



Phase II Geo-Environmental Assessment

76 Commerce Street

Melbourne

Derbyshire

DE73 8GP

Prepared for:

The Loughborough Building Society

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76 COMMERCE STREET, MELBOURNE

NON-TECHNICAL CLIENT SUMMARY

This report presents a summary of the findings of a previous Phase I Geo-Environmental Desk Study previously completed by EPS and the subsequent Phase II Geo-Environmental Assessment undertaken by EPS to determine if there are any environmental risks associated with the site and its redevelopment and to provide a geotechnical appraisal. Pertinent findings and conclusions may be summarised as follows:

- The previous Phase I Geo-Environmental Desk Study identified the sites industrial use as the primary source of potential contamination, the sale of 76 Commerce Street may lead to several potential redevelopment opportunities, the most sensitive of which has been considered as a residential redevelopment of the area.
- Intrusive investigations involved the drilling of eight window sample boreholes to a maximum depth of 3m both inside and outside of the industrial building currently present. Ground conditions were found to comprise layers of made ground underlain by natural medium dense to very dense sands with some areas of clay, groundwater was not encountered.
- Laboratory analysis of shallow soils has confirmed that there are no significant levels of contaminants present that could present any unacceptable risks to future site users should the site be redeveloped into a residential land use.
- It should be appreciated that the western part of the building was inaccessible to the drilling rig and as such, recommendations have been made for additional investigation of this area once the buildings have been demolished and the site has been cleared. Recommendations have also been made for safe redevelopment of the site.

ENGINEERING SUMMARY

- Ground conditions have been found to be suitable for conventional spread foundations with bearing capacities ranging from 105kN/m² at 1.0m to 125kN/m² at 1.5m.
- Depending on the nature of any redevelopment proposals, suspended ground floors have been recommended for small scale structures such as residential dwellings while suspended ground floors may be more suitable if the area is to be redeveloped for commercial use.
- All due care and consideration should be given to the area of the building that incorporates a basement particularly during the demolition and construction phases of any redevelopment works.
- A design sulphate class of DS-1 with an aggressive chemical for concrete classification of AC-1 is considered suitable concrete in contact with any of the soils encountered at the site.

The above points represent a simplified summary of the findings of this assessment and should not form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.

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Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

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The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance, with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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1 INTRODUCTION

In November 2018, Environmental Protection Strategies Ltd (EPS) was commissioned by The Loughborough Building Society to complete a Phase II Geo-Environmental Assessment at 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP ('the site'). A site location plan is included as Figure 1 and selected site photographs are presented as Appendix A.

This report presents a summary of a Phase I Geo-Environmental Desk Study previously completed at the site by EPS in April 2015, along with the findings, conclusions, and recommendations of this Phase II Geo-Environmental Assessment. A brief summary of the Phase I Geo-Environmental Desk Study is included in Section 2 (below).

It is understood that the work was commissioned in order to further assess the contaminant linkages previously identified within the desk study and so that this information could be incorporated into the documents of the site which is understood to be marketed for sale.

1.1 Objectives

The objectives of this investigation were as follows:

- a) Investigate potential contaminant linkages identified through the Conceptual Site Model (CSM) by means of an Intrusive Investigation and Generic Quantitative Risk Assessment.
- b) Determine the potential risks posed by the site and make recommendations for further work that may be required, to ensure safe development in accordance with the *Model Procedures for the Management of Land Contamination - Contaminated Land Report 11* and the *National Planning Policy Framework*.
- c) Collect information on ground conditions and strength in order to make recommendations for future geotechnical design.

1.2 Scope of Works

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRA's 'Contaminated Land Statutory Guidance' (2012), BS10175 – 'Investigation of Potentially Contaminated Sites', BS5930:2015 'Code of practice for ground investigations' and BS EN 1997 'Geotechnical Design', the following tasks were undertaken:

Intrusive Investigation:

- Site walkover, inspection of any visual evidence of contamination at the site, obtaining photographic records.
- Health and safety briefing / site supervision.
- Drilling of eight window sample boreholes to a maximum depth of 3.0m below ground level (bgl), using a track mounted percussive drilling rig.
- Continual logging of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected representative samples.
- Installation of monitoring standpipes at selected borehole locations for future monitoring requirements.
- In-situ testing, to assist with geotechnical design.

Reporting:

- Data collection and interpretation.
- Reporting.

The findings of these investigations and their conclusions are presented in the following sections.

1.3 Limitations and Constraints

The purpose of this report is to present the findings of a soil sampling investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and / or trial pits to recover soil and / or groundwater samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface however, ground conditions are naturally variable and it may be possible that the ground conditions encountered may differ to those encountered during the investigation.

No visible evidence of Japanese Knotweed was identified during the site walkover; however, this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its presence at certain times of the year. For this reason, EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

The investigation was carried out to assess the significance of contamination resulting from the use of the site as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

2 SUMMARY OF PREVIOUS REPORTS

A Phase I Geo-Environmental Desk Study was previously completed by EPS in April 2015. For background information, it is recommended that the reader review the following report:

- *Phase I Geo-Environmental Desk Study, 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP, 16th April 2015, EPS Ltd (Report Reference: UK15.1832)*

A summary of the information contained within this report, relating to the geo-environmental setting of the site, is presented in the following sections.

2.1 Geo-Environmental Setting

Detail	Description
Location	The site comprises an almost rectangular shaped plot of land on the western outskirts of Melbourne, which is situated around 10km south of the centre of Derby.
National Grid Reference	438056, 325460
Topography	The area is higher in the south at approximately 86m – 87m AOD (above ordnance datum) with the ground level in the northern area being at around 84m – 85m AOD, the change in level being accommodated by a step to the northern end.
Description of Site (December 2018)	The site comprises a piece of land roughly rectangular in shape and covering an approximate surface area of 280m² (0.28ha). It is known to have comprised a number of different uses including a manufacturing unit, a workshop unit, office units and a T-Mobile mast as well as areas for car parking. The building itself consists of three-storeys, including a maisonette office on the first floor and a basement beneath the rear (northern) part of the building. It has pitched roofs on its south section with corrugated roof sheets which have the potential to be asbestos containing materials (ACM's). On the ground floor two separate areas of office and meeting spaces exist. Five separate industrial units are present on the ground floor which most recently were split between two businesses called Advance Lighting and Executive Linen. Executive Linen appears to have used two units although these are now large open areas without evidence of the machinery used. However a potential wash down area with drainage and hose connections appeared to be present within unit 3. Advance Lighting appears to have used the remainder of the building including units for Goods In, Goods Out, a Workshop and a Manufacturing unit on the ground floor and a Testing Laboratory within part of the basement. However, like the Executive Linen units, these units have all been stripped back so there is no evidence of machinery or use of the units except for signs on the walls. There are large stairs leading to the basement in the rear of the building, during the investigation, the basement was completely empty and appeared to be present beneath approximately 1/3 of the buildings footprint.

Detail	Description
Surrounding Land Use	The immediate surrounding land use is predominantly made up of residential land. Residential properties lie adjacent to the site in all directions. Slightly further to the west begins a large area of agricultural land which continues to spread west, whilst the town of Melbourne dominates the land to the east.
Geology	Geological maps of the area indicate the ground conditions to consist of bedrock Rough Rock (sandstone), although Morridge Formation (sandstone) may protrude onto the southwest corner. It should be appreciated that the area lies within a complex area of geology with faults present within the wider surrounding area and several other lithologies mapped within 250m. No superficial geology is mapped within the sites boundaries or immediate surrounding area. Information acquired from the British Geological Survey (BGS) for location approximately 80m northwest of the site indicates recorded groundwater at depth of 26.5m.
Hydrogeology	Groundwater vulnerability maps for the area show that the underlying geology, is classified as a Secondary A Aquifer. The site does not lie within a Source Protection Zone (SPZ) for local groundwater abstraction. However, a Zone III (Total Catchment) is located only 10m north west.
Hydrology & Flooding	The closest surface water feature is a pond, which is approximately 270m north west. Further from the site a number of small drains and ponds are located within the surrounding area. Around 900m south there is a large mill-pond known as Melbourne Pool. Review of the EA Flood Zone Map for the area indicates that the site area lies within Flood Zone 1, which is defined within Table 1 of the National Planning Policy Framework (NPPF) as the area with the lowest potential risk of flooding from fluvial or tidal sources. It should be noted that the EA maps do not take into account the potential for flooding from poor drainage, or groundwater.
Summary of Site History	The area of investigation was undeveloped in the late 1800s, by the early 1900's a boot and shoe factory was present in the southeast of the area, this factory later expanded to the current buildings by 1968. It is understood that sometime after 1968, several other companies occupied the premises including Advance Lighting and Executive Linen. The building and associated areas are understood to have been unused and vacant for the past few years.
Industrial Land Use & Waste Summary	There have been three recorded licensed waste management facilities within 1km. The closest is 360m south which is a waste for reclamation site and was issued in July 2011. The second site is a metal recycling centre located approximately 955m east which was issued in July 2013. The third is roughly 995m southwest and relates to a Household, Commercial and Industrial waste transfer station issued in November 1999 and last modified in January 2000. Additionally, several industrial land uses are present within the surrounding area, one of these is recorded on site and was operated by Advance Lighting Ltd.

2.2 Desk Study Conclusions and Recommendations

Several potential contaminant linkages were identified in the Phase I Geo-Environmental Desk Study completed in 2015, the most pertinent of these linkages identified by EPS are presented below:

- Human health risks associated with interaction between future residents and potentially contaminated shallow soils, especially within domestic garden areas.
- Volatilisation of organic compounds to indoor and outdoor air.
- Potential exposure of site workers to contaminated soils during the proposed redevelopment.
- Risks to controlled waters from site derived contaminants of concern.

The above contaminant linkages were used to inform the scope of this intrusive Phase II investigation.

3 SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive investigations were undertaken on the 12th and 13th December 2018 in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of all site activities is presented in the following sections:

3.1 Window Sample Borehole Locations

Window sample borehole locations were selected through consideration of the identified contaminant linkages, operational and health and safety considerations, to provide detailed coverage throughout the and according to the access constraints of the buildings.

Eight window sample boreholes (WS01-WS08) were formed throughout the area to a maximum depth of 3.0m, in order to assess the nature, quality and strength of the underlying soils.

The overall objective in terms of borehole location was to provide an appropriate lateral and vertical coverage of the soils across the site. Boreholes WS01, WS02 were formed outside of the building in the southwest car park area while boreholes WS05 – WS08 were formed in the car parking area in the north. Boreholes WS03 – WS05 were formed inside the buildings.

Due to the nature of the western part of the building being occupied by vacant offices and the north western part of the building having a basement present with limited headroom, this area could not be investigated during this intrusive investigation. It is likely that this area will be unable to be fully investigated until the buildings at the site have been demolished/removed.

Combined gas and groundwater monitoring wells were installed at two borehole locations (WS02 & WS06) in anticipation of any future monitoring requirements. The monitoring points were installed using 50mm diameter uPVC well casing and fitted with a bung and gas tap. Slotted casing (1mm slot) was installed at each location from the base of the borehole to approximately 1.0m below the surface and the installations were completed to ground surface using plain casing. A filter pack of 2-3mm washed gravel extended from the base of the boreholes to approximately 0.1m above the slotted section with a bentonite seal to surface. Each monitoring location was finished to ground level using flush, forecourt rated, bolt down steel headworks.

Exploratory hole location plan is presented as Figure 2.

3.2 Soil Sampling & Field Testing

Standard or cone penetration tests (SPT / CPT) were carried out in the window sample boreholes using an automatic trip hammer. The number of blows required to advance a standard split spoon, (or solid 60° nose cone for the CPT test) over the final 300mm of a 450mm total drive was recorded, and is shown on the borehole records at the penetration resistance (“N” value).

Each borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination such as soil staining, odour and the presence of separate phase liquids. Soil samples were recovered from each borehole location at regular intervals for record purposes and future laboratory testing. Selection of samples for laboratory analysis focussed on assessing the quality of shallow subsurface soils present across the site.

Where potentially volatile organic compounds are suspected, EPS carries a Photoionisation Detector (PID), which can be used to measure the relative concentrations of vapour associated with soil samples collected from different depths and locations at the site. In these circumstances, soil samples will be placed into plastic bags, sealed, shaken and then allowed to rest for a few minutes to allow time for volatile vapour to accumulate in the air trapped within the bag. The PID probe will then be used to pierce the bag and sample the air above the soil to measure the concentration of volatile compounds that have accumulated. PID readings are only used to provide EPS with a basic means to quantify areas of volatile organic compounds in the field to help guide the investigation. PID readings were collected during this intrusive investigation due to the potential sources of volatile compounds identified in the desk study. The results of headspace testing by PID are displayed on the site specific borehole logs in parts per million volume (ppm v).

3.3 Laboratory Analysis

All samples obtained for analysis of identified contaminants of concern were submitted to Exova Jones Environmental of Flintshire, who hold appropriate UKAS / MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered to the laboratory by approved courier.

Geotechnical testing was undertaken by Soil Property Testing, Huntingdon, a UKAS accredited laboratory.

Laboratory testing schedules detailing all environmental and geotechnical samples submitted for laboratory analysis are included as Table 1a and Table 1b respectively.

4 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the various aspects of the Phase II investigation.

4.1 Ground Conditions

Geological maps of the area show the ground conditions to consist of bedrock Rough Rock.

A total of eight window sample boreholes, were formed throughout the area at 76 Commerce Street and the ground conditions encountered were found to comprise made ground at the surface underlain by soils considered to be representative of the Rough Rock bedrock. The maximum depth of this investigation was limited to 3m below ground level due to the dense nature of the underlying soils.

Site specific borehole logs are included as Appendix B and give descriptions and depths of strata encountered and also show the results of in-situ testing. A summary of the general strata encountered across the site is provided in the table below, with more detailed description given in the following sub sections.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Made Ground	1.60	0.40-1.60
Rough Rock	Not proven (>3.0m)	Not Proven (>1.75)

4.1.1 Made Ground / Topsoil

At the surface of all borehole locations, either asphalt (outside of the buildings) or concrete (inside the buildings) was cored out using a coring attachment on the window sample drilling rig. The thickness of the asphalt was recorded as generally around 0.15m while the thickness of the concrete varied from approximately 0.15m to 0.20m.

Made ground soils were found to lie beneath the asphalt / concrete at all borehole locations. The made ground soils varied depending on the location of the borehole. Soils lying below the asphalt in the boreholes that were formed outside of the buildings (WS01, WS02 & WS06 – WS08) consisted of a coarse sand and gravel subbase containing fragments of concrete, ash and charcoal.

The soils underlying the concrete within the factory were slightly more varied and comprised medium dense to dense sometimes clayey sand with fragments such as concrete, asphalt, brick, ash and charcoal contained within. The maximum depth of made ground was recorded at WS05 in the central part of the building, here the made ground soils were identified to a maximum depth of 1.60m.

4.1.2 *Rough Rock*

Natural soils considered to represent the bedrock Rough Rock were encountered below the made ground at all borehole locations. This varied from granular to cohesive material depending on the location of the borehole and the depth at which the soil was recovered.

Generally, the granular material can be described as medium dense to very dense sometimes gravelly, silty and clayey fine to medium sand with the gravel comprising fragments of sandstone. The more cohesive material was generally recovered as firm to stiff sometimes slightly sandy and gravelly silty clay with gravel also comprising sandstone. A thin horizon of soft grey clay at WS04 from a depth of 1.7m to 1.8m was much softer than the other cohesive soils encountered and there does not appear to be any particular pattern or trend for the locations and depths at which either more granular or more cohesive soils were encountered.

4.2 **Groundwater**

Groundwater was not struck within any of the boreholes formed as part of this investigation, upon completion of each borehole a dip meter was used to measure if any groundwater had entered any of the boreholes however no groundwater was recorded. This is not unexpected as regionally groundwater was recorded at significant depth of 26.5m, as evidenced on historical borehole logs obtained from BGS (EPS Report Reference: UK15.1832).

4.3 **Physical Evidence of Contamination**

Aside from the made ground soils described above, no physical evidence of contamination such as hydrocarbon staining, odours or putrescible material was discovered in any of the soils observed during this investigation. The lack of any other physical evidence of contamination was corroborated by headspace testing completed using a PID, the results of this testing did not detect volatile compounds above the minimum instrument detection limit of 0.1ppm v in any of the soils tested.

4.4 **Laboratory Analysis – Soil**

An environmental laboratory analysis testing schedule is presented as Table 1a and all environmental soil sample results obtained from the laboratory are included as Appendix C. The key results of laboratory testing on soil samples are summarised below:

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	8	8	2.8	18.6	WS07 (0.2-0.5)
Cadmium	8	8	0.1	0.6	WS02 (0.2-0.8)
Chromium III	8	8	13.5	62.7	WS03 (0.2-0.9)
Chromium VI	8	-	-	-	-
Copper	8	8	16	299	WS02 (0.2-0.8)
Lead	8	8	13	160	WS02 (0.2-0.8)
Mercury	8	-	-	-	-
Nickel	8	8	9.0	33.1	WS02 (0.2-0.8)
Selenium	8	-	-	-	-
Zinc	8	8	33	394	WS02 (0.2-0.8)
Naphthalene	8	1	0.29		WS02 (0.2-0.8)
Benzo(a)pyrene	8	4	0.06	1.06	WS05 (0.3-0.9)
Dibenz(ah)anthracene	8	2	0.12	0.20	WS05 (0.3-0.9)
PAH's (Total of 16)	8	4	0.6	14.6	WS05 (0.3-0.9)
MTBE	4	-	-	-	-
BTEX	4	-	-	-	-
TPH (total Aliphatics & Aromatics)	4	1	152		WS05 (0.3-0.9)
SVOC's (total excluding PAH's)	4	1	0.027		WS03 (0.2-0.9)
VOC's (total)	4	-	-	-	-
ACM (% mass)	8	3	<0.001%	<0.001%	WS01 (0.3-0.5) WS02 (0.2-0.8) WS05 (0.3-0.9)

Notes:

-	Contaminant Not Recorded Above Laboratory Minimum Instrument Detection Limits		
PAH's	Polycyclic Aromatic Hydrocarbons	MTBE	Methyl Tertiary Butyl Ether
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes	TPH	Total Petroleum Hydrocarbons
SVOC's	Semi Volatile Organic Compounds	VOC's	Volatile Organic Compounds
ACM	Asbestos Containing Material		

- Laboratory testing has revealed relatively low concentrations of metals within the shallow soil samples analysed.
- Low concentrations of select individual PAH compounds were recorded within all of the shallow soil samples analysed with the most prominent concentrations and distribution of PAH compounds being recorded in sample WS05 0.3m-0.9m.
- While no MTBE or BTEX compounds were identified above laboratory minimum detection limits, TPH compounds were measured in one of the eight shallow soil samples. Aliphatics TPH fractions C21-C35 and aromatic TPH fractions EC21-EC35 were recorded at concentrations of 94mg/kg and 58mg/kg respectively within sample WS05 0.3m-0.9m, laboratory interpretation suggests that these compounds are derived from a lubricating oil source.
- Excluding PAH's the only SVOC that was detected above laboratory minimum detection limits was carbozole which was detection in one sample; WS03 0.2m-0.9m at a concentration of 0.027mg/kg (27ug/kg).

- Asbestos containing material was identified in three of the eight shallow soil samples submitted for laboratory analysis; WS01 0.3m-0.5m, WS02 0.2m-0.8m and WS05 0.3m-0.9m. Quantification of this material revealed it be comprise chrysotile fibre bundles representing <0.001% mass in each soil sample where it was detected.

4.5 Geotechnical Testing

The results of geotechnical laboratory and field testing are summarised in the table below.

Strata	Range of Parameters							
	Moisture Content (%)		Plasticity Index		pH		Water Soluble Sulphate 2:1 SO ₃ g/l	
	Min	Max	Min	Min	Min	Max	Min	Max
Rough Rock	18.4	24.9	25	26	6.5	7.5	0.03	0.13

The natural moisture content was established for two soil samples in accordance with BS1377 Part 1:7.3 and BS1377: Part 2:3.2.

Atterberg limit tests were undertaken on two soil samples in accordance with BS1377: Part 1:7.4 and BS1377: Part 2:3.2 & 4.2.

Particle Size Distribution testing was undertaken on three soil samples in accordance with BS1377: Part 2: 1990: 9.2.

Sulphate contents and pH value determinations were also carried out by the geotechnical laboratory, the results of which are summarised in Section 5.6 below.

A geotechnical laboratory analysis testing schedule is presented as Table 1b and all geotechnical sample results obtained from the laboratory are included as Appendix D.

5 GEOTECHNICAL APPRAISAL

The ground conditions have been found to comprise concrete or asphalt hardstanding underlain by made ground to a maximum depth of 1.6m. Natural soils have been found to be a mix of medium dense to very dense sand and firm to stiff clays.

5.1 Structural Foundations

5.1.1 Spread Foundations

The ground conditions are considered suitable for the use of conventional spread foundations, either strip footings or pad foundations bearing on the underlying natural Rough Rock deposits.

A minimum foundation depth of 0.9m is considered suitable for the site, below existing or proposed ground level, whichever gives the deeper foundation based upon the following provisos.

- a) Foundations should fully penetrate any made ground materials and all disturbed ground arising from the removal of existing buildings or infrastructure, and extend a minimum of 150mm into undisturbed natural strata.
- b) Some of the shallow soils are cohesive and hence are shrinkable, where affected by any vegetation such as trees, foundations should be designed in full accordance within *Chapter 4.2 of NHBC Standard "Building Near Trees"*. The natural cohesive Rough Rock soils have been proven to be of a 'medium volume change potential' and hence any foundations that will be affected by any proposed trees or vegetation should be designed for a 'medium volume change potential soil'. It is recommended that a full tree survey is undertaken in order that the influence of all trees on and surrounding the site can be taken into account in foundation design, the only areas where trees and vegetation was noted to be present were adjacent to the south western and north western borders.

Where foundation depths exceed 1.5m due to the presence of trees, anti-heave precautions will be required.

Allowable bearing capacities are provided in the table below.

Depth (m bgl)	Allowable Bearing Capacity (kN/m ²)
1.0	105
1.5	125

The allowable bearing capacity is the permissible increase in vertical stress at the level of the underside of the foundation, above existing overburden pressure, which may be calculated on the basis of a soil density of 18kN/m³.

At the above bearing pressures, total settlements are unlikely to exceed approximately 20mm to 25mm. Settlements in the cohesive soils will likely comprise both immediate and long term (consolidation) settlement that will occur over a long period of time while settlements in granular soils will occur more rapidly as loadings increase.

5.2 Ground Floor Construction

Given that some of the shallow soils are cohesive and hence subject to volume change, suspended ground floors incorporating a suitable sub floor void are suggested in the first instance if the site were to be developed for typical residential housing.

However, if the area was redeveloped to incorporate larger structures, such as warehouses or office buildings, consideration could be given to ground bearing floor slabs with a layer of suitably compacted granular material below the ground floor.

5.3 External Works

5.3.1 Pavement Design

To initially assess CBR values, reference has been made to the Department of Transport Design Manual for Roads and Bridges, Volume 7, Pavement Design and Maintenance. This publication gives estimates of CBR values based upon plasticity index and grading. For a pavement constructed under average conditions in a silty sandy clay with a plasticity index of 20% to 30% an estimated CBR value of 3% to 5% is quoted. Comparatively for a pavement constructed under average conditions in a poorly graded sand an estimated CBR value of 20% is quoted.

Where pavements are to be formed on made ground at subgrade level, a CBR value of 2-3% is likely to be suitable.

Once development proposals are known and depending on the nature of the development and extent of any access roads, in situ or laboratory CBR testing should be completed in order to confirm the above and assist in pavement design.

Once the formation level for new pavements has been achieved, proof rolling should be carried out using a heavy roller, and any locally soft or loose areas revealed should be excavated and a greater depth of sub-base provided.

Exposed subgrades will likely deteriorate rapidly on exposure to wet weather and should be shaped to shed water. Sub-base should be placed as soon as possible to minimise the exposure of the subgrade to adverse weather conditions.

5.3.2 Drainage

While the drainage characteristics of the underlying soils were not investigated as part of this investigation, the natural soils that were recovered were found to be both cohesive and granular in nature. As such, the permeability of these natural soils is likely to vary throughout the area.

Formal soakaway testing will be required in order to assess the suitability of using soakaways for any redevelopment.

5.4 Groundworks

Whilst excavations in the soils encountered may remain stable for short periods during construction, the long term stability of these soils should not be relied upon.

Heavy plant and stockpiles of materials should not be permitted close to the edges of unsupported excavations.

Further reference should be made to CIRIA Report No. 97 '*Trenching Practice*' 1992.

Groundwater was not encountered in any of the boreholes or trial pits during the intrusive investigation.

5.5 Existing Basement & Retaining Structure/s

The northern third of the building footprint is occupied by a basement, the floor of which leads out to the car parking area close to the sites northern boundary. As such, if the current building is to be demolished and replaced with a new building / buildings, all due care and consideration should be given to the fact that the floor level of the basement is situated approximately 2m lower than the ground floor throughout the central area of the current building.

It would also be prudent to consider the potential need to investigate the southern wall of the basement which has the potential to act as a retaining structure for soils directly beneath the central part of the current building where the basement is not extant and the ground floor of the basement in the north.

5.6 Concrete Grade

Sulphate contents and pH value determinations were carried out by both the environmental and geotechnical laboratories. The latter present results in terms of SO₃ and these results must be multiplied by 1.2 to convert them to SO₄

Results for concrete grade are summarised within the following table, and have been divided into results applicable to soils recovered from the Made Ground and the Rough Rock materials and is reflected in the subsequent design classifications.

Strata	Water Soluble Sulphate (mg/l SO ₄)		pH	
	Min	Max	Min	Max
Made Ground	<1.5	226.4	7.69	11.90
Rough Rock	30	160	6.5	7.5

In accordance with Part 1 of the BRE Special Digest 1 '*Concrete in Aggressive Ground*' 2005, for both the made ground and Rough Rock soils a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1s can be adopted.

6 ENVIRONMENTAL APPRAISAL

The following section outlines the approach applied to assessing the risks posed to human health and controlled waters through a Generic Quantitative Risk Assessment, then identifies any sample results found by this investigation which warrant further consideration.

6.1 Human Health

6.1.1 Land Use Setting

At present there are no development plans available for the 76 Commerce Street as the site is understood to be sold for redevelopment opportunities. Nonetheless, in order to provide a conservative assessment and highlight areas which may present future risks this assessment has been undertaken considering a residential end-use, as this land use is the most sensitive.

6.1.2 Generic Screening – Soils

In order to screen laboratory data for concentrations of contaminants in soil with potential to cause harm to human health in a residential (with home-grown produce) setting, relevant generic screening values for contaminants in soil have been used. The technical framework used to derive the screening values and the documents in which they are published are summarised as follows:

- *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- *EA Soil Guideline Value Science Reports*
- *Suitable for Use Levels ('S4ULs') for Human Health Risk Assessment* – LQM and CIEH (2015)
- *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL:AIRE (2010)

Category 4 Screening Levels (C4SLs) released in December 2013 by The Department for the Environment, Food and Rural Affairs (DEFRA), (*Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010*) provide generic suitable for use screening values for common contaminants in a variety of land uses and are utilised as appropriate suitability limits.

For assessing concentrations of free and complex cyanide in soil, in the absence of any commonly accepted national criteria, reference has been made to the Dutch Intervention Values (DIV). It is acknowledged that there are significant limitations in the derivation of these figures and they are not based on UK exposure modelling, so they have only been used to further inform the initial screening of the dataset.

For concentrations of Lead in soil, EPS has used DEFRA's C4SL as an appropriate guide for professional judgement with respect to reasonable 'low risk' levels in the context of this site and its suitability for use.

A summary of the screening criteria and the methodology used to derive them is included in Appendix E.

6.1.3 Assessment of Soil Results

The results of the screening process for on-site human receptors show that the relevant generic screening values have not been exceeded for any contaminants within any of the shallow soil samples analysed by the laboratory.

While there is no readily available screening criteria for the SVOC Carbazole, which was detected at a concentration of 0.027mg/kg (27ug/kg) in sample WS03 0.2m-0.9m, given that this compound was only detected in one of the four shallow soil samples analysed for SVOC's at a concentration not much higher than the laboratory minimum instrument detection limits, EPS does not consider this concentration of Carbazole to present any unacceptable risks to future site users.

Low (trace) concentrations of asbestos containing material were identified in soil samples WS01 0.3m-0.5m, WS02 0.2m-0.8m and WS05 0.3m-0.9m. Given that no visible fragments of asbestos were noted within any of the soils recovered from the area and that laboratory quantification of the material revealed it be comprise chrysotile fibre bundles below laboratory detection limits (<0.001% mass) in each soil sample where it was detected risks from asbestos at the site are considered to be acceptable.

6.2 Controlled Waters

6.2.1 Generic Screening

In addition to screening the concentrations of contaminants in soil for risks to human health, EPS has also screened the concentrations for potential to cause harm to water resources. The criteria used for this process were derived by EPS using the following technical guidance:

- *Environment Agency Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination*

Resource Sensitivity of Area	Basis of Tier 1 Criteria
High Groundwater Resource Potential (HGwRP) - Principal Aquifers	UK Drinking Water Standards (UKDWS)
Low Groundwater Resource Potential (LGwRP) - Secondary Aquifers not being abstracted and Unproductive groundwater strata	UK Environmental Quality Standards (EQS)

Screening criteria for Low Groundwater Resource Potential (LGwRP) have been adopted for this site as the geology within the site boundaries and the surrounding area is classified as a Secondary A Aquifer.

A summary of the screening criteria and the methodology used to derive them is included in Appendix E.

6.2.2 Assessment of Soil Results – Controlled Waters

Screening of the soil sample results for the potential to pose a risk to controlled waters indicates that generic screening criteria have not been exceeded for any of the shallow soil samples analysed by the laboratory.

6.3 Management of Contaminated Land

In accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11), the area of investigation will likely not require further assessment or remedial action / control measures in terms of contaminated land provided that no evidence of unexpected contamination is encountered during any redevelopment works.

6.4 Environment Conclusions and Recommendations

This Phase II assessment of 76 Commerce Street was undertaken to determine ground conditions and to investigate the potential contaminant linkages initially identified through the previously completed Phase I Desk Study completed by EPS in April 2015. Potential sources of contamination associated with the sites industrial use were identified as having the potential to have led to contamination of the shallow soils throughout the area.

As a result, several boreholes were formed throughout the area both inside and outside of the currently present industrial building. Soil samples were collected from each of these boreholes with laboratory analysis confirming that the concentrations of the identified contaminants of concern are low enough for the site to be considered suitable for use for the most sensitive land use – residential (with home-grown produce). It should be fully appreciated however that the shallow soils beneath the western and north western part of the buildings could not be assessed due to access constraints within these areas. As such, EPS recommends that post demolition, these shallow soils are investigated and analysed to confirm their suitability. This would eliminate the current data gap in this investigation which could present problems if for example, individual housing plots were to be built in the west and northwest of the current buildings footprint.

Additionally, as potential asbestos containing materials (ACM) were noted to form the roofing materials for some of the buildings, it is recommended that an asbestos survey should be completed by an appropriately qualified professional and all ACM should be disposed of prior to demolition of the buildings with the appropriate duty of care in accordance with the Control of Asbestos Regulations (2012).

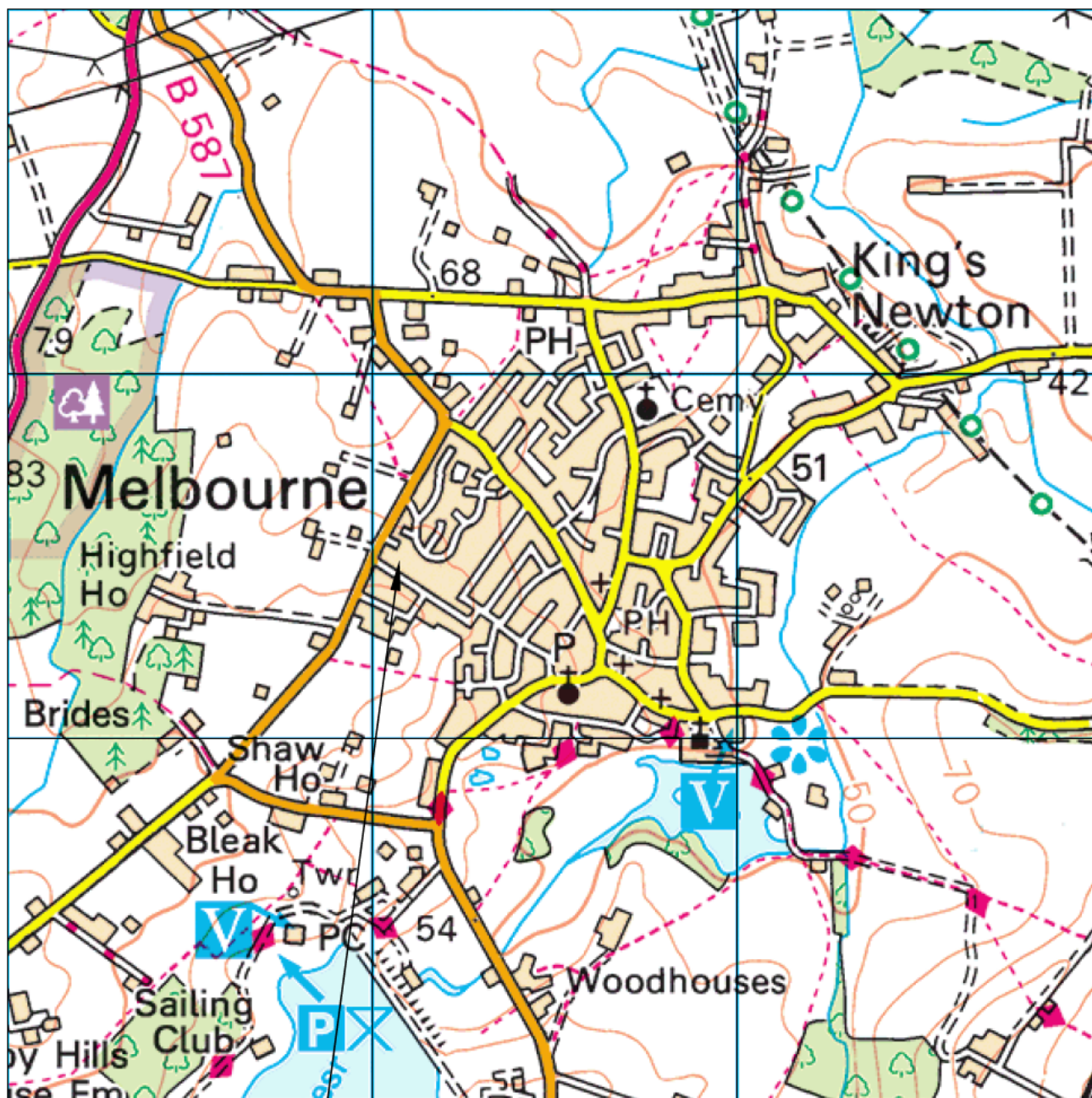
While no specific risks to future site users have been identified either during or post completion of the current development, the following recommendation is made in regards to safe redevelopment at the site:

- a. All construction workers operating at the site should be advised of the potential for exposure to and contact with, made ground in the subsurface of the site. Appropriate health and safety precautions should also be adopted during any excavation works to avoid exposure to soils. Reference should be made to the following HSE document: *Protection of Workers and the General Public during Development of Contaminated Land*.

- b. Should any palpable evidence of unexpected contamination be encountered during the redevelopment work, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out. A method statement for encountering any unexpected contamination is included as Appendix F of this report.

It is recommended that a copy of this report be provided to the Environmental Health Department of South Derbyshire District Council in support of any future planning application and so that the information may be incorporated into their land quality records.

FIGURES



Approximate Site Location

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Licence Number: 100054115



Title: Site Location Plan

Project: 76 Commerce Street, Melbourne,
Derbyshire, DE73 8GP

Fig No: 1

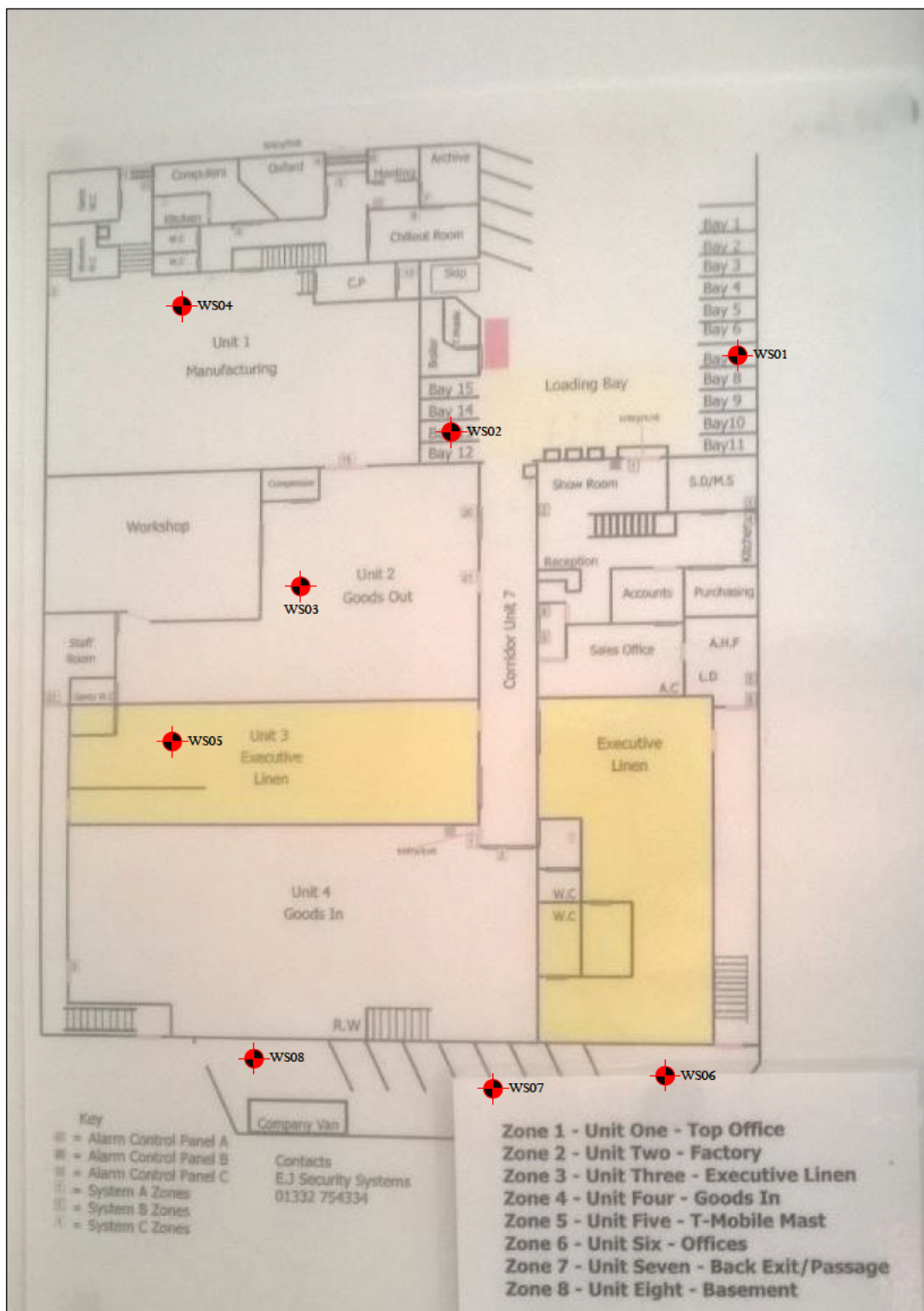
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Drawn By: TA **Approved By:** SB

Job No: UK15 1832B

Dwg No: 76CommerceStMelbourne/1218/01

Date: December 2018



Approximate Window Sample Borehole Location

Please Note: Image reproduced from photograph taken at the site



Title: Borehole Location Plan

Project: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

Fig No: 2

Scale	NTS		
Drawn By	TA	Approved By	SB
Job No	UK15 1832B		
Dwg No	76CommerceStMelbourne/1218/02		
Date	December 2018		

TABLES

Table 1a – Environmental Laboratory Testing Schedule

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	EPS TPH Suite	VOC's	SVOC's
WS01	0.3-0.5	1	-	-	-
WS02	0.2-0.8	1	-	-	-
WS03	0.2-0.9	1	1	1	1
WS04	0.2-0.4	1	1	1	1
WS05	0.3-0.9	1	1	1	1
WS06	0.2-0.6	1	-	-	-
WS07	0.2-0.5	1	-	-	-
WS08	0.2-0.5	1	1	1	1

Notes:

mbgl	meters below ground level
1	Sample Analysed
-	Sample Not Analysed
EPS Mini Suite	Organic Matter, Cyanide, Metals, PAH's, Phenols, Asbestos
EPS TPH Suite	Total Petroleum Hydrocarbons, Benzene, Toluene, Ethylbenzene, Xylene
VOC's	Volatile Organic Compounds
SVOC's	Semi Volatile Organic Compounds

Table 1b – Geotechnical Laboratory Testing Schedule

Sample ID	Sample Depth (m bgl)	Moisture Content	Atterberg Limits	Particle Size Distribution	pH & Sulphate
WS01	0.9-1.0	-	-	1	1
WS02	1.7-2.0	-	-	1	1
WS05	1.6-1.8	1	1	-	1
WS06	1.2-1.5	-	-	1	1
WS08	1.7-2.0	1	1	-	1

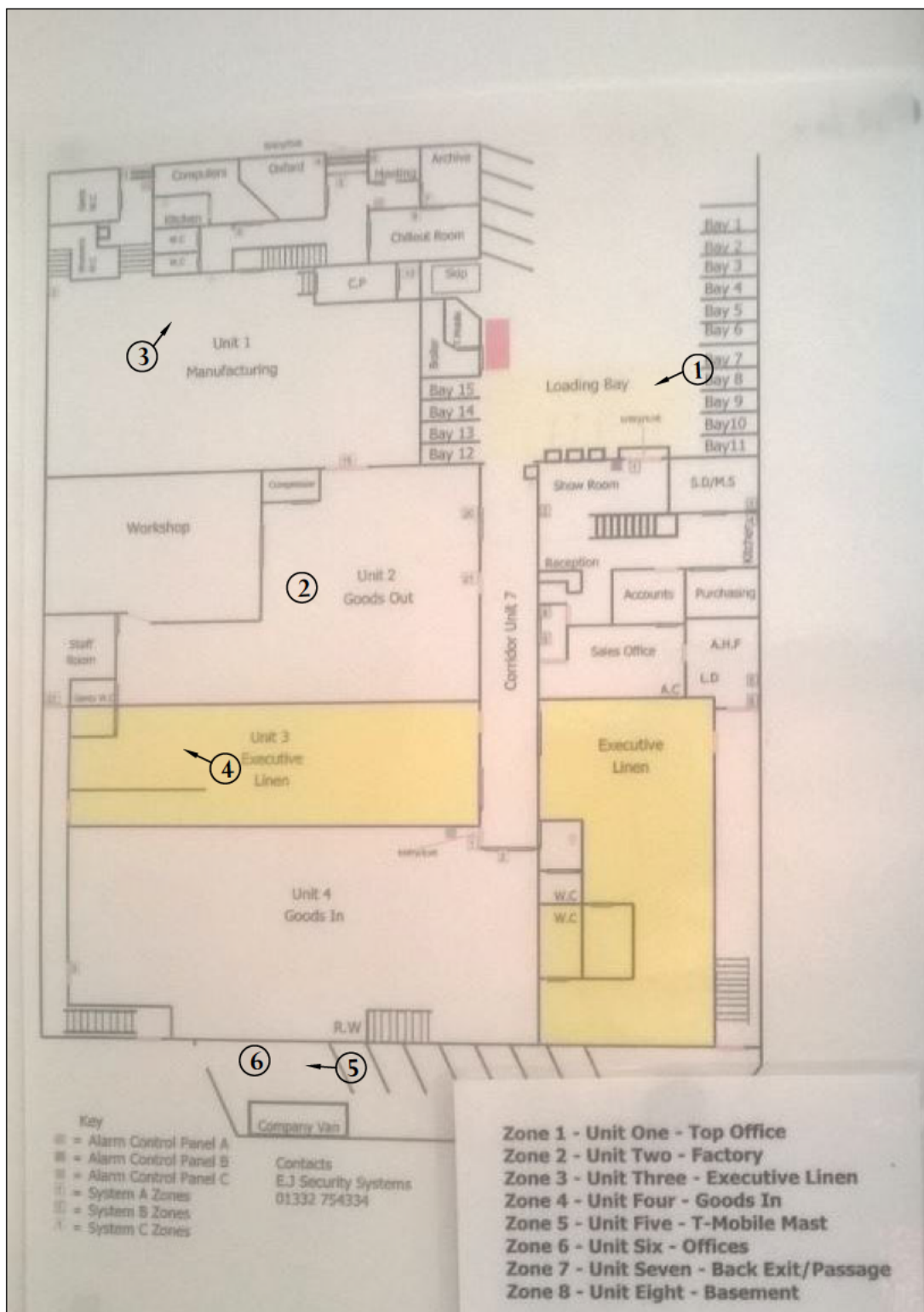
Notes:

mbgl	meters below ground level
1	Sample Analysed
-	Sample Not Analysed

APPENDICES

APPENDIX A

Selected Site Photographs



① Approximate Photo Location

Please Note: Image reproduced from photograph taken at the site



Title: Photo Location Plan

Project: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

Appendix: A

Scale	NTS		
Drawn By	TA	Approved By	SB
Job No	UK15 1832B		
Dwg No	76CommerceStMelbourne/1218/A		
Date	December 2018		

Photo 1: Image showing the location and forming of WS02



Photo 2: Image showing the material recovered from WS03



Photo 3: Image showing the location and forming of WS04



Photo 4: Image showing the location and forming of WS05



Photo 5: Image showing the location and forming of WS08



Photo 6: Image showing the material recovered from WS08



APPENDIX B

Site Specific Borehole Logs



Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159964E - 6950786N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 12/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
					0.20			Cored ASPHALT	
		0.30 - 0.50	ES					MADE GROUND: coarse sand and gravel subbase containing concrete fragments and some ash and charcoal fragments	
		0.50	PID	PID=0.00					
		0.80 - 1.00	ES		0.75			Dense to very dense brown silty SAND (RR) and greyish brown angular and subangular sandstone GRAVEL	
		0.90 - 1.00 0.90 - 1.00	D D						
		1.00	SPT	PSD FI: 13 PSD SA: 42 PSD GR: 45 50 (13,12/50 for 145mm)	1.00			End of Borehole at 1.000m	1
									2
									3
									4

Remarks

RR: Rough Rock
Refusal at 1.0m



Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159938E - 6950782N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 12/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.20 - 0.80	ES		0.15			Cored ASPHALT	
		0.70	PID	PID=0.00				MADE GROUND: soft brown and black sandy silty gravelly clay. Gravel is coarse and rounded	
		1.00	SPT	N=9 (1,2/1,2,3,3)	1.10				1
		1.20 - 1.50	ES					Firm to stiff light olive brown slightly gravelly sandy silty CLAY (RR). Gravel is light olive brown and brown sandstone	
		1.70 - 2.00	D						
		1.70 - 2.00	D						
		2.00	SPT	PSD FI: 36 PSD SA: 37 PSD GR: 26 50 (22,3/50 for 95mm)	2.00			End of Borehole at 2.000m	2
									3
									4

Remarks

RR: Rough Rock
Refusal at 1.0m



Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159912E - 6950786N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 12/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.20 - 0.90	ES		0.15			Cored CONCRETE	1
		0.45	PID	PID=0.00				MADE GROUND: medium dense brown slightly clayey sand with common fragments of concrete, some fragments of brick, ash and charcoal	
		1.00	SPT	N=14 (2,2/3,3,4,4)					
		1.20	PID	PID=0.00					
		1.30 - 1.50	ES		1.25			Dense to very dense brown and grey fine to medium SAND (RR)	
		2.00	SPT	N=43 (4,4/6,12,11,14)					2
		2.10 - 2.50	D						
		3.00	SPT	50 (25 for 60mm/50 for 40mm)	3.00				
								End of Borehole at 3.000m	3
									4

Remarks

RR: Rough Rock
Refusal at 1.0m



Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159918E - 6950754N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

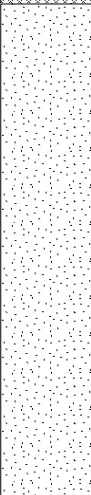
Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 12/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.20 - 0.40	ES	PID=0.00	0.15			Cored CONCRETE	1
		0.30	PID		0.40			MADE GROUND: dense beige grey fine sand with common brick fragments	
		0.50 - 0.80	ES					Dense to very dense beige grey fine to medium SAND (RR)	
		1.00 - 1.30 1.00	D SPT	N=31 (5,6/6,5,13,7)	1.70			Soft grey CLAY (RR)	
					1.80			Dense to very dense beige grey fine to medium SAND (RR)	
		2.00	SPT		2.00			End of Borehole at 2.000m	2
									3
									4

Remarks

RR: Rough Rock
Refusal at 1.0m



Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159895E - 6950794N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

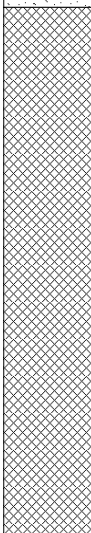
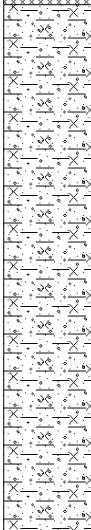
Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 12/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
					0.20			Cored CONCRETE	1
		0.30 - 0.90	ES	PID=0.00				MADE GROUND: medium dense orange brown clayey sand with some fragments of concrete, ash, charcoal, brick and asphalt	
		0.50	PID						
		1.00	SPT	N=8 (3,2/1,2,2,3)		S iff to very stiff grey slightly sandy slightly gravelly silty CLAY (RR) with occasional orangish brown mottling and rare fine and medium sandstone. Sand is fine and gravel is medium and coarse subangular and rounded	2		
		1.60 - 1.80	D	PI: 26 MC: 18.4 PID=0.00 N=36 (4,3/5,17,9,5)					
		1.60 - 1.80	D						
		1.70 - 2.00	ES						
		1.70	PID						
		2.00	SPT						
		3.00	SPT	50 (12,11/50 for 105mm)	3.00		End of Borehole at 3.000m	3	
								4	

Remarks

RR: Rough Rock
Refusal at 3.0m



Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159920E - 6950843N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

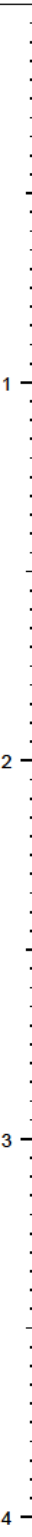
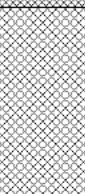
Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 13/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
								Cored ASPHALT	
		0.20 - 0.60	ES	PID=0.00	0.15		MADE GROUND: coarse sand and gravel subbase containing concrete fragments and some ash and charcoal fragments		
		0.40	PID						
		0.70 - 1.00	ES	N=26 (4,3/13,6,3,4)	0.65		Firm olive grey slightly gravelly slightly sandy silty CLAY (RR). Gravel is olive grey angular sandstone		
		1.00	SPT						
		1.20 - 1.50	D						
		1.20 - 1.50	D						
				PSD FI: 63 PSD SA: 19 PSD GR: 18					
		1.80	SPT	N=50 (15,8/50 for 265mm)	1.80		End of Borehole at 1.800m		

Remarks

RR: Rough Rock
Refusal at 1.8m



Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159899E - 6950832N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

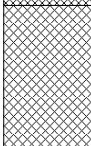
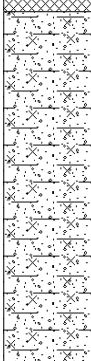
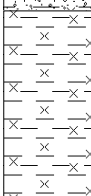
Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 13/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
					0.15			Cored ASPHALT	1
		0.20 - 0.50	ES	PID=0.00	0.55		MADE GROUND: coarse sand and gravel subbase containing concrete fragments and some ash and charcoal fragments		
		0.40	PID						
		0.60 - 0.80	ES						
		0.80 - 1.00	D	N=15 (3,2/3,4,4,4)	1.50		Medium dense to very dense brown and grey slightly gravelly clayey fine SAND (RR). Gravel is light olive brown and brown sandstone		
		1.00	SPT						
					1.50			S iff pale olive and olive silty CLAY (RR) with occasional light grey mottling, rare fine sand pockets and decayed roots	
		2.00	SPT	50 (8,6/50 for 210mm)	2.00		End of Borehole at 2.000m	2	
									3
									4

Remarks

RR: Rough Rock
Refusal at 2.0m



Borehole Log

Borehole No.

WS08

Sheet 1 of 1

Project Name: 76 Commerce Street, Melbourne

Project No.
UK15.1832B

Co-ords: -159885E - 6950822N

Hole Type
WLS

Location: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

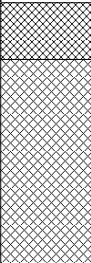
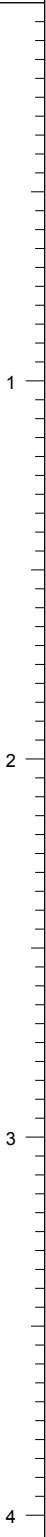
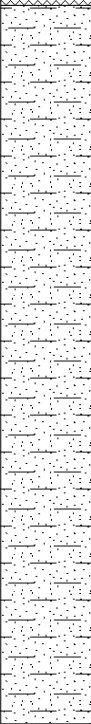
Level:

Scale
1:20

Client: The Loughborough Building Society

Dates: 13/12/2018

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	In Situ Results					
		0.20 - 0.50	ES	PID=0.00	0.15			Cored ASPHALT	
		0.40	PID					MADE GROUND: coarse sand and gravel subbase containing concrete fragments and some ash and charcoal fragments	
		0.80 - 1.00	ES	N=15 (4,4/3,4,4,4)	0.70			Medium dense to very dense brown and grey slightly gravelly clayey fine SAND (RR). Gravel is light olive brown and brown sandstone	
		1.00	SPT						
		1.70 - 2.00 1.70 - 2.00	D D	PI: 25 MC: 24.9 N=43 (12,12/8,8,11,16)					
		2.00	SPT						
		2.60	SPT	50 (25 for 70mm/50 for 190mm)	2.60			End of Borehole at 2.600m	

Remarks

RR: Rough Rock
Refusal at 2.6m

APPENDIX C

Laboratory Results – Environmental



Exova Jones Environmental

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Attention :	Tom Androsiuk
Date :	31st December, 2018
Your reference :	UK15.1832b
Our reference :	Test Report 18/20355 Batch 1
Location :	76 Commerce Street Melbourne
Date samples received :	14th December, 2018
Status :	Final report
Issue :	2

Sixteen samples were received for analysis on 14th December, 2018 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc

Project Manager

Client Name: EPS Ltd
Reference: UK15.1832b
Location: 76 Commerce Street Melbourne
Contact: Tom Androsiuk
JE Job No.: 18/20355

Report : Solid

Solids V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-2	5-6	9-10	13-14	17-18	21-22	25-26	29-30			Please see attached notes for all abbreviations and acronyms		
Sample ID	WS01	WS02	WS03	WS04	WS05	WS06	WS07	WS08					
Depth	0.30-0.50	0.20-0.80	0.20-0.90	0.20-0.40	0.30-0.90	0.20-0.60	0.20-0.50	0.20-0.50					
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J					
Sample Date	12/12/2018	12/12/2018	12/12/2018	12/12/2018	12/12/2018	13/12/2018	13/12/2018	13/12/2018					
Sample Type	Soil	Soil	Clay	Sand	Soil	Clay	Clayey Sand	Clayey Sand					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018			LOD/LOR	Units	Method No.
Arsenic ^{#M}	-	-	4.3	2.8	-	7.0	18.6	4.4			<0.5	mg/kg	TM30/PM15
Cadmium ^{#M}	-	-	0.2	0.1	-	0.2	0.4	0.2			<0.1	mg/kg	TM30/PM15
Chromium ^{#M}	-	-	62.7	57.9	-	62.0	31.0	61.5			<0.5	mg/kg	TM30/PM15
Copper ^{#M}	-	-	88	30	-	23	74	16			<1	mg/kg	TM30/PM15
Lead ^{#M}	-	-	18	13	-	45	21	30			<5	mg/kg	TM30/PM15
Mercury ^{#M}	-	-	<0.1	<0.1	-	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Nickel ^{#M}	-	-	16.6	10.8	-	18.2	9.0	14.0			<0.7	mg/kg	TM30/PM15
Selenium ^{#M}	-	-	<1	<1	-	<1	<1	<1			<1	mg/kg	TM30/PM15
Total Sulphate as SO ₄ ^{#M}	-	-	421	1639	-	299	834	117			<50	mg/kg	TM50/PM29
Zinc ^{#M}	-	-	62	33	-	70	46	60			<5	mg/kg	TM30/PM15
Arsenic	6.1	14.7	-	-	7.7	-	-	-			<0.5	mg/kg	TM30/PM62
Cadmium	0.2	0.6	-	-	0.3	-	-	-			<0.1	mg/kg	TM30/PM62
Chromium	17.1	41.4	-	-	13.5	-	-	-			<0.5	mg/kg	TM30/PM62
Copper	45	299	-	-	85	-	-	-			<1	mg/kg	TM30/PM62
Lead	82	160	-	-	85	-	-	-			<5	mg/kg	TM30/PM62
Mercury	<0.1	<0.1	-	-	<0.1	-	-	-			<0.1	mg/kg	TM30/PM62
Nickel	9.2	33.1	-	-	17.4	-	-	-			<0.7	mg/kg	TM30/PM62
Selenium	<1	<1	-	-	<1	-	-	-			<1	mg/kg	TM30/PM62
Total Sulphate as SO ₄	3124	1165	-	-	2026	-	-	-			<50	mg/kg	TM50/PM29
Zinc	148	394	-	-	343	-	-	-			<5	mg/kg	TM30/PM62
PAH MS													
Naphthalene ^{#M}	<0.04	0.29	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.14	<0.03	<0.03	0.22	<0.03	0.04	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene ^{#M}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.13	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene ^{#M}	0.07	<0.03	0.08	<0.03	1.05	<0.03	1.05	0.06			<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04	<0.04	0.38	<0.04	0.37	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene ^{#M}	0.14	<0.03	0.21	0.03	3.17	<0.03	2.09	0.07			<0.03	mg/kg	TM4/PM8
Pyrene [#]	0.11	<0.03	0.18	0.03	2.54	<0.03	1.67	0.06			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.07	<0.06	0.13	<0.06	1.46	<0.06	0.94	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	0.06	<0.02	0.09	<0.02	1.31	<0.02	0.87	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	0.11	<0.07	0.17	<0.07	2.14	<0.07	1.53	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	0.06	<0.04	0.08	<0.04	1.06	<0.04	0.88	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{#M}	<0.04	<0.04	0.04	<0.04	0.57	<0.04	0.47	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	<0.04	<0.04	0.20	<0.04	0.12	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	<0.04	<0.04	0.04	<0.04	0.46	<0.04	0.43	<0.04			<0.04	mg/kg	TM4/PM8
PAH 16 Total	0.6	<0.6	1.0	<0.6	14.6	<0.6	10.7	<0.6			<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.08	<0.05	0.12	<0.05	1.54	<0.05	1.10	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.03	<0.02	0.05	<0.02	0.60	<0.02	0.43	<0.02			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	91	102	97	98	92	94	94	97			<0	%	TM4/PM8
Methyl Tertiary Butyl Ether [#]	-	-	<2	<2	<2	-	-	<2			<2	ug/kg	TM15/PM10
Benzene [#]	-	-	<3	<3	<3	-	-	<3			<3	ug/kg	TM15/PM10

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J E Sample No.	1-2	5-6	9-10	13-14	17-18	21-22	25-26	29-30			Please see attached notes for all abbreviations and acronyms		
Sample ID	WS01	WS02	WS03	WS04	WS05	WS06	WS07	WS08					
Depth	0.30-0.50	0.20-0.80	0.20-0.90	0.20-0.40	0.30-0.90	0.20-0.60	0.20-0.50	0.20-0.50					
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J					
Sample Date	12/12/2018	12/12/2018	12/12/2018	12/12/2018	12/12/2018	13/12/2018	13/12/2018	13/12/2018					
Sample Type	Soil	Soil	Clay	Sand	Soil	Clay	Clayey Sand	Clayey Sand					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018	14/12/2018					
											LOD/LOR	Units	Method No.
Toluene [#]	-	-	<3	<3	<3	-	-	<3			<3	ug/kg	TM15/PM10
Ethylbenzene [#]	-	-	<3	<3	<3	-	-	<3			<3	ug/kg	TM15/PM10
p/m-Xylene [#]	-	-	<5	<5	<5	-	-	<5			<5	ug/kg	TM15/PM10
o-Xylene [#]	-	-	<3	<3	<3	-	-	<3			<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	-	93	103	98	-	-	97			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	-	80	101	90	-	-	89			<0	%	TM15/PM10
TPH CWG													
Aliphatics													
>C5-C6 ^{#M}	-	-	<0.1	<0.1	<0.1	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 ^{#M}	-	-	<0.1	<0.1	<0.1	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10	-	-	<0.1	<0.1	<0.1	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	-	-	<0.2	<0.2	<0.2	-	-	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 ^{#M}	-	-	<4	<4	<4	-	-	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 ^{#M}	-	-	<7	<7	<7	-	-	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 ^{#M}	-	-	<7	<7	94	-	-	<7			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	-	-	<19	<19	94	-	-	<19			<19	mg/kg	MS MSB MS M 2 M 6
Aromatics													
>C5-EC7 [#]	-	-	<0.1	<0.1	<0.1	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 [#]	-	-	<0.1	<0.1	<0.1	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 ^{#M}	-	-	<0.1	<0.1	<0.1	-	-	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 [#]	-	-	<0.2	<0.2	<0.2	-	-	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 [#]	-	-	<4	<4	<4	-	-	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 [#]	-	-	<7	<7	<7	-	-	<7			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 [#]	-	-	<7	<7	58	-	-	<7			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 [#]	-	-	<19	<19	58	-	-	<19			<19	mg/kg	MS MSB MS M 2 M 6
Total aliphatics and aromatics(C5-35)	-	-	<38	<38	152	-	-	<38			<38	mg/kg	MS MSB MS M 2 M 6
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15			<0.15	mg/kg	TM26/PM21
Natural Moisture Content	14.5	25.8	11.4	8.8	13.2	13.8	11.4	12.8			<0.1	%	PM4/PM0
Hexavalent Chromium [#]	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) ^{#M}	-	-	0.0925	0.1255	-	<0.0015	0.1011	0.0056			<0.0015	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext)	0.0166	0.0338	-	-	0.2264	-	-	-			<0.0015	g/l	TM38/PM60
Chromium III	NDP	NDP	62.7	57.9	NDP	62.0	31.0	61.5			<0.5	mg/kg	NONE/NONE
Chromium III	17.1	41.4	-	-	13.5	-	-	-			<0.5	mg/kg	NONE/NONE
Total Cyanide ^{#M}	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	mg/kg	TM89/PM45
Organic Matter	NDP	NDP	0.5	<0.2	NDP	2.3	0.5	1.0			<0.2	%	TM21/PM24
pH ^{#M}	11.90	8.12	8.43	9.82	8.43	7.69	9.45	7.80			<0.01	pH units	TM73/PM11
Sample Type	NDP	NDP	Clay	Sand	NDP	Clay	Clayey Sand	Clayey Sand			None		PM13/PM0

Client Name: EPS Ltd
Reference: UK15.1832b
Location: 76 Commerce Street Melbourne
Contact: Tom Androsiuk
JE Job No.: 18/20355

SVOC Report : Solid

J E Sample No.	9-10	13-14	17-18	29-30							Please see attached notes for all abbreviations and acronyms		
Sample ID	WS03	WS04	WS05	WS08									
Depth	0 20-0 90	0 20-0.40	0 30-0 90	0 20-0 50									
COC No / misc													
Containers	V J	V J	V J	V J									
Sample Date	12/12/2018	12/12/2018	12/12/2018	13/12/2018									
Sample Type	Clay	Sand	Soil	Clayey Sand									
Batch Number	1	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	14/12/2018	14/12/2018	14/12/2018	14/12/2018									
SVOC MS													
Phenols													
2-Chlorophenol ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2,4-Dichlorophenol ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Phenol ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
PAHs													
2-Chloronaphthalene ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2-Methylnaphthalene ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Naphthalene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Acenaphthylene	59	<10	<10	<10							<10	ug/kg	TM16/PM8
Acenaphthene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Fluorene	<10	<10	<10	20							<10	ug/kg	TM16/PM8
Phenanthrene ^{#M}	236	<10	69	127							<10	ug/kg	TM16/PM8
Anthracene	77	<10	23	43							<10	ug/kg	TM16/PM8
Fluoranthene ^{#M}	698	<10	206	141							<10	ug/kg	TM16/PM8
Pyrene ^{#M}	534	<10	156	107							<10	ug/kg	TM16/PM8
Benzo(a)anthracene	573	<10	<10	<10							<10	ug/kg	TM16/PM8
Chrysene	410	<10	127	<10							<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	599	<10	119	97							<10	ug/kg	TM16/PM8
Benzo(a)pyrene	371	<10	51	54							<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	170	<10	16	24							<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	49	<10	<10	<10							<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	148	<10	18	29							<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	431	<10	86	70							<10	ug/kg	TM16/PM8
Benzo(k)fluoranthene	168	<10	33	27							<10	ug/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100							<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100	<100	<100	<100							<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100	<100	<100	<100							<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100	<100	<100	<100							<100	ug/kg	TM16/PM8
Diethyl phthalate	<100	<100	<100	<100							<100	ug/kg	TM16/PM8
Dimethyl phthalate ^{#M}	<100	<100	<100	<100							<100	ug/kg	TM16/PM8

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SVOC Report : Solid

J E Sample No.	9-10	13-14	17-18	29-30							Please see attached notes for all abbreviations and acronyms		
Sample ID	WS03	WS04	WS05	WS08									
Depth	0 20-0 90	0 20-0.40	0 30-0 90	0 20-0 50									
COC No / misc													
Containers	V J	V J	V J	V J									
Sample Date	12/12/2018	12/12/2018	12/12/2018	13/12/2018									
Sample Type	Clay	Sand	Soil	Clayey Sand							LOD/LOR	Units	Method No.
Batch Number	1	1	1	1									
Date of Receipt	14/12/2018	14/12/2018	14/12/2018	14/12/2018									
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2-Nitroaniline	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
3-Nitroaniline	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
4-Bromophenylphenylether ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
4-Chloroaniline	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
4-Nitroaniline	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Azobenzene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Carbazole	27	<10	<10	<10							<10	ug/kg	TM16/PM8
Dibenzofuran ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Hexachlorobutadiene ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Hexachloroethane	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Isophorone ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Nitrobenzene ^{#M}	<10	<10	<10	<10							<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	130	130	128	121							<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	129	125	122	117							<0	%	TM16/PM8

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J E Sample No.	9-10	13-14	17-18	29-30							Please see attached notes for all abbreviations and acronyms		
Sample ID	WS03	WS04	WS05	WS08									
Depth	0 20-0 90	0 20-0.40	0 30-0 90	0 20-0 50									
COC No / misc													
Containers	V J	V J	V J	V J									
Sample Date	12/12/2018	12/12/2018	12/12/2018	13/12/2018									
Sample Type	Clay	Sand	Soil	Clayey Sand									
Batch Number	1	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	14/12/2018	14/12/2018	14/12/2018	14/12/2018									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2							<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6							<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30	<30	<30							<30	ug/kg	TM15/PM10
trans-1,2-Dichloroethene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
cis-1,2-Dichloroethene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6							<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
cis-1,3-Dichloropropene	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
trans-1,3-Dichloropropene	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
p/m-Xylene #	<5	<5	<5	<5							<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3							<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5							<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6							<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7	<7	<7							<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27							<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7	<7	<7							<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	93	103	98	97							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	80	101	90	89							<0	%	TM15/PM10

Matrix : Solid

8 of 18

Client Name: EPS Ltd
Reference: UK15.1832b
Location: 76 Commerce Street Melbourne
Contact: Tom Androsiuk

Note

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:



Ryan Butterworth
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/20355	1	WS01	0.30-0.50	2	17/12/2018	General Description (Bulk Analysis)	soil-stones
					17/12/2018	Asbestos Fibres	Fibre Bundles
					17/12/2018	Asbestos ACM	NAD
					17/12/2018	Asbestos Type	Chrysotile
					17/12/2018	Asbestos Level Screen	less than 0.1%
					31/12/2018	Total ACM Gravimetric Quantification (% Asb)	<0.001 (mass %)
					31/12/2018	Total Detailed Gravimetric Quantification (% Asb)	<0.001 (mass %)
					31/12/2018	Total Gravimetric Quantification (ACM + Detailed) (% Asb)	<0.001 (mass %)
					31/12/2018	Asbestos PCOM Quantification (Fibres)	<0.001 (mass %)
					31/12/2018	Asbestos Gravimetric & PCOM Total	<0.001 (mass %)
18/20355	1	WS02	0.20-0.80	6	17/12/2018	General Description (Bulk Analysis)	soil-stones
					17/12/2018	Asbestos Fibres	Fibre Bundles
					17/12/2018	Asbestos ACM	NAD
					17/12/2018	Asbestos Type	Chrysotile
					17/12/2018	Asbestos Level Screen	less than 0.1%
					31/12/2018	Total ACM Gravimetric Quantification (% Asb)	<0.001 (mass %)
					31/12/2018	Total Detailed Gravimetric Quantification (% Asb)	<0.001 (mass %)
					31/12/2018	Total Gravimetric Quantification (ACM + Detailed) (% Asb)	<0.001 (mass %)
					31/12/2018	Asbestos PCOM Quantification (Fibres)	<0.001 (mass %)
					31/12/2018	Asbestos Gravimetric & PCOM Total	<0.001 (mass %)
18/20355	1	WS03	0.20-0.90	10	17/12/2018	General Description (Bulk Analysis)	soil-stones
					17/12/2018	Asbestos Fibres	NAD
					17/12/2018	Asbestos ACM	NAD
					17/12/2018	Asbestos Type	NAD
					17/12/2018	Asbestos Level Screen	NAD
18/20355	1	WS04	0.20-0.40	14	17/12/2018	General Description (Bulk Analysis)	soil-stones
					17/12/2018	Asbestos Fibres	NAD
					17/12/2018	Asbestos ACM	NAD
					17/12/2018	Asbestos Type	NAD
					17/12/2018	Asbestos Level Screen	NAD
18/20355	1	WS05	0.30-0.90	18	17/12/2018	General Description (Bulk Analysis)	soil-stones
					17/12/2018	Asbestos Fibres	Fibre Bundles
					17/12/2018	Asbestos ACM	NAD
					17/12/2018	Asbestos Type	Chrysotile
					17/12/2018	Asbestos Level Screen	less than 0.1%

Client Name: EPS Ltd
Reference: UK15.1832b
Location: 76 Commerce Street Melbourne
Contact: Tom Androsiuk

[illegible]

Matrix : Solid

[illegible]

Client Name: EPS Ltd
Reference: UK15.1832b
Location: 76 Commerce Street Melbourne
Contact: Tom Androsiuk

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/20355

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/20355

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-F D.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-F D.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-F D.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	

JE Job No: 18/20355

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCF D co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCF D co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

JE Job No: 18/20355

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCF D co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM60	As received solid samples are extracted with deionised water in a 2:1 ratio of water to solid.			AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes	Yes	AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes	Yes	AR	Yes
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes

JE Job No: 18/20355

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	NONE	No Method Code			AR	Yes
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

APPENDIX D

Laboratory Results – Geotechnical



TEST REPORT
ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 04/01/2019



0998

Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby		
Serial No.	34342		
Client: Environmental Protection Strategies Ltd Unit 7 Caxton House Broad Street Great Cambourne Cambridge CB23 6JN		Soil Property Testing Ltd 15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG Tel: 01480 455579 Email: enquiries@soilpropertytesting.com Website: www.soilpropertytesting.com	
Samples Submitted By: Environmental Protection Strategies Ltd Samples Labelled: UK15.1832B - 76 Commerce Street, Melbourne, Derby		Approved Signatories: ☒ J.C. Garner B.Eng (Hons) FGS Technical Director ☐ S.P. Townend FGS Quality Manager ☐ W. Johnstone Materials Lab Manager ☐ D. Sabnis Operations Manager 	
Date Received: 13/12/2018		Samples Tested Between: 13/12/2018 and 04/01/2019	
Remarks: For the attention of Mr T Androsiuk Your Reference No: UK15.1832B Your Order No: 21007			
Notes: 1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary. 2 (a) UKAS - United Kingdom Accreditation Service (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation 3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory. 4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.			



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 04/01/2019



0998

Contract		UK15.1832B - 76 Commerce Street, Melbourne, Derby																			
Serial No.		34342										Target Date		07/01/2019							
Scheduled By		Environmental Protection Strategies Ltd																			
SCHEDULE OF LABORATORY TESTS																					
Schedule Remarks																					
Bore Hole No.	Type	Sample Ref.	Top Depth	Particle Size Distribution (BS1377) Sulphate Content/pH Value Water Content (BS54N) Liquid/Plastic Limits																Sample Remarks	
WS01	D	1	0.90	1	1																
WS02	D	2	1.70	1	1																
WS05	D	5	1.60		1	1	1														
WS06	D	6	1.20	1	1																
WS08	D	8	1.70		1	1	1														
Totals				3	5	2	2												End of Schedule		



TEST REPORT

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DATE ISSUED: 04/01/2019



0998

Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby
Serial No.	34342

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquid-ity Index (%)	SAMPLE PREPARATION				Description	CLASS
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
WS05	1.60 - 1.80	D	5	18.4	45	19	26	-0.02	From Natural	<1% (A)		28	Stiff grey slightly sandy silty CLAY with occasional orangish brown mottling and rare fine and medium sandstone. Sand is fine	CI
WS08	1.70 - 2.00	D	8	24.9	48	23	25	0.08	From Natural	0 (A)		29	Stiff pale olive and olive silty CLAY with occasional light grey mottling, rare fine sand pockets and decayed roots	CI

Method Of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C



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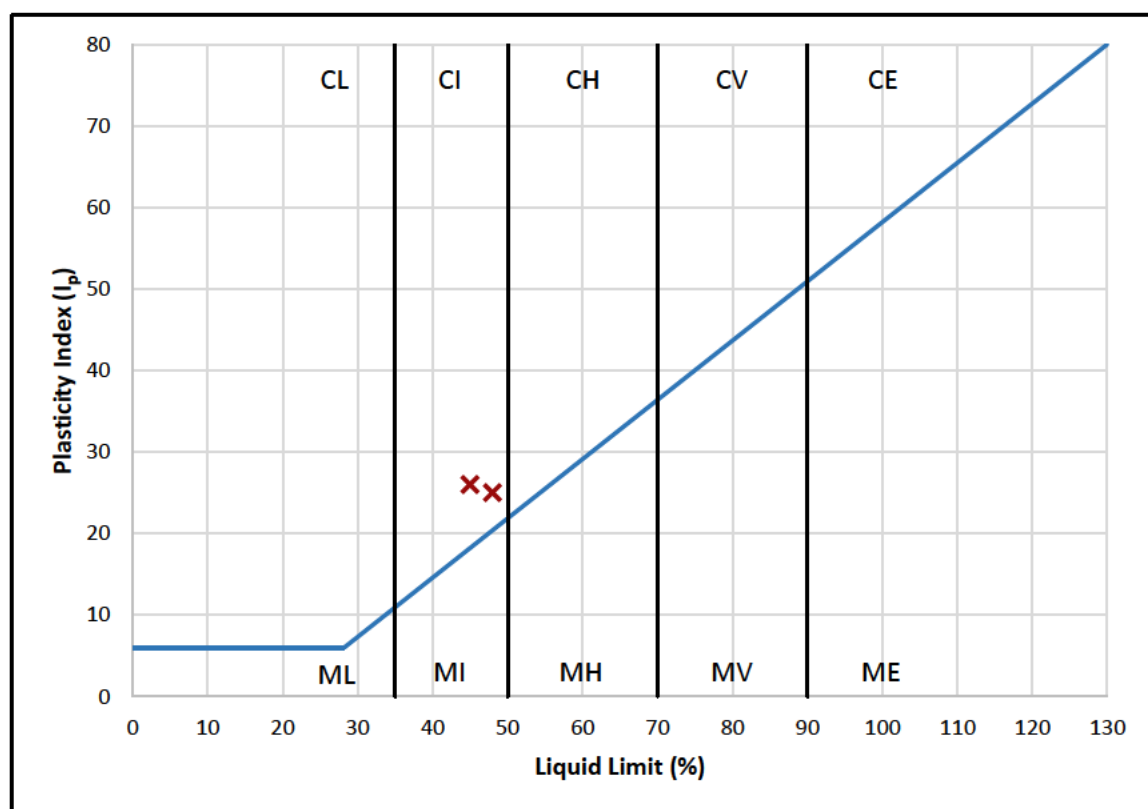


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Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby
Serial No.	34342

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



High
Medium
Low

NHBC Volume Change Potential

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index



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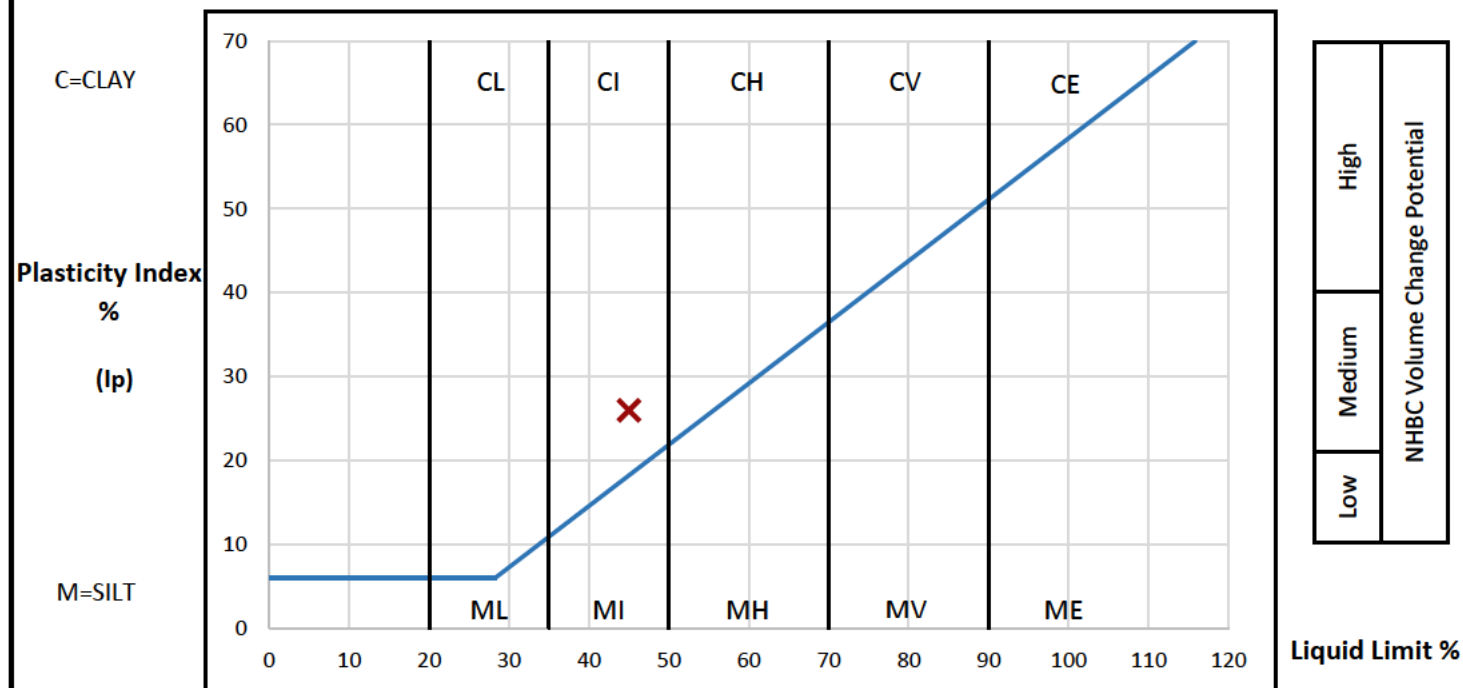
0998

Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby
Serial No.	34342

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
WS05	1.60 - 1.80	D	5	18.4	Stiff grey slightly sandy silty CLAY with occasional orangish brown mottling and rare fine and medium sandstone. Sand is fine	

PREPARATION			Liquid Limit		45 %
Method of preparation			From natural/gravel picked out by hand		Plastic Limit 19 %
Sample retained 0.425mm sieve (Assumed)			0 %		Plasticity Index 26 %
Corrected water content for material passing 0.425mm					Liquidity Index -0.02
Sample retained 2mm sieve (Assumed)			<1 %		NHBC Modified (I _p) n/a
Curing time		28 hrs	Clay Content		Not analysed
			Derived Activity		Not analysed



Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



TEST REPORT

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DATE ISSUED: 04/01/2019



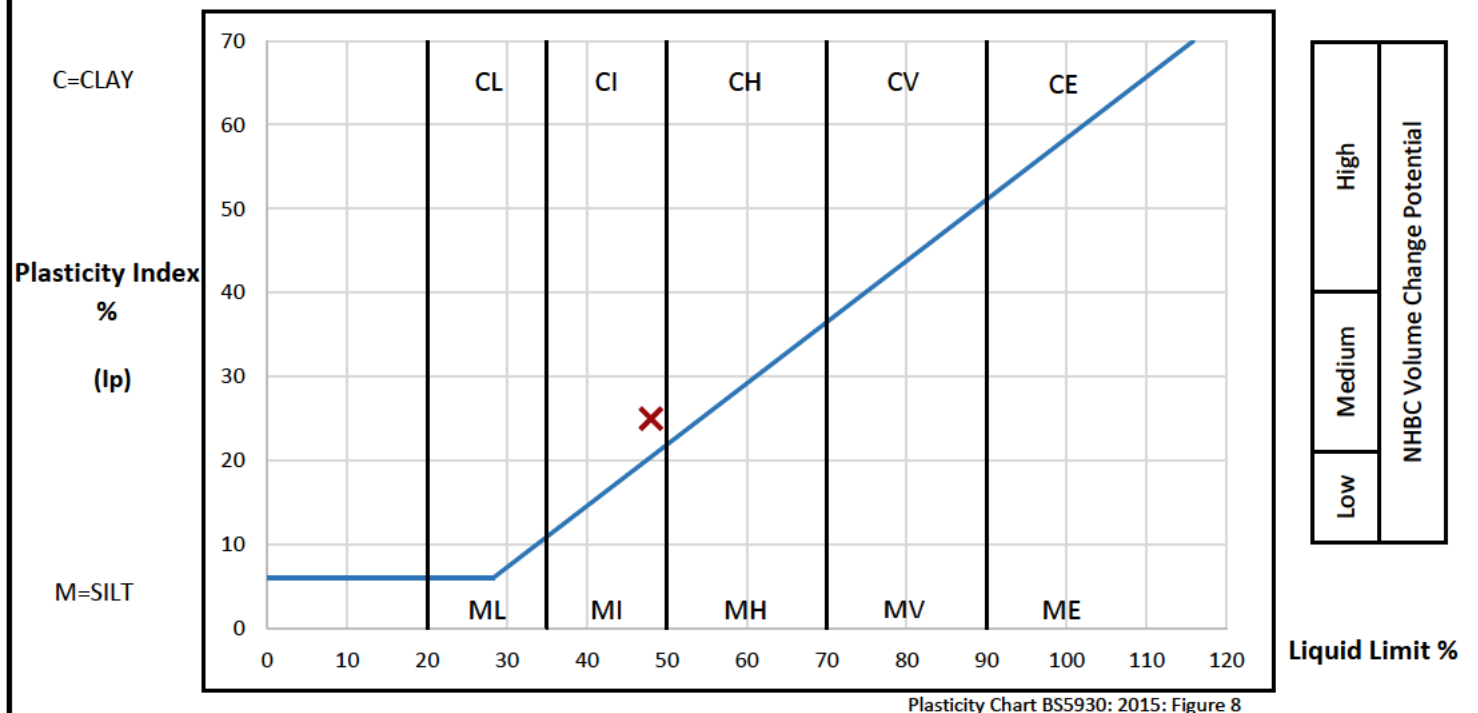
0998

Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby
Serial No.	34342

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
WS08	1.70 - 2.00	D	8	24.9	Stiff pale olive and olive silty CLAY with occasional light grey mottling, rare fine sand pockets and decayed roots	

PREPARATION			Liquid Limit	48 %	
Method of preparation		From natural	Plastic Limit	23 %	
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	25 %	
Corrected water content for material passing 0.425mm			Liquidity Index	0.08	
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a	
Curing time	29 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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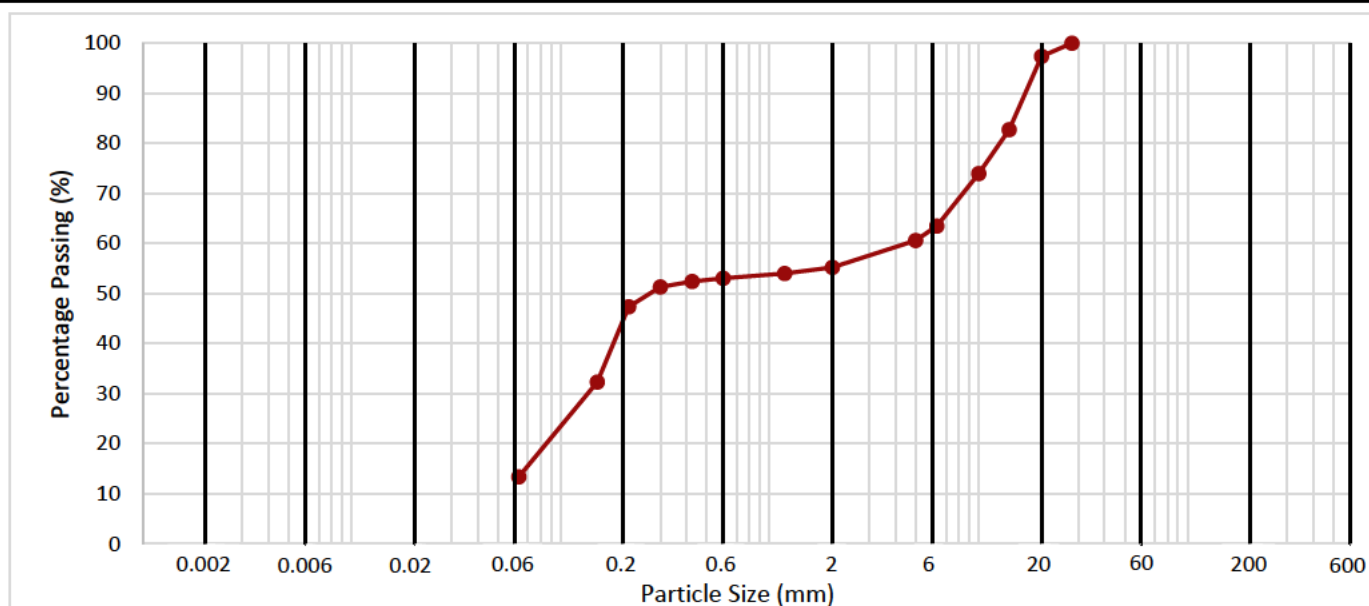
Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby
Serial No.	34342

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
WS01	0.90 - 1.00	D	1	Brown silty SAND and greyish brown angular and subangular sandstone GRAVEL	Dry mass of sample required 1kg. Mass of sample submitted 0.654kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3.

Method of Test: **Wet Sieve**

Method of Pretreatment:

Not required

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	Particle Size (mm)	Passing (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	55	42
1.18	54	
0.600	53	
0.425	52	
0.300	51	
0.212	47	
0.150	32	
0.063	13	

Fines By Dry Mass (%)	
<0.063mm	13

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		45
125		
90		
63		
50		
37.5		
28	100	
20	97	
14	83	
10	74	
6.3	63	
5	61	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
 Method of test: BS1377: Part2: 1990: 9.2
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



TEST REPORT

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Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby
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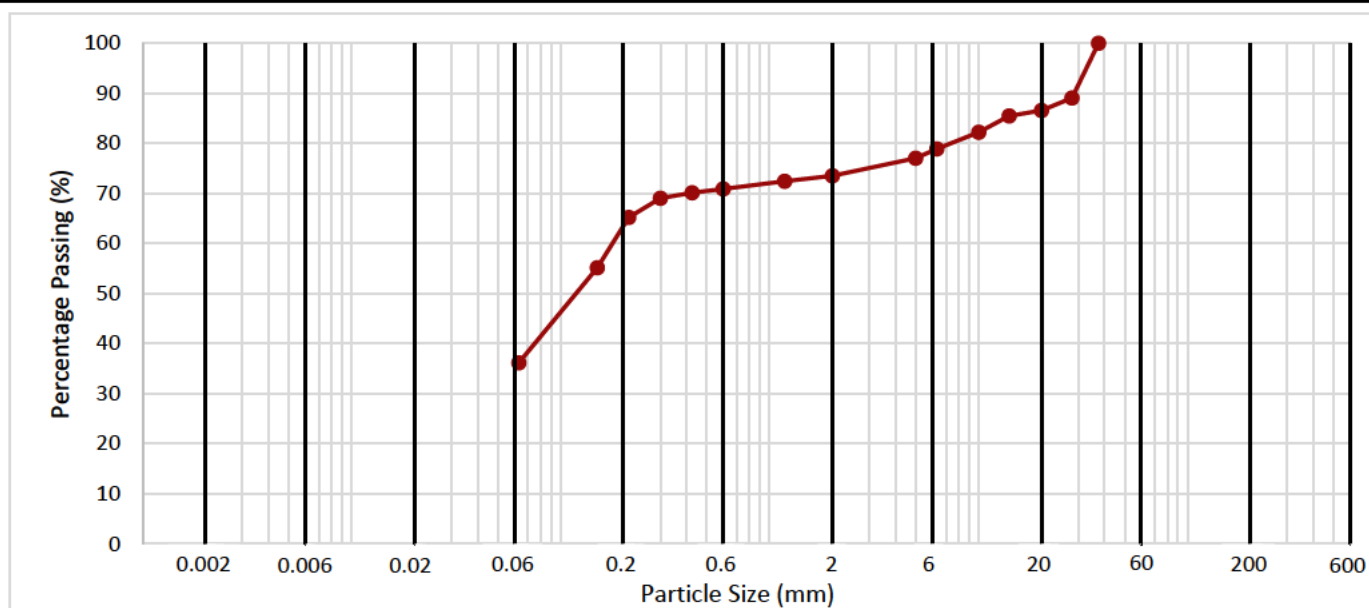
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
WS02	1.70 - 2.00	D	2	Light olive brown slightly gravelly sandy silty CLAY. Gravel is light olive brown and brown sandstone	Dry mass of sample required 6kg. Mass of sample submitted 1kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3.

Method of Test: **Wet Sieve**

Method of Pretreatment:

Not required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

H y d r o m e t e r	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.075		
	0.150		
	0.300		
	0.600		
	1.25		
	2.5		
	5.0		
			Clay by Dry Mass (%)
			38

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	74	38
1.18	72	
0.600	71	
0.425	70	
0.300	69	
0.212	65	
0.150	55	
0.063	36	

Fines By Dry Mass (%)	
<0.063mm	36

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		26
125		
90		
63		
50		
37.5	100	
28	89	
20	87	
14	85	
10	82	
6.3	79	
5	77	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:



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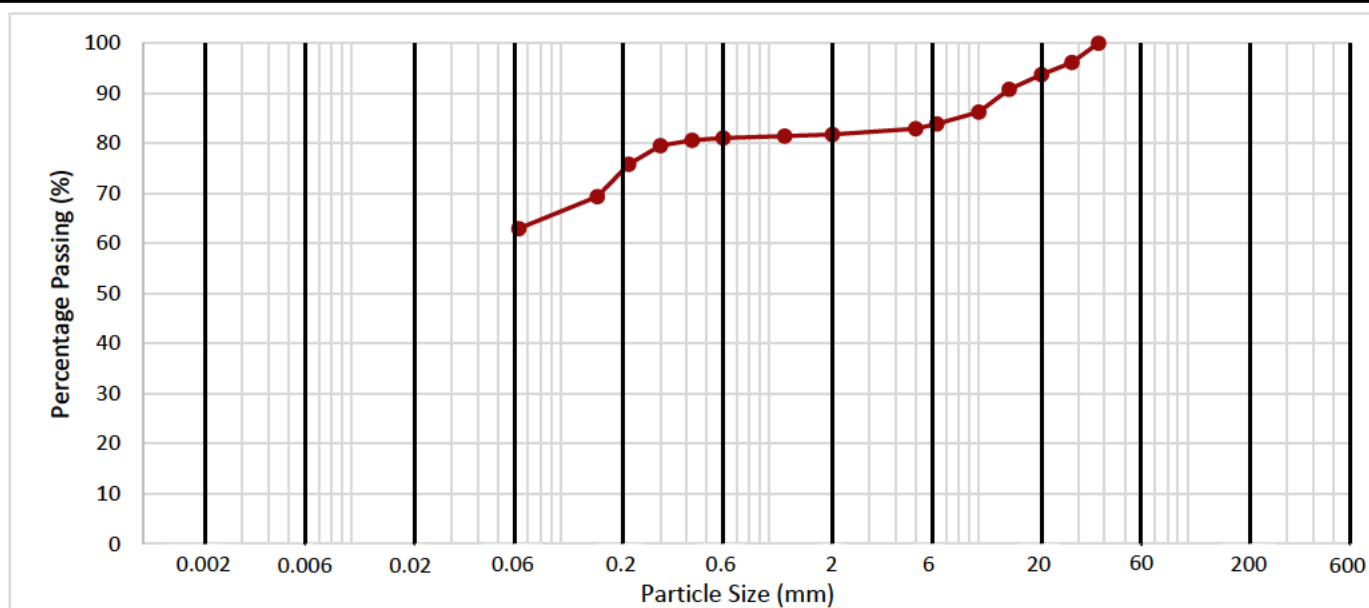
Contract	UK15.1832B - 76 Commerce Street, Melbourne, Derby
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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
WS06	1.20 - 1.50	D	6	Firm olive grey slightly gravelly slightly sandy silty CLAY. Gravel is olive grey angular sandstone	

Method of Test: **Wet Sieve**

Method of Pretreatment:

Not required

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	Particle Size (mm)	Passing (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	82	19
1.18	81	
0.600	81	
0.425	81	
0.300	80	
0.212	76	
0.150	69	
0.063	63	

Fines By Dry Mass (%)	
<0.063mm	63

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		18
125		
90		
63		
50		
37.5	100	
28	96	
20	94	
14	91	
10	86	
6.3	84	
5	83	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
 Method of test: BS1377: Part2: 1990: 9.2
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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DATE ISSUED: 04/01/2019

Contract:	UK15.1832B - 76 Commerce Street, Melbourne, Derby
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DETERMINATION OF THE SULPHATE CONTENT AND pH OF SOIL AND GROUNDWATER

Borehole / Pit No.	Depth (m)	Sample		Conc. of Soluble SO ₃		Calc'd	pH Value	% Sample Passing 2mm Sieve	Description	Remarks
		Type	Ref.	Water Soluble 2:1 (g/L)	Ground Water (g/L)	Conc. Of SO ₄ (g/L)				
WS01	0.90 - 1.00	D	1	0.03		0.03	7.4	55	Brown silty SAND and greyish brown angular and subangular sandstone GRAVEL	
WS02	1.70 - 2.00	D	2	0.04		0.05	6.9	74	Light olive brown slightly gravelly sandy silty CLAY. Gravel is light olive brown and brown sandstone	
WS05	1.60 - 1.80	D	5	0.05		0.06	6.5	98	Stiff grey slightly sandy silty CLAY with occasional orangish brown mottling and rare fine and medium sandstone. Sand is fine	
WS06	1.20 - 1.50	D	6	0.13		0.16	7.5	82	Firm olive grey slightly gravelly slightly sandy silty CLAY. Gravel is olive grey angular sandstone	
WS08	1.70 - 2.00	D	8	0.04		0.05	6.8	100	Stiff pale olive and olive silty CLAY with occasional light grey mottling, rare fine sand pockets and decayed roots	

Method of Preparation: BS1377: Part 1: 2016: 8.5, BS1377: Part 3: 1990: 5.3 Soil/Water Extract, 5.4 Groundwater
Method of Test: BS1377: Part 3: 1990: 5.5
Type of Sample Key: U= Undisturbed, B= Bulk, D= Disturbed, J= Jar, W= Water, SPT= Split Spoon Sample, C= Core Cutter
Comments: **Test not UKAS accredited**
Remarks to Include: Sample disturbance, loss of moisture, variation from test procedure, location, and origin of test specimen within original sample. Oven drying temperature if not 105-110C.

APPENDIX E

Minimal & Low Risk Generic Screening Criteria

EPS Generic Quantitative Risk Assessment

Minimal Risk Generic Screening Criteria - Residential Land Use

Contaminant	Soil Targets			Groundwater Targets	
	Human Health	Controlled Waters		Controlled Waters	
		LGWRP	HGWRP	LGWRP	HGWRP
Unit	mg/kg			ug/l	
Arsenic	37	n/c	n/c	50	10
Cadmium	11	n/c	n/c	5	5
Chromium III	910	n/c	n/c	250	50
Chromium VI	6	n/c	n/c	n/c	n/c
Copper	2400	n/c	n/c	28	28
Mercury (elemental)	1.2	n/c	n/c	1	1
Nickel	180	n/c	n/c	200	50
Lead	NA	n/c	n/c	250	10
Selenium	250	n/c	n/c	10	10
Zinc	3700	n/c	n/c	500	500
Benzene	0.087	0.252	0.008	30	1
Toluene	130	1.17	1.17	50	50
Ethylbenzene	47	15.0	10.0	300	200
Xylene (para)	56	0.885	0.885	30	30
MTBE#	49	0.138	0.0276	75	15
Benzo(a)Pyrene	2.2	10	1.44	0.7	0.1
Naphthalene	2.3	0.934	0.02	10	0.1
Dibenz(ah)anthracene	0.24	n/c	n/c	n/c	n/c
Aliphatic C5-C6	42	5.27	1.05	50	10
Aliphatic C6-C8	100	23.2	4.64	50	10
Aliphatic C8-C10	27	175	35.1	50	10
Aliphatic C10-C12	130(48)*	1380	276	50	10
Aliphatic C12-C16	1100(8.48)**	27500	5490	50	10
Aliphatic C16-C35	65000 (8.48)**	3.46E+06	6.91E+05	50	10
Aromatic C8-C10	34	8.74	1.75	50	10
Aromatic C10-C12	74	13.8	2.76	50	10
Aromatic C12-C16	140	27.5	5.5	50	10
Aromatic C16-C21	260	86.9	17.4	50	10
Aromatic C21-C35	1100	690	138	50	10

Notes:

LGWRP - Low Groundwater Resource Potential

HGWRP - High Groundwater Resource Potential

f = Oral, dermal and inhalation exposure compared with oral HCV N/C = Not Calculated

* = S4UL exceeds vapour saturation limit (in brackets)

** = S4UL exceeds solubility saturation limit (in brackets)

Soil Targets

Targets for Human Health have been taken from *S4ULs 'Suitable For Use Levels for Human Health Risk Assessment' – LQM and CIEH (2014)* derived using standard sandy loam soil with 1% SOM, except (#) = *EIC/AGS/CL:AIRE GAC 'Soil Generic Assessment Criteria' (2010)*. For sites where ground conditions differ significantly from sandy loam or site-specific SOM and pH are available, the generic human health targets may be revised.

Targets for Controlled waters have been derived using EA Remedial Targets Worksheet (v3.1) - using standard Sandy Loam ground conditions as described in Science Report SC050021/SR3, assuming no degradation for a 10m compliance distance with criteria of EQS or UKDWS for LGWRP and HGWRP respectively (see notes for GW targets).

Groundwater Targets

For LGWRP, targets have been taken as Freshwater EQS where available. For Ethylbenzene and BaP the WHO Health limit has been used and for MTBE and individual TPH fractions a 5 times multiplier of taste threshold and UKDWS has been taken respectively.

For HGWRP, targets have been taken as UKDWS where available, with the exception of Copper and Zinc where the EQS is lower than the DWS and therefore the EQS has been used as the groundwater target. For Ethylbenzene the upper WHO ATO limit has been used. For Toluene and Xylene, the WHO ATO limit is higher than the EQS and so the lower value has been taken. For MTBE the taste threshold has been taken.

Work carried out to calculate generic screening criteria for concentrations of contaminant in groundwater with respect of risks to Human Health has generally found that criteria far exceed (by at least 2 orders of magnitude) those listed for the protection of either LGWRP and HGWRP receptors. On this basis, the above Groundwater criteria are also considered protective of human health and further evaluation of these risks should be considered alongside any detailed quantitative risk assessments carried out for groundwater on a site specific basis.



EPS Generic Quantitative Risk Assessment

Low Risk Generic Screening Criteria - All Land Uses

	Soil Targets					
Contaminant	Residential		Allotments	Commercial	Public Open Spaces	
	With Home Grown Produce	Without Home Grown Produce			Residential	Parks
Unit	mg/kg					
Arsenic	37	40	49	640	79	168
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5	5.3	5.7	76	10	21
Cadmium	26	149	4.9	410	220	880
Chromium (VI)	21	21	170	49	23	250
Lead	200	310	80	2330	630	1300

Notes:

Targets for Human Health have been taken from available Category 4 Screening Levels (C4SLs) for assessment of land affected by contamination issued by DEFRA in December 2013.

APPENDIX F

Method Statement for Encountering Unexpected Contamination



METHOD STATEMENT

ACTIONS TO BE TAKEN IN THE EVENT OF DISCOVERING UNEXPECTED CONTAMINATION DURING INTRUSIVE GROUNDWORKS

If at any point during intrusive groundworks at a site, evidence of unforeseen contamination is encountered in the form of significant noxious odours, discolouration, or instability within soils or sheen/ discolouration in groundwater, the following actions will be taken:

- Intrusive works in the immediate area of the impacted ground will be suspended and the continuation of work in other areas of the site will be considered within the context of the site-specific health & safety plan.
- Environmental Protection Strategies Ltd (EPS) will be contacted and appraised of the situation so that arrangements can be made to characterise the impact and determine what action may be necessary in addition to the scheduled site works. Where possible / health & safety plan permits, digital photographs of the impacted ground will be taken and emailed to EPS at the address below to assist in the initial assessment.
- It may well be necessary for EPS to attend site to undertake visual inspection and obtain samples for field and/or laboratory analysis, although the actions taken will be dependent on the nature of what is encountered.
- In cases where EPS consider the unforeseen contamination likely to pose a significant risk of significant harm to adjacent site users or local environmental receptors, the local authority and the Environment Agency will be informed of the situation and the actions being taken.
- Once appropriate action has been agreed and undertaken, a written summary will be produced by EPS for submission to the Local Authority, (and where relevant, the Environment Agency) in accordance with planning requirements. The submission will include details of work undertaken, analytical results of investigative and validation samples obtained and conclusions and recommendations for any further actions considered necessary.
- Where regulatory bodies have been involved, site works should only recommence following their agreement and in all cases should only recommence when the site manager considers it safe to do so within the context of the site specific health & safety plan.

EPS Contact Details:

Giles Lock	Director	Tel: 0781 253 9656
Will Evans	Director	Tel: 0781 253 9655
Steve Bullock	Director	Tel: 0786 694 9221

Email: info@epstrategies.co.uk (Automatically forwarded to the above and office-based personnel.)