Contamination Assessment Report

Site: Proposed Barrow Store
7025 Denyer Street
London
SW3 3AP

Client: Proun Architects

Date: February 2017

Our Ref: CONT/8181

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# EXECUTIVE SUMMARY

## Proposed Barrow Store

7025 Denyer Street  
London, SW3 3AP

### Site History

From historical information obtained from [www.old-maps.co.uk](http://www.old-maps.co.uk), the site appeared to show terraced housing situated on-site from the late 19th Century to the mid-20th Century. A school was shown immediately to the south west of the site. A smithy and a saw mill were also recorded close by. From the mid-20th Century to the present day, the existing layout was shown, including a block of flats and outbuildings. Notable premises nearby included a telephone exchange, milk depot and warehouses.

### Proposed Development

It is understood that the proposed scheme involves construction of a single storey 'L' shaped 'barrow store'. The footprint of the proposed building will occupy a similar, but larger area, than the existing building.

### Ground Conditions

Made Ground was encountered to a maximum depth of 3.90m bgl which was underlain by the Kempton Park Gravel Formation to the maximum drilling depth of 8.10m bgl.

### Groundwater

No groundwater was recorded during the current intrusive investigation.

### Soil Contamination

Elevated concentrations of benzo(a)pyrene ranging from 3.2mg/kg to 4.7mg/kg were recorded in TP2 and BH1 between 0.25 and 0.50m bgl when compared to the ATRISK contaminated land screening values (SSVs) for *Residential without plant uptake* criteria. Elevated concentrations of lead ranging from 523mg/kg to 552mg/kg were recorded in TP2 and BH1 between 0.25 and 0.50m bgl when compared to the ATRISK contaminated land screening values (SSVs) for *Residential without plant uptake* criteria. No asbestos was identified within the samples tested.

### Controlled Waters

No groundwater was recorded during the current intrusive investigation. Groundwater standpipes and subsequent monitoring visits were not requested during the current intrusive investigation. However, given the relatively thick made ground encountered at the site and underlying Secondary A aquifer, it is advised that groundwater standpipes are installed and subsequent monitoring and groundwater testing is undertaken to gain further data to fully assess the risks to controlled waters.

### Ground Gas

Groundwater/ground gas standpipes and subsequent monitoring visits were not requested during the current intrusive investigation. However, given the relatively thick made ground encountered at the site, it is advised that groundwater/ground gas standpipes are installed and subsequent ground gas monitoring is undertaken to gain further data to fully assess the risks from ground gases prior to final design.

### Services & Building

It is recommended that the results of the soil chemical analyses undertaken on the site should be provided to the potable water supply company in order to ensure that any pipe provided complies with their requirements.

### WAC Test

The results of the WAC tests indicate that the sample from BH1 at 1.00m would probably be classified suitable for disposal at a site which accepts 'inert' landfill material. Full details of the results are given on the appended results sheets.

### Health & Safety

As a preventative measure, appropriate Personal Protective Equipment (PPE) and other measures (e.g. good standards of hygiene, washing facilities) should be utilised to mitigate the risk and protect future ground workers.
1.0 INTRODUCTION

1.1 The following Contamination Assessment has been prepared by Chelmer Site Investigation Laboratories Limited (CSI) to the written instructions of Client for the project, Proun Architects.

1.2 The site under consideration comprised an area at the junction of Denyer Street and Draycott Avenue within the Wiltshire Close Estate. The area under consideration comprised an amenity area in front of a six storey residential block including single storey outbuildings arranged in an ‘L’ shape.

1.3 It is understood that the proposed scheme involves construction of a single storey ‘L’ shaped ‘barrow store’. The footprint of the proposed building will occupy a similar, but larger, area than the existing building. Proposed Plans, Sections and Elevations (2652/BSO/04 Rev A, /05 Rev B, /20 Rev A & /10, July 2016) are appended to this report.

1.4 A Phase I Desk Top Study was not requested by the client.

1.5 This Phase II Intrusive site investigation has been commissioned to provide information on the sub-soil conditions, together with laboratory testing of the underlying soils. Based on the findings of the site investigation, an assessment has been undertaken to evaluate the site conditions in the context of it being potentially contaminated and presenting an environmental risk in the context of current UK policy. Where appropriate, recommendations are made in light of the findings and evaluation.
### 2.0 SUMMARY OF FIELDWORK EXECUTED

2.1 All fieldwork was generally executed in accordance with the recommendations given in BS 5930:1999 (Ref 1), contamination sampling was undertaken in accordance with BS10175: 2011 (Ref 2).

2.2 The work at this site was undertaken on 15th December 2016 comprising the drilling of 1 No. c.f.a borehole. The location of the borehole is indicated on the appended Sketch Fieldwork Location Plan.

#### Continuous Flight Auger (C.F.A) Boreholes

2.3 1 No. c.f.a borehole (BH1) was advanced to a depth of 8.10m below ground level (bgl).

2.4 The borehole was located within the external areas of the site, as indicated on the Sketch Fieldwork Location Plan. The location of the borehole was to target the proposed buildings for geotechnical purposes and to help identify potential sources of contamination.

2.5 Discrete disturbed samples were taken throughout the boreholes at regular depth intervals within each stratum as the borehole was advanced and when a change of stratum was encountered.

2.6 In-situ Standard Penetration Tests (SPT) were also undertaken throughout the deep boreholes in order to provide additional information on the in-situ consistency of the material encountered.

2.7 Full details of the borehole findings are given on the appended borehole record sheet.

#### Hand Excavated Trial Pits

2.8 Two trial pits (TP1 & TP2) were excavated at the locations indicated on the Sketch Fieldwork Location Plan in order to expose and record existing foundations.

2.9 TP1 was undertaken in the southern corner, adjacent to the main block of flats (section A) and the outbuilding (section B). Section A found the brick wall set onto a concrete foundation above ground level. The underside of the concrete foundation was unable to be established and the trial pit was terminated at a depth of 1.5m bgl. Section B found the outbuilding was set onto a concrete foundation at ground level. The concrete foundation was found to be 0.25m thick and set onto Made Ground.

2.10 TP2 was undertaken alongside the east side of the outbuilding and found the brick wall set onto a concrete foundation above ground level. The concrete foundation was found to be 0.6m thick and was set onto Made Ground at a depth of 0.4m bgl.

2.11 Full details of the trial pit findings are given on the appended trial pit record sheets.
### 3.0 GEOLOGICAL SETTING

#### 3.1 According to information published by the British Geological Survey (BGS) the underlying geology at this site is shown as being the superficial Kempton Park Gravel Formation overlying the London Clay Formation.

**Kempton Park Gravel Formation**

#### 3.2 This Devensian aged formation is a sand and gravel with local lenses of silt, clay or peat. It generally rests on bedrock geology of London Clay, or Woolwich and Reading Beds. It is typically 6m thick but can be much thicker where infilling deep hollows. It is geographically limited to the Thames Valley and its associated tributaries.

**London Clay Formation**

#### 3.3 It is inferred that the London Clay Formation was deposited during a period of sea inundation in the area up to 200m in depth. The London Clay can be up to 150m thick beneath south Essex thinning across London to about 90m near Reading.

When exposed to the weathering process the upper regions of the London Clay oxidise to brown in colour. It usually contains selenite crystals, often grouped in bands or layers, which are thought to have originated from the decomposition of shell fragments. London Clay contains clay minerals in the form of illite, kaolinite and smectite. The presence of smectite renders the London Clay particularly susceptible to changes in moisture content and is prone to shrinkage and swelling (settlement and heave) caused by alternate wetting and drying near the surface. In addition, weathering and possible slight transportation of semi-frozen material “en-masse” in glacial or peri-glacial regions is believed to have occurred. This action often completely destroys the structure of the material and can involve a serious loss of strength. As the soil composition is derived mostly from materials local to the point of deposition, the lithology can be variable and reflects that of the parent strata.
4.0 SUMMARY OF GROUND CONDITIONS

4.1 Full details of the ground conditions encountered are presented on the borehole records appended to this report and can be summarised as follows:

<table>
<thead>
<tr>
<th>Depth (m bgl)</th>
<th>Depth To (m bgl)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.05</td>
<td>Tarmac</td>
</tr>
<tr>
<td>0.05</td>
<td>0.60+/3.90</td>
<td>Made Ground</td>
</tr>
<tr>
<td>3.90</td>
<td>8.00</td>
<td>Kempton Park Gravel Formation: medium dense dark brown very silty SAND and GRAVEL</td>
</tr>
<tr>
<td>8.00</td>
<td>8.10+</td>
<td>Kempton Park Gravel Formation: dense yellowish brown silty very gravelly SAND</td>
</tr>
</tbody>
</table>

4.2 It should be noted that the Made Ground depths recorded above are those encountered within the borehole and trial pits undertaken during the current work. Owing to the variable nature and unknown provenance of Made Ground it is possible that deeper or more extensive areas of Made Ground may exist at this site which have not been revealed by the current work.

4.3 No groundwater was recorded during the current intrusive investigation.
5.0 LABORATORY TESTING

5.1 The following contamination tests have been carried out on samples recovered from the borehole locations at this site and full details are appended to this report.

The chemical testing was carried out in accordance with standard industry methods in a UKAS approved laboratory which is also currently accredited in accordance with MCERTS for the majority of its testing. Further information regarding this accreditation is available on request together with a full list of test methods if required.

5.2 Chemical Analysis

3 N°. representative samples of the underlying soils encountered across the site were selected and tested for a suite of key chemical species used to identify and assess the nature of the soil in the context of it being contaminated and potentially presenting a risk to end users of the site, building fabric and the wider environment.

The testing suite applied included selected critical heavy metals, US EPA 16 priority Polycyclic Aromatic Hydrocarbons (PAH), speciated Total Petroleum Hydrocarbons in accordance with TPH CWG recommended carbon bandings for both aliphatic and aromatic compounds, BTEX (benzene, toluene, ethylbenzene, xylene), MTBE (Methyl tertiary-butyl ether) and asbestos screening.

5.3 Waste Classification Tests

In order to assist with the classification of soils in the context of their possible off-site disposal, 1 N°. sample of the underlying soils was collected and tested for Waste Acceptance Criteria (WAC) in accordance with BS EN 12457 Part 3.

Full details of the results are given on the appended results sheets.
6.0 PRELIMINARY CONTAMINATION ASSESSMENT

BACKGROUND AND TERMS OF REFERENCE

6.1 In the UK, contaminated land is assessed and managed through a number of integrated policies and guidance. Contaminated land is defined in legislation enacted under Part IIA of the Environmental Protection Act 1990 and guidance issued by DEFRA under CLR11 and sister documentation published in 2012 advises on how the legislative framework dealing with contaminated land should be implemented.

6.2 Distinct from the strict and onerous legal definition and classification of land as being contaminated but a corollary to the legislation and associated statutory guidance, the National Planning Policy Framework (NPPF) makes provision for assessing and managing contaminated land in the context of redevelopment which is subject to planning control. Earlier published guidance (PPS23) identified contamination as being a material consideration within any planning application and current policy under NPPF states that land which “is affected by contamination or land stability issues” must be correctly assessed such that planning decisions should ensure that “the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation”.

6.3 The assessment process requires that “adequate site investigation information, prepared by a competent person, is presented.” The guidance provided in NPPF also states that “all investigations of land potentially affected by contamination should be carried out in accordance with established procedures, such as BS10175 (2001).”

6.4 The NPPF and statutory provisions for dealing with contaminated land are clear in ensuring that where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the “developer and/or landowner.”

6.5 Fundamental to the assessment of contaminated land is the development of a Conceptual Site Model (CSM). This is an evaluation of the site conditions and its particular characteristics with respect to so called Source-Pathway-Receptor relationships, or plausible pollutant linkages. The CSM can then be used to assess and define risk and in turn it provides a basis for determining the condition of the land in the context of the proposed development and what, if any, action needs to be taken to allow the proposed development to proceed safely and without detrimental impact to the site itself or the wider environment.
6.6 A plausible pollutant linkage is defined by three elements:

**Source** A hazard which exists within the site or its environs which has the potential to cause harm (e.g. contaminated soil, ground gas, unstable ground, etc.)

**Receptor** Something associated with the site (e.g. end-user, building, off-site feature, etc.) which can be harmed.

**Pathway** A plausible linkage between the Source and Receptor such that harm can be realised (e.g. end-user coming into direct contact with contaminated soil, mobile contamination adversely impacting groundwater, etc.).

6.7 By definition a pollutant linkage can only exist where the three elements, source-pathway-receptor, are present and co-exist. If one of the elements that make up the pollutant linkage are not present then it follows that there can be no related risk. The breaking of pollutant linkages is a fundamental principal in the management of contaminated land risk and where the risk is identified and deemed to be unacceptable the appropriate action taken will be “breaking” the pollutant linkage in some way.

6.8 Risk in the context of contaminated land is considered in terms of its significance and this is qualitatively assessed on the basis of magnitude of harm that may occur and likelihood of that harm occurring. The risk assessment follows the general principles as set out within BS10175:2001 and CIRIA C552.

6.9 The CSM is used to provide both a context and framework for undertaking any intrusive site investigation which may be deemed necessary to characterise the site with respect to contamination. Where a pollutant linkage is identified further investigation may be needed to confirm or quantify specific conditions, validate the existence of the pollutant linkage and thereby confirm and quantify the degree of risk. This is an important element of the assessment process and under the principles of risk assessment constitutes “hazard identification” and “hazard assessment”.

**CONCEPTUAL SITE MODEL & PLAUSIBLE POLLUTANT LINKAGES**

**Hazards**

6.10 Made Ground was identified during the current investigation to a maximum depth of 3.90m bgl. Made Ground should always be viewed as being a potential on-site source of contamination which may have adverse impacts to a number of different receptors.

6.11 Ground gas (carbon dioxide, methane, and possibly other related gases and vapours) are ubiquitous within the subsoil environment. Low concentration of either, or both, carbon dioxide and methane may not be problematic. However, elevated concentrations of ground gas and/or conditions where ground gas is being actively
generated (e.g. filled ground, landfill, organic rich natural soils, etc.) may present a significant hazard to the site development or the wider environment, particularly so where these gases may enter and accumulate in buildings and as such impact building occupants. Ground gas may be present from sources either within the site itself or maybe being generated from an off-site source and migrating on to the site.

6.12 The greatest hazards posed by methane are those of fire and explosion, when encountered between the Lower Explosion Limit (LEL) and Upper Explosion Limit (UEL), the limits of flammability, of 5% v/v and 15% v/v respectively in air. When methane is present at high concentrations, it acts as an asphyxiant. Asphyxiants displace oxygen in the air and can cause symptoms of oxygen deprivation (anoxia). The available oxygen should be a minimum of 18% or harmful effects will result. Methane displaces oxygen to 18% in air when present at concentrations of 14%. Methane is classified as an asphyxiant when above 30% v/v and highlighted in CIRIA report 14920 based on eight hour long term exposure limit (HSE, 1991).

6.13 Carbon dioxide affects the respiratory and central nervous system. At concentrations greater than 0.5% v/v (highlighted in CIRIA Report 149 based on eight hour long term exposure limit (HSE, 1991)) it can cause unconsciousness leading to death at concentrations greater than 10% to 15% v/v. It is highly soluble and physiological effects are almost instantaneous.

6.14 Hydrogen sulphide (H₂S) is classed as a chemical asphyxiant, similar to carbon monoxide and cyanide gases. It inhibits cellular respiration and uptake of oxygen, causing biochemical suffocation. The Health & Safety Executive (Ref 4) states that the workplace exposure limits for hydrogen sulphide during a short-term exposure limit (STEL) -15 minute reference period is 10ppm (14 mg m⁻³) and a long term exposure limit is (LTEL) - 8 hour reference period is 5 ppm (7 mg m⁻³).

6.15 Carbon monoxide (CO) is a highly toxic gas that binds to haemoglobin in red blood cells over oxygen, effectively causing suffocation by preventing transport of oxygen around the body. The Health & Safety Executive states that the workplace exposure limits for carbon monoxide during a short-term exposure limit (STEL) -15 minute reference period is 200 ppm (232mg m⁻³) and a long term exposure limit is (LTEL) - 8 hour reference period is 30 ppm (35mg m⁻³).

6.16 Groundwater present within a site may itself be contaminated or may liberate and be a source of (and pathway for) mobile contamination. Contaminated groundwater can impact on various receptors but most notably controlled waters either on the site or offsite.
Receptors

6.17 From the intended end site use the following potential receptors have been identified.

- Construction workers on the site during development.
- Neighbouring sites and site users.
- Controlled Waters both within the site and off-site.
- Future users of the proposed development.
- Building fabric for the proposed development.
- Soft landscaping (vegetation)

Pathways

6.18 Contamination within the soil could reach receptors by direct contact with the soils where there is a potential for contamination to be ingested by some means (direct ingestion, inhalation, dermal contact). This is most acute during site development although contact, albeit limited, is also possible for future site users given the proposed soft landscaping. Despite the proposed end use of the site being a commercial / industrial development, the planned areas of soft landscaping represent a sensitive end use. As such, a moderate risk to future end users is considered present, as a plausible pathway for contamination is considered to be present.

6.19 Mobile contamination, present either within the groundwater or otherwise liberated by contact with groundwater (leachable contaminants), may exist.

6.20 Ground gas may migrate through or on/offsite through preferential pathways most likely in the superficial Made Ground.

6.21 Elements of the building fabric for the proposed development may be in direct contact with contamination which may have adverse impacts. Plastic potable water supply pipelines may be susceptible to certain organic contamination if present.

SOIL CONTAMINATION EVALUATION

6.22 In accordance with current good practice (DEFRA guidance and CLR11) a Tier 1 assessment has been undertaken to determine the significance of the contamination present within the site in the context of the CSM. In this regard the contamination present within the soils sampled and determined from the program of chemical testing (see paragraph 5.2) has been compared to published guidance either UK Soil Guideline Values (SGV) as derived from current CLEA publications or other generic assessment criteria (GAC) derived from other applicable and relevant sources.

6.23 It should be noted SGV criteria is derived from a risk-based modelling software which has limited functionality, is based on assumptions and contains algorithms which the DEFRA and Environment Agency (EA) has publicly expressed its intention to update. As a consequence of this, some of the screening values generated by the CLEA software may not adequately reflect specific site conditions and in some instances are
unduly conservative. In addition, it should also be noted that the figures given in the
appended table are based on a 6% soil organic matter content.

6.24 DEFRA/EA previously published a number of Soil Guideline Values (SGVs) for certain
determinands, (common toxic metals) for assessing the risks to human health from
chronic exposure to soil contamination for standard land-use functions. However,
these were withdrawn in late 2008 and DEFRA/EA have now issued a new set of
guidance documents. Currently SGV figures have only been issued for Arsenic,
Cadmium, Mercury, Nickel, Phenols and Selenium.

6.25 In the absence of currently published SGV values for the remaining contaminants,
GAC screening values have been used. In this regard W. S. Atkins have derived
ATRISKsoil Soil Screening Values (SSVs) based on the new 2009 guidance
(SC050021/SR3 (the CLEA Report) and SC050021/SR2 (the TOX report)) for a
commercial/industrial, residential without home grown produce, residential with home
grown produce and allotment land uses. These have been based on the default
assumptions provided in the CLEA report which it is understand will be used in the
Atkins SSVs have been derived in line with the new guidance using CLEA model
v1.04. As the inhalation of vapour pathway contributes less than ten percent of total
exposure, this is unlikely to significantly affect the combined assessment criterion and
the SSV values used are the combined assessment criterion given by CLEA if free
product is not observed.

6.26 Neither CLEA or ATRISK currently publish values for Hexavalent Chromium.
Therefore, both Total Chromium and Hexavalent Chromium values have been
compared against the Land Quality Management/Chartered Institute of Environmental
Health (LQM/CIEH) Generic Assessment Criteria published in 2009 and based on
CLEA v1.04 with Total Chromium values based on Chromium III.

6.27 The SGV and SSV levels represent “intervention” levels above which the levels of
contamination may pose an unacceptable risk to the health of site-users such that
further investigation and/or remediation is required.

6.28 Total Petroleum Hydrocarbons are considered in accordance with the fractions
proposed by The Environment Agency, drawing on the TPHCWG methodology.
These are contained in Table 4.2 – Petroleum hydrocarbon fractions for use in UK
human health risk assessment, based on Equivalent Carbon (EC) number, contained
in Science Report P5-080/TR3, The UK Approach for Evaluating Human Health Risks
from Petroleum Hydrocarbons in Soils.

6.29 The chemical results have been compared against the Residential without plant
uptake criteria. Despite the proposed end use for the site being considered
commercial/industrial, due to the plans showing a significant portion of the site to be
soft landscaping, it is therefore deemed necessary to compare the results against a
more sensitive criteria.
ASSESSMENT OF CONTAMINATION RESULTS

Soils

6.30 Elevated concentrations of benzo(a)pyrene ranging from 3.2mg/kg to 4.7mg/kg were recorded in TP2 and BH1 between 0.25 and 0.50m bgl when compared to the ATRISK contaminated land screening values (SSVs) for Residential without plant uptake criteria.

6.31 Elevated concentrations of lead ranging from 523mg/kg to 552mg/kg were recorded in TP2 and BH1 between 0.25 and 0.50m bgl when compared to the ATRISK contaminated land screening values (SSVs) for Residential without plant uptake criteria.

6.32 No asbestos was identified within the samples tested.

Ground Gas

6.33 Groundwater/ground gas standpipes and subsequent monitoring visits were not requested during the current intrusive investigation.

6.34 However, given the identified made ground at the site, it is strongly advised that ground gas monitoring is undertaken to gain further data to fully assess the risks from ground gases prior to final design.

Controlled Water

6.35 No groundwater was recorded during the current intrusive investigation.

SOIL DISPOSAL & WASTE ACCEPTANCE CRITERIA

6.36 1 No. EN 14473/02 Waste Acceptance Criteria (WAC) tests were undertaken on a sample from BH1 at 1.00m to assist in classifying for waste disposal purposes.

6.37 The results of the WAC test indicates that the sample from BH1 at 1.00m would probably be classified suitable for disposal at a site which accepts ‘inert’ landfill material. Full details of the results are given on the appended results sheets.

6.38 However, it should be noted that Chelmer Site Investigation Laboratories Ltd are not a licensed landfill operator and we therefore strongly recommend that the WAC data should be presented to potential Waste Management Companies in order for them to confirm the waste classification of surplus soils to be removed from this site and to determine its acceptability at appropriate landfill sites for disposal/treatment.
RISK ASSESSMENT

6.39 The following diagram summaries the potential pollution linkages identified for this site in the form of a diagrammatic Conceptual Model.

<table>
<thead>
<tr>
<th>Probability</th>
<th>Consequence</th>
<th>Severe</th>
<th>Medium</th>
<th>Mild</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Likelihood</td>
<td>Very High Risk</td>
<td>High Risk</td>
<td>Moderate Risk</td>
<td>Moderate/Low Risk</td>
<td></td>
</tr>
<tr>
<td>Likely</td>
<td>High Risk</td>
<td>Moderate Risk</td>
<td>Moderate/Low Risk</td>
<td>Low Risk</td>
<td></td>
</tr>
<tr>
<td>Low Likelihood</td>
<td>Moderate Risk</td>
<td>Moderate/Low Risk</td>
<td>Low Risk</td>
<td>Very Low Risk</td>
<td></td>
</tr>
<tr>
<td>Unlikely</td>
<td>Moderate/Low Risk</td>
<td>Low Risk</td>
<td>Very Low Risk</td>
<td>Very Low Risk</td>
<td></td>
</tr>
</tbody>
</table>

*Extracted from CIRIA C552
<table>
<thead>
<tr>
<th>Source</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Assessment of Risk</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contaminated soil</td>
<td>Dermal contact with contaminated soils and inhalation/ingestion of soil vapours, soil derived dust and other airborne particulates</td>
<td>Site-end users</td>
<td>Moderate</td>
<td>Elevated concentrations of benzo(a)pyrene and lead were identified within the tested soil samples. Despite the proposed end use of the site being a commercial / industrial development, the planned areas of soft landscaping represents a sensitive end use. As such, a moderate risk to future end users is considered present, as a plausible pathway for contamination is considered to be present.</td>
</tr>
<tr>
<td></td>
<td>Construction/maintenance workers</td>
<td>Low / Moderate</td>
<td>As a preventative measure, appropriate Personal Protective Equipment (PPE) and other measures (e.g. good standards of hygiene, washing facilities) are utilised to mitigate the risk. This should include appropriate Health &amp; Safety method statement and risk assessments.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaching</td>
<td>Surface water and groundwater</td>
<td>-</td>
<td>Further assessment of controlled waters will be undertaken once monitoring data is available.</td>
</tr>
<tr>
<td></td>
<td>Plant uptake</td>
<td>Vegetation (not for consumption)</td>
<td>Moderate</td>
<td>Given that there are plans for soft landscaping, the risk to new vegetation (not for consumption) is considered moderate.</td>
</tr>
<tr>
<td>Contaminated surface water or groundwater</td>
<td>Direct contact</td>
<td>Site end users / Construction/maintenance workers</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Direct contact</td>
<td>Construction materials</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical/lateral migration</td>
<td>Controlled waters / Adjacent properties</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface water run-off</td>
<td>Controlled waters / Adjacent Properties</td>
<td>-</td>
<td>Groundwater/ground gas standpipes and subsequent monitoring visits and testing were not requested during the current intrusive investigation. However, given the relatively thick made ground encountered at the site and underlying Secondary A aquifer, it is advised that groundwater/ground gas standpipes are installed and subsequent ground gas monitoring is undertaken to gain further data to fully assess the risks from ground gases prior to final design.</td>
</tr>
<tr>
<td>Ground Gas and Vapour</td>
<td>Migration</td>
<td>Proposed development and adjacent sites</td>
<td>-</td>
<td>Groundwater/ground gas standpipes and subsequent monitoring visits were not requested during the current intrusive investigation. However, given the relatively thick made ground encountered at the site, it is advised that groundwater/ground gas standpipes are installed and subsequent ground gas monitoring is undertaken to gain further data to fully assess the risks from ground gases prior to final design.</td>
</tr>
<tr>
<td></td>
<td>Inhalation of vapours</td>
<td>Site end users/ Construction and future maintenance workers</td>
<td>-</td>
<td>Groundwater/ground gas standpipes and subsequent monitoring visits were not requested during the current intrusive investigation. However, given the relatively thick made ground encountered at the site, it is advised that groundwater/ground gas standpipes are installed and subsequent ground gas monitoring is undertaken to gain further data to fully assess the risks from ground gases prior to final design.</td>
</tr>
</tbody>
</table>
7.0 CONCLUSIONS & RECOMMENDATIONS

Soils

7.1 Elevated values of benzo(a)pyrene and lead were recorded within the soil samples tested when compared to the ATRISK contaminated land screening values (SSVs) for Commercial / Industrial criteria.

7.2 No asbestos was identified within the samples tested.

7.3 Given that elevated concentrations of heavy metals and PAHs were identified, the near surface soils are not considered suitable for use as areas of gardens or soft landscaping. Remediation of the near surface soils is therefore recommended to reduce the risk to future ground workers and end users.

7.4 At this stage, a Remediation Method Statement is recommended and should be undertaken to further explore the remediation options and to consider any further works to assist in bringing the site to a suitable level of risk. It is likely that a clean cover system will be required in all soft landscaping and garden areas.

7.5 Despite the proposed end use of the site being a commercial / industrial development, the planned areas of soft landscaping represents a sensitive end use. As such, a moderate risk to future end users is considered present, as a plausible pathway for contamination is considered to be present.

7.6 As a preventative measure, appropriate Personal Protective Equipment (PPE) and other measures (e.g. good standards of hygiene, washing facilities) should be utilised to mitigate the risk and protect future ground workers. This should include appropriate health and safety method statements during any ground works.

7.7 With regard to the installation of any future water supply pipe work, the current guidance on selection of materials for potable water supply pipes to be laid in contaminated land is contained in a document published jointly by Water UK and the Home Builders Federation (Water UK HBF (2014)). The protocols in that document are for guidance and are not subject to enforcement by Water UK or any agency, but have been adopted by Water UK and by HBF as best practice for their members. It is recommended that the results of the soil chemical analyses undertaken on the site should be provided to the potable water supply company in order to ensure that any pipe provided complies with their requirements. Barrier pipework is likely to be required.

Groundwater

7.8 No groundwater was recorded during the current intrusive investigation. Groundwater standpipes and subsequent monitoring visits were not requested during the current intrusive investigation.
7.9 However, given the relatively thick made ground encountered at the site and underlying Secondary A aquifer, it is advised that groundwater standpipes are installed and subsequent monitoring and groundwater testing is undertaken to gain further data to fully assess the risks to controlled waters.

Ground Gases/Vapour

7.10 Groundwater/ground gas standpipes and subsequent monitoring visits were not requested during the current intrusive investigation.

7.11 However, given the relatively thick made ground encountered at the site, it is advised that groundwater/ground gas standpipes are installed and subsequent ground gas monitoring is undertaken to gain further data to fully assess the risks from ground gases prior to final design.

Additional Comments

7.12 As always, the above recommendations are based on a selected number of representative samples, with sampling locations based on the information available at the time of this investigation.

Prepared By: James Blyth BSc (Hons)
Junior Geo-Environmental Engineer

Reviewed By: Jack Hunter BSc (Hons), AMIEnvSc
Senior Geo-Environmental Engineer

References

END OF REPORT
a) This report has been prepared for the purpose of providing advice to the client pursuant to its appointment of Chelmer Site Investigation Laboratories Limited (CSI) to act as a consultant.  
b) Save for the client no duty is undertaken or warranty or representation made to any party in respect of the opinions, advice, recommendations or conclusions herein set out.  
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q) In addition CSI will not be liable for any loss whatsoever arising directly or indirectly from any opinion within this report.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample</th>
<th>Test Result</th>
<th>Depth (m)</th>
<th>Thickness (m)</th>
<th>Legend</th>
<th>Strata Description</th>
<th>Root Information</th>
<th>Groundwater (m)</th>
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<td>GL</td>
<td>GL</td>
<td>0.05</td>
<td>GL</td>
<td>0.05</td>
<td>CARDM</td>
<td>MADE GRUND: Dark brown very sandy clayey silt with occasional brick, concrete, wood fragments and gravel. Gravel is sub-angular of fine flint.</td>
<td>No roots observed.</td>
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<tr>
<td>0.25</td>
<td>D</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1.00</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.50</td>
<td>D</td>
<td>SPT 02/03</td>
<td>03</td>
<td>02</td>
<td>03</td>
<td>3.85</td>
<td>With occasional brick fragments at 1.50m.</td>
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</tr>
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<td>D</td>
<td></td>
<td>03</td>
<td></td>
<td></td>
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<td>2.50</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>3.00</td>
<td>D</td>
<td>SPT 03/04</td>
<td>03</td>
<td>02</td>
<td>03</td>
<td>3.90</td>
<td>With coarse gravel at 3.50m.</td>
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</tr>
<tr>
<td>3.50</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.00</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medium dense dark brown very sandy sub-angular to well-rounded fine to coarse flint GRAVEL. Sand is fine to coarse.</td>
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</tr>
<tr>
<td>4.50</td>
<td>D</td>
<td>SPT 04/06</td>
<td>04</td>
<td>05</td>
<td>05</td>
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<td>5.00</td>
<td>D</td>
<td></td>
<td>05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.50</td>
<td>D</td>
<td>SPT 08/10</td>
<td>11</td>
<td>09</td>
<td>09</td>
<td>4.10</td>
<td>Gravel becoming medium to coarse from 5.50m.</td>
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</tr>
<tr>
<td>6.00</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>With rare gravel at 6.50m. Gravel becoming coarse.</td>
<td></td>
</tr>
<tr>
<td>7.00</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becoming sandy from 7.00m.</td>
<td></td>
</tr>
<tr>
<td>7.50</td>
<td>D</td>
<td>SPT 10/11</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>8.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.00</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dense yellowish brown silty very gravelly fine to coarse SAND. Gravel is sub-angular to rounded of fine to medium flint.</td>
<td></td>
</tr>
<tr>
<td>8.10</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BOREHOLE TERMINATED AT 8.10m</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
Borehole dry and collapsed to 5.00m on completion.
Sample not representative from 3.90m due to recovery.

**Key:**
- CFA: Continuous Flight Auger
- GL: Ground Level
- D: Small Disturbed Sample
- SPT N: Standard Penetration Test Blow Count
Made ground: Dark brown clayey sandy silt/silty fine to coarse sand with numerous brick, concrete and clinker-like fragments. Sand is fine to medium. No roots observed.

Trial Pit Terminated at 1500mm

All dimensions in millimetres.
Trial Pit Log

Site: Wiltshire Close Estate, Denyer Street, London, SW3
Client: Proun Architects
Trial Pit ID: TP1B

Contract No: 8181
Date: 15.12.16
Logged By: JP
Checked by: JH
Weather: Overcast
Sheet 1 of 1

Easting: ND
Northing: ND
Ground Level: ND
Excavation Method: Hand Tools
Scale: NTS

Trial Pit Terminated at 1500mm

Made ground: Dark brown clayey sandy silt with numerous brick, concrete and clinker-like fragments. Sand is fine to medium.
No roots observed.

Remarks:
All dimensions in millimetres.

Key:
GL Ground Level
D Small Disturbed Sample
M Mackintosh Probe
V Pilicon Vane (kPa)
Trial Pit Log

Site: Wiltshire Close Estate, Denyer Street, London, SW3
Client: Proun Architects
Trial Pit ID: TP2

Contract No: 8181  Date: 15.12.16  Logged By: JP  Checked by: JH  Weather: Overcast


Weather: Overcast

Remarks:

All dimensions in millimetres.

Key:
- GL: Ground Level
- D: Small Disturbed Sample
- M: Mackintosh Probe

Made ground: Dark brown clayey very silty fine to coarse sand with numerous brick, concrete and clinker-like fragments. Sand is fine to medium.

No roots observed.
Analytical Report Number: 17-10297

Issue: 1

Date of Issue: 23/01/2017

Contact: Steve Green

Customer Details: Chelmer Site Investigations Ltd
Unit 15
East Hanningfield Ind Est
Chelmsford
Essex CM3 8AB

Quotation No: Q16-00625

Order No: 7633

Customer Reference: CGL8181-C

Date Received: 18/01/2017

Date Approved: 23/01/2017

Details: 7025 Denyer Street

Approved by:

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)
# Sample Summary

Report No.: 17-10297

<table>
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<th>Elab No.</th>
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<th>Date Sampled</th>
<th>Date Scheduled</th>
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<td>85908</td>
<td>TP2 83288 0.25</td>
<td>15/01/2017</td>
<td>18/01/2017</td>
<td>Sandy silty loam</td>
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<td>85909</td>
<td>BH1 83289 0.50</td>
<td>15/01/2017</td>
<td>18/01/2017</td>
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<td>85910</td>
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<td>18/01/2017</td>
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### Results Summary

**Report No.: 17-10297**

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<th>Determinand</th>
<th>Codes</th>
<th>Units</th>
<th>LOD</th>
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<tr>
<td>Arsenic</td>
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<td>mg/kg</td>
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<td>Cadmium</td>
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<td>Chromium</td>
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<td>M</td>
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<tr>
<td>Mercury</td>
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<td>mg/kg</td>
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</tr>
<tr>
<td>Nickel</td>
<td>M</td>
<td>mg/kg</td>
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<tr>
<td>Selenium</td>
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<tr>
<td>Zinc</td>
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<td>mg/kg</td>
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<td><strong>Anions</strong></td>
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<tr>
<td>Water Soluble Sulphate</td>
<td>M</td>
<td>g/l</td>
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<td><strong>Inorganics</strong></td>
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<tr>
<td>Elemental Sulphur</td>
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<tr>
<td>Total Sulphide</td>
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<td>mg/kg</td>
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<tr>
<td>Total Cyanide</td>
<td>M</td>
<td>mg/kg</td>
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<tr>
<td>Acid Soluble Sulphate (SO4)</td>
<td>U</td>
<td>%</td>
<td>0.02</td>
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<td><strong>Miscellaneous</strong></td>
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<td>Acid Neutralisation Capacity</td>
<td>N</td>
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<tr>
<td>Loss On Ignition (450°C)</td>
<td>M</td>
<td>%</td>
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<tr>
<td>pH</td>
<td>M</td>
<td>pH units</td>
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<tr>
<td>Total Organic Carbon</td>
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<td><strong>Phenols</strong></td>
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<td><strong>Polyaromatic hydrocarbons</strong></td>
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<tr>
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<tr>
<td>Acenaphthylene</td>
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<td>mg/kg</td>
<td>0.1</td>
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<tr>
<td>Acenaphthene</td>
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<td>mg/kg</td>
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<tr>
<td>Fluorene</td>
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<tr>
<td>Phenanthrene</td>
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<td>mg/kg</td>
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<td>Anthracene</td>
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<td>Pyrene</td>
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<td>Benzo(a)anthracene</td>
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<td>mg/kg</td>
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<tr>
<td>Chrysene</td>
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<td>Benzo (b) fluoranthene</td>
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<td>Benzo(k)fluoranthen</td>
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<tr>
<td>Benzo (a) pyrene</td>
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<tr>
<td>Indeno (1,2,3-cd) pyrene</td>
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<tr>
<td>Dibenz(o,h)anthracene</td>
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<td>Benzo(g,h,i)perylene</td>
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<tr>
<td>Total PAH(16)</td>
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<td>Total PAH (Including Coronene)</td>
<td>N</td>
<td>mg/kg</td>
<td>2</td>
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Tests marked N are not UKAS accredited.

The Environmental Laboratory Ltd. Reg. No. 3882193
### Results Summary

**Report No.: 17-10297**

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<tr>
<th>ELAB Reference</th>
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<td>83288</td>
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<td>15/01/2017</td>
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<td>SOIL</td>
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<td>0.50</td>
<td>15/01/2017</td>
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<td>SOIL</td>
<td>BH1</td>
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#### Determinand

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<tr>
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<tr>
<td>Toluene</td>
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<td>Ethylbenzene</td>
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<td>Xylenes</td>
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<td>MTBE</td>
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<td>Total BTEX</td>
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#### >C5-C6 Aliphatic

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<td>&gt;C35-C40 Aliphatic</td>
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#### >C7-C8 Aromatic

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<th>Codes</th>
<th>Units</th>
<th>LOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;C8-C10 Aromatic</td>
<td>N</td>
<td>mg/kg</td>
<td>1</td>
</tr>
<tr>
<td>&gt;C10-C12 Aromatic</td>
<td>N</td>
<td>mg/kg</td>
<td>1</td>
</tr>
<tr>
<td>&gt;C12-C16 Aromatic</td>
<td>N</td>
<td>mg/kg</td>
<td>1</td>
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<tr>
<td>&gt;C16-C21 Aromatic</td>
<td>N</td>
<td>mg/kg</td>
<td>1</td>
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<tr>
<td>&gt;C21-C35 Aromatic</td>
<td>N</td>
<td>mg/kg</td>
<td>1</td>
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<tr>
<td>&gt;C35-C40 Aromatic</td>
<td>N</td>
<td>mg/kg</td>
<td>1</td>
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</table>

#### Total (>C5-C40) Ali/Aro

<table>
<thead>
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<th>Codes</th>
<th>Units</th>
<th>LOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral Oil</td>
<td>U</td>
<td>mg/kg</td>
<td>5</td>
</tr>
<tr>
<td>PCB (Total of 7 congeners)</td>
<td>M</td>
<td>mg/kg</td>
<td>0.03</td>
</tr>
<tr>
<td>PCB (ICES 7 congeners)</td>
<td>M</td>
<td>mg/kg</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Tests marked N are not UKAS accredited.

The Environmental Laboratory Ltd. Reg. No. 3882193
### Results Summary

**Report No.:** 17-10297

**Site:** 7025 Denyer Street

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Code</th>
<th>Units</th>
<th>Inert Waste Landfill</th>
<th>Stable Non-reactive Hazardous waste in non-hazardous Landfill</th>
<th>Hazardous Waste Landfill</th>
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<tbody>
<tr>
<td>Total Organic Carbon</td>
<td>N</td>
<td>%</td>
<td>1.60</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Loss on Ignition</td>
<td>M</td>
<td>%</td>
<td>2.9</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total BTEX</td>
<td>M</td>
<td>mg/kg</td>
<td>&lt; 0.01</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>Total PCBs (7 congeners)</td>
<td>M</td>
<td>mg/kg</td>
<td>&lt; 0.03</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>TPH Total WAC</td>
<td>M</td>
<td>mg/kg</td>
<td>8</td>
<td>500</td>
<td>--</td>
</tr>
<tr>
<td>Total (of 17) PAHs</td>
<td>N</td>
<td>mg/kg</td>
<td>40.0</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>pH</td>
<td>M</td>
<td>8.2</td>
<td>--</td>
<td>&gt;6</td>
<td>--</td>
</tr>
<tr>
<td>Acid Neutralisation Capacity</td>
<td>N</td>
<td>mol/kg</td>
<td>&lt; 0.1</td>
<td>--</td>
<td>To evaluate</td>
</tr>
</tbody>
</table>

**Eluate Analysis**

Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Code</th>
<th>Units</th>
<th>10:1 mg/l</th>
<th>10:1 mg/kg</th>
<th>Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>N</td>
<td>0.005</td>
<td>0.05</td>
<td>0.5</td>
<td>25</td>
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<tr>
<td>Barium</td>
<td>N</td>
<td>0.014</td>
<td>0.14</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Cadmium</td>
<td>N</td>
<td>&lt; 0.001</td>
<td>&lt; 0.01</td>
<td>0.04</td>
<td>1</td>
</tr>
<tr>
<td>Chromium</td>
<td>N</td>
<td>&lt; 0.005</td>
<td>&lt; 0.05</td>
<td>0.5</td>
<td>10</td>
</tr>
<tr>
<td>Copper</td>
<td>N</td>
<td>0.006</td>
<td>0.06</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>Mercury</td>
<td>N</td>
<td>&lt; 0.005</td>
<td>&lt; 0.01</td>
<td>0.01</td>
<td>0.2</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>N</td>
<td>0.008</td>
<td>0.08</td>
<td>0.5</td>
<td>10</td>
</tr>
<tr>
<td>Nickel</td>
<td>N</td>
<td>&lt; 0.001</td>
<td>&lt; 0.05</td>
<td>0.4</td>
<td>10</td>
</tr>
<tr>
<td>Lead</td>
<td>N</td>
<td>0.002</td>
<td>&lt; 0.05</td>
<td>0.5</td>
<td>10</td>
</tr>
<tr>
<td>Antimony</td>
<td>N</td>
<td>0.006</td>
<td>0.06</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Selenium</td>
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<td>&lt; 0.005</td>
<td>&lt; 0.05</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Zinc</td>
<td>N</td>
<td>&lt; 0.005</td>
<td>&lt; 0.05</td>
<td>4</td>
<td>50</td>
</tr>
<tr>
<td>Chloride</td>
<td>N</td>
<td>&lt; 5</td>
<td>&lt; 50</td>
<td>800</td>
<td>15000</td>
</tr>
<tr>
<td>Fluoride</td>
<td>N</td>
<td>&lt; 5</td>
<td>&lt; 10</td>
<td>10</td>
<td>150</td>
</tr>
<tr>
<td>Sulphate</td>
<td>N</td>
<td>17</td>
<td>168.00</td>
<td>1000</td>
<td>20000</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>N</td>
<td>&lt; 100</td>
<td>1000.00</td>
<td>4000</td>
<td>60000</td>
</tr>
<tr>
<td>Phenol Index</td>
<td>N</td>
<td>&lt; 0.01</td>
<td>&lt; 0.10</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Dissolved Organic Carbon</td>
<td>N</td>
<td>5.900</td>
<td>59.00</td>
<td>500</td>
<td>800</td>
</tr>
</tbody>
</table>

**Leach Test Information**

<table>
<thead>
<tr>
<th>Determinand</th>
<th>Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>N</td>
<td>7.7</td>
</tr>
<tr>
<td>Conductivity (uS/cm)</td>
<td>N</td>
<td>156</td>
</tr>
<tr>
<td>Dry mass of test portion (g)</td>
<td></td>
<td>101.00</td>
</tr>
<tr>
<td>Dry Matter (%)</td>
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<td>86</td>
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<tr>
<td>Moisture (%)</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Eluent Volume (ml)</td>
<td></td>
<td>975</td>
</tr>
</tbody>
</table>

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

Stated limits are for guidance only and ELAB cannot be held responsible for any discrepancies with current legislation.
## Results Summary

### Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No.2683). They are subjective comments only which must be verified by the client.

<table>
<thead>
<tr>
<th>Elab No</th>
<th>Depth (m)</th>
<th>Clients Reference</th>
<th>Description of Sample Matrix #</th>
<th>Asbestos Identification</th>
<th>Gravimetric Analysis Total (%)</th>
<th>Gravimetric Analysis by ACM Type (%)</th>
<th>Free Fibre Analysis (%)</th>
<th>Total Asbestos (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>85908</td>
<td>0.25</td>
<td>TP2 83288</td>
<td>Brown soil, brick, stones, clinker</td>
<td>No asbestos detected</td>
<td>n/t</td>
<td>n/t</td>
<td>n/t</td>
<td>n/t</td>
</tr>
<tr>
<td>85909</td>
<td>0.50</td>
<td>BH1 83289</td>
<td>Brown soil, stones, clinker</td>
<td>No asbestos detected</td>
<td>n/t</td>
<td>n/t</td>
<td>n/t</td>
<td>n/t</td>
</tr>
</tbody>
</table>

The Environmental Laboratory Ltd. Reg. No. 3882193
# Method Summary

**Report No.: 17-10297**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Codes</th>
<th>Analysis Undertaken On</th>
<th>Date Tested</th>
<th>Method Number</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphide</td>
<td>N</td>
<td>As submitted sample</td>
<td>19/01/2017</td>
<td>109</td>
<td>Colorimetry</td>
</tr>
<tr>
<td>Acid Soluble Sulphate</td>
<td>U</td>
<td>Air dried sample</td>
<td>23/01/2017</td>
<td>115</td>
<td>Ion Chromatography</td>
</tr>
<tr>
<td>Aqua regia extractable metals</td>
<td>M</td>
<td>Air dried sample</td>
<td>20/01/2017</td>
<td>118</td>
<td>ICPMS</td>
</tr>
<tr>
<td>Phenols in solids</td>
<td>N</td>
<td>As submitted sample</td>
<td>19/01/2017</td>
<td>121</td>
<td>HPLC</td>
</tr>
<tr>
<td>Elemental Sulphur</td>
<td>N</td>
<td>Air dried sample</td>
<td>20/01/2017</td>
<td>122</td>
<td>HPLC</td>
</tr>
<tr>
<td>PAH (GC-FID)</td>
<td>M</td>
<td>As submitted sample</td>
<td>19/01/2017</td>
<td>133</td>
<td>GC-FID</td>
</tr>
<tr>
<td>Water soluble anions</td>
<td>M</td>
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<td>20/01/2017</td>
<td>172</td>
<td>Ion Chromatography</td>
</tr>
<tr>
<td>Total cyanide</td>
<td>M</td>
<td>As submitted sample</td>
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<td>Colorimetry</td>
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<tr>
<td>Aliphatic hydrocarbons in soil</td>
<td>N</td>
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<td>19/01/2017</td>
<td>214</td>
<td>GC-FID</td>
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<tr>
<td>Aromatic hydrocarbons in soil</td>
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<td>Low range Aliphatic hydrocarbons soil</td>
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<td>214</td>
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<td>Asbestos identification</td>
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**Leachate**

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<th>Codes</th>
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<th>Date Tested</th>
<th>Method Number</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic*</td>
<td>N</td>
<td></td>
<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
</tr>
<tr>
<td>Cadmium*</td>
<td>N</td>
<td></td>
<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
</tr>
<tr>
<td>Chromium*</td>
<td>N</td>
<td></td>
<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
</tr>
<tr>
<td>Lead*</td>
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<td></td>
<td>23/01/2017</td>
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<td>ICPMS</td>
</tr>
<tr>
<td>Nickel*</td>
<td>N</td>
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<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
</tr>
<tr>
<td>Copper*</td>
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<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
</tr>
<tr>
<td>Zinc*</td>
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<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
</tr>
<tr>
<td>Mercury*</td>
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<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
</tr>
<tr>
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</tr>
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<td>ICPMS</td>
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<td>N</td>
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<td>23/01/2017</td>
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<td>ICPMS</td>
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<td>Molybdenum*</td>
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<td>23/01/2017</td>
<td>101</td>
<td>ICPMS</td>
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<tr>
<td>pH Value*</td>
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<td>23/01/2017</td>
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<td>Electrical Conductivity*</td>
<td>N</td>
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<td>Dissolved Organic Carbon</td>
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<td>TOC analyser</td>
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<td>Chloride*</td>
<td>N</td>
<td></td>
<td>23/01/2017</td>
<td>131</td>
<td>Ion Chromatography</td>
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<tr>
<td>Fluoride*</td>
<td>N</td>
<td></td>
<td>23/01/2017</td>
<td>131</td>
<td>Ion Chromatography</td>
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<tr>
<td>Sulphate*</td>
<td>N</td>
<td></td>
<td>23/01/2017</td>
<td>131</td>
<td>Ion Chromatography</td>
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<tr>
<td>Total Dissolved Solids</td>
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<td>Phenol index</td>
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</table>

**WAC Solids analysis**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Codes</th>
<th>Analysis Undertaken On</th>
<th>Date Tested</th>
<th>Method Number</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH Value**</td>
<td>M</td>
<td>Air dried sample</td>
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<td>Total Organic Carbon</td>
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<td>Loss on Ignition**</td>
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<tr>
<td>Acid Neutralization Capacity to pH 7</td>
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<td>Air dried sample</td>
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<td>NEN 737</td>
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<td>Total BTEX**</td>
<td>M</td>
<td>As submitted sample</td>
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<td>181</td>
<td>GCMS</td>
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<tr>
<td>Mineral Oil**</td>
<td>U</td>
<td>As submitted sample</td>
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<td>117</td>
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<tr>
<td>Total PCBs (7 congeners)</td>
<td>M</td>
<td>Air dried sample</td>
<td>20/01/2017</td>
<td>120</td>
<td>GCMS</td>
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<tr>
<td>Total PAH (17)**</td>
<td>N</td>
<td>As submitted sample</td>
<td>20/01/2017</td>
<td>133</td>
<td>GC-FID</td>
</tr>
</tbody>
</table>

Tests marked N are not UKAS accredited
Report Information
Report No.: 17-10297

Key

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>hold UKAS accreditation</td>
</tr>
<tr>
<td>M</td>
<td>hold MCERTS and UKAS accreditation</td>
</tr>
<tr>
<td>N</td>
<td>do not currently hold UKAS accreditation</td>
</tr>
<tr>
<td>^</td>
<td>MCERTS accreditation not applicable for sample matrix</td>
</tr>
<tr>
<td>*</td>
<td>UKAS accreditation not applicable for sample matrix</td>
</tr>
<tr>
<td>S</td>
<td>Subcontracted to approved laboratory UKAS Accredited for the test</td>
</tr>
<tr>
<td>SM</td>
<td>Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test</td>
</tr>
<tr>
<td>I/S</td>
<td>Insufficient Sample</td>
</tr>
<tr>
<td>U/S</td>
<td>Unsuitable sample</td>
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<tr>
<td>n/t</td>
<td>Not tested</td>
</tr>
<tr>
<td>&lt;</td>
<td>means &quot;less than&quot;</td>
</tr>
<tr>
<td>&gt;</td>
<td>means &quot;greater than&quot;</td>
</tr>
</tbody>
</table>

Soil sample results are expressed on an air dried basis (dried at < 30°C)
Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviations Codes

- a  No date of sampling supplied
- b  No time of sampling supplied (Waters Only)
- c  Sample not received in appropriate containers
- d  Sample not received in cooled condition
- e  The container has been incorrectly filled
- f  Sample age exceeds stability time (sampling to receipt)
- g  Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage
<table>
<thead>
<tr>
<th>Location: 7025 Denyer Street</th>
<th>Date : 15/01/2017</th>
<th>Job No. : 8181</th>
<th>Sheet 1 of 1</th>
</tr>
</thead>
</table>

### Contamination Test Results on Soil Samples

#### Borehole No.
- **TP2**
- **BH1**
- **BH1**

#### Sample No.
- **83288**
- **83289**
- **83290**

#### Depth (m)
- **0.25**
- **0.50**
- **1.00**

#### Material Type
- **SOIL**
- **SOIL**
- **SOIL**

#### Aromatic Hydrocarbons (mg/kg)

<table>
<thead>
<tr>
<th>Material</th>
<th>Residential with plant uptake</th>
<th>Residential without plant uptake</th>
<th>Allotments</th>
<th>Commercial/Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;C5-C7</td>
<td>&lt; 0.01</td>
<td>n/t</td>
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<tr>
<td>&gt;C7-C8</td>
<td>&lt; 0.01</td>
<td>n/t</td>
<td></td>
<td></td>
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<tr>
<td>&gt;C8-C10</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
<td></td>
<td></td>
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<tr>
<td>&gt;C10-C12</td>
<td>&lt; 1.0</td>
<td>&lt; 1.0</td>
<td></td>
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</tr>
<tr>
<td>&gt;C12-C16</td>
<td>&lt; 1.0</td>
<td>&lt; 1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;C16-C21</td>
<td>8.2</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;C21-C35</td>
<td>28.6</td>
<td>23.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Aliphatic Hydrocarbons (mg/kg)

<table>
<thead>
<tr>
<th>Material</th>
<th>Commercial/Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;C5-C6</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>&gt;C6-C8</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>&gt;C8-C10</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>&gt;C10-C12</td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>&gt;C12-C16</td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>&gt;C16-C21</td>
<td>4.1</td>
</tr>
<tr>
<td>&gt;C21-C35</td>
<td>2.1</td>
</tr>
</tbody>
</table>

#### Naphthalene
- **mg/kg**
- **< 0.1**
- **0.2**
- **n/t**

#### Total PAH
- **mg/kg**
- **64.6**
- **39.0**
- **40**

#### Cyanide (Free)
- **mg/kg**
- **2.0**
- **< 1.0**
- **n/t**

#### pH
- **unit**
- **9.2**
- **8.0**
- **8.2**

#### Copper (Total)
- **mg/kg**
- **94.0**
- **104**

#### Lead (Total)
- **mg/kg**
- **552**
- **523**

#### Zinc (Total)
- **mg/kg**
- **207**
- **385**

#### Chromium (Total)
- **mg/kg**
- **27.2**
- **27.0**
- **n/t**

#### Arsenic (Total)
- **mg/kg**
- **16.9**
- **28.0**
- **n/t**

#### Cadmium (Total)
- **mg/kg**
- **0.9**
- **< 0.5**
- **n/t**

#### Mercury (Total)
- **mg/kg**
- **0.9**
- **2.2**
- **n/t**

#### Nickel (Total)
- **mg/kg**
- **21.1**
- **29.5**
- **n/t**

#### Phenols (Total)
- **mg/kg**
- **< 6**
- **< 6**
- **n/t**

#### Selenium (Total)
- **mg/kg**
- **< 1.0**
- **< 1.0**
- **n/t**

#### Total Sulphate as SO4
- **mg/kg**
- **n/t**
- **n/t**
- **n/t**

#### W/S Sulphate as SO4 (2:1)
- **g/l**
- **0.20**
- **0.37**
- **n/t**

#### Elemental Sulphur
- **mg/kg**
- **54**
- **45**
- **n/t**

#### Sulphide
- **mg/kg**
- **< 2**
- **< 2**
- **n/t**

### Key
- **PAH** - Polyaromatic Hydrocarbons
- **TPH** - Total Petroleum Hydrocarbons
- **- Not determined**

### Notes
- Result exceeds ATRISK screening value
- Result exceeds EQS/CIEH generic assessment criteria
- Result exceeds CLEA Soil Guideline Value (SGV)
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ARCHITECTS     DESIGNERS      PLANNERS
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Tel: 020 7407 3700   Fax: 020 7407 3800

GROUND FLOOR PLAN
STORE  & STAFF FACILITIES
PROPOSED NEW BARROW
1 : 100 @ A3

REV.
DATE
DESCRIPTION
A
14-07-16
PRIVATE GARDEN ADDED
B
20-07-16
LANDSCAPING ADDED

NORTH

GROSS EXTERNAL AREA : 207.3m2

NB: DIMENSIONS ARE APPROXIMATE

SCALE
0  1.0  2.0  3.0m
0  2  4  6  8

1.0
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

12
17
18
19
20

0.5
1
1.5
2

0
2
4
6
8

PROPOSED NEW PRIVATE GARDEN

MALE CHANGING

FEMALE CHANGING
OFFICE

WC

WC

MALE

FEMALE

WC

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