chromate }				46 mg/kg	2.976	117.741 mg/kg	0.0118 %		✓	
	028-035-00-7	238-766-5	14721-18-7								
10	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %			<LOD
	028-031-00-5	239-125-2	15060-62-5								
11	zinc { zinc chromate }				45 mg/kg	2.774	107.359 mg/kg	0.0107 %		✓	
	024-007-00-3	236-878-9	13530-65-9								
12	TPH (C6 to C40) petroleum group		TPH		<10 mg/kg		<10 mg/kg	<0.001 %			<LOD
13	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	603-181-00-X	216-653-1	1634-04-4								
14	benzene				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	601-020-00-8	200-753-7	71-43-2								
15	toluene				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	601-021-00-3	203-625-9	108-88-3								

#	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							
16	ethylbenzene				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
17	xylene				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
18	pH				7.6 pH		7.6 pH	7.6 pH		
			PH							
19	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
20	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8							
21	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
22	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7							
23	phenanthrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8							
24	anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7							
25	fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0							
26	pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0							
27	benzo[a]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
28	chrysene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
29	benzo[b]fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
30	benzo[k]fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
31	benzo[a]pyrene; benzo[def]chrysene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
32	indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5							
33	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							
34	benzo[ghi]perylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2							
Total:								0.034 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS02


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

Sample details

Sample name:	LoW Code:
WS02	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.6 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
13%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 13% Wet Weight Moisture Correction applied (MC)

#	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							
1	arsenic { arsenic trioxide }				4.2 mg/kg	1.32	4.824 mg/kg	0.000482 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
2	boron { diboron trioxide; boric oxide }				0.2 mg/kg	3.22	0.56 mg/kg	0.000056 %	✓	
	005-008-00-8	215-125-8	1303-86-2							
3	cadmium { cadmium oxide }				0.2 mg/kg	1.142	0.199 mg/kg	0.0000199 %	✓	
	048-002-00-0	215-146-2	1306-19-0							
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				12 mg/kg	1.462	15.259 mg/kg	0.00153 %	✓	
		215-160-9	1308-38-9							
5	chromium in chromium(VI) compounds { chromium(VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<4 mg/kg	2.27	<9.08 mg/kg	<0.000908 %		<LOD
	024-017-00-8									
6	copper { dicopper oxide; copper (I) oxide }				27 mg/kg	1.126	26.447 mg/kg	0.00264 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
7	lead { lead chromate }			1	32 mg/kg	1.56	43.425 mg/kg	0.00278 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
8	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							
9	nickel { nickel chromate }				13 mg/kg	2.976	33.662 mg/kg	0.00337 %	✓	
	028-035-00-7	238-766-5	14721-18-7							
10	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5							
11	zinc { zinc chromate }				59 mg/kg	2.774	142.397 mg/kg	0.0142 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
12	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
13	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
14	benzene				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
15	toluene				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							

#	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							
16	ethylbenzene 601-023-00-4	202-849-4	100-41-4		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
17	xylene 601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
18	pH		PH		7 pH		7 pH	7pH		
19	naphthalene 601-052-00-2	202-049-5	91-20-3		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
20	acenaphthylene 205-917-1	208-96-8			<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
21	acenaphthene 201-469-6	83-32-9			<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
22	fluorene 201-695-5	86-73-7			<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	phenanthrene 201-581-5	85-01-8			<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
24	anthracene 204-371-1	120-12-7			<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
25	fluoranthene 205-912-4	206-44-0			0.52 mg/kg		0.452 mg/kg	0.0000452 %	✓	
26	pyrene 204-927-3	129-00-0			0.54 mg/kg		0.47 mg/kg	0.000047 %	✓	
27	benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		0.33 mg/kg		0.287 mg/kg	0.0000287 %	✓	
28	chrysene 601-048-00-0	205-923-4	218-01-9		0.31 mg/kg		0.27 mg/kg	0.000027 %	✓	
29	benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		0.33 mg/kg		0.287 mg/kg	0.0000287 %	✓	
30	benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		0.21 mg/kg		0.183 mg/kg	0.0000183 %	✓	
31	benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		0.35 mg/kg		0.305 mg/kg	0.0000305 %	✓	
32	indeno[123-cd]pyrene 205-893-2	193-39-5			<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
33	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
34	benzo[ghi]perylene 205-883-8	191-24-2			<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
Total:								0.0281 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

■ 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

■ TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

■ ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4

Description/Comments:

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 2B (77) 2000

■ pH (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

■ 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

■ 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

■ 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

■ 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

■ 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

■ 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

▪ **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

▪ **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

▪ **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

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worst case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021

HazWasteOnline Classification Engine Version: 2022.11.4970.9430 (11 Jan 2022)

HazWasteOnline Database: 2022.4.4967.9426 (04 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