# 1119 Ashton Old Road, Manchester

## Ground Investigation Report

**Report for:**

# Eco NRG Solutions Ltd

Date: 1st September 2017

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T & P Regeneration Ltd

Unit 4, Brunel Lock Development

Smeaton Road

Bristol

BS1 6SE

Tel: 0117 927 7756

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| | | |
| **Raife Crookes** | **Helen Matheson /James Dodd** | **Mike Nicholas** |

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# EXECUTIVE SUMMARY

| | | |
|---|---|---|
| Project information and site setting | **Project details** | This ground investigation report has been prepared by T&P Regeneration Ltd (T&P) on behalf of Eco NRG Solutions Ltd for the site located north of Old Ashton Road, Manchester – postcode M11 1AA / NGR: 388635, 397445.<br>This report presents a review of third party Phase 1 desk study information and the findings of a Phase 2 intrusive ground investigation. |
| | **Current land use** | At the time of the ground investigation works, the site was found to be a rectangular parcel of land approximately 35m by 46m orientated northeast to southwest, currently used as a storage area by the neighbouring car body/ auto repair shop.<br>Access was gained via a wide double gate in the north east of the site. At the time of the walkover it was noted that a wire basket containing a number of sealed and unsealed containers was present in the north of the site. Signs of burning and staining of the surrounding ground area was identified. |
| | **Development** | The potential future development will comprise the construction of a STOR gas generator plant. Current proposed plans show the commercial development to consist of approximately 85% hardstanding and 15% gravel cover, a warehouse style building, substation and oil and gas storage tanks. |
| Phase 1 desk study assessment and conceptual model | **Environmental setting** | Published geological records indicate that the site is underlain by Superficial Devensian Till (Secondary – Undifferentiated aquifer). Underlying the Till the Chester Pebble Bed Formation, a principal aquifer is recorded.<br>Historical boreholes less than 50m from the site, record the superficial deposits to extend to at least 24 metres below ground level (mbgl).<br>There are no surface water features within a 500m radius of the site.<br>There are no licensed groundwater, potable water or surface water abstractions within 500m of the site. |
| | **Radon** | The site is situated inside a 1km$^2$ Ordnance Survey (OS) grid area where between <1% of properties are within a Radon Affected area, therefore radon protection measures will not be required. |
| | **Site history** | In summary, the site has been previously associated with a number of industrial land uses including a Cotton Mill and Works (Iron Foundry, Dye and Print Works). These different uses have seen the site be incorporated with buildings to the south and north, with satellite imagery suggesting current levels were reached in 2009.<br>Neighbouring industrial land uses included oil, steel, engineering and chemical works. Infilling of a canal (registered landfill) to the immediate west and a sand pit 100m to the north of the site. Historical Openshaw Bridge Works 50m east are identified as manufacturing/handling insulation material. |
| | **Areas of potential concern** | Areas of potential concern in relation to ground contamination have been identified as follows:<br>• Unsealed and discarded chemical containers in the north central area of site, including thinners and other unlabelled chemicals;<br>• Gas and contaminant migration from the infilled canal/ landfill to the immediate west;<br>• Contaminant migration from industrial practices in the surrounding area;<br>• Made ground from historical industrial activities and miscellaneous development on site;<br>• Former refuse pit located approximately 98m north-east of site which may have been infilled with made ground of unknown composition. |

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| Phase 2 Ground investigation | **T&P ground investigation** | An intrusive ground investigation was undertaken by T&P at the site on Friday 28th April and in summary comprised the following:<br>Drilling of 7No dynamic soil sampling boreholes;<br>Installation of 3No boreholes as environmental monitoring wells;<br>Ground gas monitoring on 6No occasions;<br>Logging of ground conditions and soil sampling by a suitably qualified engineer.<br>Selected samples collected during the ground investigation were submitted to the laboratory for geotechnical and environmental testing. |
| | **Ground conditions** | Made ground was found within all exploratory hole locations to depths of 0.70m to 1.2mbgl. This was found to comprise dark gravelly sand and sandy gravelly clay. The gravel was angular fine to coarse of red brick, concrete, ceramics, plastic, glass and wood.<br>Underneath the made ground to maximum depths of 1.8 – 2.2mbgl stiff to very stiff orangish brown mottled grey occasionally sandy clay was encountered. Underling this to an unconfirmed maximum depth of 5mbgl a dense to very dense occasionally slightly clayey sand was encountered. The clay and sand is considered to be representative of the Superficial Till Deposits recorded in the area by BGS mapping. |
| | **Groundwater** | Groundwater was encountered within WS01, WS04, WS06 and WS07 at 3m bgl during the ground investigation. |
| Principal findings and conclusions | **Human health** | Chemical analysis has shown that potential contaminants within the both the made ground (except within WS04) and natural ground are beneath the adopted screening levels for a commercial development.<br>A singular raised elevation of Lead – 4030mg/kg was detected within the made ground sample WS04 (0.5 – 0.8m bgl). This has been identified as a hotspot, however based upon the proposed design this will be encapsulated underneath areas of hardstanding and will not pose a risk to the critical receptor. |
| | **Controlled waters** | Based on the available information, we consider that the risk posed to the controlled waters by potential sources of contamination on site is low.<br>This is based upon the proposed development limiting percolation/leaching and subsequent vertical migration of determinants, evidence of monitoring of the sand band within the underlying Till is not a significant water bearing unit and chemical testing demonstrating a significant reduction in contaminant concentrations with depth. |
| | **Gas protection** | A six-week gas monitoring regime has been completed at the site and has demonstrated the site to be a categorised as a Characteristic Situation 1 (CS1). As such gas protection measures will not be required within the design.<br>The site is also shown to be in an area where <1% of homes are affected by radon gas, so radon protection measures will not be required on the site. |
| | **Plant growth and buried potable supply pipework** | The site wide made ground on site is not typically considered suitable for existing flora. However, current flora on site does not show signs of wilting.<br>Upgraded pipework will be required where placed within the existing made ground. |

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| | **Waste** | The topsoil and natural ground and the majority of the made ground is classified as non-hazardous waste. The chemical data indicates the soil will likely be treated as inert or stable non-reactive waste, avoiding the higher rate of landfill tax.<br>In locations where hazardous waste has been identified, (made ground in the areas of WS02, 03, 04 and SS01) the material will need to be dealt with separately to the majority of the material being removed from site. It is recommended that the hazardous material is segregated and removed as hazardous waste. Receiving landfills will require WAC testing to be carried out on the hazardous waste in order to determine whether or not it can be classified as inactive material which would mean that it could avoid the higher landfill tax rate. |
| | **Engineering design** | The cohesive soils have shown to be of moderate shrinkage potential.<br>CBR values have not been provided for the site, although made ground is not typically classed as suitable for use beneath adoptable road, due to the private nature of the hardstanding on site, it may be applicable to utilise the made ground as a formation surface, in such situation coarse material should be removed as to prevent differential settlement.<br>It is considered that pad foundations (1m by 1m) placed at depths of 1.2mbgl within the cohesive clay could be designed for an allowable bearing pressure of 125kPa. Should a larger bearing pressure be required, a 1.5m by 1.5m pad at 2.0mbgl within the sand could be designed for an allowable bearing capacity of 250kPa for acceptable settlement.<br>Sulphate testing of selected soil samples indicates that a suitable design mix for concrete for buried structures is likely to be DS1-AC1s.<br>Any inflows into excavations above this depth would be expected to be low and should be adequately dealt with via sump pumping. Where excavations will surpass 3m below current ground levels the use of specialist dewatering techniques will likely be required and the advice of specialist dewatering contractors should be sought. |
| | **Considerations** | The conceptual site model has been based on the current proposed development which involves the majority of site becoming hard standing and gravelled area. Any updates to this design should be assessed against the recommendations within this report. |

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| **Considerations and further works** | **Recommendations** | <u>Human health/Controlled Waters</u><br><br>• Based upon laboratory testing a Lead hotspot has been identified within the eastern corner of the site (WS04). Based upon the current proposed development plan this area will be capped and the pathway to critical receptors removed.<br>• Where gross soil contamination has been identified i.e. non-aqueous phase (NAPL), such as in the vicinity of SS01, which is anticipated to be the result of surface spillage of oils/solvents observed to be stored on-site, it is recommended that this is removed during construction, under a watching brief to further reduce the risks to Controlled Waters in accordance with best practice. This will further lower the residual vapour risk to future site users.<br>• Although through the redevelopment of the site the risks to receptors is low, advice and controls should be put in place for those visiting and using the site currently.<br><br><u>Plant growth and potable water supply pipework</u><br><br>• The made ground soils on-site are not considered suitable for plant growth. However the proposed layout doesn't identify any areas of planting and as such this is not considered to require any specific action.<br>• Upgraded potable pipework will be required in all areas of made ground on site.<br><br><u>Engineering</u><br><br>• The cohesive Till deposits have been characterized as having medium volume change potential, as such foundations should be a minimum of 0.9mbgl. These soils will also be moderately effected by on site trees and hedgerows, as such it is recommended that an arboricultural survey of the site should be consulted during foundation design.<br>• 1m by 1m pad foundations at a depth of 1.2mbgl could be designed for an allowable bearing capacity of 125kPa for allowable settlement within the cohesive Till Deposits. In the event that greater pad sized are required and or a larger bearing capacity, pads within the granular sand deposits could be designed for a allowable bearing capacity of 250kPa.<br>• Based upon the Hazwaste results it is expected that where disposal is required the made ground in the east of the site will be classed as hazardous and be at the higher tax rate, while areas in the west will be classed as non-Hazardous and be at the standard rate.<br><br><u>General</u><br><br>• The statutory water provider should be consulted regarding suitable water supply pipework requirements.<br>• Discussions should be held with local landfill facilities to determine their classification for any soils to be disposed off-site arising from its development.<br>• A site-specific health and safety plan should be prepared to inform on risks posed from the previous site use and mitigations for ground workers developing the site e.g. requirements for appropriate PPE, hygiene practices, environmental monitoring and requirements for mitigation measures during construction works.<br>• Construction workers should remain vigilant for visible and olfactory signs of gross contamination which has not been identified and assessed within this ground investigation. In the event that gross contamination is found an environmental engineer should be consulted. |

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| | | • On-site boreholes should be decommissioned in accordance with Environment Agency guidance prior to development.<br>• The relevant regulatory authorities should be forwarded a copy of the ground investigation report, to confirm that they are in agreement with the conclusions and recommendations herein. |

# 1 INTRODUCTION

## 1.1 Contract details

Following instruction from Eco NRG Solutions Ltd – 'the client', this report presents the results of a geo-environmental ground investigation undertaken to support planning application 113808/FO/2016 for a commercial Energy Reserve Facility at 1119 Ashton Old Road, Manchester - 'the site'.

## 1.2 Proposed development

Information presented to T&P Regeneration Ltd (T&P) indicates that planned development is to comprise the erection of a single story building to form a small-scale gas fired Energy Reserve Facility involving flues to roof, associated outbuildings, plant, hardstanding and boundary treatment.

A proposed layout is included as Appendix A.

## 1.3 Purpose of the assessment

The purpose of the assessment has been to establish the environmental and geotechnical conditions of the site to support discharge of conditions relating to planning consent ref 113808/FO/2016. This report also considers the likely foundation options appropriate to the site, along with requirements for any related ground improvement works and/or remediation considered necessary to mitigate against any unacceptable human health or environmental risks resulting from existing or former land uses.

## 1.4 Previous reports

A desk study and preliminary risk assessment was previously completed for the site by a third party[1]. Pertinent information from the report and existing Groundsure report (issued August 2016) is summarised and used within this assessment.

## 1.5 Scope of works

The scope of works to fulfil the purpose of the assessment has included the following:

- Review of the third party report.
- Drilling of 7N° dynamic soil sampling boreholes.
- 3N° environmental monitoring installations.
- Preparation of engineering exploratory hole logs to record the observed ground conditions.
- Chemical and geotechnical testing of the soils.
- 6N° return groundwater and ground gas monitoring visits.

[1] Desk Study and Preliminary Risk Assessment – RPS Group (September 2016)

- Preparation of an interpretative report presenting the findings of the investigations.

## 1.6 Report limitations

The recommendations, interpretations and conclusions of this report are based on the historical and current site conditions reported by the previous third party report and observed during the intrusive investigations undertaken. No responsibility can be accepted for the accuracy of third party information including reference data contained within site specific database reports. Due to the inherent variability of the ground conditions between exploratory hole positions these conditions can only be interpreted and not defined and are accurate only for the date of the investigation works.

# 2 CURRENT SITE DESCRIPTION AND LOCATION

## 2.1 Site location

The site occupies an area of approximately 0.2 hectares (ha) and is located around National Grid Reference (NGR): 388635, 397445 in the east of Manchester. The nearest postcode for the site is M11 1AA.

## 2.2 Site description

At the time of the ground investigation works, the site was found to be a rectangular shaped parcel of land measuring approximately 35m north to south and 46m east to west. The site was found to be predominantly level with a slight fall from E to W and a raised berm running adjacent to the south boundary, elevated approximately 1m above the rest of the site. The northern and western boundaries of the site are demarked by palisade fencing. The eastern and southern boundaries are demarked by a 1m wide concrete path adjacent to the adjacent commercial businesses. Service plans and evidence gathered during the site walkover indicates surface water drainage may run underneath this path exiting the site via the north-east boundary.

Access was gained to the site via a wide double gate in the north-east of the site. The yard is currently associated with a nearby car body/auto repair shop and is indicated to be used currently for storage. Items recorded on site during the investigation include a horsebox, disused barbeque, kennel, numerous car parts in the north of the site (plastic bumpers) and a wire mesh container containing numerous open and sealed containers. The area surrounding this wire container showed dark staining of the soils, along with additional plastic containers surrounding with one labelled as ‘Standard Thinners’ and evidence of ash in the bottom of the wire container.

The immediate surrounding area was found to comprise industrial buildings and a public footpath (Old Canal) to the west. The surrounding industries include a recycling centre to the north, car body/repair shop and a motorbike accessories store to the south.

The wider area comprises terraced residential housing to the east, a primary School and Old Ashton Road (A635) to the south-east, a wholesale market and recycling centre to the south-west and commercial buildings to the west/north.

Mature trees were noted on the western boundary of the site. It is understood these will remain as part of the future redevelopment.

An annotated site features plan is provided within Appendix A and a selection of photographs within Appendix B.

## 2.3 Site context

### *2.3.1 Geological setting*

The published solid and drift geological mapping (1:50,000 sheet 85) indicates the site to be entirely underlain by Devensian Superficial Till Deposits comprising clay to sandy clay, unsorted with common pebbles, cobbles and some boulders. The Chester Pebble Beds Formation (Lower Triassic) is recorded to underlie the Till deposits and consists of a reddish brown and pinkish red medium grained sandstone with common quartzite pebbles towards the base.

3N[0] historical borehole records are available within 150m of the site. These were completed in 1970 and record varying deposits of clay and sand to depths of approximately 24mbgl. These logs are considered to demonstrate the local thickness of superficial till deposits below the site to greater than 24m bgl.

### *2.3.2 Hydrogeology and groundwater sensitivity*

The underlying Superficial Till Deposits are recorded as a Secondary – Undifferentiated Aquifer with the underlying Chester Pebble Beds Formation being recorded as a Principal Aquifer by the Environment Agency.

Evidence from historical borehole reference SJ89NE1127 located <50m south-east from the assessment site identifies the superficial till deposits predominantly as a sandy clay with, bands of sand, lenses of silt and some gravel, terminating within them at 24m bgl. This overlying thickness of till deposits will significantly limit the potential for vertical connectivity with the underlying Chester Pebble Beds Formation to be active. As such the principal aquifer will not be assessed as a potential receptor further within this report.

### *2.3.3 Hydrology and surface water quality*

No surface water features are recorded to be present within 500m of the site.

### *2.3.4 Groundwater and surface water abstractions and discharges*

Based on previous reports and data available on the Environment Agency website no surface water or groundwater abstractions are recorded within a 500m radius of the site. The site is not located within a Source Protection Zone (SPZ).

### *2.3.5 Radon*

The third party desk study report indicates that the site is within an area where <1% of properties are within a Radon Affected Area. Therefore, no radon protective measures are required within future redevelopment.

### *2.3.6 Historical site usage*

The available historical maps were reviewed as part of the third party desk study report. A summary of the pertinent points is included below.

The site has been previously associated with a number of industrial land uses including a cotton mill, delivery forecourt and works (iron foundry, dye and print works). A tank is identified in the west of the site circa 1922.

By 1974, historical mapping indicates previous buildings and associated structures have largely been demolished. Aerial imagery from 2009 shows the site to be stripped with only the perimeter pathway recorded.

The third party report indicates that surrounding land uses have comprised a variety of industrial activities, including former oil, steel, engineering, carriage/wagon and chemical works. The Manchester and Stockport canal was located to the west of the site between 1797 and 1970. Furthermore, a refuse pit was located 98m to the north-east of the site between 1890 and 1915.

Both features may have been historically infilled and could represent an off-site source of ground gas.

### *2.3.7 Landfill sites and waste management facilities*

The third party desk study report indicates that there are no current landfills located within 500m of the site boundary; however, 3N° historical landfills were identified. The closest historical landfill is associated with the infilling of the historical Stockport Branch Canal, which was registered as having accepted inert waste and liquid sludge.

### *2.3.8 Sensitive environmental designations*

There are no recorded sensitive environmental designations in the area of the site.

# 3 CONCEPTUAL SITE MODEL

## 3.1 Potential contaminative sources

Potential on- and off-site sources of contamination as highlighted within the previous report are summarised in Table 3.1. Where applicable these have been expanded / updated by T&P as deemed necessary based on review of the previous reports.

**Table 3.1 – Potentially contaminating sources summary**

| | Areas of potential concern (APC) | Source origin/description | Source hazard contaminants |
|---|---|---|---|
| **Existing sources (On-site)** | 1 | Unsealed and discarded chemical containers in the north central area of site, including thinners and other unlabelled chemicals. | Asbestos, heavy metals, TPH, PAH, $CO_2$, $CH_4$, VOCs, sVOCs. |
| **Existing sources (Off-site)** | 2 | Gas and contaminant migration from the infilled canal/ landfill to the immediate west. | |
| | 3 | Contaminant migration from industrial practices in the surrounding area including a recycling centre 10m to the north and an auto repair shop/ spray shop 5m to the east. | |
| **Historical sources (On-site)** | 4 | Made ground from historical industrial activities and miscellaneous development on site. | |
| **Historical sources (Off-site)** | 5 | Former refuse pit located approximately 98m north-east of site which may have been infilled with made ground of unknown composition. | |

*Notes:*
*PAH – polycyclic aromatic hydrocarbons.*
*$CH_4$ – methane.*
*$CO_2$ – carbon dioxide.*
*TPH – total petroleum hydrocarbons.*
*VOCs – volatile organic compounds.*
*sVOCs – semi volatile organic compounds.*

## 3.2 Potential receptors

The future land use of the site has been considered as 'commercial' based upon the proposed end use and the land use scenarios described in SP1010[2].

With regard to the current and future proposed setting and form of the site, potential receptors to possible source hazards identified above are summarised below.

### *3.2.1 Humans*

- Future on-site operatives – **critical receptor**.
- Future maintenance workers
- Construction workers.

### *3.2.2 Controlled waters*

- Groundwater – The site is not recorded to lie within a SPZ and no potable water or groundwater abstraction points are recorded within a 500m radius. The underlying Superficial Till is classified as a Secondary Aquifer – Undifferentiated. With reference to national guidance[3], the sensitivity of groundwater as a potential receptor to contaminant impact beneath the site is considered to be Low (L1).
- No surface water features are present within 500m of the site. As such surface water is not considered to require further consideration as a receptor within this report.

### *3.2.3 Other environmental receptors*

- Potable water supply pipework and buried concrete associated with future development. Underground services associated with the proposed development may be affected by the chemical characteristics of the soil through direct chemical attack.

## 3.3 Exposure and pathway mechanisms

For potential sources of contamination to pose a risk to environmental and human receptors, there must be at least one active or potentially active pathway. Pathways can be considered in terms of direct exposure or in terms of migration routes and transport mechanisms.

For example, direct exposure can occur through: inhalation of toxic gases, dusts or vapours, and ingestion or dermal uptake of contaminated dusts, soils or vegetables. Contaminants can also migrate to receptors via physical transport processes including soil leaching, surface water and groundwater flow.

The proposed development identifies site use to be approximately 85% buildings and hardstanding and 15% with a gravel finish. Due to the extensive areas of hardstanding across the

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[2] SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (2013 – as amended) – CL:AIRE

[3] Annex 2 - Guidance for the Safe Development of Housing on land Affected by Contamination R&D66: 2008

site providing a physical barrier and proposed end use, pathways such as direct contact/ingestion, plant/vegetable uptake and dust inhalation are effectively severed. This hardstanding will also intercept rainwater, greatly reducing percolation through the made ground and potential leaching of contaminants.

Assumptions have been made that construction workers and current site visitors/ users would be working under appropriate health and safety controls such that their risks of exposure would be mitigated.

## 3.4 Summary of source – pathway – receptor relationships

Table 3.2 highlights the source-pathway-receptor relationships (SPRs) that are considered viable post development. Those SPRs assessed as low or very low risk do not require further consideration.

**Table 3.2 - Potential source–pathway–receptor relationships**

| Area of potential concern Nº | Source | Pathway (s) | Receptor | Classification of consequence | Classification of probability | Classification of risk* |
|---|---|---|---|---|---|---|
| 1 | On-site<br>Unsealed and discarded chemical containers in the north central area of site, including thinners and other unlabelled chemicals. | Oral ingestion | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |
| | | Dermal contact | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |
| | | Dust inhalation | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |
| | | Leaching/dissolution with vertical migration | Groundwater | Medium | Unlikely | **Low Risk** |
| | | Direct contact | Buildings and underground services | Medium | Low likelihood | **Moderate/Low Risk** |
| | | Gas / vapour inhalation | Future on-site operatives, construction workers | Medium | Low likelihood | **Moderate/Low Risk** |

| Table 3.2 - Potential source–pathway–receptor relationships | | | | | | |
|---|---|---|---|---|---|---|
| **Area of potential concern Nº** | **Source** | **Pathway (s)** | **Receptor** | **Classification of consequence** | **Classification of probability** | **Classification of risk*** |
| 2 | Off-site<br>Gas migration from infilled canal/ landfill to the immediate west. | Lateral gas migration and subsequent gas inhalation/explosion | Future on-site operatives, construction workers | Medium | Low likelihood | **Moderate/Low Risk** |
| 3 | Off-site<br>Contaminant migration from industrial practices in the surrounding area including a recycling centre 10m to the north and an auto repair shop/ spray shop 5m to the east. | Lateral migration in groundwater and gas / vapour generation. | Future on-site operatives, construction workers | Medium | Low likelihood | **Moderate/Low Risk** |
| 4 | On-site | Downward migration | Groundwater | Medium | Unlikely | **Low Risk** |

| Table 3.2 - Potential source–pathway–receptor relationships | | | | | | |
|---|---|---|---|---|---|---|
| **Area of potential concern Nº** | **Source** | **Pathway (s)** | **Receptor** | **Classification of consequence** | **Classification of probability** | **Classification of risk*** |
| | Made ground from historical industrial activities and miscellaneous development on site. | Direct contact | Buildings and underground services | Medium | Likely | **Moderate Risk** |
| | | Gas / vapour inhalation | Future on-site operatives, construction workers | Medium | Low Likelihood | **Moderate/Low Risk** |
| 5 | Off-site<br>Former refuse pit located approximately 98m north-east of site which may have been infilled with made ground of unknown composition. | Lateral gas migration and subsequent gas inhalation/explosion | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |

**Where multiple receptors exist the risk classification is based on most sensitive receptor for conservatism.*

## 3.5 Geotechnical hazard identification summary

Based on information presented within Sections 2.0 and 3.0 above and the expected geology underlying the site, the following geotechnical hazards are worthy of consideration and are discussed further in later sections of this report:

- Attack of buried concrete by aggressive ground conditions.
- Volume change potential of superficial clays and influence of existing/ remaining trees.

# 4 SCOPE OF GROUND INVESTIGATION WORKS

## 4.1 General scope of fieldwork

An intrusive ground investigation was undertaken by T&P at the site on Friday 28th April and in summary comprised the following:

- Drilling of 7N° dynamic soil sampling boreholes;
- Installation of 3N° boreholes as environmental monitoring wells;
- Ground gas monitoring on 6N° occasions;
- Logging of ground conditions and soil sampling by a suitably qualified engineer.

Selected samples collected during the ground investigation were submitted to the laboratory for geotechnical and environmental testing.

An exploratory hole location plan is presented within Appendix A and the exploratory hole logs are presented as Appendix C.

## 4.2 Exploratory hole positioning and access restrictions

Table 4.1 presents the exploratory hole targeting rationale.

**Table 4.1 - Rationale/targeting of T&P exploratory hole locations**

| Exploratory hole(s) | Target |
|---|---|
| WS01-04 and WS06-07 | General coverage |
| WS05 | Raised bank bordering the south boundary. |

## 4.3 Dynamic soil sampling boreholes

T&P supervised the drilling of 7N° windowless sample boreholes (WS01 – WS07) which were terminated at depths between 1.00 and 5.00m below ground level (bgl) due to driving refusal. *In situ* standard penetration testing (SPT) was undertaken at 1.00m intervals and at the base of the boreholes. Environmental monitoring wells were installed within WS01,03 and WS07.

## 4.4 Environmental monitoring

Measurement of ground gases and water levels have been undertaken on 6N° separate return monitoring visits at bi-weekly intervals.

All monitoring wells were installed to detect ground gases from the potential on- and off-site sources.

# 5 SUMMARY OF GROUND CONDITIONS AND LABORATORY TESTING

## 5.1 Recorded ground conditions

The ground conditions recorded across the site broadly correlated with the anticipated published geology detailed in Section 2.3 which recorded a substantial Superficial Till deposit across the majority of the site, with the Chester Pebble Bed Formation bedrock beneath.

The strata encountered across the site area are summarised in Table 5.1 and are described further in the following sub-sections.

**Table 5.1 - Summary of strata encountered**

| Depth (m bgl) | | Exploratory holes identified | Area of site | Soil type | General description/comments |
|---|---|---|---|---|---|
| Top depth range | Base depth range | | | | |
| Ground level | 0.7 – 1.2 | All Holes | General | Made Ground STRATUM M1 | Gravelly SAND and sandy gravelly CLAY. (Made Ground) |
| 0.7 – 1.2 | 1.8 – 2.2 | WS01 – 04 and WS06-07 | General | Natural Ground STRATUM N1 | Stiff to very stiff dark orangish brown mottled grey CLAY. (Superficial Till) |
| 1.8 - 2.2 | 4.0 – 5.0 | WS01 – 04 and WS06-07 | General | Natural Ground STRATUM N2 | Medium dense to dense and dense orangish brown and reddish orangish brown occasionally clayey SAND. (Superficial Till) |

### *5.1.1 Made Ground*

Made ground was encountered across all areas of the site to a typical maximum depth of 1.2mbgl. The raised berm in the south of the site thought to be indicative of the original site level was found to comprise made ground to a depth of 1.0m bgl at which depth the borehole was met with refusal on hard strata (equivalent to average site level). The made ground consisted of slightly sandy gravelly clay. The gravel was angular fine to coarse of red brick, concrete, ceramics, plastic, glass and wood. An exception to this was found within WS07, where made ground consisted of red brick and concrete to 0.5m bgl underlain by a black sand to 0.7mbgl.

A slight hydrocarbon odour was detected within WS02 between 1.0 – 1.2mbgl and WS07 between 0.5 – 0.7mbgl.

### *5.1.2 Natural soils – Superficial Till Deposits*

Beneath the made ground and covering the entire site area, to maximum depths of 1.8 – 2.2m bgl, a stiff to very stiff orangish brown mottled grey clay was encountered. Underlying the clay, a medium dense to dense occasionally clayey sand was encountered to 5.0mbgl which was the maximum depth achieved by the boreholes.

This is considered to represent clay and sand of the Devensian Glacial Till.

### *5.1.3 Evidence of contamination*

With the exception of the areas of made ground noted above, no further significant visible or olfactory evidence of any contamination was noted during the ground investigation.

## 5.2 Groundwater

Groundwater was encountered within WS01, WS04, WS06 and WS07 at 3mbgl during the intrusive investigation. Groundwater levels recorded during the 6 week gas monitoring period is presented in Table 5.2 below.

**Table 5.2 – Groundwater levels recorded during environmental monitoring visits.**

| Hole ID | Groundwater level (m bgl) | | | | | |
|---|---|---|---|---|---|---|
| | Visit 1 | Visit 2 | Visit 3 | Visit 4 | Visit 5 | Visit 6 |
| WS01 | 3.17 | 3.04 | ND | ND | 2.16* | ND |
| WS03 | 3.05 | 3.06 | ND | ND | ND | ND |
| WS07 | 3.09 | 3.03 | ND | ND | ND | ND |

**Uncharacteristically high reading. Taken post heavy downpour with standing water recorded in the centre of the site.*
*ND – Not detected, as such groundwater is at greater depth than installation base. WS01 – 3.18m bgl WS03 – 3.11m bgl WS07 – 3.10m bgl*

## 5.3 Laboratory testing

### *5.3.1 Geotechnical testing*

The soil testing deemed necessary to adequately characterise the site from a geotechnical perspective in the context of the proposed development is given in the table below. The full set of geotechnical analysis results are provided in Appendix D.

**Table 5.2 – Geotechnical testing summary**

| Test | Notes | Quantity |
|---|---|---|
| Moisture content | - | 4 soils |
| Atterberg limits | - | 4 soils |
| Particle Size Distribution | - | 1 soil |
| Geochemical analysis BRE SD1 Suite | K9.1 – Suite A | 4 soils |

### *5.3.2 Chemical testing – soils*

The soil testing deemed necessary to adequately characterise the site from a contamination perspective in the context of the conceptual site model and proposed development is given in the table below.

Samples from the investigation were forwarded to The Environmental Laboratory Ltd, a UKAS and MCERTS accredited laboratory. The full set of chemical analysis results are provided in Appendix E.

| **Table 5.3 - Schedule of chemical testing** | |
|---|---|
| **Test type** | **Quantity** |
| **Soils** | |
| Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel, Copper, Zinc, Selenium, Soil Organic Matter and Speciated Polyaromatic Hydrocarbons. | 9 soils |
| TPH – Total (C6-C40) – GCFID | 4 soils |
| TPH – CWG Banded – aro/ali split | 4 soils |
| Asbestos soil screen and ID | 6 soils |
| sVOC – GCMS | 3 soils |

# 6 HUMAN HEALTH RISK ASSESSMENT

## 6.1 Introduction

The human health risk assessment discussed in this section has been undertaken in accordance with extant UK regulation and guidance on contaminated land and risk assessment as outlined in key government documents[4].

## 6.2 Assessment of averaging areas/zones following ground investigation works

For the purposes of investigation and assessment a site can be divided into zones based on the historical usages or proposed end use and these zones can be further divided into averaging areas. These averaging areas can be used to assess different soil types revealed or different potential exposure pathways etc. for the purposes of accurately modelling the site conditions. Each averaging area can be considered independently of each other for human health exposure assessment.

Based upon the proposed end use of the site and the findings of the ground investigation it is proposed that a single zone split into two averaging areas are appropriate for the site as follows:

- General site area – Made ground.
- General site area – Natural ground.

## 6.3 Presentation of risk assessment

For each averaging area the analytical results from the T&P investigations for each determinant have been evaluated directly against the adopted screening levels[5] for a 'commercial' end use.

Table 6.1 below presents the results for the averaging area – 'General site area – made ground'.

**Table 6.1 – Summary of general site area (made ground)**

| Determinant | Laboratory detection limit or recorded concentrations (mg/kg) | | | | | |
|---|---|---|---|---|---|---|
| | Screening levels | Screening level source | Made Ground | | | |
| | | | Min | Max | Nº of exceedances | Calculated 95th UCL |
| **Metals** | | | | | | |
| Arsenic (inorganic) | 640 | C4SL | 7.0 | 66.0 | 0 of 7 | - |
| Boron | 240,000 | S4UL | 0.5 | 1.3 | 0 of 7 | - |
| Cadmium | 410 | C4SL | <0.5 | 21.8 | 0 of 7 | - |
| Chromium III | 8,600 | S4UL | 21.4 | 811 | 0 of 7 | - |

[4] *Environmental Protection Act 1990.*
*Contaminated Land Statutory Guidance (April 2012).*
*SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (2013 – as amended) – CL:AIRE.*
*CLR11 – Model procedures for the management of land contamination (2004) – DEFRA/Environment Agency.*
[5] *C4SLs or S4ULs.*

| Table 6.1 – Summary of general site area (made ground) | | | | | | |
|---|---|---|---|---|---|---|
| **Determinant** | **Laboratory detection limit or recorded concentrations (mg/kg)** | | | | | |
| | **Screening levels** | **Screening level source** | **Made Ground** | | | |
| | | | **Min** | **Max** | **Nº of exceedances** | **Calculated 95th UCL** |
| Chromium VI | 49 | C4SL | <0.8 | <0.8 | 0 of 7 | - |
| Copper | 68,000 | S4UL | 26.2 | 499 | 0 of 7 | - |
| **Lead[2]** | **2,300** | **C4SL** | **142** | **4030** | **1 of 7** | **Outlier** |
| Mercury (inorganic) | 1,100 | S4UL | <0.5 | 0.5 | 0 of 7 | - |
| Nickel | 980 | S4UL | 12.8 | 100 | 0 of 7 | - |
| Selenium | 12,000 | S4UL | <1.0 | 3.2 | 0 of 7 | - |
| Zinc | 730,000 | S4UL | 68.3 | 2460 | 0 of 7 | - |
| **Organics** | | | | | | |
| Total Organic Carbon (%) | n/a | - | 1.7 | 20 | - | - |
| Soil Organic Matter (%) | n/a | - | 2.9 | 34.5 | - | - |
| Total Monohydric Phenols | 760(6) | S4UL | <5 | <5 | 0 of 7 | - |
| Naphthalene | 190 (76.4)(5) | S4UL | < 0.1 | 1.2 | 0 of 7 | - |
| Acenaphthylene | 83000 (86.1)(5) | S4UL | < 0.1 | 0.2 | 0 of 7 | - |
| Acenaphthene | 84000 (57)(5) | S4UL | < 0.1 | 0.7 | 0 of 7 | - |
| Fluorene | 63000 (30.9)(5) | S4UL | < 0.1 | 0.5 | 0 of 7 | - |
| Phenanthrene | 22000 | S4UL | < 0.1 | 6.6 | 0 of 7 | - |
| Anthracene | 52000 | S4UL | < 0.1 | 1.9 | 0 of 7 | - |
| Fluoranthene | 23000 | S4UL | 0.3 | 10.5 | 0 of 7 | - |
| Pyrene | 54000 | S4UL | 0.3 | 9.3 | 0 of 7 | - |
| Benz(a)anthracene | 170 | S4UL | < 0.1 | 5.0 | 0 of 7 | - |
| Chrysene | 350 | S4UL | < 0.1 | 6.1 | 0 of 7 | - |
| Benzo(b)fluoranthene | 44 | S4UL | < 0.1 | 5.1 | 0 of 7 | - |
| Benzo(k)fluoranthene | 1200 | S4UL | < 0.1 | 5.1 | 0 of 7 | - |
| Benzo(a)pyrene | 77 | C4SL | < 0.1 | 6.1 | 0 of 7 | - |
| Indeno(123-cd) pyrene | 500 | S4UL | < 0.1 | 5.1 | 0 of 7 | - |
| Dibenz(ah)anthracene | 3.5 | S4UL | < 0.1 | 2.4 | 0 of 7 | - |
| Benzo(ghi)perylene | 3900 | S4UL | < 0.1 | 5.0 | 0 of 7 | - |
| Petroleum hydrocarbons | | | | | | |
| Benzene | 98 | C4SL | <0.1 | <0.1 | 0 of 3 | - |

| Table 6.1 – Summary of general site area (made ground) | | | | | | |
|---|---|---|---|---|---|---|
| **Determinant** | **Laboratory detection limit or recorded concentrations (mg/kg)** | | | | | |
| | **Screening levels** | **Screening level source** | **Made Ground** | | | |
| | | | **Min** | **Max** | **Nº of exceedances** | **Calculated 95th UCL** |
| Toluene | 56,000 (869)(3) | S4UL | <0.1 | <0.1 | 0 of 3 | - |
| Ethylbenzene | 5,700 (518)(3) | S4UL | <1.0 | <1.0 | 0 of 3 | - |
| Xylenes[4] | 5,900 (576)(3) | S4UL | <1.0 | <1.0 | 0 of 3 | - |
| Aliphatic C5-C6 | 3,200 (304)(5) | S4UL | < 0.01 | < 0.01 | 0 of 3 | - |
| Aliphatic >C6-C8 | 7,800 (144)(5) | S4UL | < 0.01 | < 0.01 | 0 of 3 | - |
| Aliphatic >C8-C10 | 2,000 (78)(5) | S4UL | < 1.0 | 2.3 | 0 of 3 | - |
| Aliphatic >C10-C12 | 9,700 (48)(5) | S4UL | < 1.0 | <1.0 | 0 of 3 | - |
| Aliphatic >C12-C16 | 59,000 (24)(5) | S4UL | 1.2 | 23.7 | 0 of 3 | - |
| Aliphatic >C16-C35 | 1,600,000 | S4UL | 619.2 | 17854 | 0 of 3 | - |
| Aliphatic >C35-C40 | 1,600,000 | S4UL | 238 | 1610 | 0 of 3 | - |
| Aromatic C5-C7 | 26,000 (1,220)(5) | S4UL | <0.01 | <0.01 | 0 of 3 | - |
| Aromatic >C7-C8 | 56,000 (869)(3) | S4UL | <0.01 | <0.01 | 0 of 3 | - |
| Aromatic >C8-C10 | 3,500 (613)(3) | S4UL | <1.0 | <1.0 | 0 of 3 | - |
| Aromatic >C10-C12 | 16,000 (364)(5) | S4UL | <1.0 | <1.0 | 0 of 3 | - |
| Aromatic >C12-C16 | 36,000 (169)(5) | S4UL | <1.0 | 3.1 | 0 of 3 | - |
| Aromatic >C16-C21 | 28,000 | S4UL | 22.8 | 256 | 0 of 3 | - |
| Aromatic >C21-C35 | 28,000 | S4UL | 352 | 5220 | 0 of 3 | - |
| Aromatic >C35-C40 | 28,000 | S4UL | 148 | 694 | 0 of 3 | - |
| **sVOCs** | | | | | | |
| Dimethyl phthalate | **n/a** | **n/a** | <0.01 | 0.46 | 0 of 3 | - |
| Dibenzofuran | **n/a** | **n/a** | 0.03 | 0.32 | 0 of 3 | - |
| Carbazole | **n/a** | **n/a** | <0.01 | 0.20 | 0 of 3 | - |
| **Inorganics** | | | | | | |
| Water Soluble Sulphate (mg/l) *3 | n/a | n/a | 0.04 | 1.45 | 0 of 7 | - |
| pH *4 | n/a | n/a | 7 | 9.2 | - | - |

| Table 6.1 – Summary of general site area (made ground) | | | | | | |
|---|---|---|---|---|---|---|
| **Determinant** | **Laboratory detection limit or recorded concentrations (mg/kg)** | | | | | |
| | **Screening levels** | **Screening level source** | **Made Ground** | | | |
| | | | **Min** | **Max** | **Nº of exceedances** | **Calculated 95th UCL** |
| Asbestos screen | Presence | n/a | None Detected | | 0 of 6 | n/a |

*Notes:*

1. *Category 4 Screening Level (C4SL) based on 6% Soil Organic Matter (SOM). SP1010 Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Rev 2. CL:AIRE. 2014; Suitable 4 Use Level (S4UL) based on 1% SOM, where appropriate, as a conservative assessment. (The LQM/CIEH S4ULs for Human Health Risk Assessment (Land Quality Management, 2005).*
2. *C4SL for lead based on the LLTC of 3.5µg/dL-1 and C4SL exposure changes for child/adult receptors.*
3. *S4UL exceeds vapour saturation limit, which is presented in brackets.*
4. *Lowest S4UL selected for o-xylene, m-xylene or p-xylene. S4UL should be compared against total xylenes as the Health Criteria Value (HCV) is based on this, rather than individual isomers.*
5. *S4UL exceeds solubility saturation limit, which is presented in brackets.*
6. *S4UL based on threshold protective of direct skin contact.*

As indicated by Table 6.1, a single soil concentration of lead within a sample of made ground from WS04 (0.4-0.8mbgl) was recorded in excess of the adopted screening levels. Statistical analysis has shown this value to be a statistical outlier and indicative of a hotspot. A copy of the statistical assessment is included within Appendix H. Although high concentrations of hydrocarbons have been shown to be present on the site associated with SS01 where evidence of surface spillage was noted, these results are associated with longer chain aliphatic/aromatic hydrocarbons which typically have a low volatility. Lighter hydrocarbon fractions are noted to be below detection limit. Recorded soil concentrations are all below adopted screening values for a commercial development. Furthermore, PID levels were recorded to be low during the 6 week period of monitoring. No other contaminants were noted to exceed relevant screening levels.

Table 6.2 presents the results for the averaging area – 'General site area – natural ground'.

| Table 6.2 – Summary of general site area (natural ground) | | | | | | |
|---|---|---|---|---|---|---|
| **Determinant** | **Laboratory detection limit or recorded concentrations (mg/kg)** | | | | | |
| | **Screening levels** | **Screening level source** | **Natural Ground** | | | |
| | | | **Min** | **Max** | **Nº of exceedances** | **Calculated 95th UCL** |
| **Metals** | | | | | | |
| Arsenic (inorganic) | 640 | C4SL | 9.6 | 9.9 | 0 of 2 | - |
| Boron | 240,000 | S4UL | 0.6 | 1.0 | 0 of 2 | - |
| Cadmium | 410 | C4SL | <0.5 | 0.5 | 0 of 2 | - |
| Chromium III | 8,600 | S4UL | 42.3 | 48.5 | 0 of 2 | - |
| Chromium VI | 49 | C4SL | <0.8 | <0.8 | 0 of 2 | - |
| Copper | 68,000 | S4UL | 35.2 | 36.4 | 0 of 2 | - |
| Lead[2] | 2,300 | C4SL | 23.5 | 26.7 | 0 of 2 | - |
| Mercury (inorganic) | 1,100 | S4UL | <0.5 | <0.5 | 0 of 2 | - |
| Nickel | 980 | S4UL | 36.8 | 46.9 | 0 of 2 | |
| Selenium | 12,000 | S4UL | <1.0 | <1.0 | 0 of 2 | - |

| Table 6.2 – Summary of general site area (natural ground) | | | | | | |
|---|---|---|---|---|---|---|
| **Determinant** | **Laboratory detection limit or recorded concentrations (mg/kg)** | | | | | |
| | **Screening levels** | **Screening level source** | **Natural Ground** | | | |
| | | | **Min** | **Max** | **Nº of exceedances** | **Calculated 95th UCL** |
| Zinc | 730,000 | S4UL | 78.1 | 107 | 0 of 2 | - |
| **Organics** | | | | | | |
| Total Organic Carbon (%) | n/a | - | 0.45 | 0.61 | - | - |
| Soil Organic Matter (%) | n/a | - | 0.26 | 0.35 | - | - |
| Total Monohydric Phenols | 760(6) | S4UL | <5 | <0.5 | 0 of 2 | - |
| Naphthalene | 190 (76.4)(5) | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Acenaphthylene | 83000 (86.1)(5) | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Acenaphthene | 84000 (57)(5) | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Fluorene | 63000 (30.9)(5) | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Phenanthrene | 22000 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Anthracene | 52000 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Fluoranthene | 23000 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Pyrene | 54000 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Benz(a)anthracene | 170 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Chrysene | 350 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Benzo(b)fluoranthene | 44 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Benzo(k)fluoranthene | 1200 | S4UL | < 0.1 | < 0.1 | 0 of 2 | - |
| Benzo(a)pyrene | 77 | C4SL | < 0.1 | < 0.1 | 0 of 2 | - |
| Indeno(123-cd) pyrene | 500 | S4UL | < 0.1 | 0.2 | 0 of 2 | - |
| Dibenz(ah)anthracene | 3.5 | S4UL | < 0.1 | 0.6 | 0 of 2 | - |
| Benzo(ghi)perylene | 3900 | S4UL | < 0.1 | 0.3 | 0 of 2 | - |
| Petroleum hydrocarbons | | | | | | |
| Benzene | 98 | C4SL | <0.1 | <0.1 | 0 of 1 | - |
| Toluene | 56,000 (869)(3) | S4UL | <0.1 | <0.1 | 0 of 1 | - |
| Ethylbenzene | 5,700 (518)(3) | S4UL | <1.0 | <0.1 | 0 of 1 | - |
| Xylenes[4] | 5,900 (576)(3) | S4UL | <1.0 | <0.1 | 0 of 1 | - |

| Table 6.2 – Summary of general site area (natural ground) | | | | | | |
|---|---|---|---|---|---|---|
| **Determinant** | **Laboratory detection limit or recorded concentrations (mg/kg)** | | | | | |
| | **Screening levels** | **Screening level source** | **Natural Ground** | | | |
| | | | **Min** | **Max** | **Nº of exceedances** | **Calculated 95th UCL** |
| Aliphatic C5-C6 | 3,200 (304)(5) | S4UL | < 0.01 | < 0.01 | 0 of 1 | - |
| Aliphatic >C6-C8 | 7,800 (144)(5) | S4UL | < 0.01 | < 0.01 | 0 of 1 | - |
| Aliphatic >C8-C10 | 2,000 (78)(5) | S4UL | < 1.0 | < 1.0 | 0 of 1 | - |
| Aliphatic >C10-C12 | 9,700 (48)(5) | S4UL | < 1.0 | < 1.0 | 0 of 1 | - |
| Aliphatic >C12-C16 | 59,000 (24)(5) | S4UL | < 1.0 | < 1.0 | 0 of 1 | - |
| Aliphatic >C16-C35 | 1,600,000 | S4UL | 5.4 | 5.4 | 0 of 1 | - |
| Aliphatic >C35-C40 | 1,600,000 | S4UL | < 1.0 | < 1.0 | 0 of 1 | - |
| Aromatic C5-C7 | 26,000 (1,220)(5) | S4UL | <0.01 | <0.01 | 0 of 1 | - |
| Aromatic >C7-C8 | 56,000 (869)(3) | S4UL | <0.01 | <0.01 | 0 of 1 | - |
| Aromatic >C8-C10 | 3,500 (613)(3) | S4UL | <1.0 | <1.0 | 0 of 1 | - |
| Aromatic >C10-C12 | 16,000 (364)(5) | S4UL | <1.0 | <1.0 | 0 of 1 | - |
| Aromatic >C12-C16 | 36,000 (169)(5) | S4UL | <1.0 | <1.0 | 0 of 1 | - |
| Aromatic >C16-C21 | 28,000 | S4UL | <1.0 | <1.0 | 0 of 1 | - |
| Aromatic >C21-C35 | 28,000 | S4UL | 4.2 | 4.2 | 0 of 1 | - |
| Aromatic >C35-C40 | 28,000 | S4UL | <1.0 | <1.0 | 0 of 1 | - |
| **Inorganics** | | | | | | |
| Water Soluble Sulphate (mg/l) | n/a | n/a | 0.1 | 0.11 | 0 of 2 | - |
| pH | n/a | n/a | 7.6 | 7.6 | - | - |

*Notes:*

1. *Category 4 Screening Level (C4SL) based on 6% Soil Organic Matter (SOM). SP1010 Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Rev 2. CL:AIRE. 2014; Suitable 4 Use Level (S4UL) based on 1% SOM, where appropriate, as a conservative assessment. (The LQM/CIEH S4ULs for Human Health Risk Assessment (Land Quality Management, 2005).*
2. *C4SL for lead based on the LLTC of 3.5µg/dL-1 and C4SL exposure changes for child/adult receptors.*
3. *S4UL exceeds vapour saturation limit, which is presented in brackets.*
4. *Lowest S4UL selected for o-xylene, m-xylene or p-xylene. S4UL should be compared against total xylenes as the Health Criteria Value (HCV) is based on this, rather than individual isomers.*
5. *S4UL exceeds solubility saturation limit, which is presented in brackets.*
6. *S4UL based on threshold protective of direct skin contact.*

As indicated by Table 6.2, no tested contaminants were shown to exceed the adopted screening levels.

## 6.4 Summary findings of human health risk assessment and recommendations

The chemical analysis has shown that determinants within the soil samples from both the made ground (except WS04 which is discussed further below) and natural ground are below the adopted screening levels for a commercial development.

Soil concentrations of semi-volatile compounds (SVOCs) dimethyl phthalate, dibenzofuran and carbazole were identified above the limit of detection. It is noted that there are currently no available human health screening levels for these determinants. These contaminants were detected within WS04 (0.50 – 0.80m) and WS06 (0.30 – 0.70m); however based upon the commercial end use and proposed design, interaction with material at these depths is unlikely/ minimal deemed to be low risk to receptors.

A single elevated soil concentration of lead was encountered within WS04 (0.5-0.8mbgl) with a concentration of 4030mg/kg recorded (screening level = 2300mg/kg). Statistical analysis has identified this result to be a statistical outlier, indicative of a contamination hotspot. Based on the future development proposals, it is understood that the site will comprise approximately 90% hard standing, with WS04 located in the footprint of the proposed engine house, which will serve to sever direct contact/ingestion pathways with future site users.

As such, it is considered that on-site soils do not present an unacceptable risk to future site users within the proposed development. However, it is recommended that on-site controls are implemented to prevent unauthorised access to the site and that the use of personal protective equipment (PPE)/hygiene practices is implemented to minimise risks to current site users/visitors.

# 7 CONTROLLED WATERS RISK ASSESSMENT

## 7.1 Conceptual Model

No surface water has been identified within a 500m radius of the site.

The underlying Superficial Till deposits are categorised as a Secondary – Undifferentiated Aquifer.

Groundwater was encountered within WS01, WS04, WS06 and WS07 at 3m bgl within the superficial sand deposits, during the intrusive drilling works. Water levels throughout the 6 week period of the environmental monitoring found the shallow groundwater to reach a maximum level of 3.03m bgl (with the exception of WS01 visit 5), with no detects on 4 of 6 visits.

Furthermore, no active ground water abstractions or source protection zones are recorded within a 500m radius of the site. Situationally the surrounding area has historically been heavily industrialised and is still used for commercial practices to date. As such the future development of the shallow water as a potable water supply is limited, based upon the likelihood that background groundwater is of poor quality in the wider area.

Following the submission of the Phase 1 Desk Study and Risk Assessment a concern was raised by the local EHO regarding records of a laterally extensive water-bearing sand layer within the drift deposits in the area of the site. The concern related to the risk of the water bearing sand having the potential to act as a pathway for potentially contaminated shallow groundwater to migrate from the site.

## 7.2 Risk evaluation

The ground investigation identified low permeability clay to be present beneath made ground in all exploratory locations between 0.7 and 1.5m thick. Groundwater monitoring within WS01, WS03 and WS07, installed within the superficial Till identified water levels ranging between 3.03 and >3.18m bgl. WS02 and WS05 were recorded to be dry. Insufficient water was found to enable groundwater sampling to be conducted during the monitoring period. In consideration of the ground investigation findings, and subsequent monitoring, the evidence indicates that the sand band within the Till Deposits is not a significant water bearing unit.

Soil analysis of made ground and deeper natural soils has indicated that concentrations decrease with depth, indicating that the vertical leaching pathway is unlikely to be significantly active. An example of this is can be seen within the made ground sample and natural ground samples within WS04, where concentrations of metals, PAHs and hydrocarbons can be seen to significantly drop within the natural ground below.

In addition, it is also considered that the proposed development of the site will further mitigate potential risks to Controlled Waters. This is based upon two factors, firstly it is anticipated that made ground in areas of foundations and the southern bank will be removed to facilitate site redevelopment, which will reduce the residual contaminant mass. Secondly the finished site area will be approximately 85% hardstanding and 15% gravel, which will greatly reduce the infiltration of rainwater through the made ground, reducing the likelihood of contaminants leaching from made ground. In consideration of the site conceptual model and above assessment, the risks to Controlled Waters are considered to be low.

However, irrespective of the above assessment, where gross soil contamination has been identified i.e. non-aqueous phase (NAPL), such as in the vicinity of SS01, which is anticipated to be the result of surface spillage of oils/solvents observed to be stored on-site, it is recommended that this is removed during construction, under a watching brief to further reduce the risks to Controlled Waters in accordance with best practice. This will also reduce the residual risk associated with potential vapour generation in the area of the historical spill.

# 8 GAS PROTECTION REQUIREMENTS

## 8.1 Overview

Through the development of the preliminary conceptual model, potential on-site sources of gas and vapour generation were limited to made ground from previous site development. Off-site sources were identified to comprise the infilled former canal to the west and refuse pit to the north east.

The made ground was observed to comprise inert materials that are considered to have a low gas generating potential.

## 8.2 Ground gas monitoring results

Six ground gas monitoring visits have been undertaken over a six-week period throughout May and June 2017 utilising all three monitoring installations (WS01, WS03 and WS07).

The findings are summarised below with results attached in Appendix F:

- Atmospheric pressure conditions were found to vary from 985 and 1010mB over the monitoring period, with atmospheric pressure recorded as falling below 1000mB during Visit 1. Falling pressure was also recorded during Visit 1.
- Methane (Visit 1 peaked at 0.1%) and carbon monoxide levels were recorded at or below the instrument detection levels (<0.1% for methane and <0.1ppm for carbon monoxide).
- Peak carbon dioxide was recorded between <0.3% – 3.0% by volume across the monitoring period. Stable carbon dioxide levels were recorded between <0.3% - 2.5% by volume.
- Oxygen levels were recorded between 12.6% – 20.8% by volume across the period of monitoring. The lower volumes of oxygen did not correspond with high carbon dioxide levels.
- Ground gas flow rates were all recorded to be below instrument detection with the exception of WS01 on visit 1 which recorded a peak value of 0.6l/hr, equalising to a steady flow which was below instrument detection level after 5 seconds.
- Hydrogen sulphide was detected on one occasion (visit 1) within all wells, with concentrations of 1.0 – 1.1ppmv. This is likely to originate from bacterial reactions and is below the Occupational Exposure Limit (OEL) which is conservatively set at 5ppm for long term exposure.
- PID levels were recorded between <0.1(LOD) and 3.3 parts per million volume across the monitoring period. The highest reading of 3.3ppm was recorded within WS03 Visit 1, the following visits recorded this to be 0.7ppm or below.
- Ground water was identified within all wells on Visits 1 and 2 with no detects in the remaining 4. The highest recorded level was 3.03mbgl within WS07. An anomalous result within WS01 - Visit 5 of 2.16m bgl has been discounted as representative of ground water.

## 8.3 Gas screening values

Guideline gas screening values (GSV) ($Q_{hg}$) for maximum methane and carbon dioxide concentrations recorded at the site can be considered through calculation of the hazardous gas flow rate ($Q_{hg}$) in accordance with BS8485[6] and CIRIA 665[7] using the following equation:

$$Q_{hg} = (C_{hg}/100) \times q$$

Where '$C_{hg}$' is the gas concentration measured as a percentage and 'q' is the flow rate.

This calculation is undertaken separately for both carbon dioxide and methane and the maximum $Q_{hg}$ for each, including historical site data, has been calculated and listed below. For conservatism, where no gas flow was detected the gas detector limit of 0.1l/hr has been employed in the calculation:

$Q_{hg}$ (GSV) – methane = 0.0006 (based on peak flow of 0.6l/hr = worst case)

$Q_{hg}$ (GSV) – carbon dioxide = 0.0066 (based on peak flow of 0.6l/hr = worst case)

In accordance with the guidance documents above and the data set gathered, it is considered appropriate to adopt the calculated hazardous gas flow rates as the GSVs. As such, these adopted values suggest there to be no significant gas risk at the site from methane or carbon dioxide.

## 8.4 Discussion

The calculated GSVs indicate there to be no significant gas risk at the site suggesting it is suitable to characterise the site as Characteristic situation 1 based upon the CIRIA guidance, where no protection measures are required.

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[6] BS8485: *Code of Practice for the characterization and remediation from ground gas in affected development – 2015.*

[7] *Assessing risks posed by hazardous ground gases for buildings – CIRIA665 (2007.)*

# 9 PLANT GROWTH AND POTABLE SUPPLY PIPEWORK RISK ASSESSMENT

## 9.1 Phytotoxic risk estimation

A summary of the chemical test results for phytotoxic contaminants is presented in Table 9.1 (made ground) to illustrate the distribution of potential phytotoxic risks revealed by the ground investigation works.

**Table 9.1 – Summary of potentially phytotoxic contaminants**

| Determinant | Laboratory detection limit or recorded concentrations(mg/kg) | | | |
|---|---|---|---|---|
| | Adopted screening level | Made Ground | | |
| | | Min | Max | Nº of exceedances |
| **Cadmium** | **8** | **<0.5** | **21.8** | **2 of 7** |
| **Chromium** | **154** | **21.4** | **811** | **1 of 7** |
| **Copper** | **130** | **26.2** | **499** | **3 of 7** |
| Mercury | 28 | <0.5 | 0.5 | 0 of 7 |
| **Nickel** | **70** | **12.8** | **100** | **3 of 7** |
| Selenium | 10 | <1.0 | 3.2 | 0 of 7 |
| **Zinc** | **300** | **68.3** | **2460** | **5 of 7** |
| Boron | 3 | 0.5 | 1.3 | 0 of 7 |

As indicated by the table above, concentrations of copper, nickel, zinc, cadmium and chromium within the made ground samples were found to be above the assessment criteria. Table 9.2 below summarised the distribution of the results across the site.

**Table 9.2 – Distribution of phytotoxic exceedances**

| Site area | Exploratory holes | Material Description | Determinant level |
|---|---|---|---|
| East | WS03 | MADE GROUND: dark brown stained black clayey gravelly SAND. | Cadmium – 20mg/kg<br>Chromium – 811mg/kg<br>Copper – 301mg/kg<br>Nickel – 71.1mg/kg<br>Zinc – 2240mg/kg |
| | WS04 | | Cadmium – 20mg/kg<br>Copper – 301mg/kg<br>Nickel – 71.1mg/kg<br>Zinc – 2240mg/kg |
| | SS01 | | Copper – 499mg/kg<br>Nickel – 100mg/kg<br>Zinc – 983mg/kg |
| North centre | WS02 | MADE GROUND: dark brown slightly sandy gravelly CLAY. | Zinc – 309mg/kg |

| Table 9.2 – Distribution of phytotoxic exceedances | | | |
|---|---|---|---|
| Southern bank | WS05 | MADE GROUND: dark brown sandy gravelly SILT | Zinc – 314mg/kg |

Table 9.2 demonstrates that exceedances to phytotoxic levels are in the central to eastern portion of the site. Although there are no planned planted areas on the site, levels within the made ground to the west of the site are shown to be within acceptable levels for planting with current flora showing no signs of withering.

If the proposed development is updated to include limited areas of soft landscaping. It is recommended that provision of suitable thickness of topsoil (300mm-450mm) is imported to site for placement in areas of soft cover, in consultation with a landscaping specialist and the development landscaping plan.

## 9.2 Potable water supply pipework risk estimation

Extant water industry guidance[8] states that only organic contaminants pose a potential risk to plastic pipe materials. The UKWIR report provides threshold values for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. These are summarised below in context with the laboratory results gathered through this investigation.

| Table 9.2 - Assessment of results against UKWIR criteria | | | | | |
|---|---|---|---|---|---|
| **Determinant** | **Pipe material GAC (mg/kg)** | | **Laboratory detection limit or recorded concentrations(mg/kg)** | | |
| | **PE** | **PVC** | **Surface material results (7N°)** | | |
| | | | **Min** | **Max** | **N° of exceedances** |
| Extended VOC suite *2 | 0.5 | 0.125 | <0.1 | **8.47** | **7 of 7** |
| BTEX + MTBE | 0.1 | 0.03 | <0.01 | <0.01 | 0 of 3 |
| SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic $C_5$-$C_{10}$) | 2 | 1.4 | <0.01 | **2.3** | **1 of 3** |
| Phenols *3 | 2 | 0.4 | <5 | <5 | 0 of 7 |
| Cresols and chlorinated phenols *1 | 2 | 0.04 | <1 | <1 | 0 of 7 |
| Mineral oil $C_{11}$-$C_{20}$ | 10 | Suitable | 100.2 | 836.7 | 3 of 3 |
| Mineral oil $C_{21}$ – $C_{40}$ | 500 | Suitable | **1284** | **24824** | **3 of 3** |
| Corrosive (conductivity, redox and pH) *1 | Suitable | Suitable | - | - | |

*(*1) Determinant not tested.*
*(*2) Based upon recorded BaP concentrations.*
*(*3) All singular phenols recorded below LOD of 1.0mg/kg.*

[8] Guidance for the selection of water supply pipes to be used in brownfield sites (UK Water Industry Research Limited (UKWIR) - Ref: 10/WM/03/21) - 2010

Site wide elevated concentrations of benzo(a)pyrene, mineral oils ($C_{11}$-$C_{20}$) and ($C_{21}$-$C_{40}$) were detected above the necessary values for PE and PVC pipework within the made ground across the site to 1.2mbgl. As such upgraded pipework will be required.

# 10 REFINED CONCEPTUAL SITE MODEL

## 10.1 Sources

The preliminary conceptual site model identified the following potential contamination sources:

1. Unsealed discarded chemical containers;
2. Gas and contamination migration from the infilled canal to the west;
3. Contaminant migration from adjacent industrial practices;
4. Made ground from historical industrial activities and miscellaneous development on site; and,
5. Gas generation and lateral migration from historical refuse pit.

Chemical testing has demonstrated that contaminant levels within the made and natural ground are below the adopted 'commercial' screening levels with the exception of a Lead hotspot in the east corner of the site (WS04). As such the hazard relating to sources 1 and 4 are significantly reduced.

Results of a six week gas monitoring programme has demonstrated minimal gas detection levels with worst case GSV's characterising the site as a CS1, therefore no gas protection will be required. As such gas hazards associated with sources 2, 3, 4 and 5 are significantly reduced.

No asbestos fibres were detected within 6N° samples of the made ground. As such the consequence of asbestos source within the made ground (Source 4) is significantly lower.

No further potential sources of impact were identified during the subsequent ground investigation works.

## 10.2 Pathways

When considering the proposed end use and the results of the investigation to date, the following exposure pathways have been discounted as plausible for the majority of the site and sensitive receptors identified:

- Leaching and migration to controlled water receptors.

Due to the proposed design the significant increase in hard standing across the site will act as a physical barrier significantly limiting the percolation of water through the made ground source. This will greatly reduce the leaching potential of the leaching and vertical migration of contaminants to shallow groundwater within the superficial sands below.

However, the pathways listed below are considered to be viable for areas of made ground identified across the site:

- Direct attack of buried services.
- Inhalation and explosion due to gases.

## 10.3 Risk evaluation

In order to demonstrate the risks associated with contaminant linkages identified above, a revised site specific risk evaluation updating the details presented in Section 5.0 with data gathered as part of this investigation has been carried out in accordance with national guidance. Table 10.1 summarises the evaluation of risk to identified receptors based upon investigation results to date and the proposed commercial end-use.

**Table 10.1 – Revised source–pathway–receptor relationships**

| Area of potential concern Nº | Source | Comments | Pathway (s) | Receptor | Classification of consequence | Classification of probability | Classification of risk* |
|---|---|---|---|---|---|---|---|
| 1 | On-site<br>Unsealed and discarded chemical containers in the north central area of site, including thinners and other unlabelled chemicals. | Chemical testing of surrounding soils shows contaminants to be within adopted screening levels. Furthermore, the proposed design also identifies the affected area to be encapsulated beneath tarmac hardstanding. | Direct contact | Buildings and Underground Services | Medium | Unlikely | **Low Risk** |
| | | | Gas / vapour inhalation | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |
| 2 | Off-site<br>Gas migration from infilled canal/ landfill to the immediate west. Gas migration from infilled canal/ landfill to the immediate west. | Gas monitoring regime has proven acceptable GSV's and that no gas mitigation methods will be required. | Lateral migration and gas inhalation | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |

**Table 10.1 – Revised source–pathway–receptor relationships**

| Area of potential concern Nº | Source | Comments | Pathway (s) | Receptor | Classification of consequence | Classification of probability | Classification of risk* |
|---|---|---|---|---|---|---|---|
| 3 | Off-site<br>Contaminant migration from industrial practices in the surrounding area including a recycling centre 10m to the north and an auto repair shop/ spray shop 5m to the east. | Gas monitoring regime has proven acceptable GSV's and that no gas mitigation methods will be required. | Lateral migration in groundwater and gas / vapour generation. | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |
| 4 | On-site<br>Made ground from historical industrial activities and miscellaneous development on site. | Although a significant thickness of made ground has been identified across the site, chemical testing has identified contaminants to be below the adopted screening levels, except for a singular Lead hotspot in the east of site (WS04). | Downward migration | Groundwater | Medium | Unlikely | **Low Risk** |
| | | | Direct contact | Buildings and Underground Services | Medium | Unlikely | **Low Risk** |
| | | | Gas / vapour inhalation | Future on-site operatives, construction workers | Medium | Unlikely | **Low Risk** |

| Table 10.1 – Revised source–pathway–receptor relationships | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Area of potential concern Nº** | **Source** | **Comments** | **Pathway (s)** | **Receptor** | **Classification of consequence** | **Classification of probability** | **Classification of risk*** |
| 5 | Off-site<br>Infilled sand pit 100m north – Gas generation. | Gas monitoring regime has proven acceptable GSV's and that no gas mitigation methods will be required. | Lateral migration and gas inhalation | Future on-site operatives, construction workers | Minor | Unlikely | **Very Low Risk** |

**Where multiple receptors exist the risk classification is based on most sensitive receptor for conservatism.*

# 11 WASTE CLASSIFICATION

## 11.1 Landfill acceptance criteria

When waste is intended for disposal at a suitably licensed landfill site it is necessary for the producer (i.e. the developer or consultant on their behalf) to identify, among other general information, the following:

- The List of Waste (LoW) code for the waste.
- The relevant hazardous property (HP1 to HP15).
- The landfill class where the waste may be accepted.
- Waste Acceptance Criteria (WAC) testing results.

Relevant information on the above can be found in WM3[9].

## 11.2 List of Waste (LoW) code

Based on the chemical analysis results for the soils on the site, it is anticipated that the most suitable LoW codes for the site will be:

- **17 05 03** (soils and stones containing hazardous substances).
- **17 05 04 (**soils and stones other than those mentioned in 17 05 03).

## 11.3 Hazardous waste codes and soil waste classification

For the determination of whether the soils revealed on the site are hazardous, the chemical analysis results obtained have been assessed using the Hazwaste online computer program.

A full copy of the computer printout is contained in Appendix G, the results of which are summarised in Table 11.1.

**Table 11.1 - Summary of classification of potential soils for disposal from chemical analysis**

| Exploration hole ref. | Depth (mbgl) | Soil type | Soil classification |
|---|---|---|---|
| WS02 | 1.0 - 1.2 | Made ground | Hazardous |
| WS02 | 1.5 - 1.8 | Natural ground | Non Hazardous |
| WS03 | 0.0-1.2 | Made ground | Hazardous |
| WS04 | 0.5-0.8 | Made ground | Hazardous |
| WS04 | 1.5-1.7 | Natural ground | Non Hazardous |
| WS06 | 0.3-0.7 | Made ground | Non Hazardous |
| WS06 | 0.5-0.7 | Made ground | Non Hazardous |

[9] EA 'Guidance On the classification and assessment of waste (1st Edition 2015) - Technical Guidance WM3'

| Table 11.1 - Summary of classification of potential soils for disposal from chemical analysis | | | |
|---|---|---|---|
| **Exploration hole ref.** | **Depth (mbgl)** | **Soil type** | **Soil classification** |
| WS07 | 0.7-1.0 | Natural ground | Non Hazardous |
| SS01 | 0.0-0.3 | Made ground | Hazardous |
| WS05 | 0.3-0.6 | Made ground | Non Hazardous |

## 11.4 Waste acceptance criteria (WAC) testing

Following the implementation of the Landfill Regulations 2002, the use of Waste Acceptance Criteria (WAC) testing for waste classification was introduced on 16th July 2005.

WAC testing is intended to supplement the waste identification and classification methods above, and is often required by landfills to assist in the determination of whether a waste can reliably be classified as 'inert' or 'stable non-reactive' as well as 'hazardous' or 'non-hazardous' and therefore whether the lower or higher rates of landfill tax apply.

## 11.5 Landfill tax

Following the termination of the landfill tax exemption scheme by the government in November 2008 any material leaving site that is classed as non-hazardous or hazardous waste will be liable to the landfill tax levy, which is currently set at £86.10/tonne (2017/2018)[10] unless it can be proven to be inactive waste through WAC testing.

## 11.6 Waste assessment discussion

Based on the HazWaste assessment the natural ground and the majority of the made ground is classified as non-hazardous waste. The chemical data indicates the soil will likely be treated as inert or stable non-reactive waste, avoiding the higher rate of landfill tax. However, this is not guaranteed and will need to be confirmed through discussions with the receiving tip/waste soils treatment facility who may require WAC testing.

In locations where hazardous waste has been identified, made ground in the areas of WS02, 03, 04 and SS01, the material will need to be dealt with separately to the majority of the material being removed from site. It is recommended that the hazardous material is segregated and removed as hazardous waste. Receiving landfills will require WAC testing to be carried out on the hazardous waste in order to determine whether or not it can be classified as inactive material which would mean that it could avoid the higher landfill tax rate.

[10] Details on landfill tax rates can be found at: https://www.gov.uk/government/publications/landfill-tax-increase-in-rates/landfill-tax-increase-in-rates

# 12 COMMENTS ON ENGINEERING DESIGN

## 12.1 General

Eurocode 7 (Section 2) advocates the use of geotechnical categorisation of the proposed structures to establish the design requirements. For the purposes of this investigation the proposed structures have been classified as follows:

- Geotechnical category 1: Small and relatively simple buildings with strip or piled foundations, roads, pavements, car parks, retaining walls below 2m, small excavations for drainage works, with the proposed development considered to be within this category.

Information presented to T&P indicates that a potential future development is to comprise the construction of 1N° warehouse style structure containing 8N° internal gas engines, along with on-site substation, transformer, gas skid and oil storage tank with associated tarmac parking and manoeuvring surface. It has been assumed that the buildings will be of steel and masonry construction with loads of between 150 - 250kN/m.

## 12.2 Summary of geotechnical parameters

Stratum thicknesses and geotechnical parameters for the soil and rock encountered in the investigation are summarised in the following sections. The level of confidence in the derived parameters is indicated as follows:

| **Table 12.1 – Level of confidence indicator references** | |
|---|---|
| value | High level of confidence - based on information from investigation. |
| value | Medium level of confidence - based on published data. |
| value | Low level of confidence – more data required if parameter to be used in design. |

### *12.2.1 Made Ground*

The made ground encountered across the site was found to be locally variable, as such it is considered inappropriate to present geotechnical information.

### *12.2.2 Superficial Till Deposits - Cohesive*

The design thicknesses and geotechnical parameters for use in the Superficial Till - Cohesive deposits are described in Table 12.2.

**Table 12.2 – Summary of Geotechnical Parameters from the Superficial Till - Cohesive Deposits**

| Parameter | Units | Min | Max | Design | Comments |
|---|---|---|---|---|---|
| Top Depth | mbgl | 0.7 | 1.2 | 1.2 | |
| Base Depth | mbgl | 1.8 | 2.2 | 1.8 | |
| Thickness | m | 0.7 | 1.1 | 0.7 | |
| Moisture Content | % | 18 | 22 | 20 | |

| Table 12.2 – Summary of Geotechnical Parameters from the Superficial Till - Cohesive Deposits | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Units** | **Min** | **Max** | **Design** | **Comments** |
| Liquid Limit | % | 41 | 50 | 45 | |
| Plastic Limit | % | 19 | 22 | 20 | |
| Plasticity Index | - | 22 | 28 | 24 | |
| % passing 425µm sieve | % | 89 | 98 | **N/A** | |
| Modified Plasticity Index | - | 20.2 | 27.4 | 22 | Based on the NHBC guidance, results are indicative of soils of a **Medium** volume change potential |
| Standard Penetration Resistance @ 1.0m | N Value | 11 | 33 | 14 | Values within head deposits are generally approximately 14 - 15 with the exception of one high result of 33 expected to be a sandstone cobble. |
| Undrained shear Strength | kPa | 100 | 125 | 100 | Values from WS01 only, attempted tests in other WS locations caused fracture of sample indicative of >125kPa. |
| Modulus of volume compressibility | $m^2$/MN | **0.05** | **0.30** | **0.15** | Based on published data for fluvio-glacial and overconsolidated clay and empirical relationship between PI values and SPT results. |
| Skempton Consolidation Factor µ | - | **0.5** | **1.0** | **0.75** | Based on published data - Normally consolidated to over-consolidated clay. |
| pH | - | 7.5 | 7.7 | 7.6 | |
| Water soluble sulphate ($SO_4^{2-}$) | mg/l | 0.1 | 128 | 128 | (Worst case scenario) |

### *12.2.3 Superficial Till Deposits - Granular*

The design thicknesses and geotechnical parameters for use in the Superficial Till – Granular are described in Table 12.3.

| Table 12.3 – Summary of Geotechnical Parameters from the Superficial Till – Granular | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Units** | **Min** | **Max** | **Design** | **Comments** |
| Top Depth | mbgl | 1.8 | 1.9 | 1.9 | Based on depth to sand within the footprint of the main structure. |
| Base Depth | mbgl | 4.0 | 5.0 | 4.5 | |
| Thickness | M | >3.2 | >1.1 | 1.00 | |
| Gravel/cobbles | % | 3 | 3 | 3 | This is indicative of a slightly gravelly silty SAND - which is consistent with logging. |
| Sand | % | 83 | 83 | 83 | |
| Silt and clay | % | 15 | 15 | 15 | |

| Table 12.3 – Summary of Geotechnical Parameters from the Superficial Till – Granular | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Units** | **Min** | **Max** | **Design** | **Comments** |
| Standard Penetration Resistance @ 2.0m | N Value | 21 | 43 | 28 | |
| Standard Penetration Resistance @ 3.0m | N Value | 16 | 44 | 30 | |
| Standard Penetration Resistance @ 4.0m | N Value | 38 | 50 | 45 | Refusal within 5N° boreholes. |
| Standard Penetration Resistance @ 5.0m | N Value | 50 | 50 | 50 | Refusal within 1N° Borehole. |
| Angle of shearing resistance ϕ | ° | **36** | **41** | **36** | Derived from empirical relationship with SPTs |
| Compressibility index | | **0.001** | **0.30** | **0.30** | Most conservative assumption. |

## 12.3 Construction considerations

### *12.3.1 Subsurface concrete*

Based on the pH and water soluble sulphate values recorded by the chemical and geotechnical laboratory analysis, a DS1-AC1s design mix concrete should be suitable for buried structures when compared against the BRE[11] assessment levels.

### *12.3.2 Floor slabs*

Due to the thickness of made ground across the site (0.7m >1.2m) it is advised that proprietary suspended ground floor slabs are utilised on site. At this stage it is recommended that the clay is assumed to be of medium volume change potential and as a result any proprietary suspended ground floor slabs are designed with a minimum 250mm void based upon NHBC guidance as an example of best practice.

### *12.3.3 Building near trees*

The cohesive soils found beneath the site are considered to have a medium shrinkage potential and will therefore be susceptible to the influence of trees/hedges like those adjacent to the western boundary. It is recommended that an arboricultural survey for the site is consulted during the design of foundations on the site.

Based upon the volume change potential the recommended minimum founding depth of traditional foundations should be 0.9m; however, due to the thickness of made ground foundations are expected to be placed at a greater depth than this. At this stage due to the volume change potential of the soils it is also recommended that provision be included for proprietary void formers as part of the foundation design where foundation depths exceed 1.5m and are in areas prone to the effect of trees.

[11] *BRE Special Digest 1:2005 – Third edition – Concrete in aggressive ground.*

### *12.3.4 Deep excavations*

During the investigation, the underlying natural material in the boreholes were found to be generally stable apart from within the water logged sand where collapse was observed. Excavations within water bearing sand during the construction phase will likely need shoring. Man entry into any excavations should be avoided but if this is ultimately necessary then the sides should be adequately shored and supported or battered back to a safe angle in accordance with the site specific developed health and safety plan.

### *12.3.5 Groundwater*

Groundwater was encountered within a number of the exploratory holes during the ground investigation with monitoring results showing water levels to rest at approximately 3m bgl. Any inflows into excavations above this depth would be expected to be low and should be adequately dealt with via sump pumping. Where excavations will surpass 3m below current ground levels the use of specialist dewatering techniques will likely be required and the advice of specialist dewatering contractors should be sought.

### *12.3.6 Buried utilities*

Available utility service plans do not indicate any underlying services beneath the site. A medium pressure Gas main runs within the canal to the west.

### *12.3.7 Earthworks and material handling*

Should organic rich material be encountered this should be removed from beneath all building and hard standing areas. It is understood that final development levels will be broadly similar to existing. As such, the cut/fill balance for the development is anticipated to require off-site disposal of surplus soils. No on-site re-use is considered likely to be required.

### *12.3.8 Road construction issues*

Although no *in situ* or laboratory testing was required within the ground investigation, the proposed development identifies a large tarmacked area for vehicle movements.

Where made ground was revealed is not considered likely to be suitable as an effective formation for construction beneath adoptable roads. Where it is observed at formation soft spots and oversized material should be excavated and replaced with compacted granular fill.

## 12.4 Preliminary foundation recommendations

The future development is to comprise the construction of 1N$^{o}$ warehouse style structure containing 8N$^{o}$ internal gas engines, along with on-site substation, transformer, gas skid and oil storage tank with associated tarmac parking and manoeuvring surface. It has been assumed that the buildings will be of steel and masonry construction with loads of between 150 - 250kN/m.

The ground conditions across the site were generally found to comprise made ground to between 0.7 and 1.2m, underlain by stiff to very stiff cohesive superficial glacial till deposits to approximately 2.0m. This was underlain by medium dense to dense granular sand of the superficial glacial till deposits, the base of which is unproven.

Based on the ground conditions encountered and proposed development recommendations for the utilisation of square pad foundations targeted upon the cohesive deposits and the granular material below are presented within tables 12.4 and 12.5 below.

| **Table 12.4 – Superficial Glacial Till - Cohesive** | | |
|---|---|---|
| **Design depth (mbgl)** | **Pad Dimensions** | **Allowable bearing capacity (kPa)** |
| 1.2 | 1.5m by 1.5m | 100 |
| 1.2 | 1.0m by 1.0m | 125 |

Note that the values for allowable bearing capacity given in the above table are for anticipated settlements of between 15 and 20mm.

| **Table 12.5 – Superficial Glacial Till - Granular** | | |
|---|---|---|
| **Design depth (mbgl)** | **Pad Dimensions** | **Allowable bearing capacity (kPa)** |
| 2.0 | 1.5m by 1.5m | 250 |

As demonstrated in the tables above the cohesive soils beneath the site provide comparatively lower allowable bearing capacity for acceptable settlement compared to founding within the granular material at 2.0m. Additionally, it is recommended that all pads are placed within the same founding stratum to minimise the possibility of differential settlement.

Considering the conceptual site model, the very low permeability clay is identified as a physical break to the pathway for contaminants within the overlying made ground to reach the water bearing sand deposits below (receptor). As such if deeper foundations are required, penetrating the granular material below, a preferential pathway will be formed. Removal of the hydrocarbon impacted soils present as part of the redevelopment works would mitigate this risk. However, as discussed previously in section 7.0 “Controlled waters” the proposed hardstanding areas of the site will greatly reduce the potential for leaching and vertical migration of determinants from the made ground to the low sensitivity shallow groundwater receptor.

# 13 CONSIDERATIONS AND RECOMMENDATIONS

## 13.1 Considerations

The following areas of uncertainty have been identified:

- The conceptual site model has been based on the current proposed development which involves the majority of site becoming hard standing and gravelled area. Any updates to this design should be assessed against the recommendations within this report.

## 13.2 Recommendations: Human health and controlled waters

The following recommendations for are made:

- Based upon laboratory testing a Lead hotspot has been identified within the eastern corner of the site (WS04). Based upon the current proposed development plan this area will be capped and the pathway to critical receptors removed.
- Where gross soil contamination has been identified i.e. non-aqueous phase (NAPL), such as in the vicinity of SS01, which is anticipated to be the result of surface spillage of oils/solvents observed to be stored on-site, it is recommended that this is chased out during construction, under a watching brief to further reduce the risks to Controlled Waters in accordance with best practice. Furthermore, this will lower the residual vapour risk.
- Although through the redevelopment of the site the risks to receptors is low, advice and controls should be put in place for those visiting and using the site currently.

## 13.3 Recommendations: Plant growth and potable water supply pipework

The following recommendations for further work are made with regard to plant growth and potable water supply pipework:

- The made ground soils on site are not considered suitable for plant growth. However the proposed layout doesn't identify any areas of planting and as such this will not be an issue.
- Upgraded potable pipework will be required in all areas of made ground on site.

## 13.4 Recommendations: Engineering

The following recommendations are made with regard to geotechnics:

- The cohesive Till deposits have been characterized as having medium volume change potential, as such foundations should be a minimum of 0.9mbgl. These soils will also be moderately effected by on site trees and hedgerows, as such it is recommended that an arboricultural survey of the site should be consulted during foundation design.
- 1m by 1m pad foundations at a depth of 1.2mbgl could be designed for an allowable bearing capacity of 125kPa for allowable settlement within the cohesive Till Deposits. In the event that greater pad sized are required and or a larger bearing capacity, pads within the granular sand deposits could be designed for an allowable bearing capacity of 250kPa.
- Based upon the Hazwaste results it is expected that where disposal is required the made ground will be classed as hazardous and be at the higher tax rate.

## 13.5 Recommendations: General

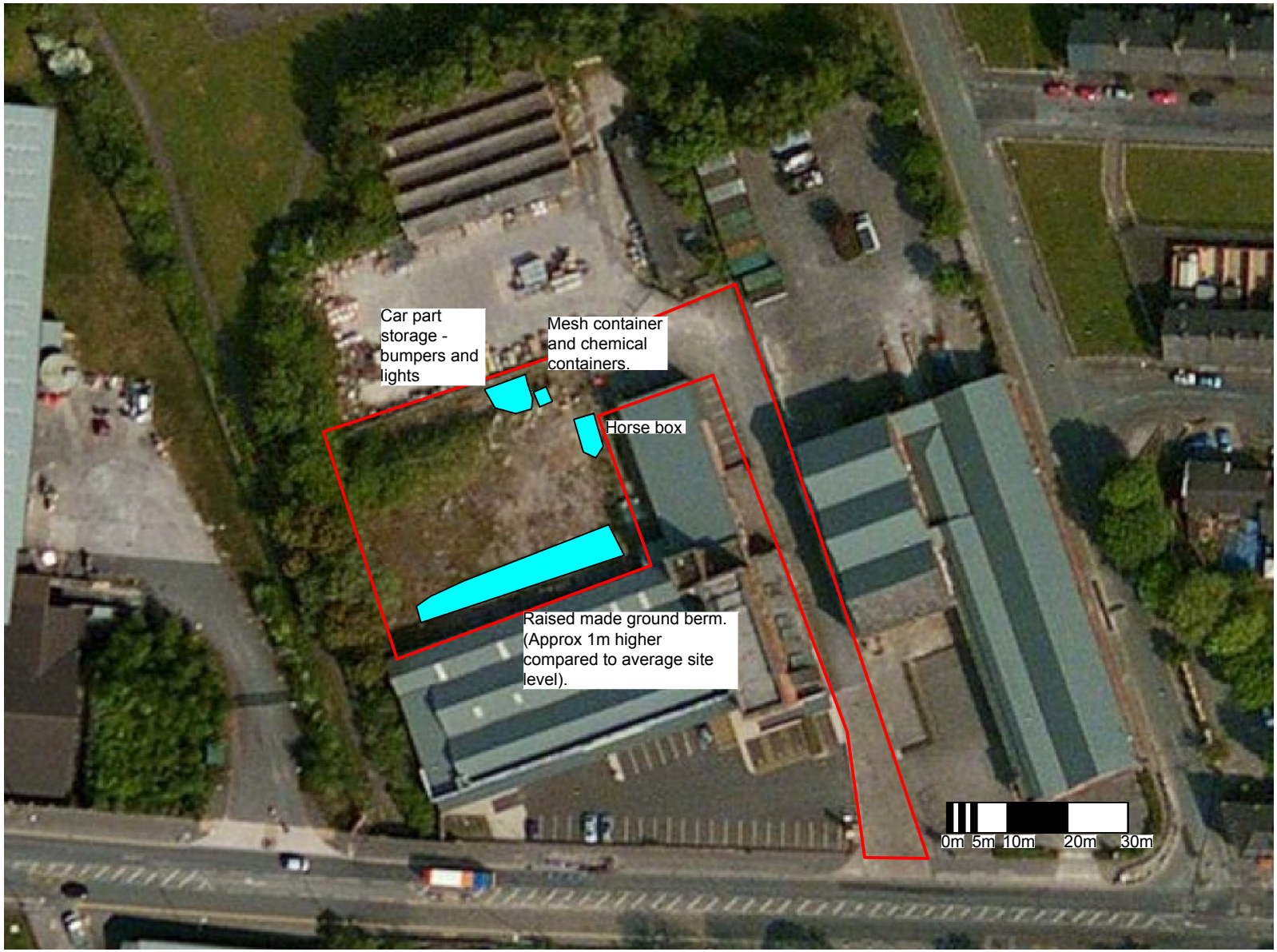
More general recommendations are provided as follows:

- The statutory water provider should be consulted regarding suitable water supply pipework requirements.
- Discussions should be held with local landfill facilities to determine their classification for any soils to be disposed off-site arising from its development.
- A site-specific health and safety plan should be prepared to inform on risks posed from the previous site use and mitigations for ground workers developing the site e.g. requirements for appropriate PPE, hygiene practices, environmental monitoring and requirements for mitigation measures during construction works.
- Contractors on site should remain vigilant for visible and olfactory signs of gross contamination which has not been identified and assessed within this ground investigation. In the event that gross contamination is found an environmental engineer should be consulted.
- On site boreholes should be decommissioned in accordance with environment agency guidance prior to development.
- The relevant regulatory authorities should be forwarded a copy of the ground investigation report, to confirm that they are in agreement with the conclusions and recommendations herein.

A DRAWINGS
B PHOTOGRAPHS
C EXPLORATORY HOLE RECORDS
D GEOTECHNICAL ANALYSIS RESULTS
E CHEMICAL ANALYSIS RESULTS
F MONITORING RESULTS
G HAZWASTE PRINTOUT
H STATISTICAL ASSESSMENT

# Appendix A – Drawings

N




| Rev. | Date | Amendment | Drawn | Ckd |
|---|---|---|---|---|
| | | | | |

Base map source:
OS Maps

T&P Regen

*Unit 4 Brunel Lock Development,*
*Smeaton Road, Bristol, BS1 6SE*
*Tel: 0117 927 7756*

Project Name
Ashton Old Road, Manchester

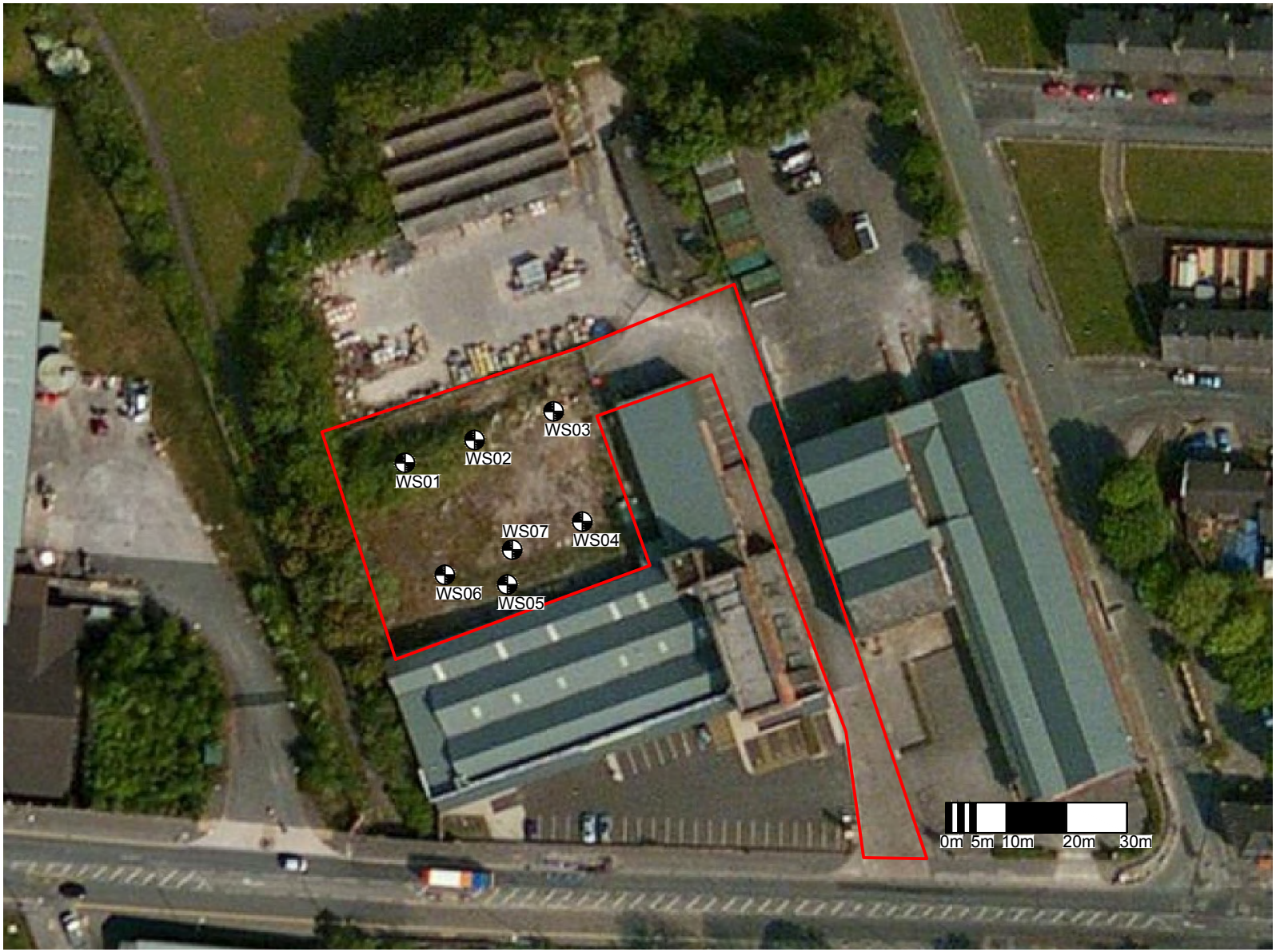
Drawing Title
Site Feature Plan

Client
Eco NRG Solutions Ltd

| Drawn by | Checked by | Date | Scale |
|---|---|---|---|
| RC | HEM | 29/6/17 | 1:1000@A4 |

| Drawing No. | Rev. |
|---|---|
| ASH1867-01-003 | A |

N




Key:

T&P Window Sample Borehole Locations *(WS01-07)*

Note: Environmental monitoring wells installed within WS01,WS03 and WS07.

| Rev. | Date | Amendment | Drawn | Ckd |
|---|---|---|---|---|

Base map source:
OS Maps

T&P Regen

*Unit 4 Brunel Lock Development, Smeaton Road, Bristol, BS1 6SE*

*Tel: 0117 927 7756*

Project Name

Ashton Old Road, Manchester

Drawing Title

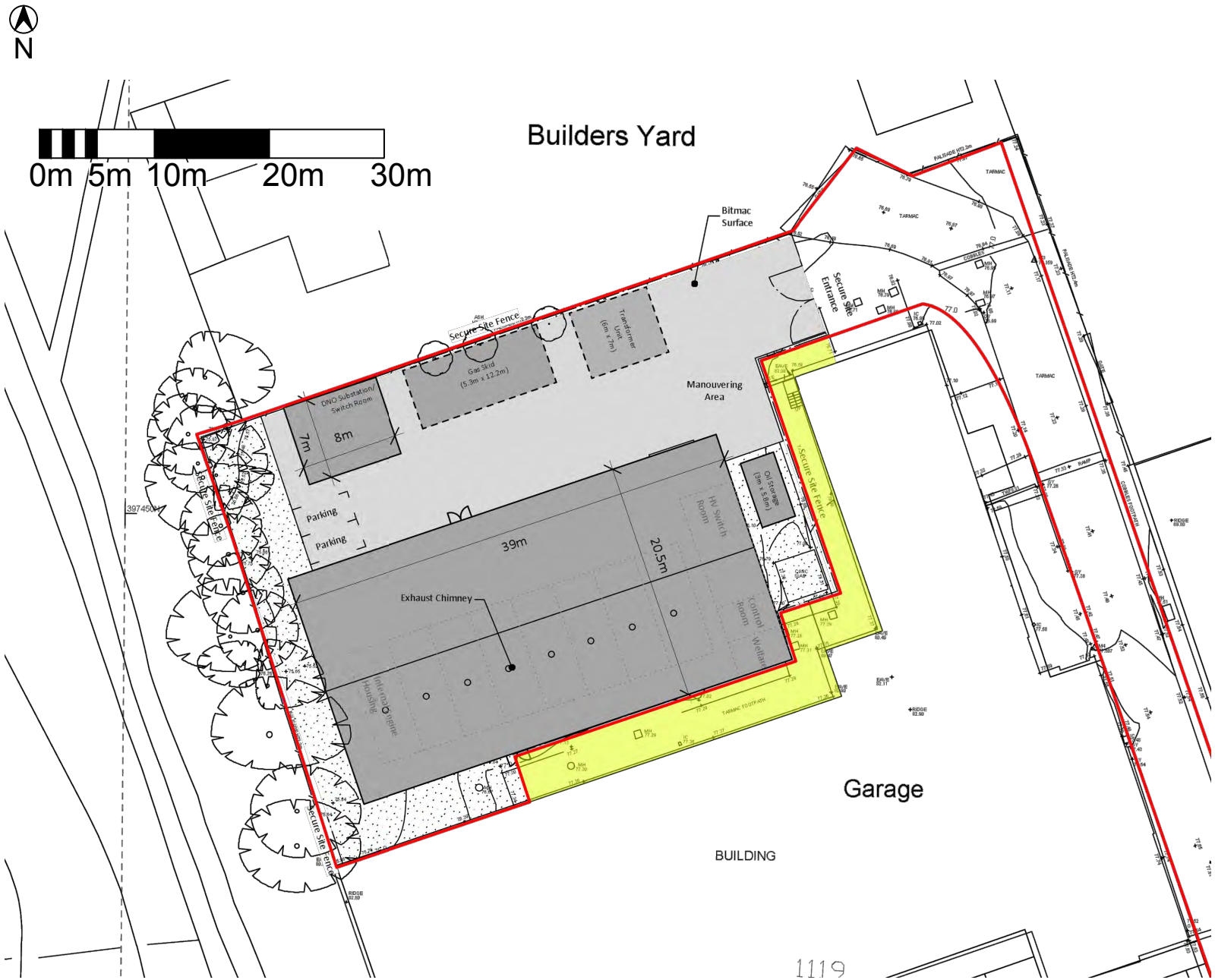
Exploratory Hole Location Plan

Client

Eco NRG Solutions Ltd

| Drawn by | Checked by | Date | Scale |
|---|---|---|---|
| RC | HEM | 5/5/17 | 1:1000@A4 |

| Drawing No. | Rev. |
|---|---|
| ASH1867-01-002 | A |




| Rev. | Date | Amendment | Drawn | Ckd |
|---|---|---|---|---|
| | | | | |

Base map source: RPS Group
DWG No: 9722-0002-04
Date: Sept 16

T&P Regen

*Unit 4 Brunel Lock Development, Smeaton Road, Bristol, BS1 6SE*

*Tel: 0117 927 7756*

Project Name

Ashton Old Road, Manchester

Drawing Title

Proposed Development Plan

Client

Eco NRG Solutions Ltd

| Drawn by | Checked by | Date | Scale |
|---|---|---|---|
| RC | HEM | 30/6/17 | 1:500@A4 |

| Drawing No. | Rev. |
|---|---|
| ASH1867-01-004 | A |

# Appendix B – Photographs

# APPENDIX B – SITE RECONNAISANCE PHOTOGRAPHS

| | |
|---|---|
| | |
| **Photo A –** Mesh basket with sealed and open chemical containers, with car parts in the background. Visible staining of the ground. Red Circle = location of SS01 (Facing north-east) | **Photo B** – Close up of the western side of the mesh basket showing signs of burnt material inside, white container at the base of image labelled "Thinners" |
| | |
| **Photo C –** View across the site to the south-east. | **Photo D –** View across the site to the south-west. |
| | |
| **Photo E –** Typical made ground spoil. WS01. | **Photo F –** Typical window sample core. Made ground to 0.7m clay to 1.9m and clayey sand to 4.0m. (WS07) |

# Appendix C – Exploratory Hole Records

| T&P Regen | Contract Name: Ashton Old Road | | Client: EcoNRG | | | Borehole ID: WS01 |
|---|---|---|---|---|---|---|
| www.tandpregeneration.co.uk | Contract Number: ASH1867 | Date Started: 28/04/2017 | Logged By: RC | Checked By: JF | Status: FINAL | Sheet 1 of 1 |
| Windowless Sample Borehole Log | Easting: | Northing: | Ground Level: | Plant Used: Competitor Dart | Print Date: 29/06/2017 | Scale: 1:25 |

Weather: Clear and sunny | Termination: Refusal | SPT Hammer: DART262 Energy Ratio: 72%

| Samples & In Situ Testing | | | | Strata Details | | | | Groundwater | |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample ID | Windowless Sample Recovery | Test Result | Level (mAOD) | Depth (m) (Thickness) | Legend | Strata Description | Water Strike | Backfill / Installation |
| 0.00 - 0.50 | ES1 | | | | | | MADE GROUND - Firm dark brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of red brick, concrete, ceramics and plastic. | | |
| 0.50 - 1.00 | ES2 | | | | (1.20) | | | | |
| | | 1.20 - 2.00 = 100% | SPT(C) 1.20m, N=15 (3,4/3,5,3,4) | | 1.20 | | Very stiff orangish brown CLAY. (Devensian Till) | | |
| 1.30 - 1.50 | ES3 | | | | | | | | |
| 1.60 - 1.80 | D4 | | | | (0.80) | | | | |
| | | 2.00 - 3.00 = 100% | SPT(C) 2.00m, N=26 (5,5/5,6,7,8) | | 2.00 | | Medium dense to dense orangish brown SAND. (Devensian Till) | | |
| 2.30 - 2.50 | D5 | | | | | | | | |
| 2.30 - 2.50 | ES7 | | | | | | | | |
| 3.00 - 4.00 | B6 | 3.00 - 4.00 = 100% | SPT(C) 3.00m, N=34 (5,6/6,8,9,11) | | (2.00) | | | | |
| | | | SPT(C) 4.00m, N=50 (6,1/9,12,14,15) | | 4.00 | | End of Borehole at 4.00m | | |

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

**Start & End of Shift Observations**

| Date | Time | Depth (m) | Casing (m) | Water (m) |
|---|---|---|---|---|
| 28-04-2017 | 09:30 | 4.00 | | 3.00 |

**Borehole Diameter**

| Depth (m) | Dia (mm) |
|---|---|
| 2.00 | 101 |
| 3.00 | 86 |
| 4.00 | 76 |

**Casing Diameter**

| Depth | Dia (mm) |
|---|---|
| | |

**Water Strikes**

| Strike (m) | Casing (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks |
|---|---|---|---|---|---|
| 3.00 | | | 0 | 2.00 | |

**Installation**

| Top (m) | Base (m) | Type | Dia (mm) |
|---|---|---|---|
| 0.00 | 0.50 | PLAIN | 50 |
| 0.50 | 4.00 | SLOTTED | 50 |

**Remarks:**

Hand dug pit to 1.2mbgl.
Groundwater at 3.0mbgl post well installation.

| T&P Regen www.tandpregeneration.co.uk | Contract Name: Ashton Old Road | | | Client: EcoNRG | | Borehole ID: WS02 |
|---|---|---|---|---|---|---|
| | Contract Number: ASH1867 | Date Started: 28/04/2017 | Logged By: RC | Checked By: JF | Status: FINAL | Sheet 1 of 1 |
| Windowless Sample Borehole Log | Easting: | Northing: | Ground Level: | Plant Used: Competitor Dart | Print Date: 29/06/2017 | Scale: 1:25 |
| Weather: Clear and sunny | | Termination: Refusal | | | SPT Hammer: DART400 Energy Ratio: 66% | |

| Samples & In Situ Testing | | | | Strata Details | | | | Groundwater | |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample ID | Windowless Sample Recovery | Test Result | Level (mAOD) | Depth (m) (Thickness) | Legend | Strata Description | Water Strike | Backfill / Installation |
| | | 0.50 - 1.00 = 100% | | | (1.20) | | MADE GROUND - Firm dark brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of red brick, concrete, ceramics and plastic. | | |
| 1.00 - 1.20 | ES1 | 1.00 - 2.00 = 100% | SPT(C) 1.00m, N=16 (2,2/3,4,4,5) | | | | *Between 1.0 - 1.2m - Slight hydrocarbon odour.* | | |
| | | | | | 1.20 | | Stiff to very stiff dark reddish brown mottled grey CLAY. (Devensian Till) | | |
| 1.50 - 1.80 | ES2 | | | | (0.70) | | | | |
| | | 2.00 - 3.00 = 100% | SPT(C) 2.00m, N=21 (5,5/5,5,5,6) | | 1.90 | | Medium dense orangish brown and grey slightly clayey SAND. (Devensian Till) | | |
| 2.40 - 2.60 | ES3 | | | | (1.30) | | | | |
| | | 3.00 - 4.00 = 100% | SPT(C) 3.00m, N=16 (3,3/4,4,4,4) | | | | | | |
| | | | | | 3.20 | | Medium dense to dense dark orangish brown SAND. (Devensian Till) | | |
| 3.50 - 3.70 | ES4 | | | | (0.80) | | | | |
| | | | SPT(C) 4.00m, 50 (11,12/50 for 255mm) | | 4.00 | | End of Borehole at 4.00m | | |

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

**Start & End of Shift Observations**

| Date | Time | Depth (m) | Casing (m) | Water (m) |
|---|---|---|---|---|
| 28-04-2017 | 10:30 | 4.00 | | |

| Borehole Diameter | | Casing Diameter | |
|---|---|---|---|
| Depth (m) | Dia (mm) | Depth | Dia (mm) |
| 1.00 | 116 | | |
| 2.00 | 101 | | |
| 3.00 | 86 | | |
| 4.00 | 76 | | |

**Water Strikes**

| Strike (m) | Casing (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks |
|---|---|---|---|---|---|
| | | | | | |

**Installation**

| Top (m) | Base (m) | Type | Dia (mm) |
|---|---|---|---|
| | | | |

**Remarks:**
Hand dug to 0.5mbgl.
Groundwater not encountered.

| T&P Regen | Contract Name: Ashton Old Road | | Client: EcoNRG | | | Borehole ID: WS03 |
|---|---|---|---|---|---|---|
| www.tandpregeneration.co.uk | Contract Number: ASH1867 | Date Started: 28/04/2017 | Logged By: RC | Checked By: JF | Status: FINAL | Sheet 1 of 1 |
| Windowless Sample Borehole Log | Easting: | Northing: | Ground Level: | Plant Used: Competitor Dart | Print Date: 29/06/2017 | Scale: 1:25 |

Weather: Clear and sunny | Termination: Refusal | SPT Hammer: DART400 Energy Ratio: 66%

| Samples & In Situ Testing | | | | Strata Details | | | | Groundwater | |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample ID | Windowless Sample Recovery | Test Result | Level (mAOD) | Depth (m) (Thickness) | Legend | Strata Description | Water Strike | Backfill / Installation |
| 0.00 - 1.20 | ES1 | | | | (1.20) | | MADE GROUND - Dark brown and black gravelly SAND. Gravel is angular fine to coarse of brick, ceramics, concrete and sandstone. | | |
| 0.80 - 1.10 | D2 | | | | | | | | |
| | | 1.20 - 2.00 = 100% | SPT(C) 1.20m, N=17 (2,3/4,4,4,5) | | 1.20 | | Stiff to very stiff orangish brown mottled grey slightly sandy CLAY with occasional rounded fine to coarse gravel of sandstone. (Devensian Till) | | |
| 1.30 - 1.50 | D3 | | HV 1.40m, 100/56kPa | | | | | | |
| 1.50 - 1.70 | ES4 | | | | | | | | |
| | | | HV 1.70m, 125/60kPa | | (1.00) | | | | |
| | | 2.00 - 3.00 = 100% | SPT(C) 2.00m, N=29 (6,6/6,7,8,8) | | | | | | |
| 2.30 - 2.50 | ES5 | | | | 2.20 | | Medium dense to dense orangish brown SAND. (Devensian Till) | | |
| | | 3.00 - 4.00 = 100% | SPT(C) 3.00m, N=38 (6,7/8,8,11,11) | | | | | | |
| | | | | | (2.80) | | | | |
| | | 4.00 - 5.00 = 100% | SPT(C) 4.00m, N=38 (8,9/9,10,9,10) | | | | | | |
| | | | SPT(C) 5.00m, 50 (7,9/50 for 295mm) | | 5.00 | | End of Borehole at 5.00m | | |

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

**Start & End of Shift Observations**

| Date | Time | Depth (m) | Casing (m) | Water (m) |
|---|---|---|---|---|
| 28-04-2017 | 09:00 | 5.00 | | |

**Borehole Diameter**

| Depth (m) | Dia (mm) |
|---|---|
| 1.00 | 116 |
| 2.00 | 101 |
| 3.00 | 86 |
| 4.00 | 76 |

**Casing Diameter**

| Depth | Dia (mm) |
|---|---|
| | |

**Water Strikes**

| Strike (m) | Casing (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks |
|---|---|---|---|---|---|
| | | | | | |

**Installation**

| Top (m) | Base (m) | Type | Dia (mm) |
|---|---|---|---|
| 0.00 | 0.50 | PLAIN | 50 |
| 0.50 | 4.00 | SLOTTED | 50 |

**Remarks:**

Hand dug pit to 1.2mbgl.
Groundwater not encountered.

| T&P Regen www.tandpregeneration.co.uk | Contract Name: Ashton Old Road | | Client: EcoNRG | | | Borehole ID: WS04 |
|---|---|---|---|---|---|---|
| | Contract Number: ASH1867 | Date Started: 28/04/2017 | Logged By: RC | Checked By: JF | Status: FINAL | Sheet 1 of 1 |
| Windowless Sample Borehole Log | Easting: | Northing: | Ground Level: | Plant Used: Competitor Dart | Print Date: 29/06/2017 | Scale: 1:25 |

Weather: Clear and sunny | Termination: Refusal | SPT Hammer: DART262 Energy Ratio: 72%

| Samples & In Situ Testing | | | | Strata Details | | | | Groundwater | |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample ID | Windowless Sample Recovery | Test Result | Level (mAOD) | Depth (m) (Thickness) | Legend | Strata Description | Water Strike | Backfill / Installation |
| 0.50 - 0.80 | ES1 | | | | (1.20) | | MADE GROUND - Dark brown and black slightly clayey gravelly SAND with a slight hydrocarbon odour. Gravel is angular fine to coarse of brick, ceramics, concrete, wood and glass. | | |
| | | 1.00 - 2.00 = 100% | SPT(C) 1.00m, N=17 (2,5/5,5,3,4) | | | | | | |
| | | | | | 1.20 | | Stiff to very stiff dark brown CLAY with rare sandstone inclusions. (Devensian Till) | | |
| 1.50 - 1.70 | ES2 | | | | (0.70) | | | | |
| | | 2.00 - 3.00 = 100% | SPT(C) 2.00m, N=33 (8,10/10,10,10,3) | | 1.90 | | Dense light orangish brown SAND. (Devensian Till) | | |
| | | | | | (1.70) | | | | |
| | | 3.00 - 4.00 = 100% | SPT(C) 3.00m, N=43 (1,4/7,11,11,14) | | | | | | |
| 3.20 - 3.40 | ES3 | | | | | | | | |
| | | | | | 3.60 | | Dense reddish orangish brown SAND. (Devensian Till) | | |
| | | | | | (0.40) | | | | |
| | | | SPT(C) 4.00m, N=50 (7,8/9,12,13,16) | | 4.00 | | End of Borehole at 4.00m | | |

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

**Start & End of Shift Observations**

| Date | Time | Depth (m) | Casing (m) | Water (m) |
|---|---|---|---|---|
| 28-04-2017 | 12:00 | 4.00 | | |

**Borehole Diameter**

| Depth (m) | Dia (mm) |
|---|---|
| 1.00 | 116 |
| 2.00 | 101 |
| 3.00 | 86 |
| 4.00 | 76 |

**Casing Diameter**

| Depth | Dia (mm) |
|---|---|
| | |

**Water Strikes**

| Strike (m) | Casing (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks |
|---|---|---|---|---|---|
| | | | | | |

**Installation**

| Top (m) | Base (m) | Type | Dia (mm) |
|---|---|---|---|
| | | | |

**Remarks:**
Hand dug pit to 0.8mbgl.
Groundwater not encountered.

| T&P Regen www.tandpregeneration.co.uk | Contract Name: Ashton Old Road | | Client: EcoNRG | | | Borehole ID: WS05 |
|---|---|---|---|---|---|---|
| | Contract Number: ASH1867 | Date Started: 28/04/2017 | Logged By: RC | Checked By: JF | Status: FINAL | Sheet 1 of 1 |
| Windowless Sample Borehole Log | Easting: | Northing: | Ground Level: | Plant Used: Competitor Dart | Print Date: 29/06/2017 | Scale: 1:25 |

Weather: Clear and sunny | Termination: Refusal | SPT Hammer: DART262 Energy Ratio: 72%

| Samples & In Situ Testing | | | | Strata Details | | | | | Groundwater | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample ID | Windowless Sample Recovery | Test Result | Level (mAOD) | Depth (m) (Thickness) | Legend | Strata Description | | Water Strike | Backfill / Installation |
| | | 0.00 - 1.00 = 100% | | | | | MADE GROUND - Grass over dark brown gravelly sandy SILT. Gravel is angular fine to coarse of concrete and brick. | | | |
| 0.30 - 0.60 | ES1 | | | | (1.00) | | | | | |
| | | | SPT(C) 1.00m, 50 (3,5/50 for 265mm) | | 1.00 | | End of Borehole at 1.00m | 1 | | |
| | | | | | | | | 2 | | |
| | | | | | | | | 3 | | |
| | | | | | | | | 4 | | |
| | | | | | | | | 5 | | |

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

**Start & End of Shift Observations**

| Date | Time | Depth (m) | Casing (m) | Water (m) |
|---|---|---|---|---|
| 28-04-2017 | 13:00 | 1.00 | | |

| Borehole Diameter | | Casing Diameter | |
|---|---|---|---|
| Depth (m) | Dia (mm) | Depth | Dia (mm) |
| 1.00 | 116 | | |

**Water Strikes**

| Strike (m) | Casing (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks |
|---|---|---|---|---|---|
| | | | | | |

**Installation**

| Top (m) | Base (m) | Type | Dia (mm) |
|---|---|---|---|
| | | | |

**Remarks:**
Groundwater not encountered.

| T&P Regen www.tandpregeneration.co.uk | Contract Name: Ashton Old Road | | Client: EcoNRG | | | Borehole ID: WS06 |
|---|---|---|---|---|---|---|
| | Contract Number: ASH1867 | Date Started: 28/04/2017 | Logged By: RC | Checked By: JF | Status: FINAL | Sheet 1 of 1 |
| Windowless Sample Borehole Log | Easting: | Northing: | Ground Level: | Plant Used: Competitor Dart | Print Date: 29/06/2017 | Scale: 1:25 |
| Weather: Clear and sunny | | Termination: Refusal | | SPT Hammer: DART400 Energy Ratio: 66% | | |

| Samples & In Situ Testing | | | | Strata Details | | | | | Groundwater | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample ID | Windowless Sample Recovery | Test Result | Level (mAOD) | Depth (m) (Thickness) | Legend | Strata Description | | Water Strike | Backfill / Installation |
| 0.30 - 0.70 | ES3 | 0.50 - 1.00 = 100% | | | (1.20) | | MADE GROUND - Dark brown gravelly SAND. Gravel is angular fine to coarse of brick, concrete, sandstone and ceramics. | | | |
| | | 1.00 - 2.00 = 100% | SPT(C) 1.00m, N=11 (1,2/2,2,3,4) | | | | | 1 | | |
| | | | | | 1.20 | | Stiff dark orangish brown mottled grey CLAY with occasional angular sandstone gravel inclusions. (Devensian Till) | | | |
| 1.60 - 1.70 | ES1 | | | | (0.80) | | | | | |
| 1.80 - 2.00 | D2 | | | | | | | | | |
| | | 2.00 - 3.00 = 100% | SPT(C) 2.00m, N=43 (10,10/11,10,11,11) | | 2.00 | | Dense to very dense orangish brown SAND. (Devensian Till) | 2 | | |
| 2.50 - 2.60 | ES3 | | | | | | | | | |
| | | 3.00 - 4.00 = 100% | SPT(C) 3.00m, N=44 (7,9/10,11,11,12) | | (2.00) | | | 3 | ▼ | |
| | | | SPT(C) 4.00m, 50 (7,11/50 for 235mm) | | 4.00 | | End of Borehole at 4.00m | 4 | | |
| | | | | | | | | 5 | | |

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

**Start & End of Shift Observations**

| Date | Time | Depth (m) | Casing (m) | Water (m) |
|---|---|---|---|---|
| 28-04-2017 | 13:30 | 4.00 | | 3.00 |

**Borehole Diameter**

| Depth (m) | Dia (mm) |
|---|---|
| 1.00 | 116 |
| 2.00 | 101 |
| 3.00 | 86 |
| 4.00 | 76 |

**Casing Diameter**

| Depth | Dia (mm) |
|---|---|
| | |

**Water Strikes**

| Strike (m) | Casing (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks |
|---|---|---|---|---|---|
| 3.00 | | | 0 | 2.00 | |

**Installation**

| Top (m) | Base (m) | Type | Dia (mm) |
|---|---|---|---|
| | | | |

**Remarks:**

Hand dug to 0.5mbgl.
Groundwater at 3.0mbgl post well installation.

| T&P Regen | Contract Name: Ashton Old Road | | Client: EcoNRG | | | Borehole ID: WS07 |
|---|---|---|---|---|---|---|
| www.tandpregeneration.co.uk | Contract Number: ASH1867 | Date Started: 28/04/2017 | Logged By: RC | Checked By: JF | Status: FINAL | Sheet 1 of 1 |
| Windowless Sample Borehole Log | Easting: | Northing: | Ground Level: | Plant Used: Competitor Dart | Print Date: 29/06/2017 | Scale: 1:25 |

Weather: Clear and sunny | Termination: Refusal | SPT Hammer: DART400 Energy Ratio: 66%

| Samples & In Situ Testing | | | | Strata Details | | | | Groundwater | |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample ID | Windowless Sample Recovery | Test Result | Level (mAOD) | Depth (m) (Thickness) | Legend | Strata Description | Water Strike | Backfill / Installation |
| | | 0.00 - 1.00 = 100% | | | (0.50) | | MADE GROUND - Red brick and concrete. | | |
| 0.50 - 0.70 | ES1 | | | | 0.50 | | MADE GROUND - Black SAND. | | |
| 0.70 - 1.00 | ES2 | | | | 0.70 | | Stiff to very stiff dark orangish brown mottled grey CLAY. (Devensian Till) | | |
| | | 1.00 - 2.00 = 100% | SPT(C) 1.00m, N=14 (2,2/3,4,3,4) | | | | | | |
| 1.30 - 1.50 | D3 | | | | (1.10) | | | | |
| 1.50 - 1.70 | ES4 | | | | | | | | |
| | | | | | 1.80 | | Medium dense orangish brown SAND. (Devensian Till) | | |
| | | 2.00 - 3.00 = 100% | SPT(C) 2.00m, N=23 (4,6/6,6,5,6) | | (0.40) | | | | |
| | | | | | 2.20 | | Medium dense to dense dark orangish brown SAND. (Devensian Till) | | |
| 2.50 | ES5 | | | | | | | | |
| 2.80 | ES6 | | | | | | | | |
| | | 3.00 - 4.00 = 100% | SPT(C) 3.00m, N=24 (3,4/5,5,6,8) | | (1.80) | | | | |
| | | | SPT(C) 4.00m, 50 (7,10/50 for 250mm) | | 4.00 | | End of Borehole at 4.00m | | |

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

**Start & End of Shift Observations**

| Date | Time | Depth (m) | Casing (m) | Water (m) |
|---|---|---|---|---|
| 28-04-2017 | 15:00 | 4.00 | | 3.00 |

**Borehole Diameter**

| Depth (m) | Dia (mm) |
|---|---|
| 1.00 | 116 |
| 2.00 | 101 |
| 3.00 | 86 |
| 4.00 | 76 |

**Casing Diameter**

| Depth | Dia (mm) |
|---|---|
| | |

**Water Strikes**

| Strike (m) | Casing (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks |
|---|---|---|---|---|---|
| 3.00 | | | 0 | 2.00 | |

**Installation**

| Top (m) | Base (m) | Type | Dia (mm) |
|---|---|---|---|
| 0.00 | 0.50 | PLAIN | 50 |
| 0.50 | 4.00 | SLOTTED | 50 |

**Remarks:**

Groundwater at 3.0mbgl post well installation.

# Appendix D – Geotechnical Analysis Results

# Transmittal Note

South West Geotechnical Ltd
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

| | | | |
|---|---|---|---|
| **Job No:** | 9106 | **Date Received:** | 09/05/17 |
| **Job Name:** | Ashton Old Road | **Date Sent:** | 23/05/17 |
| **Client Name:** | T&P Regeneration | **Transmittal Number:** | T2095 |
| **Client Job No:** | ASH1867 | **Senders Initials:** | NWW |
| **Client Address** | Unit 4, Brunel Lock Development, Smeaton Road, Bristol BS1 6SE | | |

| Test Detail | No. of Tests / Report No. |
|---|---|
| **BS1377: Part 2: 1990: Clause 3 - Moisture Content** | **4** |
| **BS1377: Part 2: 1990: Clause 4 & 5 - Atterberg Limits** | **4** |
| **BS1377: Part 2: 1990: Clause 9.2 / 9.3 - Particle Size Distribution** | **1** |
| | |
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**Approved Signatories:**

**Nick Worthington-Williams (Quality Manager), Dan Ayre (Deputy Quality Manager)**

**Marc Davis (Laboratory Manager)**

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# Summary of Classification Test Results

Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

| Project No. | Project Name |
|---|---|
| 9106 | Ashton Old Road |
| **Client Job No.** | **Client** |
| 9106 | T&P Regeneration |

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| Hole No. | Sample | | | | Soil Description | *mc* Cl.3.2 | Passing 425µm | LL | PL Cl5.3 | PI Cl5.4 | Particle density | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Top | Base | Ref | | % | % | % | % | % | Mg/m3 | |
| WS01 | D | 1.60 | 1.80 | - | Dark brown slightly sandy slightly gravelly CLAY | 19 | 96 - Sieved | 41 | 19 | 22 | - | |
| WS03 | D | 1.30 | 1.50 | - | Dark brown slightly sandy slightly gravelly CLAY | 21 | 89 - Sieved | 46 | 22 | 24 | - | |
| WS06 | D | 1.80 | 2.00 | - | Dark brown slightly sandy slightly gravelly CLAY | 18 | 92 - Sieved | 41 | 19 | 22 | - | |
| WS07 | D | 1.30 | 1.50 | - | Dark brown slightly sandy slightly gravelly CLAY | 22 | 98 - Sieved | 50 | 22 | 28 | - | |
| | | | | | | - | - | - | - | - | - | |
| | | | | | | - | - | - | - | - | - | |
| | | | | | | - | - | - | - | - | - | |
| | | | | | | - | - | - | - | - | - | |
| | | | | | | - | - | - | - | - | - | |
| | | | | | | - | - | - | - | - | - | |

**Preparation Clauses: Particle Density (BS1377:Part 1: 1990: CL7.4.4) Atterberg Limits (BS1377:Part 1: 1990: CL7.4.3) Moisture Content (BS1377: Part 1: 1990: CL7.3.3 & 7.4.2)**

**Key**

Atterberg Limits BS1377-2:1990
4pt cone (CL.4.3) unless :
1pt - single point test (CL.4.4)
4.2.3 - Natural
4.2.4 - Sieved
Moisture Content (mc) %

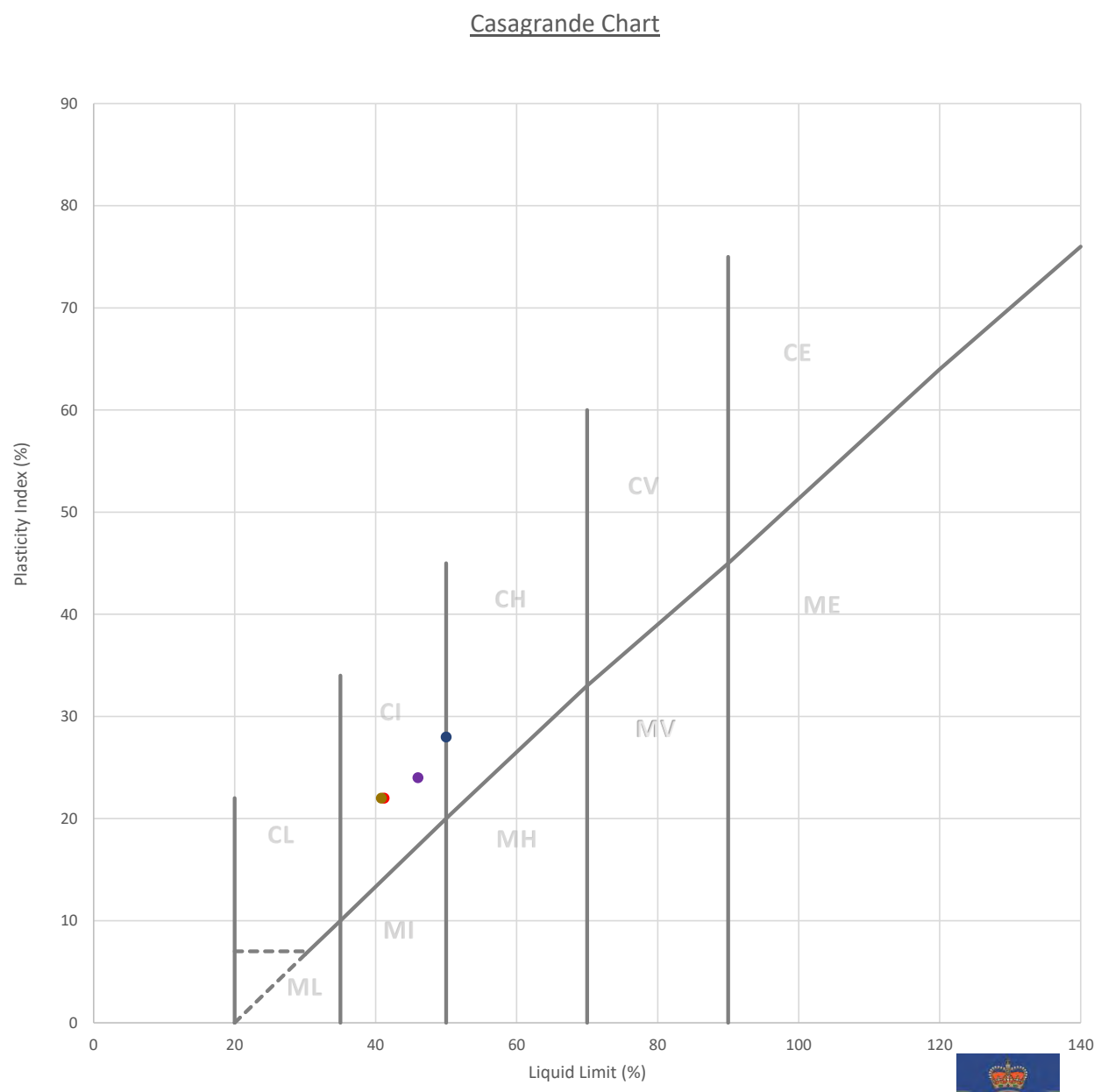
Particle density BS1377-2:1990
sp - small pyknometer CL.8.3
gj - gas jar CL.8.2

| Date | Approved By | Page No. | 1 |
|---|---|---|---|
| 23/05/2017 | Nick W-W - QM | KL001R Index Summary | |

# Graphical Summary of Atterberg Test Results

Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

| Project No. | Project Name |
|---|---|
| 9106 | Ashton Old Road |
| **Client Job No.** | **Client** |
| ASH1867 | T&P Regeneration |

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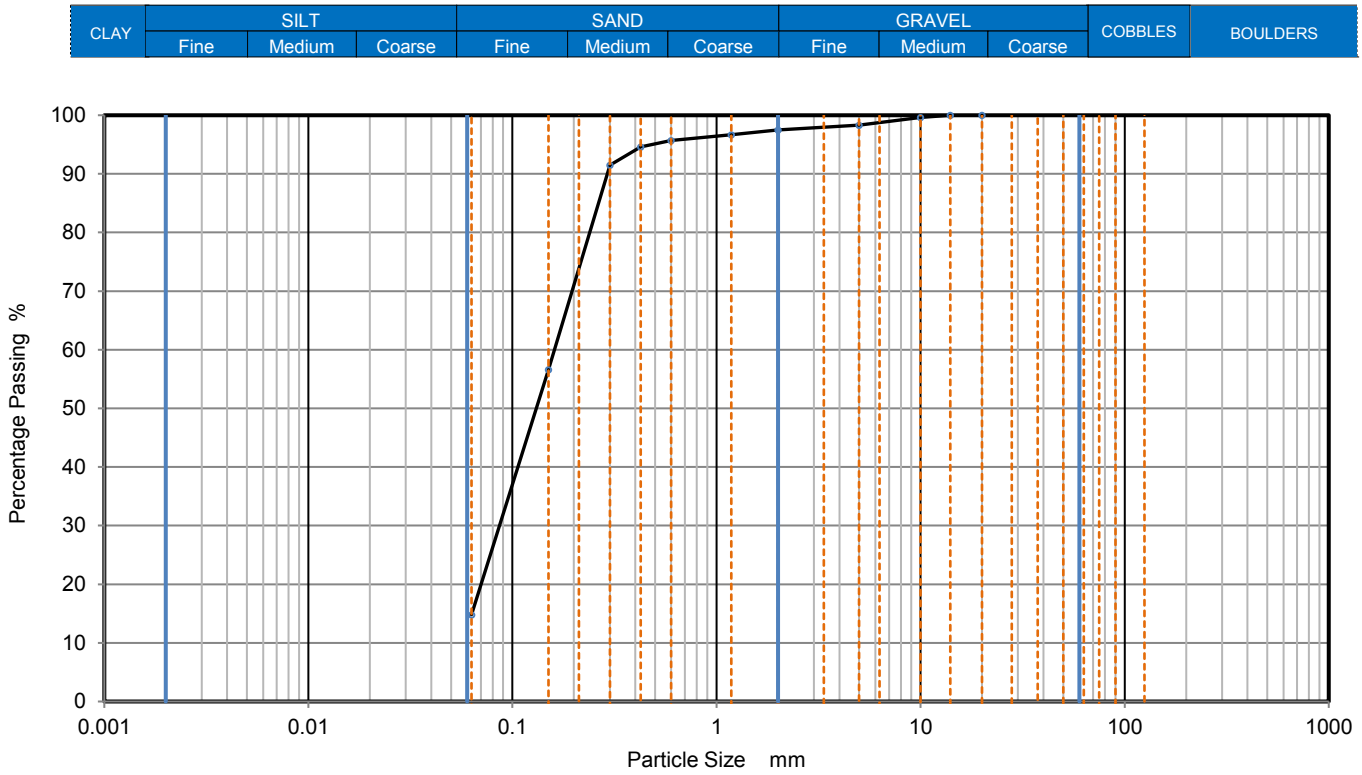
| KL001a Index Graphical Summary | Approved By | Date | Page No. |
|---|---|---|---|
| | Nick W-Williams - Quality Manager | 23/05/2017 15:40 | 1 |

SOUTH WEST GEOTECHNICAL

# Particle Size Distribution

## BS1377:Part 2:1990, clause 9.2

| | | | | | |
|---|---|---|---|---|---|
| Project No. | 9106 | | | | |
| Borehole/Pit No. | WS01 | | | | |
| Project Name | Ashton Old Road | Sample No. | - | | |
| Soil Description | Greyish brown slightly gravelly silty SAND | Depth, m | 3.00 | - | 4.00 |
| Client Job No. | 9106 | Specimen Depth | 3.00 m | Sample Type | B |
| Client | T&P Regeneration | | | | |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | - | - | - |
| 75 | - | - | - |
| 63 | - | - | - |
| 50 | - | | |
| 37.5 | - | | |
| 20 | 100 | | |
| 14 | 100 | | |
| 10 | 100 | | |
| 5 | 98 | | |
| 2 | 98 | | |
| 1.18 | 97 | | |
| 0.6 | 96 | | |
| 0.425 | 95 | | |
| 0.3 | 92 | | |
| 0.15 | 57 | | |
| 0.063 | 15 | | |

| Dry Mass of sample, g | 804 |
|---|---|

| Sample Proportions | % dry mass |
|---|---|
| Very coarse | 0 |
| Gravel | 3 |
| Sand | 83 |
| | |
| Fines <0.063mm | 15 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 0.16 |
| D30 | mm | 0.0864 |
| D10 | mm | |
| Uniformity Coefficient | | |
| Curvature Coefficient | | |

| Sedimentation pre-teatment |
|---|
| N/A |

**Remarks**

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

UKAS TESTING

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| Page No. | 1 | Date | Approved |
|---|---|---|---|
| Sheet ID: KL002R PSD | | 23/05/2017 16:35 | Nick W-W - QM |

# Transmittal Note

South West Geotechnical Ltd
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

| | | | |
|---|---|---|---|
| **Job No:** | 9106 | **Date Received:** | 09/05/17 |
| **Job Name:** | Ashton Old Road | **Date Sent:** | 18/05/17 |
| **Client Name:** | T&P Regeneration | **Transmittal Number:** | T2095A |
| **Client Job No:** | ASH1867 | **Senders Initials:** | SE |
| **Client Address** | Unit 4, Brunel Lock Development, Smeaton Road, Bristol BS1 6SE | | |

| Test Detail | No. of Tests / Report No. |
|---|---|
| **External Chemical Testing** | **17-58756.1** |
| | |
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**Approved Signatories:**

**Nick Worthington-Williams (Quality Manager), Dan Ayre (Deputy Quality Manager)**

**Marc Davis (Laboratory Manager)**

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Neil Forrow
South West Geotechnical Ltd
Unit 3 Brooklands
Howden Road
Tiverton
Devon
EX16 5HW

QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

# QTS Environmental Report No: 17-58756

| | |
|---|---|
| Site Reference: | Ashton Old Road |
| Project / Job Ref: | 9106 / T2095A |
| Order No: | None Supplied |
| Sample Receipt Date: | 10/05/2017 |
| Sample Scheduled Date: | 10/05/2017 |
| Report Issue Number: | 1 |
| Reporting Date: | 16/05/2017 |

Authorised by:

Kevin Old
Associate Director of Laboratory

Authorised by:

Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

| Soil Analysis Certificate | | | | | | |
|---|---|---|---|---|---|---|
| QTS Environmental Report No: 17-58756 | Date Sampled | 28/04/17 | 28/04/17 | 28/04/17 | 28/04/17 | |
| South West Geotechnical Ltd | Time Sampled | None Supplied | None Supplied | None Supplied | None Supplied | |
| Site Reference: Ashton Old Road | TP / BH No | WS01 | WS03 | WS06 | WS07 | |
| Project / Job Ref: 9106 / T2095A | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | |
| Order No: None Supplied | Depth (m) | 1.60 - 1.80 | 1.30 - 1.50 | 1.80 - 2.00 | 1.30 - 1.50 | |
| Reporting Date: 16/05/2017 | QTSE Sample No | 267924 | 267925 | 267926 | 267927 | |

| Determinand | Unit | RL | Accreditation | | | | | |
|---|---|---|---|---|---|---|---|---|
| pH | pH Units | N/a | MCERTS | 7.6 | 7.5 | 7.7 | 7.6 | |
| W/S Sulphate as $SO_4$ (2:1) | mg/l | < 10 | MCERTS | 37 | 128 | 40 | 72 | |
| W/S Sulphate as $SO_4$ (2:1) | g/l | < 0.01 | MCERTS | 0.04 | 0.13 | 0.04 | 0.07 | |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30$^{O}$C
Analysis carried out on the dried sample is corrected for the stone content
Subcontracted analysis $^{(S)}$

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

| Soil Analysis Certificate - Sample Descriptions | |
|---|---|
| QTS Environmental Report No: 17-58756 | |
| South West Geotechnical Ltd | |
| Site Reference: Ashton Old Road | |
| Project / Job Ref: 9106 / T2095A | |
| Order No: None Supplied | |
| Reporting Date: 16/05/2017 | |

| QTSE Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description |
|---|---|---|---|---|---|
| $ 267924 | WS01 | None Supplied | 1.60 - 1.80 | 13.5 | Brown sandy clay with stones |
| $ 267925 | WS03 | None Supplied | 1.30 - 1.50 | 15.6 | Brown sandy clay |
| $ 267926 | WS06 | None Supplied | 1.80 - 2.00 | 14.2 | Brown sandy clay |
| $ 267927 | WS07 | None Supplied | 1.30 - 1.50 | 19.4 | Brown clay |

*Moisture content is part of procedure E003 & is not an accredited test*

Insufficient Sample I/S

Unsuitable Sample U/S

*$ samples exceeded recommended holding times*

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

| Soil Analysis Certificate - Methodology & Miscellaneous Information |
|---|
| QTS Environmental Report No: 17-58756 |
| South West Geotechnical Ltd |
| Site Reference: Ashton Old Road |
| Project / Job Ref: 9106 / T2095A |
| Order No: None Supplied |
| Reporting Date: 16/05/2017 |

| Matrix | Analysed On | Determinand | Brief Method Description | Method No |
|---|---|---|---|---|
| Soil | D | Boron - Water Soluble | Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES | E012 |
| Soil | AR | BTEX | Determination of BTEX by headspace GC-MS | E001 |
| Soil | D | Cations | Determination of cations in soil by aqua-regia digestion followed by ICP-OES | E002 |
| Soil | D | Chloride - Water Soluble (2:1) | Determination of chloride by extraction with water & analysed by ion chromatography | E009 |
| Soil | AR | Chromium - Hexavalent | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry | E016 |
| Soil | AR | Cyanide - Complex | Determination of complex cyanide by distillation followed by colorimetry | E015 |
| Soil | AR | Cyanide - Free | Determination of free cyanide by distillation followed by colorimetry | E015 |
| Soil | AR | Cyanide - Total | Determination of total cyanide by distillation followed by colorimetry | E015 |
| Soil | D | Cyclohexane Extractable Matter (CEM) | Gravimetrically determined through extraction with cyclohexane | E011 |
| Soil | AR | Diesel Range Organics (C10 - C24) | Determination of hexane/acetone extractable hydrocarbons by GC-FID | E004 |
| Soil | AR | Electrical Conductivity | Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement | E022 |
| Soil | AR | Electrical Conductivity | Determination of electrical conductivity by addition of water followed by electrometric measurement | E023 |
| Soil | D | Elemental Sulphur | Determination of elemental sulphur by solvent extraction followed by GC-MS | E020 |
| Soil | AR | EPH (C10 – C40) | Determination of acetone/hexane extractable hydrocarbons by GC-FID | E004 |
| Soil | AR | EPH Product ID | Determination of acetone/hexane extractable hydrocarbons by GC-FID | E004 |
| Soil | AR | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40) | Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS | E004 |
| Soil | D | Fluoride - Water Soluble | Determination of Fluoride by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | FOC (Fraction Organic Carbon) | Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate | E010 |
| Soil | D | Loss on Ignition @ 450oC | Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace | E019 |
| Soil | D | Magnesium - Water Soluble | Determination of water soluble magnesium by extraction with water followed by ICP-OES | E025 |
| Soil | D | Metals | Determination of metals by aqua-regia digestion followed by ICP-OES | E002 |
| Soil | AR | Mineral Oil (C10 - C40) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge | E004 |
| Soil | AR | Moisture Content | Moisture content; determined gravimetrically | E003 |
| Soil | D | Nitrate - Water Soluble (2:1) | Determination of nitrate by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | Organic Matter | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate | E010 |
| Soil | AR | PAH - Speciated (EPA 16) | Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards | E005 |
| Soil | AR | PCB - 7 Congeners | Determination of PCB by extraction with acetone and hexane followed by GC-MS | E008 |
| Soil | D | Petroleum Ether Extract (PEE) | Gravimetrically determined through extraction with petroleum ether | E011 |
| Soil | AR | pH | Determination of pH by addition of water followed by electrometric measurement | E007 |
| Soil | AR | Phenols - Total (monohydric) | Determination of phenols by distillation followed by colorimetry | E021 |
| Soil | D | Phosphate - Water Soluble (2:1) | Determination of phosphate by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | Sulphate (as SO4) - Total | Determination of total sulphate by extraction with 10% HCl followed by ICP-OES | E013 |
| Soil | D | Sulphate (as SO4) - Water Soluble (2:1) | Determination of sulphate by extraction with water & analysed by ion chromatography | E009 |
| Soil | D | Sulphate (as SO4) - Water Soluble (2:1) | Determination of water soluble sulphate by extraction with water followed by ICP-OES | E014 |
| Soil | AR | Sulphide | Determination of sulphide by distillation followed by colorimetry | E018 |
| Soil | D | Sulphur - Total | Determination of total sulphur by extraction with aqua-regia followed by ICP-OES | E024 |
| Soil | AR | SVOC | Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS | E006 |
| Soil | AR | Thiocyanate (as SCN) | Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry | E017 |
| Soil | D | Toluene Extractable Matter (TEM) | Gravimetrically determined through extraction with toluene | E011 |
| Soil | D | Total Organic Carbon (TOC) | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate | E010 |
| Soil | AR | TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS | E004 |
| Soil | AR | TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS | E004 |
| Soil | AR | VOCs | Determination of volatile organic compounds by headspace GC-MS | E001 |
| Soil | AR | VPH (C6-C8 & C8-C10) | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID | E001 |

D Dried
AR As Received

# Appendix E – Chemical Analysis Results

**Unit A2**
**Windmill Road**
**Ponswood Industrial Estate**
**St Leonards on Sea**
**East Sussex**
**TN38 9BY**
Telephone: (01424) 718618
Facsimile: (01424) 729911
info@elab-uk.co.uk

2683

## THE ENVIRONMENTAL LABORATORY LTD

| | |
|---|---|
| **Analytical Report Number:** | 17-11961 |
| **Issue:** | 2 |
| **Date of Issue:** | 18/05/2017 |
| **Contact:** | Raife Crookes |
| **Customer Details:** | T & P Regeneration Ltd (Smeaton Road)<br>Unit 4<br>Brunel Lock Development<br>Bristol<br>BS1 6SF |
| **Quotation No:** | Q15-00390 |
| **Order No:** | 2779-ASH1867 |
| **Customer Reference:** | ASH1867 |
| **Date Received:** | 03/05/2017 |
| **Date Approved:** | 18/05/2017 |
| **Details:** | ASH1867 |
| **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.: 17-11961**

| Elab No. | Client's Ref. | Date Sampled | Date Scheduled | Description | Deviations |
|---|---|---|---|---|---|
| 98711 | WS01 0.00 - 0.50 | 28/04/2017 | 05/05/2017 | | |
| 98712 | WS01 0.50 - 1.00 | 28/04/2017 | 05/05/2017 | | |
| 98713 | WS01 1.30 - 1.50 | 28/04/2017 | 05/05/2017 | | |
| 98714 | WS02 1.00 - 1.20 | 28/04/2017 | 15/05/2017 | Sandy silty loam | g |
| 98715 | WS02 1.50 - 1.80 | 28/04/2017 | 05/05/2017 | Clayey loam | |
| 98716 | WS02 2.40 - 2.60 | 28/04/2017 | 05/05/2017 | | |
| 98717 | WS02 3.50 - 3.70 | 28/04/2017 | 05/05/2017 | | |
| 98718 | WS03 0.00 - 1.20 | 28/04/2017 | 05/05/2017 | Sandy silty loam | |
| 98719 | WS03 1.50 - 1.70 | 28/04/2017 | 05/05/2017 | | |
| 98720 | WS03 2.30 - 2.50 | 28/04/2017 | 05/05/2017 | | |
| 98721 | WS04 0.50 - 0.80 | 28/04/2017 | 15/05/2017 | Sandy silty loam | g |
| 98722 | WS04 1.50 - 1.70 | 28/04/2017 | 15/05/2017 | Silty clayey loam | g |
| 98723 | WS04 3.20 - 3.40 | 28/04/2017 | 05/05/2017 | | |
| 98724 | WS06 0.30 - 0.70 | 28/04/2017 | 05/05/2017 | Sandy silty loam | |
| 98725 | WS06 1.60 - 1.70 | 28/04/2017 | 05/05/2017 | | |
| 98726 | WS06 2.50 - 2.60 | 28/04/2017 | 05/05/2017 | | |
| 98727 | WS07 0.50 - 0.70 | 28/04/2017 | 05/05/2017 | Loamy sand | |
| 98728 | WS07 0.70 - 1.00 | 28/04/2017 | 05/05/2017 | Silty clayey loam | |
| 98729 | WS07 1.50 - 1.70 | 28/04/2017 | 05/05/2017 | | |
| 98730 | WS07 2.50 | 28/04/2017 | 05/05/2017 | | |
| 98731 | WS07 2.80 | 28/04/2017 | 05/05/2017 | | |
| 98732 | SS01 0.00 - 0.30 | 28/04/2017 | 15/05/2017 | Sandy silty loam | g |
| 98733 | WS01 2.30 - 2.50 | 28/04/2017 | 05/05/2017 | | |
| 98734 | WS05 0.30 - 0.60 | 28/04/2017 | 05/05/2017 | Sandy silty loam | |

# Results Summary

**Report No.: 17-11961**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | ELAB Reference | 98714 | 98715 | 98718 | 98721 | 98722 | 98724 |
| | | | Customer Reference | | | | | | |
| | | | Sample ID | | | | | | |
| | | | Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | | Sample Location | WS02 | WS02 | WS03 | WS04 | WS04 | WS06 |
| | | | Sample Depth (m) | 1.00 - 1.20 | 1.50 - 1.80 | 0.00 - 1.20 | 0.50 - 0.80 | 1.50 - 1.70 | 0.30 - 0.70 |
| | | | Sampling Date | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | | | | |
| **Metals** | | | | | | | | | |
| Arsenic | M | mg/kg | 1 | 26.9 | n/t | 66.0 | 23.8 | 9.6 | 7.0 |
| Cadmium | M | mg/kg | 0.5 | 1.3 | n/t | 20.0 | 21.8 | 0.5 | 1.1 |
| Chromium | M | mg/kg | 5 | 56.5 | n/t | 811 | 84.7 | 48.5 | 22.1 |
| Copper | M | mg/kg | 5 | 119 | n/t | 301 | 355 | 35.2 | 67.3 |
| Lead | M | mg/kg | 5 | 345 | n/t | 721 | 4030 | 26.7 | 352 |
| Mercury | M | mg/kg | 0.5 | < 0.5 | n/t | 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Nickel | M | mg/kg | 5 | 34.1 | n/t | 71.1 | 76.9 | 46.9 | 17.8 |
| Selenium | M | mg/kg | 1 | 1.3 | n/t | 3.2 | 1.9 | < 1.0 | < 1.0 |
| Zinc | M | mg/kg | 5 | 309 | n/t | 2240 | 2460 | 107 | 283 |
| **Anions** | | | | | | | | | |
| Water Soluble Sulphate | M | g/l | 0.02 | 0.68 | n/t | 1.45 | 0.14 | 0.11 | 0.08 |
| **Inorganics** | | | | | | | | | |
| Hexavalent Chromium | N | mg/kg | 0.8 | < 0.8 | n/t | < 0.8 | < 0.8 | < 0.8 | < 0.8 |
| Water Soluble Boron | N | mg/kg | 0.5 | 1.3 | n/t | 1.1 | 1.1 | 0.6 | 0.5 |
| **Miscellaneous** | | | | | | | | | |
| pH | M | pH units | 0.1 | 7.0 | n/t | 7.2 | 7.2 | 7.6 | 9.0 |
| Total Organic Carbon | N | % | 0.01 | 2.0 | n/t | 20 | 3.7 | 0.61 | 1.7 |
| **Phenols** | | | | | | | | | |
| Phenol | M | mg/kg | 1 | < 1 | n/t | < 1 | < 1 | < 1 | < 1 |
| M,P-Cresol | N | mg/kg | 1 | < 1 | n/t | < 1 | < 1 | < 1 | < 1 |
| O-Cresol | N | mg/kg | 1 | < 1 | n/t | < 1 | < 1 | < 1 | < 1 |
| 3,4-Dimethylphenol | N | mg/kg | 1 | < 1 | n/t | < 1 | < 1 | < 1 | < 1 |
| 2,3-Dimethylphenol | M | mg/kg | 1 | < 1 | n/t | < 1 | < 1 | < 1 | < 1 |
| 2,3,5-trimethylphenol | M | mg/kg | 1 | < 1 | n/t | < 1 | < 1 | < 1 | < 1 |
| Total Monohydric Phenols | N | mg/kg | 5 | < 5 | n/t | < 5 | < 5 | < 5 | < 5 |
| **Polyaromatic hydrocarbons** | | | | | | | | | |
| Naphthalene | M | mg/kg | 0.1 | < 0.1 | n/t | 1.2 | 0.5 | < 0.1 | 0.2 |
| Acenaphthylene | M | mg/kg | 0.1 | < 0.1 | n/t | 0.2 | < 0.1 | < 0.1 | 0.2 |
| Acenaphthene | M | mg/kg | 0.1 | < 0.1 | n/t | 0.6 | 0.5 | < 0.1 | 0.2 |
| Fluorene | M | mg/kg | 0.1 | < 0.1 | n/t | 0.3 | 0.4 | < 0.1 | 0.3 |
| Phenanthrene | M | mg/kg | 0.1 | < 0.1 | n/t | 3.1 | 2.9 | < 0.1 | 1.2 |
| Anthracene | M | mg/kg | 0.1 | < 0.1 | n/t | 0.6 | 0.7 | < 0.1 | 0.3 |
| Fluoranthene | M | mg/kg | 0.1 | 0.3 | n/t | 5.3 | 4.0 | < 0.1 | 3.1 |
| Pyrene | M | mg/kg | 0.1 | 0.3 | n/t | 5.2 | 5.2 | < 0.1 | 5.0 |
| Benzo(a)anthracene | M | mg/kg | 0.1 | 0.2 | n/t | 2.9 | 2.8 | < 0.1 | 1.4 |
| Chrysene | M | mg/kg | 0.1 | 0.1 | n/t | 3.8 | 4.2 | < 0.1 | 3.9 |
| Benzo (b) fluoranthene | M | mg/kg | 0.1 | < 0.1 | n/t | 2.9 | 5.1 | < 0.1 | 1.7 |
| Benzo(k)fluoranthene | M | mg/kg | 0.1 | < 0.1 | n/t | 2.6 | 4.1 | < 0.1 | 3.1 |
| Benzo (a) pyrene | M | mg/kg | 0.1 | 0.3 | n/t | 2.9 | 6.1 | < 0.1 | 2.5 |
| Indeno (1,2,3-cd) pyrene | M | mg/kg | 0.1 | < 0.1 | n/t | 2.2 | 5.1 | < 0.1 | 3.2 |
| Dibenzo(a,h)anthracene | M | mg/kg | 0.1 | < 0.1 | n/t | 0.5 | 2.4 | < 0.1 | 1.7 |
| Benzo[g,h,i]perylene | M | mg/kg | 0.1 | < 0.1 | n/t | 2.4 | 5.0 | < 0.1 | 2.7 |
| Total PAH(16) | M | mg/kg | 0.4 | 1.4 | n/t | 36.6 | 49.0 | < 0.4 | 30.6 |

# Results Summary

**Report No.: 17-11961**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | ELAB Reference | 98714 | 98715 | 98718 | 98721 | 98722 | 98724 |
| | | | Customer Reference | | | | | | |
| | | | Sample ID | | | | | | |
| | | | Sample Type | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | | Sample Location | WS02 | WS02 | WS03 | WS04 | WS04 | WS06 |
| | | | Sample Depth (m) | 1.00 - 1.20 | 1.50 - 1.80 | 0.00 - 1.20 | 0.50 - 0.80 | 1.50 - 1.70 | 0.30 - 0.70 |
| | | | Sampling Date | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | | | | |
| **BTEX** | | | | | | | | | |
| Benzene | M | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| Benzene | M | ug/kg | 10 | g < 10.0 | n/t | n/t | g < 10.0 | g < 10.0 | n/t |
| Toluene | M | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| Toluene | M | ug/kg | 10 | g < 10.0 | n/t | n/t | g < 10.0 | g < 10.0 | n/t |
| Ethylbenzene | M | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| Ethylbenzene | M | ug/kg | 10 | g < 10.0 | n/t | n/t | g < 10.0 | g < 10.0 | n/t |
| Xylenes | M | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| Xylenes | M | ug/kg | 10 | g < 10.0 | n/t | n/t | g < 10.0 | g < 10.0 | n/t |
| MTBE | N | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| MTBE | N | ug/kg | 10 | g < 10.0 | n/t | n/t | g < 10.0 | g < 10.0 | n/t |
| **TPH CWG** | | | | | | | | | |
| >C5-C6 Aliphatic | N | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| >C6-C8 Aliphatic | N | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| >C8-C10 Aliphatic | N | mg/kg | 1 | g < 1.0 | n/t | n/t | g 2.3 | g < 1.0 | n/t |
| >C10-C12 Aliphatic | N | mg/kg | 1 | g < 1.0 | n/t | n/t | g < 1.0 | g < 1.0 | n/t |
| >C12-C16 Aliphatic | N | mg/kg | 1 | g 1.2 | n/t | n/t | g 6.2 | g < 1.0 | n/t |
| >C16-C21 Aliphatic | N | mg/kg | 1 | g 73.2 | n/t | n/t | g 118 | g < 1.0 | n/t |
| >C21-C35 Aliphatic | N | mg/kg | 1 | g 546 | n/t | n/t | g 2100 | g 4.4 | n/t |
| >C35-C40 Aliphatic | N | mg/kg | 1 | g 238 | n/t | n/t | g 398 | g < 1.0 | n/t |
| >C5-C7 Aromatic | N | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| >C7-C8 Aromatic | N | mg/kg | 0.01 | g < 0.01 | n/t | n/t | g < 0.01 | g < 0.01 | n/t |
| >C8-C10 Aromatic | N | mg/kg | 1 | g < 1.0 | n/t | n/t | g < 1.0 | g < 1.0 | n/t |
| >C10-C12 Aromatic | N | mg/kg | 1 | g < 1.0 | n/t | n/t | g < 1.0 | g < 1.0 | n/t |
| >C12-C16 Aromatic | N | mg/kg | 1 | g < 1.0 | n/t | n/t | g 3.1 | g < 1.0 | n/t |
| >C16-C21 Aromatic | N | mg/kg | 1 | g 22.8 | n/t | n/t | g 72.4 | g < 1.0 | n/t |
| >C21-C35 Aromatic | N | mg/kg | 1 | g 352 | n/t | n/t | g 1100 | g 4.2 | n/t |
| >C35-C40 Aromatic | N | mg/kg | 1 | g 148 | n/t | n/t | g 264 | g < 1.0 | n/t |
| Total (>C5-C40) Ali/Aro | N | mg/kg | 1 | g 1380 | n/t | n/t | g 4070 | g 8.6 | n/t |
| **Total Petroleum Hydrocarbons** | | | | | | | | | |
| Total TPH (>C8-C40) | M | mg/kg | 5 | 1610 | < 5 | n/t | 2990 | n/t | n/t |

Tests marked N are not UKAS accredited.

# Results Summary

**Report No.: 17-11961**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | ELAB Reference | 98727 | 98728 | 98732 | 98734 |
| | | | Customer Reference | | | | |
| | | | Sample ID | | | | |
| | | | Sample Type | SOIL | SOIL | SOIL | SOIL |
| | | | Sample Location | WS07 | WS07 | SS01 | WS05 |
| | | | Sample Depth (m) | 0.50 - 0.70 | 0.70 - 1.00 | 0.00 - 0.30 | 0.30 - 0.60 |
| | | | Sampling Date | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | | |
| **Metals** | | | | | | | |
| Arsenic | M | mg/kg | 1 | 8.7 | 9.9 | 49.2 | 22.6 |
| Cadmium | M | mg/kg | 0.5 | < 0.5 | < 0.5 | 1.9 | 1.0 |
| Chromium | M | mg/kg | 5 | 21.4 | 42.3 | 69.4 | 34.0 |
| Copper | M | mg/kg | 5 | 26.2 | 36.4 | 499 | 160 |
| Lead | M | mg/kg | 5 | 142 | 23.5 | 348 | 392 |
| Mercury | M | mg/kg | 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Nickel | M | mg/kg | 5 | 12.8 | 36.8 | 100 | 27.3 |
| Selenium | M | mg/kg | 1 | < 1.0 | < 1.0 | < 1.0 | 1.1 |
| Zinc | M | mg/kg | 5 | 68.3 | 78.1 | 983 | 314 |
| **Anions** | | | | | | | |
| Water Soluble Sulphate | M | g/l | 0.02 | 0.05 | 0.10 | 0.04 | 0.09 |
| **Inorganics** | | | | | | | |
| Hexavalent Chromium | N | mg/kg | 0.8 | < 0.8 | < 0.8 | < 0.8 | < 0.8 |
| Water Soluble Boron | N | mg/kg | 0.5 | 1.2 | 1.0 | 0.7 | 1.1 |
| **Miscellaneous** | | | | | | | |
| pH | M | pH units | 0.1 | 8.3 | 7.6 | 7.5 | 9.2 |
| Total Organic Carbon | N | % | 0.01 | 3.8 | 0.45 | 1.9 | 3.6 |
| **Phenols** | | | | | | | |
| Phenol | M | mg/kg | 1 | < 1 | < 1 | < 1 | < 1 |
| M,P-Cresol | N | mg/kg | 1 | < 1 | < 1 | < 1 | < 1 |
| O-Cresol | N | mg/kg | 1 | < 1 | < 1 | < 1 | < 1 |
| 3,4-Dimethylphenol | N | mg/kg | 1 | < 1 | < 1 | < 1 | < 1 |
| 2,3-Dimethylphenol | M | mg/kg | 1 | < 1 | < 1 | < 1 | < 1 |
| 2,3,5-trimethylphenol | M | mg/kg | 1 | < 1 | < 1 | < 1 | < 1 |
| Total Monohydric Phenols | N | mg/kg | 5 | < 5 | < 5 | < 5 | < 5 |
| **Polyaromatic hydrocarbons** | | | | | | | |
| Naphthalene | M | mg/kg | 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.5 |
| Acenaphthylene | M | mg/kg | 0.1 | < 0.1 | < 0.1 | 0.1 | 0.2 |
| Acenaphthene | M | mg/kg | 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.7 |
| Fluorene | M | mg/kg | 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.5 |
| Phenanthrene | M | mg/kg | 0.1 | 0.2 | < 0.1 | < 0.1 | 6.6 |
| Anthracene | M | mg/kg | 0.1 | < 0.1 | < 0.1 | < 0.1 | 1.9 |
| Fluoranthene | M | mg/kg | 0.1 | 0.3 | < 0.1 | 1.2 | 10.5 |
| Pyrene | M | mg/kg | 0.1 | 0.4 | < 0.1 | 1.9 | 9.3 |
| Benzo(a)anthracene | M | mg/kg | 0.1 | 0.3 | < 0.1 | < 0.1 | 5.0 |
| Chrysene | M | mg/kg | 0.1 | 0.3 | < 0.1 | < 0.1 | 6.1 |
| Benzo (b) fluoranthene | M | mg/kg | 0.1 | 0.3 | < 0.1 | < 0.1 | 4.6 |
| Benzo(k)fluoranthene | M | mg/kg | 0.1 | 0.2 | < 0.1 | < 0.1 | 5.1 |
| Benzo (a) pyrene | M | mg/kg | 0.1 | 0.2 | < 0.1 | < 0.1 | 5.0 |
| Indeno (1,2,3-cd) pyrene | M | mg/kg | 0.1 | 0.5 | 0.2 | < 0.1 | 3.5 |
| Dibenzo(a,h)anthracene | M | mg/kg | 0.1 | 0.2 | 0.6 | < 0.1 | 1.0 |
| Benzo[g,h,i]perylene | M | mg/kg | 0.1 | 0.4 | 0.3 | < 0.1 | 3.7 |
| Total PAH(16) | M | mg/kg | 0.4 | 3.2 | 1.1 | 3.5 | 64.2 |

# Results Summary

**Report No.: 17-11961**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | ELAB Reference | 98727 | 98728 | 98732 | 98734 |
| | | | Customer Reference | | | | |
| | | | Sample ID | | | | |
| | | | Sample Type | SOIL | SOIL | SOIL | SOIL |
| | | | Sample Location | WS07 | WS07 | SS01 | WS05 |
| | | | Sample Depth (m) | 0.50 - 0.70 | 0.70 - 1.00 | 0.00 - 0.30 | 0.30 - 0.60 |
| | | | Sampling Date | 28/04/2017 | 28/04/2017 | 28/04/2017 | 28/04/2017 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | | |
| **BTEX** | | | | | | | |
| Benzene | M | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| Benzene | M | ug/kg | 10 | n/t | n/t | g < 10.0 | n/t |
| Toluene | M | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| Toluene | M | ug/kg | 10 | n/t | n/t | g < 10.0 | n/t |
| Ethylbenzene | M | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| Ethylbenzene | M | ug/kg | 10 | n/t | n/t | g < 10.0 | n/t |
| Xylenes | M | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| Xylenes | M | ug/kg | 10 | n/t | n/t | g < 10.0 | n/t |
| MTBE | N | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| MTBE | N | ug/kg | 10 | n/t | n/t | g < 10.0 | n/t |
| **TPH CWG** | | | | | | | |
| >C5-C6 Aliphatic | N | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| >C6-C8 Aliphatic | N | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| >C8-C10 Aliphatic | N | mg/kg | 1 | n/t | n/t | g < 1.0 | n/t |
| >C10-C12 Aliphatic | N | mg/kg | 1 | n/t | n/t | g < 1.0 | n/t |
| >C12-C16 Aliphatic | N | mg/kg | 1 | n/t | n/t | g 23.7 | n/t |
| >C16-C21 Aliphatic | N | mg/kg | 1 | n/t | n/t | g 554 | n/t |
| >C21-C35 Aliphatic | N | mg/kg | 1 | n/t | n/t | g 17300 | n/t |
| >C35-C40 Aliphatic | N | mg/kg | 1 | n/t | n/t | g 1610 | n/t |
| >C5-C7 Aromatic | N | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| >C7-C8 Aromatic | N | mg/kg | 0.01 | n/t | n/t | g < 0.01 | n/t |
| >C8-C10 Aromatic | N | mg/kg | 1 | n/t | n/t | g < 1.0 | n/t |
| >C10-C12 Aromatic | N | mg/kg | 1 | n/t | n/t | g < 1.0 | n/t |
| >C12-C16 Aromatic | N | mg/kg | 1 | n/t | n/t | g < 1.0 | n/t |
| >C16-C21 Aromatic | N | mg/kg | 1 | n/t | n/t | g 256 | n/t |
| >C21-C35 Aromatic | N | mg/kg | 1 | n/t | n/t | g 5220 | n/t |
| >C35-C40 Aromatic | N | mg/kg | 1 | n/t | n/t | g 694 | n/t |
| Total (>C5-C40) Ali/Aro | N | mg/kg | 1 | n/t | n/t | g 25600 | n/t |
| **Total Petroleum Hydrocarbons** | | | | | | | |
| Total TPH (>C8-C40) | M | mg/kg | 5 | n/t | n/t | 24400 | n/t |

Tests marked N are not UKAS accredited.
The Environmental Laboratory Ltd. Reg. No. 3882193

# Results Summary

**Report No.: 17-11961**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | ELAB Reference | 98721 | 98724 | 98732 |
| | | | Customer Reference | | | |
| | | | Sample ID | | | |
| | | | Sample Type | SOIL | SOIL | SOIL |
| | | | Sample Location | WS04 | WS06 | SS01 |
| | | | Sample Depth (m) | 0.50 - 0.80 | 0.30 - 0.70 | 0.00 - 0.30 |
| | | | Sampling Date | 28/04/2017 | 28/04/2017 | 28/04/2017 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | |
| **SVOC** | | | | | | |
| Phenol | N | mg/kg | 0.01 | 0.05 | 0.02 | 0.13 |
| Aniline | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Bis(2-chloroethyl)ether | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2-Chlorophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 1,3-Dichlorobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 1,4-Dichlorobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Benzyl Alcohol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | 0.75 |
| 1,2-Dichlorobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2-Methylphenol | N | mg/kg | 0.01 | 0.02 | 0.02 | < 0.01 |
| Bis(2-chloroisopropyl)ether | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 3 and 4-methylphenol | N | mg/kg | 0.01 | 0.08 | 0.04 | 0.03 |
| N-Nitrosodi-n-propylamine | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hexachloroethane | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Nitrobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Isophorone | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2-Nitrophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2,4-Dimethylphenol | N | mg/kg | 0.01 | 0.04 | 0.05 | 0.04 |
| Bis(2-chloroethoxy)methane | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2,4-Dichlorophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 1,3,5-Trichlorobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Naphthalene | N | mg/kg | 0.01 | 0.77 | 0.09 | 0.17 |
| 3-Chloroaniline | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hexachloro-1,3-butadiene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 4-Chloro-3-methylphenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2-Methylnaphthalene | N | mg/kg | 0.01 | 0.43 | 0.10 | 0.11 |
| 1-Methylnaphthalene | N | mg/kg | 0.01 | 0.33 | 0.07 | 0.06 |
| Hexachlorocyclopentadiene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2,4,6-Trichlorophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2,4,5-Trichlorophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 1-Chloronaphthalene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2-Nitroaniline | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 1,4-Dinitrobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Dimethyl phthalate | N | mg/kg | 0.01 | 0.46 | < 0.01 | < 0.01 |
| 1-3-dinitrobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2-6-dinitrotoluene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Acenaphthylene | N | mg/kg | 0.01 | 0.05 | 0.08 | 0.12 |
| 1,2-Dinitrobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 3-Nitroaniline | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Acenaphthene | N | mg/kg | 0.01 | 0.51 | 0.06 | 0.04 |
| 4-nitrophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Dibenzofuran | N | mg/kg | 0.01 | 0.32 | 0.05 | 0.03 |
| 2,3,5,6-Tetrachlorophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2,3,4,6-Tetrachlorophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Diethyl phthalate | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 1-chloro-4-phenoxybenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Fluorene | N | mg/kg | 0.01 | 0.42 | 0.04 | 0.02 |
| 4-Nitroaniline | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Dinitro-o-cresol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Diphenylamine | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Azobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 1-bromo-4-phenoxybenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hexachlorobenzene | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Pentachlorophenol | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |

Tests marked N are not UKAS accredited.

# Results Summary

**Report No.: 17-11961**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | ELAB Reference | 98721 | 98724 | 98732 |
| | | | Customer Reference | | | |
| | | | Sample ID | | | |
| | | | Sample Type | SOIL | SOIL | SOIL |
| | | | Sample Location | WS04 | WS06 | SS01 |
| | | | Sample Depth (m) | 0.50 - 0.80 | 0.30 - 0.70 | 0.00 - 0.30 |
| | | | Sampling Date | 28/04/2017 | 28/04/2017 | 28/04/2017 |
| **Determinand** | **Codes** | **Units** | **LOD** | | | |
| **SVOC** | | | | | | |
| Phenanthrene | N | mg/kg | 0.01 | 3.16 | 0.59 | 0.37 |
| Anthracene | N | mg/kg | 0.01 | 0.49 | 0.23 | 0.15 |
| Carbazole | N | mg/kg | 0.01 | 0.20 | 0.05 | < 0.01 |
| Dibutyl phthalate | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Fluoranthene | N | mg/kg | 0.01 | 5.85 | 1.43 | 0.58 |
| Pyrene | N | mg/kg | 0.01 | 5.57 | 1.31 | 2.08 |
| Butyl benzyl phthalate | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Bis-2-ethylhexyladipate | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Butyl benzyl phthalate | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Benzo(a)anthracene | N | mg/kg | 0.01 | 5.22 | 0.65 | 0.48 |
| Chrysene | N | mg/kg | 0.01 | 5.87 | 0.79 | 0.77 |
| Bis(2-ethylhexyl)phthalate | N | mg/kg | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Benzo(b)fluoranthene | N | mg/kg | 0.01 | 5.53 | 1.02 | 1.27 |
| Benzo(k)fluoranthene | N | mg/kg | 0.01 | 7.08 | 0.64 | 0.94 |
| Benzo(a)pyrene | N | mg/kg | 0.01 | 8.47 | 0.96 | 1.20 |
| Indeno(1,2,3-cd)pyrene | N | mg/kg | 0.01 | 5.17 | 1.02 | 1.14 |
| Dibenz(ah)anthracene | N | mg/kg | 0.01 | 1.76 | 0.25 | 0.42 |
| Benzo[g,h,i]perylene | N | mg/kg | 0.01 | 6.63 | 2.39 | 1.72 |

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

## Results Summary

**Report No.: 17-11961**

### 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 No2683). They are subjective comments only which must be verified by the client.

| Elab No | Depth (m) | Clients Reference | Description of Sample Matrix # | Asbestos Identification | Gravimetric Analysis Total (%) | Gravimetric Analysis by ACM Type (%) | Free Fibre Analysis (%) | Total Asbestos (%) |
|---|---|---|---|---|---|---|---|---|
| 98712 | 0.50 - 1.00 | WS01 | Brown soil with stones,brick,clinker,wood | No asbestos detected | n/t | n/t | n/t | n/t |
| 98718 | 0.00 - 1.20 | WS03 | Brown soil with stones,brick,clinker | No asbestos detected | n/t | n/t | n/t | n/t |
| 98721 | 0.50 - 0.80 | WS04 | Brown soil with stones,glass,clinker | No asbestos detected | n/t | n/t | n/t | n/t |
| 98724 | 0.30 - 0.70 | WS06 | Brown soil with slate and concrete | No asbestos detected | n/t | n/t | n/t | n/t |
| 98727 | 0.50 - 0.70 | WS07 | Black sandy soil with stones and glass | No asbestos detected | n/t | n/t | n/t | n/t |
| 98734 | 0.30 - 0.60 | WS05 | Brown soil with stones,brick,clinker,wood | No asbestos detected | n/t | n/t | n/t | n/t |

# Method Summary

**Report No.: 17-11961**

| Parameter | Codes | Analysis Undertaken On | Date Tested | Method Number | Technique |
|---|---|---|---|---|---|
| **Soil** | | | | | |
| Hexavalent chromium | N | As submitted sample | 09/05/2017 | 110 | Colorimetry |
| pH | M | Air dried sample | 10/05/2017 | 113 | Electromeric |
| Total Petroleum Hydrocarbons in solids | M | As submitted sample | 09/05/2017 | 117 | GC-FID |
| Aqua regia extractable metals | M | Air dried sample | 10/05/2017 | 118 | ICPMS |
| Phenols in solids | M | As submitted sample | 09/05/2017 | 121 | HPLC |
| PAH (GC-FID) | M | As submitted sample | 09/05/2017 | 133 | GC-FID |
| SVOC in solids | N | As submitted sample | 09/05/2017 | 167 | GC-MS |
| Water soluble anions | M | Air dried sample | 10/05/2017 | 172 | Ion Chromatography |
| BTEX in solids | M | As submitted sample | 16/05/2017 | 181A | GC-MS |
| Water soluble boron | N | Air dried sample | 09/05/2017 | 202 | Colorimetry |
| Total organic carbon/Total sulphur | N | Air dried sample | 11/05/2017 | 210 | IR |
| Aliphatic hydrocarbons in soil | N | As submitted sample | 16/05/2017 | 214 | GC-FID |
| Aliphatic/Aromatic hydrocarbons in soil | N | As submitted sample | 18/05/2017 | 214 | GC-FID |
| Aromatic hydrocarbons in soil | N | As submitted sample | 16/05/2017 | 214 | GC-FID |
| Low range Aliphatic hydrocarbons soil | N | As submitted sample | 16/05/2017 | 214 | GC-MS |
| Low range Aromatic hydrocarbons soil | N | As submitted sample | 16/05/2017 | 214 | GC-MS |
| Asbestos identification | U | As submitted sample | 09/05/2017 | PMAN | Microscopy |

Tests marked N are not UKAS accredited

# Report Information

**Report No.: 17-11961**

**Key**

| | |
|---|---|
| U | hold UKAS accreditation |
| M | hold MCERTS and UKAS accreditation |
| N | do not currently hold UKAS accreditation |
| ^ | MCERTS accreditation not applicable for sample matrix |
| * | UKAS accreditation not applicable for sample matrix |
| S | Subcontracted to approved laboratory UKAS Accredited for the test |
| SM | Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test |
| I/S | Insufficient Sample |
| U/S | Unsuitable sample |
| n/t | Not tested |
| < | means "less than" |
| > | means "greater than" |

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

**Deviation 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

# Appendix F – Monitoring Results

# Gas Monitoring Records

**Job details:**
**Client:** EcoNRG
**Site:** Ashton Old Road
**Date:** 11/05/2017

**Job No:** ASH1867
**Visit No:** 1 **of** 6
**Operator:** RC
**Project Manager:** RC

| Monitoring Point | VOLATILES | FLOW DATA | | | | GAS CONCENTRATIONS | | | | | | | | | | | | | WELL AND WATER DATA | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PID Peak (ppm) | Flow rate (l/hr) | | Differential borehole Pressure (Pa) | Time for flow to equalise (sec) | Methane (%v/v) | | %LEL | | Carbon dioxide (%v/v) | | Carbon monoxide (ppmv) | | Hydrogen sulphide (ppmv) | | Oxygen (%v/v) | | Run time (min) | Product thickness (mm) | Water level (mbgl) | Depth of well (m) | Reduced level (mAOD) | Water level (mAOD) | Response zone range (m) | |
| | | Peak | Steady | | | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Min. | Steady | | | | | | | | |
| WS01 | <0.1 | 0.6 | <0.1 | 1 | 5 | 0.1 | <0.1 | 1 | <0.1 | 1.1 | 1 | <0.1 | <0.1 | 1 | <0.1 | 19.3 | 19.3 | 4 | ND | 3.17 | 3.18 | | | | 30cm of pipe above ground level. |
| WS03 | 3.3 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 3 | 2.3 | <0.1 | <0.1 | 1.1 | <0.1 | 12.6 | 16 | 5 | ND | 3.05 | 3.08 | | | | 51cm od pipe above ground level |
| WS07 | 1.5 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 1 | 1 | 20.6 | 20.8 | 4 | ND | 3.09 | 3.10 | | | | 30cm of pipe above ground level. |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Max** | **3.3** | **0.6** | **0.0** | **1** | | **0.1** | **0.0** | **1.0** | **0.0** | **3.0** | **2.3** | **0** | **0** | **1.1** | **1** | **20.6** | **20.8** | | **0.0** | **3.17** | **3.18** | **0.00** | **0.00** | | |
| **Min** | **1.5** | **0.6** | **0.0** | **0** | | **0.1** | **0.0** | **1.0** | **0.0** | **1.1** | **1.0** | **0** | **0** | **1** | **1** | **12.6** | **16.0** | | **0.0** | **3.05** | **3.08** | **0.00** | **0.00** | | |

ND - Not detected
NR - Not recorded

**METEOROLOGICAL AND SITE INFORMATION:** (Put X in front of selected or enter data as applicable)

| | | | | | |
|---|---|---|---|---|---|
| State of ground: | **Dry** | Moist | Wet | Snow | Frozen |
| Wind: | Calm | Light | **Moderate** | **Strong** | |
| Cloud cover: | None | **Slight** | Cloudy | Overcast | |
| Preciptation: | **None** | Slight | Moderate | Heavy | |
| Time monitoring performed: | Start | 11:30 | End | 12:15 | |
| Barometric pressure (mbar): | Start | 990 | End | 985 | |
| Pressure trend: | **Falling** | Steady | Rising | | |
| Air temperature (degree C): | Before | 17 | After | 18 | |

**INSTRUMENTATION TECHNICAL SPECIFICATIONS:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Ground gas meter:** | GAS DATA LMS xi | Serial No: 5071 | | | | |
| Gas range: | **$CH_4$:** | 0 - 100% | **$CO_2$:** | 0 - 100% | **$O_2$:** | 0 -25% |
| Gas flow range: | +30/-10 l/hr | | | | | |
| Differential pressure: | +300/-30 Pa | | | | | |
| **Date of last calibration:** | 09/02/2017 | | | | | |
| **Date of next calibration:** | Jan-18 | | | | | |

| | | |
|---|---|---|
| **PID:** | MIniRae Lite | Serial No: 595-001381 |
| Calibrated range: | 0-99 ppm | |
| Calibration gas: | Isobutylene | |
| Response time: | 2 seconds | |
| Accuracy: | 0.1 ppm | |
| **Date of last calibration:** | Jul-16 | |
| **Date of next calibration:** | Jul-17 | |

# Gas Monitoring Records

**Job details:**
**Client:** EcoNRG
**Site:** Ashton Old Road
**Date:** 19/05/2017

**Job No:** ASH1867
**Visit No:** 2 **of** 6
**Operator:** H.Rutter
**Project Manager:** RC

| Monitoring Point | VOLATILES | FLOW DATA | | | | GAS CONCENTRATIONS | | | | | | | | | | | | | WELL AND WATER DATA | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PID Peak (ppm) | Flow rate (l/hr) | | Differential borehole Pressure (Pa) | Time for flow to equalise (sec) | Methane (%v/v) | | %LEL | | Carbon dioxide (%v/v) | | Carbon monoxide (ppmv) | | Hydrogen sulphide (ppmv) | | Oxygen (%v/v) | | Run time (min) | Product thickness (mm) | Water level (mbgl) | Depth of well (m) | Reduced level (mAOD) | Water level (mAOD) | Response zone range (m) | |
| | | Peak | Steady | | | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Min. | Steady | | | | | | | | |
| WS01 | 0.3 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 1.6 | 1.6 | <0.1 | <0.1 | <0.1 | <0.1 | 14.3 | 14.3 | 4 | ND | 3.04 | 3.13 | | | | |
| WS03 | 0.2 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 2.5 | 2.5 | <0.1 | <0.1 | <0.1 | <0.1 | 16.4 | 16.4 | 4 | ND | 3.06 | 3.12 | | | | |
| WS07 | 0.1 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 20 | 20 | 4 | ND | 3.03 | 3.04 | | | | |
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| **Max** | **0.3** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **2.5** | **2.5** | **0** | **0** | **0** | **0** | **20.0** | **20.0** | | **0.0** | **3.06** | **3.13** | **0.00** | **0.00** | | |
| **Min** | **0.1** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **1.6** | **1.6** | **0** | **0** | **0** | **0** | **14.3** | **14.3** | | **0.0** | **3.03** | **3.04** | **0.00** | **0.00** | | |

ND - Not detected
NR - Not recorded

**METEOROLOGICAL AND SITE INFORMATION:** (Put X in front of selected or enter data as applicable)

| | | | | | |
|---|---|---|---|---|---|
| State of ground: | **Dry** | Moist | Wet | Snow | Frozen |
| Wind: | **Calm** | Light | Moderate | Strong | |
| Cloud cover: | None | Slight | Cloudy | **Overcast** | |
| Preciptation: | **None** | Slight | Moderate | Heavy | |
| Time monitoring performed: | Start | 14:42 | End | 12:58 | |
| Barometric pressure (mbar): | Start | 1004 | End | 1004 | |
| Pressure trend: | Falling | **Steady** | Rising | | |
| Air temperature (degree C): | Before | 17 | After | 17 | |

**INSTRUMENTATION TECHNICAL SPECIFICATIONS:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Ground gas meter:** | Gasdata GFM 430 | Serial No: 10356 | | | | |
| Gas range: | **$CH_4$:** | 0 - 100% | **$CO_2$:** | 0 - 100% | **$O_2$:** | 0 -25% |
| Gas flow range: | +30/-10 l/hr | | | | | |
| Differential pressure: | +300/-30 Pa | | | | | |
| **Date of last calibration:** | 26/04/2017 | | | | | |
| **Date of next calibration:** | Apr-18 | | | | | |

| | | |
|---|---|---|
| **PID:** | PhoCheck Tiger | Serial No: 107622 |
| Calibrated range: | 0-99 ppm | |
| Calibration gas: | Isobutylene | |
| Response time: | 2 seconds | |
| Accuracy: | 0.1 ppm | |
| **Date of last calibration:** | 10/11/2016 | |
| **Date of next calibration:** | Nov-17 | |

# Gas Monitoring Records

**Job details:**
**Client:** EcoNRG
**Site:** Ashton Old Road
**Date:** 26/05/2017

**Job No:** ASH1867
**Visit No:** 3 **of** 6
**Operator:** J. Dyer
**Project Manager:** RC

| Monitoring Point | VOLATILES | FLOW DATA | | | | GAS CONCENTRATIONS | | | | | | | | | | | | | WELL AND WATER DATA | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PID Peak (ppm) | Flow rate (l/hr) | | Differential borehole Pressure (Pa) | Time for flow to equalise (sec) | Methane (%v/v) | | %LEL | | Carbon dioxide (%v/v) | | Carbon monoxide (ppmv) | | Hydrogen sulphide (ppmv) | | Oxygen (%v/v) | | Run time (min) | Product thickness (mm) | Water level (mbgl) | Depth of well (m) | Reduced level (mAOD) | Water level (mAOD) | Response zone range (m) | |
| | | Peak | Steady | | | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Min. | Steady | | | | | | | | |
| WS01 | 0.5 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 1.1 | 1.1 | <0.1 | <0.1 | <0.1 | <0.1 | 20.1 | 20.1 | 4 | NR | ND | 3.10 | | | | |
| WS03 | 0.7 | 0.2 | <0.1 | 0 | 10 | <0.1 | <0.1 | <0.1 | <0.1 | 2.4 | 2.3 | <0.1 | <0.1 | <0.1 | <0.1 | 14.4 | 14.4 | 4 | NR | ND | 3.11 | | | | |
| WS07 | 0.5 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 0.3 | 0.3 | <0.1 | <0.1 | <0.1 | <0.1 | 18.9 | 18.9 | 4 | NR | ND | 3.07 | | | | |
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| **Max** | **0.7** | **0.2** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **2.4** | **2.3** | **0** | **0** | **0** | **0** | **20.1** | **20.1** | | **0.0** | **0.00** | **3.11** | **0.00** | **0.00** | | |
| **Min** | **0.5** | **0.2** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **0.3** | **0.3** | **0** | **0** | **0** | **0** | **14.4** | **14.4** | | **0.0** | **0.00** | **3.07** | **0.00** | **0.00** | | |

ND - Not detected
NR - Not recorded

**METEOROLOGICAL AND SITE INFORMATION:** (Put X in front of selected or enter data as applicable)

| | | | | | |
|---|---|---|---|---|---|
| State of ground: | **Dry** | Moist | Wet | Snow | Frozen |
| Wind: | Calm | **Light** | Moderate | Strong | |
| Cloud cover: | None | **Slight** | Cloudy | Overcast | |
| Preciptation: | **None** | Slight | Moderate | Heavy | |
| Time monitoring performed: | Start | | End | | |
| Barometric pressure (mbar): | Start | 1010 | End | 1010 | |
| Pressure trend: | Falling | **Steady** | Rising | | |
| Air temperature (degree C): | Before | 28 | After | 28 | |

**INSTRUMENTATION TECHNICAL SPECIFICATIONS:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Ground gas meter:** | Gasdata GFM 430 | Serial No: 10356 | | | | |
| Gas range: | **$CH_4$:** | 0 - 100% | **$CO_2$:** | 0 - 100% | **$O_2$:** | 0 -25% |
| Gas flow range: | +30/-10 l/hr | | | | | |
| Differential pressure: | +300/-30 Pa | | | | | |
| **Date of last calibration:** | 26/04/2017 | | | | | |
| **Date of next calibration:** | Apr-18 | | | | | |

| | | |
|---|---|---|
| **PID:** | PhoCheck Tiger | Serial No: 107622 |
| Calibrated range: | 0-99 ppm | |
| Calibration gas: | Isobutylene | |
| Response time: | 2 seconds | |
| Accuracy: | 0.1 ppm | |
| **Date of last calibration:** | 10/11/2016 | |
| **Date of next calibration:** | Nov-17 | |

# Gas Monitoring Records

**Job details:**
**Client:** EcoNRG
**Site:** Ashton Old Road
**Date:** 02/06/2017

**Job No:** ASH1867
**Visit No:** 4 **of** 6
**Operator:** W. Perry
**Project Manager:** RC

| Monitoring Point | VOLATILES | FLOW DATA | | | | GAS CONCENTRATIONS | | | | | | | | | | | | | WELL AND WATER DATA | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PID Peak (ppm) | Flow rate (l/hr) | | Differential borehole Pressure (Pa) | Time for flow to equalise (sec) | Methane (%v/v) | | %LEL | | Carbon dioxide (%v/v) | | Carbon monoxide (ppmv) | | Hydrogen sulphide (ppmv) | | Oxygen (%v/v) | | Run time (min) | Product thickness (mm) | Water level (mbgl) | Depth of well (m) | Reduced level (mAOD) | Water level (mAOD) | Response zone range (m) | |
| | | Peak | Steady | | | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Min. | Steady | | | | | | | | |
| WS01 | 0.2 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 2.1 | 2.1 | <0.1 | <0.1 | <0.1 | <0.1 | 16.4 | 16.4 | 4 | NR | ND | 3.10 | | | | |
| WS03 | 0.3 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 1.9 | 1.9 | <0.1 | <0.1 | <0.1 | <0.1 | 17.5 | 17.5 | 4 | NR | ND | 3.11 | | | | |
| WS07 | 0.5 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 0.6 | 0.6 | <0.1 | <0.1 | <0.1 | <0.1 | 19.4 | 19.4 | 4 | NR | ND | 3.07 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Max** | **0.5** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **2.1** | **2.1** | **0** | **0** | **0** | **0** | **19.4** | **19.4** | | **0.0** | **0.00** | **3.11** | **0.00** | **0.00** | | |
| **Min** | **0.2** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **0.6** | **0.6** | **0** | **0** | **0** | **0** | **16.4** | **16.4** | | **0.0** | **0.00** | **3.07** | **0.00** | **0.00** | | |

ND - Not detected
NR - Not recorded

**METEOROLOGICAL AND SITE INFORMATION:** (Put X in front of selected or enter data as applicable)

| | | | | | |
|---|---|---|---|---|---|
| State of ground: | Dry | Moist | **Wet** | Snow | Frozen |
| Wind: | Calm | **Light** | Moderate | Strong | |
| Cloud cover: | None | Slight | Cloudy | **Overcast** | |
| Preciptation: | **None** | Slight | Moderate | Heavy | |
| Time monitoring performed: | Start | 11:05 | End | 11:20 | |
| Barometric pressure (mbar): | Start | 1008 | End | 1008 | |
| Pressure trend: | Falling | **Steady** | Rising | | |
| Air temperature (degree C): | Before | 15 | After | 15 | |

**INSTRUMENTATION TECHNICAL SPECIFICATIONS:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Ground gas meter:** | Gasdata GFM 430 | Serial No: 10356 | | | | |
| Gas range: | **$CH_4$:** | 0 - 100% | **$CO_2$:** | 0 - 100% | **$O_2$:** | 0 -25% |
| Gas flow range: | +30/-10 l/hr | | | | | |
| Differential pressure: | +300/-30 Pa | | | | | |
| **Date of last calibration:** | 26/04/2017 | | | | | |
| **Date of next calibration:** | Apr-18 | | | | | |

| | | |
|---|---|---|
| **PID:** | PhoCheck Tiger | Serial No: 107622 |
| Calibrated range: | 0-99 ppm | |
| Calibration gas: | Isobutylene | |
| Response time: | 2 seconds | |
| Accuracy: | 0.1 ppm | |
| **Date of last calibration:** | 10/11/2016 | |
| **Date of next calibration:** | Nov-17 | |

# Gas Monitoring Records

**Job details:**
**Client:** EcoNRG
**Site:** Ashton Old Road
**Date:** 09/06/2017

**Job No:** ASH1867
**Visit No:** 5 **of** 6
**Operator:** J. Dyer, K. Latka
**Project Manager:** RC

| Monitoring Point | VOLATILES | FLOW DATA | | | | GAS CONCENTRATIONS | | | | | | | | | | | | | WELL AND WATER DATA | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PID Peak (ppm) | Flow rate (l/hr) | | Differential borehole Pressure (Pa) | Time for flow to equalise (sec) | Methane (%v/v) | | %LEL | | Carbon dioxide (%v/v) | | Carbon monoxide (ppmv) | | Hydrogen sulphide (ppmv) | | Oxygen (%v/v) | | Run time (min) | Product thickness (mm) | Water level (mbgl) | Depth of well (m) | Reduced level (mAOD) | Water level (mAOD) | Response zone range (m) | |
| | | Peak | Steady | | | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Min. | Steady | | | | | | | | |
| WS01 | 0.3 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 20.7 | 20.7 | 4 | NR | 2.16 | 3.10 | | | | |
| WS03 | 0.2 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 0.9 | 0.9 | <0.1 | <0.1 | <0.1 | <0.1 | 19.2 | 19.2 | 4 | NR | ND | 3.11 | | | | |
| WS07 | 0.3 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 20.6 | 20.6 | 4 | NR | ND | 3.07 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Max** | **0.3** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **0.9** | **0.9** | **0** | **0** | **0** | **0** | **20.7** | **20.7** | | **0.0** | **2.16** | **3.11** | **0.00** | **0.00** | | |
| **Min** | **0.2** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **0.9** | **0.9** | **0** | **0** | **0** | **0** | **19.2** | **19.2** | | **0.0** | **2.16** | **3.07** | **0.00** | **0.00** | | |

ND - Not detected
NR - Not recorded

**METEOROLOGICAL AND SITE INFORMATION:** (Put X in front of selected or enter data as applicable)

| | | | | | |
|---|---|---|---|---|---|
| State of ground: | Dry | Moist | **Wet** | Snow | Frozen |
| Wind: | Calm | **Light** | Moderate | Strong | |
| Cloud cover: | None | **Slight** | Cloudy | Overcast | |
| Preciptation: | None | **Slight** | Moderate | Heavy | |
| Time monitoring performed: | Start | 14:30 | End | 14:52 | |
| Barometric pressure (mbar): | Start | 1001 | End | 1000 | |
| Pressure trend: | **Falling** | Steady | Rising | | |
| Air temperature (degree C): | Before | 18 | After | 18 | |

**INSTRUMENTATION TECHNICAL SPECIFICATIONS:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Ground gas meter:** | Gasdata GFM 430 | Serial No: 10356 | | | | |
| Gas range: | **$CH_4$:** | 0 - 100% | **$CO_2$:** | 0 - 100% | **$O_2$:** | 0 -25% |
| Gas flow range: | +30/-10 l/hr | | | | | |
| Differential pressure: | +300/-30 Pa | | | | | |
| **Date of last calibration:** | 26/04/2017 | | | | | |
| **Date of next calibration:** | Apr-18 | | | | | |

| | | |
|---|---|---|
| **PID:** | PhoCheck Tiger | Serial No: 109691 |
| Calibrated range: | 0-99 ppm | |
| Calibration gas: | Isobutylene | |
| Response time: | 2 seconds | |
| Accuracy: | 0.1 ppm | |
| **Date of last calibration:** | 10/11/2016 | |
| **Date of next calibration:** | Nov-17 | |

# Gas Monitoring Records

**Job details:**
**Client:** EcoNRG
**Site:** Ashton Old Road
**Date:** 16/06/2017

**Job No:** ASH1867
**Visit No:** 6 **of** 6
**Operator:** K. Latka
**Project Manager:** RC

| Monitoring Point | VOLATILES | FLOW DATA | | | | GAS CONCENTRATIONS | | | | | | | | | | | | | WELL AND WATER DATA | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PID Peak (ppm) | Flow rate (l/hr) | | Differential borehole Pressure (Pa) | Time for flow to equalise (sec) | Methane (%v/v) | | %LEL | | Carbon dioxide (%v/v) | | Carbon monoxide (ppmv) | | Hydrogen sulphide (ppmv) | | Oxygen (%v/v) | | Run time (min) | Product thickness (mm) | Water level (mbgl) | Depth of well (m) | Reduced level (mAOD) | Water level (mAOD) | Response zone range (m) | |
| | | Peak | Steady | | | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Peak | Steady | Min. | Steady | | | | | | | | |
| WS01 | 0.2 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 3.5 | 3.5 | <0.1 | <0.1 | <0.1 | <0.1 | 14.9 | 14.9 | 4 | NR | ND | 3.10 | | | | |
| WS03 | 0.2 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 0.9 | 0.9 | <0.1 | <0.1 | <0.1 | <0.1 | 19.5 | 19.5 | 4 | NR | ND | 3.11 | | | | |
| WS07 | 0.3 | <0.1 | <0.1 | 0 | - | <0.1 | <0.1 | <0.1 | <0.1 | 2.6 | 2.6 | <0.1 | <0.1 | <0.1 | <0.1 | 11.2 | 11.2 | 4 | NR | ND | 3.07 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Max** | **0.3** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **3.5** | **3.5** | **0** | **0** | **0** | **0** | **19.5** | **19.5** | | **0.0** | **0.00** | **3.11** | **0.00** | **0.00** | | |
| **Min** | **0.2** | **0.0** | **0.0** | **0** | | **0.0** | **0.0** | **0.0** | **0.0** | **0.9** | **0.9** | **0** | **0** | **0** | **0** | **11.2** | **11.2** | | **0.0** | **0.00** | **3.07** | **0.00** | **0.00** | | |

ND - Not detected
NR - Not recorded

**METEOROLOGICAL AND SITE INFORMATION:** (Put X in front of selected or enter data as applicable)

| | | | | | |
|---|---|---|---|---|---|
| State of ground: | **Dry** | Moist | Wet | Snow | Frozen |
| Wind: | Calm | **Light** | Moderate | Strong | |
| Cloud cover: | None | Slight | Cloudy | **Overcast** | |
| Preciptation: | **None** | Slight | Moderate | Heavy | |
| Time monitoring performed: | Start | 11:40 | End | 12:09 | |
| Barometric pressure (mbar): | Start | 1016 | End | 1016 | |
| Pressure trend: | Falling | **Steady** | Rising | | |
| Air temperature (degree C): | Before | 22 | After | 22 | |

**INSTRUMENTATION TECHNICAL SPECIFICATIONS:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Ground gas meter:** | Gasdata GFM 430 | Serial No: 10356 | | | | |
| Gas range: | **$CH_4$:** | 0 - 100% | **$CO_2$:** | 0 - 100% | **$O_2$:** | 0 -25% |
| Gas flow range: | +30/-10 l/hr | | | | | |
| Differential pressure: | +300/-30 Pa | | | | | |
| **Date of last calibration:** | 26/04/2017 | | | | | |
| **Date of next calibration:** | Apr-18 | | | | | |

| | | |
|---|---|---|
| **PID:** | PhoCheck Tiger | Serial No: 107622 |
| Calibrated range: | 0-99 ppm | |
| Calibration gas: | Isobutylene | |
| Response time: | 2 seconds | |
| Accuracy: | 0.1 ppm | |
| **Date of last calibration:** | 10/11/2016 | |
| **Date of next calibration:** | Nov-17 | |

| TEST DATE AND CONDITIONS | |
|---|---|
| Date | 09/02/2017 |
| Atmospheric Pressure | 1011 mB |
| Ambient Temp | 21.4 $^{0}$C |
| Environics Serial No. | n/a |


**GAS DATA LTD**

Pegasus House
Seven Stars Estate
Wheler Rd.
Coventry
CV3 4LB

Tel: 024 76 303311 Fax: 024 76 307711


# LMS FINAL INSPECTION & CALIBRATION CERTIFICATE

| INSTRUMENT DETAILS | | |
|---|---|---|
| Serial No<br>S/W Version | 5071<br>G3.18v-LTBX | CUSTOMER<br>T & P Regeneration |

| INSTRUMENT CHECKS | | | |
|---|---|---|---|
| Keyboard | ✓ | Clock Set / Running | ✓ |
| Pump In/Out | ✓ | Labels Fitted | ✓ |
| Display Contrast | ✓ | Recalibration Due | 09/02/2018 |

| GASES | | | | | |
|---|---|---|---|---|---|
| CH4 | | CO2 | | O2 | |
| Test % | Reading % | Test % | Reading % | Test % | Reading |
| 0<br>accept <= 0.1 | 0 | 0<br>accept <= 0.1 | 0 | 0<br>accept <= 0.1 | 0.1 |
| 6.8<br>accept 6.6-7.0 | 6.8 | 3.7<br>accept 3.5-3.9 | 3.6 | 21<br>accept 20.5-21.2 | 20.9 |
| 52<br>accept 50.0-54.0 | 53 | 42.0<br>accept 39.0-45.0 | 40 | | |

| PRESSURES | | | |
|---|---|---|---|
| Absolute/Relative | | Differential | |
| Atmos<br>accept current +/-1 | 1011 | 0.0 | x |
| Atmos + 50 mbar<br>accept current +48-+52 | 1062 | +30 mbar<br>accept 29.5-30.5 | x |
| Atmos - 50 mbar<br>accept current -48--52 | 961 | -30 mbar<br>accept -29.5--30.5 | x |

| TEMPERATURE | |
|---|---|
| Applied °C | Reading °C |
| 0<br>accept -0.1-+0.1 | 0 |
| 25<br>accept 24.5-25.5 | 25 |
| 40<br>accept 37.5-40.5 | 40.3 |

| OPTIONS | | | | | |
|---|---|---|---|---|---|
| Borehole Flow<br>(see other Side) | ✓ | LEL | ✓ | Temp Probe<br>(see above) | x |
| Extraction Flow | x | | | Toxic Gasses<br>(see other Side) | ✓ |

| PACKING | | | | | | |
|---|---|---|---|---|---|---|
| Charger | UK ✓ | US | Euro | Sample Pipe | Standard | Flow ✓ |
| Manual | x | | | Serial Cable | x | |
| Leather Bag | ✓ | | | Software | x | |
| Strap | ✓ | | | Cal Certificate | ✓ | |

| TEST DATE AND CONDITIONS | |
|---|---|
| Date | 09/02/2017 |
| Atmospheric Pressure | 1011 mB |
| Ambient Temp | 21.4 $^{0}$C |
| Environics Serial No. | n/a |


**GAS DATA LTD**

Pegasus House
Seven Stars Estate
Wheler Rd.
Coventry
CV3 4LB

Tel: 024 76 303311 Fax: 024 76 307711


# LMS FINAL INSPECTION & CALIBRATION CERTIFICATE (OPTIONS)

| Toxic Gasses | | | |
|---|---|---|---|
| Gas Type | Range | Tested @ | Reading |
| H2S | 200ppm | 200ppm | 200ppm |
| CO | 1000ppm | 400ppm | 401ppm |
| | | | |
| | | | |
| | | | |

| Cross Gas Effects | | | | | |
|---|---|---|---|---|---|
| Applied gas | | Readings | | | |
| Type | Concentration | Toxic 1: H2S | Toxic 2: CO | Toxic 3: | Toxic 4: |
| H2S | 200ppm | 200ppm | 1.7ppm | | |
| CO | 400ppm | 7.0ppm | 401ppm | | |
| | | | | | |
| | | | | | |

| Flow Tests - Low Range Option | | | | | |
|---|---|---|---|---|---|
| Target Flow | -5 L/Hr | 0 L/Hr | 5 L/Hr | 10 L/Hr | 20 L/Hr |
| Applied | -5 | 0.0 | 5 | 10 | 20 |
| Flow Reading | -5.1 accept applied +/- 0.5 | 0.0 accept applied +/- 0.0 | 5 accept applied +/-0.5 | 10 accept applied +/-0.7 | 20 accept applied +/-3.0 |
| dp Applied (Pa) | -13 | 0.0 | 13 | 30 | 76 |
| dp Reading (Pa) | -13 | 0.0 | 13 | 30 | 76 |
| | accept applied +/-5 | accept applied +/-0.0 | accept applied +/-5 | accept applied +/-10 | accept applied +/-20 |
| **Flow Tests - High Range Option** | | | | | |
| Target Flow | -30 L/Hr | 0 L/Hr | 30 L/Hr | 60 L/Hr | 120 L/Hr |
| Applied | -30 | 0.0 | 30 | 60 | 120 |
| Flow Reading | x accept applied +/-3.0 | 0.0 accept applied +/-0.0 | x accept applied +/-3.0 | x accept applied +/-4.0 | x accept applied +/-15 |
| dp Applied (Pa) | x | 0.0 | x | x | x |
| dp Reading (Pa) | x | 0.0 | x | x | x |
| | accept applied +/-15 | accept applied +/-0.0 | accept applied +/-15 | accept applied +/-50 | accept applied +/-200 |

Tested Approved

VAN WALT
Monitoring your needs

# Outwards Sales Checklist

## PID Lite Checklist and Calibration

Serial Number: 595-001381
Sales Customer & Company: T&P REGENERATION LTD

| | Reading | Target | Acceptable | Pass |
|---|---|---|---|---|
| 100ppm Isobutylene gas | 100.1 | 100 | ± 10% * | ✓ |
| Fresh Air | 0.1 | 0.0 | ± 10% * | ✓ |

This PID was calibrated to manufacturers standards and was within acceptable range on the day of calibration. The MiniRAE Lite can keep calibration for up to 30 days. If measurements become unstable re-calibrate the PID using the Isobutylene gas provided. * On bump test after calibration

### Maintenance Checks

| | Comments |
|---|---|
| ☑ PID Turns on/off | |
| ☑ Internal pump functioning | |
| ☑ PAT test date on charger | |
| ☑ Pump stall test | |

### Checklist

| | Comments |
|---|---|
| ☑ MiniRAE Lite | |
| ☑ Screwdriver & Allen key | |
| ☑ Cleaning kit | |
| ☑ Serial PC lead | |
| ☑ Charging Adaptor x 4 | |
| ☑ Alkaline Battery Pack | |
| ☑ Manual and Quick Start Guide | |
| ☑ Use of PID Information sheet | |
| ☑ Hard Case / Soft Case | |
| ☑ Water Trap | |
| ☑ Tamper sticker intact | |

Signed: [signature] Name: TOM BASSETT Date: 12/7/16

# Calibration Certificate and Quality Control Checklist

**Production Order Number:** 13322045 **Sales Order Number:** 12304819 / 10

**Customer Number:** 1128205 **Customer:** Van Walt Limited

**Part Number:** 059-A126-000

**Unit Type:** MiniRAE Lite059-A126-000

**Serial Number:** **595-001381**

**Comment:**

| GAS | SPAN | CYLINDER LOT |
|---|---|---|
| C4H8 | 100 ppm | 1904136 |

**Final Inspection:**

| | |
|---|---|
| Does the unit power on? | YES |
| Do sensor types match configuration? | YES |
| Any error message after power on? | NO |

**QC Stamp:** 127 **Calibration Date:** 09/06/2016

**RAE Systems by Honeywell**
4 Stinsford Road, Poole, Dorset, BH17 0RZ - United Kingdom
Tel. +44 (0) 1295 700300 - Fax +44 (0) 1295 700301
Email: PortablesUK@Honeywell.com

| TEST DATE AND CONDITIONS | |
|---|---|
| Date | 26/04/2017 |
| Atmospheric Pressure | 1002 mB |
| Ambient Temp | 22.4 °C |
| Environics Serial No. | n/a |
| Gas Cylinder Certification No. | 53484/5016 |

**GAS DATA LTD**
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

# GFM430-1 / 2 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

| INSTRUMENT DETAILS | |
|---|---|
| Serial No | Customer |
| 10356 | Ground Gas Solutions |

| INSTRUMENT CHECKS | | | |
|---|---|---|---|
| Keyboard | ✓ | Pump Flow | 500 cc/min |
| Display Contrast | ✓ | Pump Flow @ -200mB | 400 cc/min |
| Clock Set / Running | ✓ | S/W Version | G430.0024/0013 |
| Labels Fitted | ✓ | Recalibration Date | 26/04/2018 |

| GAS CHECKS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Calibration Gas | | Instrument Gas Channels Read | | | | | |
| Gas Type | Applied Conc. | CH4 ( % ) | tol. ( % vol. ) | CO2 ( % ) | tol. ( % vol. ) | O2 ( % ) | tol. ( % vol. ) |
| N2 | 100% | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | +/-0.1 |
| CH4 | 5% | 5.0 | +/-0.3 | 0.0 | 0.0 | 0.0 | +/-0.1 |
| | 60% | 61.2 | +/-3.0 | 0.0 | 0.0 | 0.0 | +/-0.1 |
| CO2 | 5% | 0.0 | 0.0 | 5.2 | +/-0.3 | 0.0 | +/-0.1 |
| | 40% | 0.0 | 0.0 | 38.7 | +/-3.0 | 0.0 | +/-0.1 |
| O2 | 20.9% | 0.0 | 0.0 | 0.0 | +0.1 | 20.7 | +/-0.5 |
| | | | | | | | |
| | | | | | | | |

| OPTIONAL GAS CHECKS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Calibration Gas | | Instrument Gas Channels Read | | | | | | |
| Gas Type | Applied Conc. | Label | H2S | CO | | | | tol. (% vol.) |
| | | Range | 5000ppm | 2000ppm | | | | |
| N2 | 100% | | 0 | 0 | | | | 0 |
| H2S | 1500ppm | | 1500 | 0 | | | | +/- 5.0 |
| CO | 430ppm | | 20 | 432 | | | | +/- 5.0 |
| | | | | | | | | +/- 5.0 |
| | | | | | | | | +/- 5.0 |
| | | | | | | | | +/- 5.0 |
| | | | | | | | | +/- 5.0 |

| TEST DATE AND CONDITIONS | |
|---|---|
| Date | 26/04/2017 |
| Atmospheric Pressure | 1002 mB |
| Ambient Temp | 22.4 °C |
| Environics Serial No. | n/a |
| Gas Cylinder Certification No. | 53484/5016 |

**GAS DATA LTD**
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

## GFM430-1 / 2 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

**PRESSURE CHECKS**

| Calibration Pressure | | Instrument Pressure Channels Read | | | | | |
|---|---|---|---|---|---|---|---|
| Pressure @ | Applied Pressure | Atmospheric [Ap] ( mB ) | tol. ( mB ) | Static [Sp] ( mB ) | tol. ( mB ) | | |
| All ports | current atmospheric | 1002 | +/-2.0 | 0.0 | 0.0 | | |
| Ap port (internal) | +800mB(a) | 799 | +/-5.0 | 0.0 | 0.0 | | |
| | +1200mB(a) | 1200 | +/-5.0 | 0.0 | 0.0 | | |
| Gas IN Port | +50mB(g) | | | 0.0 | +/-2.0 | | |
| | -100mB(g) | | | 0.0 | +/-2.0 | | |
| | | | | | | | |
| | | | | | | | |

**FLOW CHECKS**

| Calibration Flow | | Instrument Flow Channels Read | | | |
|---|---|---|---|---|---|
| Applied Flow | Applied Pressure (Pa) | Flow [Flow] ( l/hour ) | tol. ( l/hour ) | Differential Pressure [Dp] ( Pa ) | tol. ( Pa ) |
| -30.0 l/hour | -195 | -28.5 | +/-3.0 | -185 | +/-50 |
| -3.0 l/hour | -15 | -2.6 | +/-1.0 | -13 | +/-6 |
| 0.0 l/hour | 0.0 | 0.0 | 0.0 | 0.0 | +/-0.5 |
| +3.0 l/hour | 17 | 2.8 | +/-0.5 | 16 | +/-3 |
| +30.0 l/hour | 284 | 28.6 | +/-3.0 | 272 | +/-50 |
| +60.0 l/hour | 800 | 57.9 | +/-6.0 | 768 | +/-130 |
| +90.0 l/hour | 1514 | 87.1 | +/-9.0 | 1460 | +/-250 |

**TEMPERATURE CHECK**

| Calibration Temperature | Instrument Temperature Channel Read | |
|---|---|---|
| Applied Equivalent Temperature | Temperature [Temp] ( °C ) | tol. ( °C ) |
| -10.0 °C | -10.0 | +/- 2.0 |
| 0.0 °C | 0.0 | +/- 1.0 |
| 30.0 °C | 30.0 | +/- 1.0 |
| 60.0 °C | 60.0 | +/- 1.0 |
| 100.0 °C | 100.0 | +/- 1.0 |

| TEST DATE AND CONDITIONS | |
|---|---|
| Date | 26.4.17 |
| Atmospheric Pressure | 1002 mB |
| Ambient Temp | 22.4 °C |
| Environics Serial No. | N/A |

**GAS DATA LTD**
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

# GFM430 -1 OUTWARD INSPECTION & QUALITY CHECK SHEET

| INSTRUMENT DETAILS | | | |
|---|---|---|---|
| SO Number | Instrument Type | Instrument Serial Number + SW Version | Job Number(s) |
| 316823 | GFM 430 | 10356 - G430-000024/0013 | 10356 030417 |

**Calibration Technician** ..... **Date** 26.4.17

**Inspection Technician** ..... **Date** 28.4.17

| INSTRUMENT CHECKS | | | Pass (P), Fail (F) or not applicable (NA) | INSTRUMENT PACKING LIST | | Tick if included |
|---|---|---|---|---|---|---|
| Function Tests | Dust Caps Fitted | | P | Instrument | | ✓ |
| | Keyboard Test (All Keys) | | P | Leather Case | | ✓ |
| | Backlight | | P | Instrument Strap | | ✓ |
| | Clock Set / Running | | P | AC Battery Charger (UK) | | |
| | Comms Test | | P | AC Battery Charger (EURO) | | N/A |
| | Pump Flow Test (In & Out) | | P | AC Battery Charger (US) | | N/A |
| | Overall Leak Test (30mB) | | P | AC Battery Charger (AUS) | | N/A |
| | Battery Charge Test | | P | Gas Sample Pipe | | ✓ |
| | Service Date set to? | | 26.4.18 | Carry Case | | ✓ |
| Channel Test | Data Logging Enabled? | | P | Spares Pot | | ✓ |
| | Verify CH4/LEL | | P | Allen Key | | X |
| | Verify CO2 | | P | Flow Sample Pipe | | ✓ |
| | Verify O2 | | P | Temperature Probe | | X |
| | Verify LEL | | P | Vane Anemometer | | X |
| | Verify 1st Option Gas | H2S | P | USB Cable | | ✓ |
| | Verify 2nd Option Gas | CO | P | USB Memory stick | | X |
| | Verify 3rd Option Gas | | N/A | SiteMan Software | Ver 4.1.5 | X |
| | Verify 4th Option Gas | | N/A | Internal Filter Pack | Qty | X |
| | Verify Atmospheric pressure | | P | External Filter Pack | Qty | X |
| | Verify static pressure | | P | Field Guide | | X |
| | Verify differential pressure | | P | Operation Manual (hard copy) | | X |
| | Verify flow | | P | Extra Items: | | |
| | Verify temperature probe input | | P | | | |
| | Verify vane anemometer input | | P | | | |
| DataBase Checks | Jobcard(s) completed and signed | | P | | | |
| | Jobcard(s) booked off database | | P | | | |
| | Calibration certificate completed | | P | | | |
| | Complete & print QI record | | N/A | Comments: | | |
| Label Checks | No. of Calibration label fitted | | GDC08075 | | | |
| | Warranty label fitted | | N/A | | | |
| | H2S Range from Sales Order | | 5000 PPM | | | |
| | H2S Range from Cal Cert | | 5000 PPM | | | |
| | Over-range value correct? | | P | | | |

Be sure. Be safe

# CERTIFICATE OF CALIBRATION
Phocheck Tiger

## CALIBRATION CERTIFICATE NO: 59175

ISSUED BY: SHAWCITY LIMITED
DATE: 10th November 2016

APPROVED SIGNATORY:

NAME: Frank Izzo

CUSTOMER: Ground-Gas Solutions Ltd
INSTRUMENT: Phocheck Tiger
SERIAL NUMBER: T-107622

CALIBRATION METHOD: CM03
AMBIENT CONDITIONS: 20°C ± 2°C and 50% (± 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.
The instrument was calibrated by exposing the sensor to known values of gas concentrations.
All gases were sampled through the complete probe and in line filter, where applicable.
The reference value is that generated by the certified source and the indicated value is that measured by the instrument.

## CALIBRATION RESULTS

| GAS | LOT No | REF. VALUE | INDICATED VALUE |
|---|---|---|---|
| Isobutylene | 508632 | 100 ppm | 100 ppm |
| Isobutylene | S110103 | 1000 ppm | 1000 ppm |

**COMMENTS:**
The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.
This provides a level of confidence of uncertainty of approximately 95%.
The uncertainty of measurement is ±2 %
The results indicate that the instrument conforms to the applicable parts of the published specification.



Tel: 01793 780622
www.shawcity.co.uk
Instrument House, 91-92 Shrivenham Hundred Business Park
Watchfield, Oxfordshire, SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

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# SERVICE / INSPECTION SHEET

JOB NUMBER: 59175
INSTRUMENT: Phocheck Tiger

Instrument House
91-92 Shrivenham Hundred Business Park
Watchfield
Oxfordshire
SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

SERIAL NUMBER: T-107622
DATE RECEIVED: 03/11/2016

FIRMWARE: 4.33
UPGRADED TO: n/a

CUSTOMER: Ground-Gas Solutions Ltd

| ITEMS RECEIVED | CONDITION | RTN? |
|---|---|---|
| Instrument | | yes |
| Rubber Boot | | yes |
| Battery Charger | | yes |
| Charging Cradle | | yes |
| Operation Manual | | |
| Quick Start Guide | | |
| Spares Kit | | |
| Comms Cable | | yes |
| Probe | | yes |
| Peli Case | | yes |
| Tubing | | |
| Regulator | | |
| Software (Memory Stick) | | |
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| | SIGNED: | |

| TESTS | AS REC'D | AFTER REPAIR |
|---|---|---|
| Charging Test | √ | |
| Battery Test | √ | |
| Lamp Test | √ | |
| Air Flow Test | X | √ |
| Switch Test | √ | |
| Moisture Sensitivity | √ | |
| Sensor Test | √ | |
| Alarm Test | √ | |
| PC Comms Test | √ | |
| Datalog Test | √ | |
| Display Test | √ | |
| Physical Inspection | X | √ |
| PAT Test | valid | |
| Firmware Upgrade | n/a | |
| Software Upgrade (usb) | √ | |
| Function Test | √ | |
| | | |
| | | |
| | | |
| | | |
| | | |

Cracked filter clamp, probe and seal replaced with new style items.
Inlet filter, probe O-ring, PID sensor stack and worn sensor seal replaced.
Instrument service, testing, repair and calibration carried out.

TECHNICIAN: Frank Izzo

DATE: 10th November 2016

Be sure. Be safe

# CERTIFICATE OF CALIBRATION
Phocheck Tiger

## CALIBRATION CERTIFICATE NO: 59195

ISSUED BY: SHAWCITY LIMITED
DATE: 10th November 2016

APPROVED SIGNATORY:

NAME: Frank Izzo

CUSTOMER: Ground-Gas Solutions Ltd
INSTRUMENT: Phocheck Tiger
SERIAL NUMBER: T-109691

CALIBRATION METHOD: CM03
AMBIENT CONDITIONS: 20°C ± 2°C and 50% (± 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.
The instrument was calibrated by exposing the sensor to known values of gas concentrations.
All gases were sampled through the complete probe and in line filter, where applicable.
The reference value is that generated by the certified source and the indicated value is that measured by the instrument.

## CALIBRATION RESULTS

| GAS | LOT No | REF. VALUE | INDICATED VALUE |
|---|---|---|---|
| Isobutylene | 508632 | 100 ppm | 100 ppm |
| Isobutylene | S110103 | 1000 ppm | 1000 ppm |

**COMMENTS:**
The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.
This provides a level of confidence of uncertainty of approximately 95%.
The uncertainty of measurement is ±2 %
The results indicate that the instrument conforms to the applicable parts of the published specification.



Tel: 01793 780622
www.shawcity.co.uk
Instrument House, 91-92 Shrivenham Hundred Business Park
Watchfield, Oxfordshire, SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

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# SERVICE / INSPECTION SHEET

JOB NUMBER: 59195
INSTRUMENT: Phocheck Tiger

Instrument House
91-92 Shrivenham Hundred Business Park
Watchfield
Oxfordshire
SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

SERIAL NUMBER: T-109691
DATE RECEIVED: 04/11/2016

FIRMWARE: 4.33
UPGRADED TO: n/a

CUSTOMER: Ground-Gas Solutions Ltd

| ITEMS RECEIVED | CONDITION | RTN? |
|---|---|---|
| Instrument | YES | |
| Rubber Boot | YES | |
| Battery Charger | YES | |
| Charging Cradle | YES | |
| Operation Manual | NO | |
| Quick Start Guide | NO | |
| Spares Kit | YES | |
| Comms Cable | NO | |
| Probe | NO | |
| Peli Case | YES | |
| Tubing | NO | |
| Regulator | NO | |
| Software (Memory Stick) | NO | |
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| | SIGNED: | |

| TESTS | AS REC'D | AFTER REPAIR |
|---|---|---|
| Charging Test | √ | |
| Battery Test | √ | |
| Lamp Test | √ | |
| Air Flow Test | X | √ |
| Switch Test | √ | |
| Moisture Sensitivity | √ | |
| Sensor Test | √ | |
| Alarm Test | √ | |
| PC Comms Test | √ | |
| Datalog Test | n/a | |
| Display Test | √ | |
| Physical Inspection | X | √ |
| PAT Test | expired | √ |
| Firmware Upgrade | n/a | |
| Software Upgrade (usb) | √ | |
| Function Test | √ | |
| | | |
| | | |
| | | |
| | | |
| | | |

Pump suction poor and does not stall.
Inlet filter, PID sensor stack, worn sensor seal, probe and nozzle O-rings replaced.
PAT test carried out on charger.
Instrument service, testing, repair and calibration carried out.

TECHNICIAN: Frank Izzo

DATE: 10th November 2016

Appendix G – HazWaste Printout

HazWasteOnline™

# Waste Classification Report

WBEHJ-48LT7-6JU2Z

## Job name

Ashton Old Road

## Description/Comments

## Project

ASH1867

## Site

## Waste Stream Template

T&P Waste Stream

## Classified by


Name:
**Samuel Butcher**
Date:
**30/06/2017 13:45:07 UTC**
Telephone:
**01179 277 756**

Company:
**T&P Regeneration Ltd**
**Unit 4**
**Brunel Lock Development, Smeaton Road**
**Bristol**
**BS1 6SE**


## Report

Created by: Samuel Butcher
Created date: 30/06/2017 13:45 UTC

## Job summary

| # | Sample Name | Depth [m] | Classification Result | Hazard properties | Page |
|---|---|---|---|---|---|
| 1 | WS02 | 1.00 - 1.20 | Hazardous | HP 3(i), HP 7, HP 11 | 2 |
| 2 | WS02[1] | 1.50 - 1.80 | Non Hazardous | | 5 |
| 3 | WS03 | 0.00 - 1.20 | Hazardous | HP 14 | 6 |
| 4 | WS04 | 0.50 - 0.80 | Hazardous | HP 3(i), HP 7, HP 10, HP 11, HP 14 | 8 |
| 5 | WS04[1] | 1.50 - 1.70 | Non Hazardous | | 11 |
| 6 | WS06 | 0.30 - 0.70 | Non Hazardous | | 13 |
| 7 | WS07 | 0.50 - 0.70 | Non Hazardous | | 15 |
| 8 | WS07[1] | 0.70 - 1.00 | Non Hazardous | | 17 |
| 9 | SS01 | 0.00 - 0.30 | Hazardous | HP 3(i), HP 7, HP 11, HP 14 | 19 |
| 10 | WS05 | 0.30 - 0.60 | Non Hazardous | | 22 |


| Appendices | Page |
|---|---|
| Appendix A: Classifier defined and non CLP determinands | 24 |
| Appendix B: Rationale for selection of metal species | 25 |
| Appendix C: Version | 26 |

## Classification of sample: WS02

**Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

## Sample details

| | | | |
|---|---|---|---|
| Sample Name: | | LoW Code: | |
| **WS02** | | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | | |
| **1.00 - 1.20 m** | | Entry: | 17 05 03 * (Soil and stones containing hazardous substances) |

## Hazard properties

**HP 7: Carcinogenic** "waste which induces cancer or increases its incidence"

Hazard Statements hit:

**Carc. 1B; H350** "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.161%)

**HP 11: Mutagenic** "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

**Muta. 1B; H340** "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.161%)

## Hazard properties (substances considered hazardous until shown otherwise)

**HP 3(i): Flammable** "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

**Flam. Liq. 3; H226** "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.161%)

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 1 | | arsenic { arsenic trioxide } | | | | 26.9 | mg/kg | 1.32 | 35.517 | mg/kg | 0.00355 % | ✓ | |
| | | 033-003-00-0 | 215-481-4 | 1327-53-3 | | | | | | | | | |
| 2 | | cadmium { cadmium sulfide } | | | 1 | 1.3 | mg/kg | 1.285 | 1.671 | mg/kg | 0.00013 % | ✓ | |
| | | 048-010-00-4 | 215-147-8 | 1306-23-6 | | | | | | | | | |
| 3 | | chromium { chromium(III) oxide } | | | | 56.5 | mg/kg | 1.462 | 82.578 | mg/kg | 0.00826 % | ✓ | |
| | | | 215-160-9 | 1308-38-9 | | | | | | | | | |

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 119 | mg/kg | 1.126 | 133.981 | mg/kg | 0.0134 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 345 | mg/kg | 1.56 | 538.136 | mg/kg | 0.0345 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | **<LOD** |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 34.1 | mg/kg | 1.579 | 53.861 | mg/kg | 0.00539 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | 1.3 | mg/kg | 2.554 | 3.32 | mg/kg | 0.000332 % | ✓ | |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 309 | mg/kg | 1.245 | 384.617 | mg/kg | 0.0385 % | ✓ | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | 1.3 | mg/kg | 13.43 | 17.459 | mg/kg | 0.00175 % | ✓ | |
| 11 | | pH | | | PH | | 7 | pH | | 7 | pH | 7pH | | |
| 12 | | phenol | 604-001-00-2 | 203-632-7 | 108-95-2 | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| 13 | | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 14 | | acenaphthylene | | 205-917-1 | 208-96-8 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 15 | | acenaphthene | | 201-469-6 | 83-32-9 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 16 | | fluorene | | 201-695-5 | 86-73-7 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 17 | | phenanthrene | | 201-581-5 | 85-01-8 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 18 | | anthracene | | 204-371-1 | 120-12-7 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 19 | | fluoranthene | | 205-912-4 | 206-44-0 | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| 20 | | pyrene | | 204-927-3 | 129-00-0 | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| 21 | | benzo[a]anthracene | 601-033-00-9 | 200-280-6 | 56-55-3 | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| 22 | | chrysene | 601-048-00-0 | 205-923-4 | 218-01-9 | | 0.1 | mg/kg | | 0.1 | mg/kg | 0.00001 % | ✓ | |
| 23 | | benzo[b]fluoranthene | 601-034-00-4 | 205-911-9 | 205-99-2 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 24 | | benzo[k]fluoranthene | 601-036-00-5 | 205-916-6 | 207-08-9 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | 601-032-00-3 | 200-028-5 | 50-32-8 | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| 26 | | indeno[123-cd]pyrene | | 205-893-2 | 193-39-5 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 27 | | dibenz[a,h]anthracene | 601-041-00-2 | 200-181-8 | 53-70-3 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 28 | | benzo[ghi]perylene | | 205-883-8 | 191-24-2 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 29 | | TPH (C6 to C40) petroleum group | | | TPH | | 1610 | mg/kg | | 1610 | mg/kg | 0.161 % | ✓ | |
| | | | | | | | | | | | Total: | 0.267 % | | |

Key

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

## Classification of sample: WS02[1]

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

## Sample details

| | | | |
|---|---|---|---|
| Sample Name: | | LoW Code: | |
| **WS02[1]** | | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | | |
| **1.50 - 1.80 m** | | Entry: | 17 05 04 (Soil and stones other than those mentioned in 17 05 03) |

## Hazard properties

None identified

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | | | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | |
| 1 | • | TPH (C6 to C40) petroleum group | | | | <5 mg/kg | | <5 mg/kg | <0.0005 % | | **<LOD** |
| | | | | TPH | | | | | | | |
| | | | | | | | | Total: | 0.0005 % | | |

Key

| | |
|---|---|
| | User supplied data |
| | Determinand values ignored for classification, see column 'Conc. Not Used' for reason |
| • | Determinand defined or amended by HazWasteOnline (see Appendix A) |
| **<LOD** | Below limit of detection |

## Classification of sample: WS03

**Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

## Sample details

| | | | |
|---|---|---|---|
| Sample Name: | | LoW Code: | |
| **WS03** | | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | | |
| **0.00 - 1.20 m** | | Entry: | 17 05 03 * (Soil and stones containing hazardous substances) |

## Hazard properties

**HP 14: Ecotoxic** "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

**Aquatic Acute 1; H400** "Very toxic to aquatic life."

Because of determinands:

chromium(III) oxide: (compound conc.: 0.119%)
zinc oxide: (compound conc.: 0.279%)

**Aquatic Chronic 1; H410** "Very toxic to aquatic life with long lasting effects."

Because of determinands:

chromium(III) oxide: (compound conc.: 0.119%)
zinc oxide: (compound conc.: 0.279%)

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 66 | mg/kg | 1.32 | 87.141 | mg/kg | 0.00871 % | ✓ | |
| 2 | | cadmium { cadmium sulfide } | 048-010-00-4 | 215-147-8 | 1306-23-6 | 1 | 20 | mg/kg | 1.285 | 25.705 | mg/kg | 0.002 % | ✓ | |
| 3 | | chromium { chromium(III) oxide } | | 215-160-9 | 1308-38-9 | | 811 | mg/kg | 1.462 | 1185.322 | mg/kg | 0.119 % | ✓ | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 301 | mg/kg | 1.126 | 338.892 | mg/kg | 0.0339 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 721 | mg/kg | 1.56 | 1124.627 | mg/kg | 0.0721 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | 0.5 | mg/kg | 1.353 | 0.677 | mg/kg | 0.0000677 % | ✓ | |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 71.1 | mg/kg | 1.579 | 112.302 | mg/kg | 0.0112 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | 3.2 | mg/kg | 2.554 | 8.172 | mg/kg | 0.000817 % | ✓ | |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 2240 | mg/kg | 1.245 | 2788.159 | mg/kg | 0.279 % | ✓ | |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | | 1.1 | mg/kg | 13.43 | 14.773 | mg/kg | 0.00148 % | ✓ | |
| | | | | 10294-33-4, 10294-34-5, 7637-07-2 | | | | | | | | | |
| 11 | | pH | | | | 7.2 | pH | | 7.2 | pH | 7.2 pH | | |
| | | | | PH | | | | | | | | | |
| 12 | | phenol | | | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| | | 604-001-00-2 | 203-632-7 | 108-95-2 | | | | | | | | | |
| 13 | | naphthalene | | | | 1.2 | mg/kg | | 1.2 | mg/kg | 0.00012 % | ✓ | |
| | | 601-052-00-2 | 202-049-5 | 91-20-3 | | | | | | | | | |
| 14 | | acenaphthylene | | | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| | | | 205-917-1 | 208-96-8 | | | | | | | | | |
| 15 | | acenaphthene | | | | 0.6 | mg/kg | | 0.6 | mg/kg | 0.00006 % | ✓ | |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 16 | | fluorene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 17 | | phenanthrene | | | | 3.1 | mg/kg | | 3.1 | mg/kg | 0.00031 % | ✓ | |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 18 | | anthracene | | | | 0.6 | mg/kg | | 0.6 | mg/kg | 0.00006 % | ✓ | |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 19 | | fluoranthene | | | | 5.3 | mg/kg | | 5.3 | mg/kg | 0.00053 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 20 | | pyrene | | | | 5.2 | mg/kg | | 5.2 | mg/kg | 0.00052 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 21 | | benzo[a]anthracene | | | | 2.9 | mg/kg | | 2.9 | mg/kg | 0.00029 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 22 | | chrysene | | | | 3.8 | mg/kg | | 3.8 | mg/kg | 0.00038 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 23 | | benzo[b]fluoranthene | | | | 2.9 | mg/kg | | 2.9 | mg/kg | 0.00029 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 24 | | benzo[k]fluoranthene | | | | 2.6 | mg/kg | | 2.6 | mg/kg | 0.00026 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | 2.9 | mg/kg | | 2.9 | mg/kg | 0.00029 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | | indeno[123-cd]pyrene | | | | 2.2 | mg/kg | | 2.2 | mg/kg | 0.00022 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | 0.5 | mg/kg | | 0.5 | mg/kg | 0.00005 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | | benzo[ghi]perylene | | | | 2.4 | mg/kg | | 2.4 | mg/kg | 0.00024 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.531 % | | |

Key

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

## Classification of sample: WS04

**Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

## Sample details

| | | |
|---|---|---|
| Sample Name: | LoW Code: | |
| **WS04** | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | |
| **0.50 - 0.80 m** | Entry: | 17 05 03 * (Soil and stones containing hazardous substances) |

## Hazard properties

**HP 7: Carcinogenic** "waste which induces cancer or increases its incidence"

Hazard Statements hit:

**Carc. 1B; H350** "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinands:

lead chromate: (Note 1 conc.: 0.403%)
TPH (C6 to C40) petroleum group: (conc.: 0.299%)

**HP 10: Toxic for reproduction** "waste which has adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring"

Hazard Statements hit:

**Repr. 1A; H360Df** "May damage the unborn child. Suspected of damaging fertility."

Because of determinand:

lead chromate: (Note 1 conc.: 0.403%)

**HP 11: Mutagenic** "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

**Muta. 1B; H340** "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.299%)

**HP 14: Ecotoxic** "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

**Aquatic Acute 1; H400** "Very toxic to aquatic life."

Because of determinands:

lead chromate: (Note 1 conc.: 0.403%)
zinc oxide: (compound conc.: 0.306%)

**Aquatic Chronic 1; H410** "Very toxic to aquatic life with long lasting effects."

Because of determinands:

lead chromate: (Note 1 conc.: 0.403%)
zinc oxide: (compound conc.: 0.306%)

## Hazard properties (substances considered hazardous until shown otherwise)

**HP 3(i): Flammable** "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

**Flam. Liq. 3; H226** "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.299%)

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 23.8 | mg/kg | 1.32 | 31.424 | mg/kg | 0.00314 % | ✓ | |
| 2 | | cadmium { cadmium sulfide } | 048-010-00-4 | 215-147-8 | 1306-23-6 | 1 | 21.8 | mg/kg | 1.285 | 28.018 | mg/kg | 0.00218 % | ✓ | |
| 3 | | chromium { chromium(III) oxide } | | 215-160-9 | 1308-38-9 | | 84.7 | mg/kg | 1.462 | 123.794 | mg/kg | 0.0124 % | ✓ | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 355 | mg/kg | 1.126 | 399.69 | mg/kg | 0.04 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 4030 | mg/kg | 1.56 | 6286.055 | mg/kg | 0.403 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | **<LOD** |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 76.9 | mg/kg | 1.579 | 121.464 | mg/kg | 0.0121 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | 1.9 | mg/kg | 2.554 | 4.852 | mg/kg | 0.000485 % | ✓ | |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 2460 | mg/kg | 1.245 | 3061.996 | mg/kg | 0.306 % | ✓ | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | 1.1 | mg/kg | 13.43 | 14.773 | mg/kg | 0.00148 % | ✓ | |
| 11 | | pH | | | PH | | 7.2 | pH | | 7.2 | pH | 7.2 pH | | |
| 12 | | phenol | 604-001-00-2 | 203-632-7 | 108-95-2 | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| 13 | | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | 0.5 | mg/kg | | 0.5 | mg/kg | 0.00005 % | ✓ | |
| 14 | | acenaphthylene | | 205-917-1 | 208-96-8 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 15 | | acenaphthene | | 201-469-6 | 83-32-9 | | 0.5 | mg/kg | | 0.5 | mg/kg | 0.00005 % | ✓ | |
| 16 | | fluorene | | 201-695-5 | 86-73-7 | | 0.4 | mg/kg | | 0.4 | mg/kg | 0.00004 % | ✓ | |
| 17 | | phenanthrene | | 201-581-5 | 85-01-8 | | 2.9 | mg/kg | | 2.9 | mg/kg | 0.00029 % | ✓ | |
| 18 | | anthracene | | 204-371-1 | 120-12-7 | | 0.7 | mg/kg | | 0.7 | mg/kg | 0.00007 % | ✓ | |
| 19 | | fluoranthene | | 205-912-4 | 206-44-0 | | 4 | mg/kg | | 4 | mg/kg | 0.0004 % | ✓ | |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 20 | • | pyrene | | | | 5.2 | mg/kg | | 5.2 | mg/kg | 0.00052 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 21 | | benzo[a]anthracene | | | | 2.8 | mg/kg | | 2.8 | mg/kg | 0.00028 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 22 | | chrysene | | | | 4.2 | mg/kg | | 4.2 | mg/kg | 0.00042 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 23 | | benzo[b]fluoranthene | | | | 5.1 | mg/kg | | 5.1 | mg/kg | 0.00051 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 24 | | benzo[k]fluoranthene | | | | 4.1 | mg/kg | | 4.1 | mg/kg | 0.00041 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | 6.1 | mg/kg | | 6.1 | mg/kg | 0.00061 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | • | indeno[123-cd]pyrene | | | | 5.1 | mg/kg | | 5.1 | mg/kg | 0.00051 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | 2.4 | mg/kg | | 2.4 | mg/kg | 0.00024 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | • | benzo[ghi]perylene | | | | 5 | mg/kg | | 5 | mg/kg | 0.0005 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| 29 | • | TPH (C6 to C40) petroleum group | | | | 2990 | mg/kg | | 2990 | mg/kg | 0.299 % | ✓ | |
| | | | | TPH | | | | | | | | | |
| | | | | | | | | | | Total: | 1.085 % | | |

Key

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

## Classification of sample: WS04[1]

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

## Sample details

| | | | |
|---|---|---|---|
| Sample Name: | | LoW Code: | |
| **WS04[1]** | | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | | |
| **1.50 - 1.70 m** | | Entry: | 17 05 04 (Soil and stones other than those mentioned in 17 05 03) |

## Hazard properties

None identified

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 9.6 | mg/kg | 1.32 | 12.675 | mg/kg | 0.00127 % | ✓ | |
| 2 | | cadmium { cadmium sulfide } | 048-010-00-4 | 215-147-8 | 1306-23-6 | 1 | 0.5 | mg/kg | 1.285 | 0.643 | mg/kg | 0.00005 % | ✓ | |
| 3 | | chromium { chromium(III) oxide } | | 215-160-9 | 1308-38-9 | | 48.5 | mg/kg | 1.462 | 70.885 | mg/kg | 0.00709 % | ✓ | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 35.2 | mg/kg | 1.126 | 39.631 | mg/kg | 0.00396 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 26.7 | mg/kg | 1.56 | 41.647 | mg/kg | 0.00267 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | **<LOD** |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 46.9 | mg/kg | 1.579 | 74.079 | mg/kg | 0.00741 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | <1 | mg/kg | 2.554 | <2.554 | mg/kg | <0.000255 % | | **<LOD** |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 107 | mg/kg | 1.245 | 133.184 | mg/kg | 0.0133 % | ✓ | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | 0.6 | mg/kg | 13.43 | 8.058 | mg/kg | 0.000806 % | ✓ | |
| 11 | | pH | | | PH | | 7.6 | pH | | 7.6 | pH | 7.6 pH | | |
| 12 | | phenol | 604-001-00-2 | 203-632-7 | 108-95-2 | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| 13 | | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 14 | | acenaphthylene | | 205-917-1 | 208-96-8 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 15 | • | acenaphthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 16 | • | fluorene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 17 | • | phenanthrene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 18 | • | anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 19 | • | fluoranthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 20 | • | pyrene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 21 | | benzo[a]anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 22 | | chrysene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 23 | | benzo[b]fluoranthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 24 | | benzo[k]fluoranthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | • | indeno[123-cd]pyrene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | • | benzo[ghi]perylene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.0372 % | | |

Key

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

## Classification of sample: WS06

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

## Sample details

| | | | |
|---|---|---|---|
| Sample Name: | | LoW Code: | |
| **WS06** | | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | | |
| **0.30 - 0.70 m** | | Entry: | 17 05 04 (Soil and stones other than those mentioned in 17 05 03) |

## Hazard properties

None identified

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 7 | mg/kg | 1.32 | 9.242 | mg/kg | 0.000924 % | ✓ | |
| 2 | | cadmium { cadmium sulfide } | 048-010-00-4 | 215-147-8 | 1306-23-6 | 1 | 1.1 | mg/kg | 1.285 | 1.414 | mg/kg | 0.00011 % | ✓ | |
| 3 | | chromium { chromium(III) oxide } | | 215-160-9 | 1308-38-9 | | 22.1 | mg/kg | 1.462 | 32.3 | mg/kg | 0.00323 % | ✓ | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 67.3 | mg/kg | 1.126 | 75.772 | mg/kg | 0.00758 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 352 | mg/kg | 1.56 | 549.055 | mg/kg | 0.0352 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | **<LOD** |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 17.8 | mg/kg | 1.579 | 28.115 | mg/kg | 0.00281 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | <1 | mg/kg | 2.554 | <2.554 | mg/kg | <0.000255 % | | **<LOD** |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 283 | mg/kg | 1.245 | 352.254 | mg/kg | 0.0352 % | ✓ | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | 0.5 | mg/kg | 13.43 | 6.715 | mg/kg | 0.000672 % | ✓ | |
| 11 | | pH | | | PH | | 9 | pH | | 9 | pH | 9pH | | |
| 12 | | phenol | 604-001-00-2 | 203-632-7 | 108-95-2 | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| 13 | | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| 14 | | acenaphthylene | | 205-917-1 | 208-96-8 | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 15 | • | acenaphthene | | | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 16 | • | fluorene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 17 | • | phenanthrene | | | | 1.2 | mg/kg | | 1.2 | mg/kg | 0.00012 % | ✓ | |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 18 | • | anthracene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 19 | • | fluoranthene | | | | 3.1 | mg/kg | | 3.1 | mg/kg | 0.00031 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 20 | • | pyrene | | | | 5 | mg/kg | | 5 | mg/kg | 0.0005 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 21 | | benzo[a]anthracene | | | | 1.4 | mg/kg | | 1.4 | mg/kg | 0.00014 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 22 | | chrysene | | | | 3.9 | mg/kg | | 3.9 | mg/kg | 0.00039 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 23 | | benzo[b]fluoranthene | | | | 1.7 | mg/kg | | 1.7 | mg/kg | 0.00017 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 24 | | benzo[k]fluoranthene | | | | 3.1 | mg/kg | | 3.1 | mg/kg | 0.00031 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | 2.5 | mg/kg | | 2.5 | mg/kg | 0.00025 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | • | indeno[123-cd]pyrene | | | | 3.2 | mg/kg | | 3.2 | mg/kg | 0.00032 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | 1.7 | mg/kg | | 1.7 | mg/kg | 0.00017 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | • | benzo[ghi]perylene | | | | 2.7 | mg/kg | | 2.7 | mg/kg | 0.00027 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.0892 % | | |

Key

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

## Classification of sample: WS07

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

## Sample details

| | | | |
|---|---|---|---|
| Sample Name: | | LoW Code: | |
| **WS07** | | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | | |
| **0.50 - 0.70 m** | | Entry: | 17 05 04 (Soil and stones other than those mentioned in 17 05 03) |

## Hazard properties

None identified

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 8.7 | mg/kg | 1.32 | 11.487 | mg/kg | 0.00115 % | ✓ | |
| 2 | | cadmium { cadmium sulfide } | 048-010-00-4 | 215-147-8 | 1306-23-6 | 1 | <0.5 | mg/kg | 1.285 | <0.643 | mg/kg | <0.00005 % | | **<LOD** |
| 3 | | chromium { chromium(III) oxide } | | 215-160-9 | 1308-38-9 | | 21.4 | mg/kg | 1.462 | 31.277 | mg/kg | 0.00313 % | ✓ | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 26.2 | mg/kg | 1.126 | 29.498 | mg/kg | 0.00295 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 142 | mg/kg | 1.56 | 221.494 | mg/kg | 0.0142 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | **<LOD** |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 12.8 | mg/kg | 1.579 | 20.218 | mg/kg | 0.00202 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | <1 | mg/kg | 2.554 | <2.554 | mg/kg | <0.000255 % | | **<LOD** |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 68.3 | mg/kg | 1.245 | 85.014 | mg/kg | 0.0085 % | ✓ | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | 1.2 | mg/kg | 13.43 | 16.116 | mg/kg | 0.00161 % | ✓ | |
| 11 | | pH | | | PH | | 8.3 | pH | | 8.3 | pH | 8.3 pH | | |
| 12 | | phenol | 604-001-00-2 | 203-632-7 | 108-95-2 | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| 13 | | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 14 | | acenaphthylene | | 205-917-1 | 208-96-8 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 15 | • | acenaphthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 16 | • | fluorene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 17 | • | phenanthrene | | | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 18 | • | anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 19 | • | fluoranthene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 20 | • | pyrene | | | | 0.4 | mg/kg | | 0.4 | mg/kg | 0.00004 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 21 | | benzo[a]anthracene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 22 | | chrysene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 23 | | benzo[b]fluoranthene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 24 | | benzo[k]fluoranthene | | | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | • | indeno[123-cd]pyrene | | | | 0.5 | mg/kg | | 0.5 | mg/kg | 0.00005 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | • | benzo[ghi]perylene | | | | 0.4 | mg/kg | | 0.4 | mg/kg | 0.00004 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.0344 % | | |

Key

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

## Classification of sample: WS07[1]

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

## Sample details

| | | | |
|---|---|---|---|
| Sample Name: | | LoW Code: | |
| **WS07[1]** | | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | | |
| **0.70 - 1.00 m** | | Entry: | 17 05 04 (Soil and stones other than those mentioned in 17 05 03) |

## Hazard properties

None identified

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 1 | | arsenic { arsenic trioxide } | | | | 9.9 | mg/kg | 1.32 | 13.071 | mg/kg | 0.00131 % | ✓ | |
| | | 033-003-00-0 | 215-481-4 | 1327-53-3 | | | | | | | | | |
| 2 | | cadmium { cadmium sulfide } | | | 1 | <0.5 | mg/kg | 1.285 | <0.643 | mg/kg | <0.00005 % | | <LOD |
| | | 048-010-00-4 | 215-147-8 | 1306-23-6 | | | | | | | | | |
| 3 | | chromium { chromium(III) oxide } | | | | 42.3 | mg/kg | 1.462 | 61.824 | mg/kg | 0.00618 % | ✓ | |
| | | | 215-160-9 | 1308-38-9 | | | | | | | | | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | | | | 36.4 | mg/kg | 1.126 | 40.982 | mg/kg | 0.0041 % | ✓ | |
| | | 029-002-00-X | 215-270-7 | 1317-39-1 | | | | | | | | | |
| 5 | | lead { lead chromate } | | | 1 | 23.5 | mg/kg | 1.56 | 36.656 | mg/kg | 0.00235 % | ✓ | |
| | | 082-004-00-2 | 231-846-0 | 7758-97-6 | | | | | | | | | |
| 6 | | mercury { mercury dichloride } | | | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | <LOD |
| | | 080-010-00-X | 231-299-8 | 7487-94-7 | | | | | | | | | |
| 7 | | nickel { nickel dihydroxide } | | | | 36.8 | mg/kg | 1.579 | 58.126 | mg/kg | 0.00581 % | ✓ | |
| | | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | | | | | | | | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | | | | <1 | mg/kg | 2.554 | <2.554 | mg/kg | <0.000255 % | | <LOD |
| | | 034-002-00-8 | | | | | | | | | | | |
| 9 | | zinc { zinc oxide } | | | | 78.1 | mg/kg | 1.245 | 97.212 | mg/kg | 0.00972 % | ✓ | |
| | | 030-013-00-7 | 215-222-5 | 1314-13-2 | | | | | | | | | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | | 1 | mg/kg | 13.43 | 13.43 | mg/kg | 0.00134 % | ✓ | |
| | | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | | | | | | | | |
| 11 | | pH | | | | 7.6 | pH | | 7.6 | pH | 7.6 pH | | |
| | | | | PH | | | | | | | | | |
| 12 | | phenol | | | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | <LOD |
| | | 604-001-00-2 | 203-632-7 | 108-95-2 | | | | | | | | | |
| 13 | | naphthalene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <LOD |
| | | 601-052-00-2 | 202-049-5 | 91-20-3 | | | | | | | | | |
| 14 | | acenaphthylene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <LOD |
| | | | 205-917-1 | 208-96-8 | | | | | | | | | |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 15 | • | acenaphthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 16 | • | fluorene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 17 | • | phenanthrene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 18 | • | anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 19 | • | fluoranthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 20 | • | pyrene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 21 | | benzo[a]anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 22 | | chrysene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 23 | | benzo[b]fluoranthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 24 | | benzo[k]fluoranthene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | • | indeno[123-cd]pyrene | | | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | 0.6 | mg/kg | | 0.6 | mg/kg | 0.00006 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | • | benzo[ghi]perylene | | | | 0.3 | mg/kg | | 0.3 | mg/kg | 0.00003 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.0315 % | | |

Key

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

## Classification of sample: SS01

**Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

## Sample details

| | | |
|---|---|---|
| Sample Name: | LoW Code: | |
| **SS01** | Chapter: | 17: Construction and Demolition Wastes (including excavated soil from contaminated sites) |
| Sample Depth: | | |
| **0.00 - 0.30 m** | Entry: | 17 05 03 * (Soil and stones containing hazardous substances) |

## Hazard properties

**HP 7: Carcinogenic** "waste which induces cancer or increases its incidence"

Hazard Statements hit:

**Carc. 1B; H350** "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 2.44%)

**HP 11: Mutagenic** "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

**Muta. 1B; H340** "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 2.44%)

**HP 14: Ecotoxic** "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

**Aquatic Acute 1; H400** "Very toxic to aquatic life."

Because of determinand:

zinc oxide: (compound conc.: 0.122%)

**Aquatic Chronic 1; H410** "Very toxic to aquatic life with long lasting effects."

Because of determinand:

zinc oxide: (compound conc.: 0.122%)

**Aquatic Chronic 2; H411** "Toxic to aquatic life with long lasting effects."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 2.44%)

## Hazard properties (substances considered hazardous until shown otherwise)

**HP 3(i): Flammable** "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

**Flam. Liq. 3; H226** "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 2.44%)

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 49.2 | mg/kg | 1.32 | 64.96 | mg/kg | 0.0065 % | ✓ | |
| 2 | | cadmium { cadmium sulfide } | 048-010-00-4 | 215-147-8 | 1306-23-6 | 1 | 1.9 | mg/kg | 1.285 | 2.442 | mg/kg | 0.00019 % | ✓ | |
| 3 | | chromium { chromium(III) oxide } | | 215-160-9 | 1308-38-9 | | 69.4 | mg/kg | 1.462 | 101.432 | mg/kg | 0.0101 % | ✓ | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 499 | mg/kg | 1.126 | 561.818 | mg/kg | 0.0562 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 348 | mg/kg | 1.56 | 542.816 | mg/kg | 0.0348 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | **<LOD** |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 100 | mg/kg | 1.579 | 157.95 | mg/kg | 0.0158 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | <1 | mg/kg | 2.554 | <2.554 | mg/kg | <0.000255 % | | **<LOD** |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 983 | mg/kg | 1.245 | 1223.554 | mg/kg | 0.122 % | ✓ | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | 0.7 | mg/kg | 13.43 | 9.401 | mg/kg | 0.00094 % | ✓ | |
| 11 | | pH | | | PH | | 7.5 | pH | | 7.5 | pH | 7.5 pH | | |
| 12 | | phenol | 604-001-00-2 | 203-632-7 | 108-95-2 | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| 13 | | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 14 | | acenaphthylene | | 205-917-1 | 208-96-8 | | 0.1 | mg/kg | | 0.1 | mg/kg | 0.00001 % | ✓ | |
| 15 | | acenaphthene | | 201-469-6 | 83-32-9 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 16 | | fluorene | | 201-695-5 | 86-73-7 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 17 | | phenanthrene | | 201-581-5 | 85-01-8 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 18 | | anthracene | | 204-371-1 | 120-12-7 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 19 | | fluoranthene | | 205-912-4 | 206-44-0 | | 1.2 | mg/kg | | 1.2 | mg/kg | 0.00012 % | ✓ | |
| 20 | | pyrene | | 204-927-3 | 129-00-0 | | 1.9 | mg/kg | | 1.9 | mg/kg | 0.00019 % | ✓ | |
| 21 | | benzo[a]anthracene | 601-033-00-9 | 200-280-6 | 56-55-3 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 22 | | chrysene | 601-048-00-0 | 205-923-4 | 218-01-9 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 23 | | benzo[b]fluoranthene | 601-034-00-4 | 205-911-9 | 205-99-2 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| 24 | | benzo[k]fluoranthene | 601-036-00-5 | 205-916-6 | 207-08-9 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | • | indeno[123-cd]pyrene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | • | benzo[ghi]perylene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| 29 | • | TPH (C6 to C40) petroleum group | | | | 24400 | mg/kg | | 24400 | mg/kg | 2.44 % | ✓ | |
| | | | | TPH | | | | | | | | | |
| | | | | | | | | | | Total: | 2.688 % | | |

Key

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

## Classification of sample: WS05

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

## Sample details

Sample Name:
**WS05**
Sample Depth:
**0.30 - 0.60 m**

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

## Hazard properties

None identified

## Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

| # | | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 22.6 | mg/kg | 1.32 | 29.839 | mg/kg | 0.00298 % | ✓ | |
| 2 | | cadmium { cadmium sulfide } | 048-010-00-4 | 215-147-8 | 1306-23-6 | 1 | 1 | mg/kg | 1.285 | 1.285 | mg/kg | 0.0001 % | ✓ | |
| 3 | | chromium { chromium(III) oxide } | | 215-160-9 | 1308-38-9 | | 34 | mg/kg | 1.462 | 49.693 | mg/kg | 0.00497 % | ✓ | |
| 4 | | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 160 | mg/kg | 1.126 | 180.142 | mg/kg | 0.018 % | ✓ | |
| 5 | | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 392 | mg/kg | 1.56 | 611.448 | mg/kg | 0.0392 % | ✓ | |
| 6 | | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | <0.5 | mg/kg | 1.353 | <0.677 | mg/kg | <0.0000677 % | | **<LOD** |
| 7 | | nickel { nickel dihydroxide } | 028-008-00-X | 235-008-5 [1]<br>234-348-1 [2] | 12054-48-7 [1]<br>11113-74-9 [2] | | 27.3 | mg/kg | 1.579 | 43.12 | mg/kg | 0.00431 % | ✓ | |
| 8 | | selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } | 034-002-00-8 | | | | 1.1 | mg/kg | 2.554 | 2.809 | mg/kg | 0.000281 % | ✓ | |
| 9 | | zinc { zinc oxide } | 030-013-00-7 | 215-222-5 | 1314-13-2 | | 314 | mg/kg | 1.245 | 390.84 | mg/kg | 0.0391 % | ✓ | |
| 10 | | boron { boron tribromide/trichloride/trifluoride (combined) } | | | 10294-33-4,<br>10294-34-5,<br>7637-07-2 | | 1.1 | mg/kg | 13.43 | 14.773 | mg/kg | 0.00148 % | ✓ | |
| 11 | | pH | | | PH | | 9.2 | pH | | 9.2 | pH | 9.2 pH | | |
| 12 | | phenol | 604-001-00-2 | 203-632-7 | 108-95-2 | | <1 | mg/kg | | <1 | mg/kg | <0.0001 % | | **<LOD** |
| 13 | | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | 0.5 | mg/kg | | 0.5 | mg/kg | 0.00005 % | ✓ | |
| 14 | | acenaphthylene | | 205-917-1 | 208-96-8 | | 0.2 | mg/kg | | 0.2 | mg/kg | 0.00002 % | ✓ | |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 15 | ● | acenaphthene | | | | 0.7 | mg/kg | | 0.7 | mg/kg | 0.00007 % | ✓ | |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 16 | ● | fluorene | | | | 0.5 | mg/kg | | 0.5 | mg/kg | 0.00005 % | ✓ | |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 17 | ● | phenanthrene | | | | 6.6 | mg/kg | | 6.6 | mg/kg | 0.00066 % | ✓ | |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 18 | ● | anthracene | | | | 1.9 | mg/kg | | 1.9 | mg/kg | 0.00019 % | ✓ | |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 19 | ● | fluoranthene | | | | 10.5 | mg/kg | | 10.5 | mg/kg | 0.00105 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 20 | ● | pyrene | | | | 9.3 | mg/kg | | 9.3 | mg/kg | 0.00093 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 21 | | benzo[a]anthracene | | | | 5 | mg/kg | | 5 | mg/kg | 0.0005 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 22 | | chrysene | | | | 6.1 | mg/kg | | 6.1 | mg/kg | 0.00061 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 23 | | benzo[b]fluoranthene | | | | 4.6 | mg/kg | | 4.6 | mg/kg | 0.00046 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 24 | | benzo[k]fluoranthene | | | | 5.1 | mg/kg | | 5.1 | mg/kg | 0.00051 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 25 | | benzo[a]pyrene; benzo[def]chrysene | | | | 5 | mg/kg | | 5 | mg/kg | 0.0005 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 26 | ● | indeno[123-cd]pyrene | | | | 3.5 | mg/kg | | 3.5 | mg/kg | 0.00035 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 27 | | dibenz[a,h]anthracene | | | | 1 | mg/kg | | 1 | mg/kg | 0.0001 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 28 | ● | benzo[ghi]perylene | | | | 3.7 | mg/kg | | 3.7 | mg/kg | 0.00037 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.117 % | | |

Key

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

## Appendix A: Classifier defined and non CLP determinands

- **chromium(III) oxide** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **dicopper oxide; copper (I) oxide** (EC Number: 215-270-7, CAS Number: 1317-39-1)

CLP index number: 029-002-00-X
Data source: Regulation (EU) 2016/1179 of 19 July 2016 (ATP9)
Additional Hazard Statement(s): None.
Reason for additional Hazards Statement(s)/Risk Phrase(s):
10/10/2016 - N R50/53 risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases
10/10/2016 - N R50/53 >= 0.25 % risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases

- **boron tribromide/trichloride/trifluoride (combined)** (CAS Number: 10294-33-4, 10294-34-5, 7637-07-2)

Conversion factor: 13.43
Description/Comments: Combines the hazard statements and the average of the conversion factors for boron tribromide, boron trichloride and boron trifluoride
Data source: N/A
Data source date: 06/08/2015
Hazard Statements: EUH014 , Acute Tox. 2 H330 , Acute Tox. 2 H300 , Skin Corr. 1A H314 , Skin Corr. 1B H314

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25/05/2015
Hazard Statements: None.

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21/08/2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21/08/2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Hazard Statements: Carc. 2 H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23/07/2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25/05/2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

## Appendix B: Rationale for selection of metal species

**arsenic {arsenic trioxide}**

Worst case species based on risk phrases

**cadmium {cadmium sulfide}**

Worst case species based on risk phrases

**chromium {chromium(III) oxide}**

Concentrations of CH not high enough for the creation of CH(VI)

**copper {dicopper oxide; copper (I) oxide}**

Most likely common species

**lead {lead chromate}**

Worst case species based on risk phrases

**mercury {mercury dichloride}**

Worst case species based on risk phrases

**nickel {nickel dihydroxide}**

Worst case species based on risk phrases

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

Worst case species based on risk phrases

**zinc {zinc oxide}**

Concentration of chromium not high enough for creation of zinc chromate.

**boron {boron tribromide/trichloride/trifluoride (combined)}**

Worst case species based on risk phrases

## Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition, May 2015, HP14 using CLP
HazWasteOnline Classification Engine Version: 2017.180.3351.6750 (29 Jun 2017)
HazWasteOnline Database: 2017.180.3351.6750 (29 Jun 2017)

This classification utilises the following guidance and legislation:
**WM3 - Waste Classification** - May 2015
**CLP Regulation** - Regulation 1272/2008/EC of 16 December 2008
**1st ATP** - Regulation 790/2009/EC of 10 August 2009
**2nd ATP** - Regulation 286/2011/EC of 10 March 2011
**3rd ATP** - Regulation 618/2012/EU of 10 July 2012
**4th ATP** - Regulation 487/2013/EU of 8 May 2013
**Correction to 1st ATP** - Regulation 758/2013/EU of 7 August 2013
**5th ATP** - Regulation 944/2013/EU of 2 October 2013
**6th ATP** - Regulation 605/2014/EU of 5 June 2014
**WFD Annex III replacement** - Regulation 1357/2014/EU of 18 December 2014
**Revised List of Wastes 2014** - Decision 2014/955/EU of 18 December 2014
**7th ATP** - Regulation 2015/1221/EU of 24 July 2015
**8th ATP** - Regulation (EU) 2016/918 of 19 May 2016
**9th ATP** - Regulation (EU) 2016/1179 of 19 July 2016
**10th ATP** - Regulation (EU) 2017/776 of 4 May 2017
**POPs Regulation 2004** - Regulation 850/2004/EC of 29 April 2004
**1st ATP to POPs Regulation** - Regulation 756/2010/EU of 24 August 2010
**2nd ATP to POPs Regulation** - Regulation 757/2010/EU of 24 August 2010

# Appendix H – Statistical Assessment

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | **Outlier Tests for Selected Uncensored Variables** |
| 2 | | | | **User Selected Options** | | | |
| 3 | | | Date/Time of Computation | ProUCL 5.129/06/2017 18:09:10 | | | |
| 4 | | | | From File | ASH1867 | | |
| 5 | | | | Full Precision | OFF | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | **Dixon's Outlier Test for Lead** | | | |
| 9 | | | | | | | |
| 10 | Number of Observations = 7 | | | | | | |
| 11 | 10% critical value: 0.434 | | | | | | |
| 12 | 5% critical value: 0.507 | | | | | | |
| 13 | 1% critical value: 0.637 | | | | | | |
| 14 | | | | | | | |
| 15 | **1. Observation Value 4030 is a Potential Outlier (Upper Tail)?** | | | | | | |
| 16 | | | | | | | |
| 17 | Test Statistic: 0.851 | | | | | | |
| 18 | | | | | | | |
| 19 | For 10% significance level, 4030 is an outlier. | | | | | | |
| 20 | For 5% significance level, 4030 is an outlier. | | | | | | |
| 21 | For 1% significance level, 4030 is an outlier. | | | | | | |
| 22 | | | | | | | |
| 23 | **2. Observation Value 142 is a Potential Outlier (Lower Tail)?** | | | | | | |
| 24 | | | | | | | |
| 25 | Test Statistic: 0.052 | | | | | | |
| 26 | | | | | | | |
| 27 | For 10% significance level, 142 is not an outlier. | | | | | | |
| 28 | For 5% significance level, 142 is not an outlier. | | | | | | |
| 29 | For 1% significance level, 142 is not an outlier. | | | | | | |
| 30 | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **Normal UCL Statistics for Uncensored Full Data Sets** | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | User Selected Options | | | | | | | | | | | |
| 4 | Date/Time of Computation | | | ProUCL 5.129/06/2017 18:27:09 | | | | | | | | |
| 5 | From File | | | ASH1867 | | | | | | | | |
| 6 | Full Precision | | | OFF | | | | | | | | |
| 7 | Confidence Coefficient | | | 95% | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | **Lead** | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
| 12 | **General Statistics** | | | | | | | | | | | |
| 13 | Total Number of Observations | | | | | 6 | Number of Distinct Observations | | | | | 6 |
| 14 | | | | | | | Number of Missing Observations | | | | | 1 |
| 15 | Minimum | | | | | 142 | Mean | | | | | 383.3 |
| 16 | Maximum | | | | | 721 | Median | | | | | 350 |
| 17 | SD | | | | | 187.6 | SD of logged Data | | | | | 0.519 |
| 18 | Coefficient of Variation | | | | | 0.489 | Skewness | | | | | 1.104 |
| 19 | | | | | | | | | | | | |
| 20 | **Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use** | | | | | | | | | | | |
| 21 | **guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.** | | | | | | | | | | | |
| 22 | **For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).** | | | | | | | | | | | |
| 23 | **Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1** | | | | | | | | | | | |
| 24 | | | | | | | | | | | | |
| 25 | **Normal GOF Test** | | | | | | | | | | | |
| 26 | Shapiro Wilk Test Statistic | | | | | 0.846 | **Shapiro Wilk GOF Test** | | | | | |
| 27 | 5% Shapiro Wilk Critical Value | | | | | 0.788 | Data appear Normal at 5% Significance Level | | | | | |
| 28 | Lilliefors Test Statistic | | | | | 0.315 | **Lilliefors GOF Test** | | | | | |
| 29 | 5% Lilliefors Critical Value | | | | | 0.325 | Data appear Normal at 5% Significance Level | | | | | |
| 30 | **Data appear Normal at 5% Significance Level** | | | | | | | | | | | |
| 31 | | | | | | | | | | | | |
| 32 | **Assuming Normal Distribution** | | | | | | | | | | | |
| 33 | **95% Normal UCL** | | | | | | **95% UCLs (Adjusted for Skewness)** | | | | | |
| 34 | 95% Student's-t UCL | | | | | 537.7 | 95% Adjusted-CLT UCL (Chen-1995) | | | | | 546.2 |
| 35 | | | | | | | 95% Modified-t UCL (Johnson-1978) | | | | | 543.4 |
| 36 | | | | | | | | | | | | |
| 37 | **Suggested UCL to Use** | | | | | | | | | | | |
| 38 | 95% Student's-t UCL | | | | | 537.7 | | | | | | |
| 39 | | | | | | | | | | | | |
| 40 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 41 | Recommendations are based upon data size, data distribution, and skewness. | | | | | | | | | | | |
| 42 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | | | | |
| 43 | However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | | | | | | | | | |
| 44 | | | | | | | | | | | | |