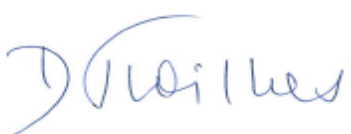


GROUND INVESTIGATION REPORT
for the site at
36 STATION ROAD, HAYLING ISLAND,
HAMPSHIRE PO11 0EQ
on behalf of
LEE JOHNSON



Report:	GROUND INVESTIGATION REPORT
Site:	36 STATION ROAD, HAYLING ISLAND, HAMPSHIRE PO11 0EQ
Client:	LEE JOHNSON
Date:	11/10/17
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FIGURES

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APPENDICES

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EXECUTIVE SUMMARY		
Site Details	Site Address	36 Station Road, Hayling Island, Hampshire SO11 0EQ
	National Grid Reference	471252, 099641
	Site Area	c. 0.16 Ha
	Form of Development	The site is proposed to be developed with shops and apartments within a three storey building together with gardens, access roads and associated infrastructure.
Encountered Conditions	Scope of works	A desk study report including a preliminary risk assessment (reference 15-8909, dated January 2016) was previously prepared by others. The investigation recommended the undertaking of an intrusive investigation and laboratory testing to inform a geotechnical and geo-environmental assessment in the context of the proposed mixed use residential and commercial development.
	Ground Conditions	The ground conditions encountered were broadly consistent with those anticipated from a review of the British Geological Survey mapping and from the Desk Study Report, i.e. the River Terrace Deposits. The underlying London Clay Formation was not encountered during the investigation. Made Ground soils comprising brown silty or sandy clay or grey, orange or brown gravelly or clayey sand or dark brown clayey gravel with varying proportions of gravel of brick, concrete and flint were found to be present within all investigation locations overlying natural strata.
	Groundwater	Groundwater was encountered at depths between 0.80m bgl and 1.23m bgl within the window sampler boreholes during the intrusive investigation. Groundwater was also recorded at depths between 0.60m bgl and 1.53m bgl during the return gas and groundwater monitoring and at a depth of 0.55m bgl within WS1 during the return groundwater monitoring.
Geotechnical Considerations	Foundations	Based on the ground and groundwater conditions encountered in the boreholes, shallow conventional foundations are considered to be appropriate for the proposed development, albeit with likely requirement for groundwater control.
	Excavations	Excavations are likely to remain stable in the short to medium term, however may require support and battering back to a safe angle where left open for prolonged periods. It should be noted that relatively shallow groundwater was encountered during the course of the investigation and return monitoring. It is considered likely that excavations may require dewatering during the construction phase. Furthermore, Made Ground and/or granular soils may be prone to instability with cohesive soils prone to softening should shallow groundwater be encountered.
Environmental Considerations	Human Health	Statistical assessment of shallow soils across the site has identified concentrations of Lead above the respective screening criteria for a residential land use. In consideration of the current residential and commercial development proposals, it is considered that remedial measures are likely to be required within areas of soft landscaping for the protection of end users from soil contamination. It is considered that the use of clean imported Topsoil and subsoil will be required within proposed areas of soft landscaping, with these soils to be laid to a depth of at least 600mm, with a minimum Topsoil depth of 150mm, suitable to act as a growing medium.
	Groundwater	The site is underlain by a Secondary 'A' Aquifer over Unproductive Strata and is outside of any groundwater Source Protection Zone. No significant mobile contaminants were recorded during the investigation and as a result it is considered that the site presents a generally low risk to groundwater resources. A sample of groundwater obtained during the investigation did not record significantly elevated concentrations of contaminants representative of gross groundwater contamination and as a result no remedial action in respect of groundwater contamination is considered to be warranted.
	Ground Gases	A single round of confirmatory ground gas monitoring has been undertaken which indicates that gas protection measures may be required due to marginally elevated carbon dioxide. It is considered that additional gas monitoring should be undertaken in order to provide a robust assessment in accordance with good practice.



	Radon Gas	No radon protection measures are required.
	Built Environment	It is recommended that laboratory results be provided to the Local Water provider for confirmation of the nature of water supply pipes.
	Waste Disposal	Should Made Ground be identified for removal from site it is recommended that these materials be subject to further WAC testing to confirm the classification of these soils for disposal purposes.
Further Action: • If abnormal conditions are encountered, Geotechnical/Geo-Environmental advice should be sought to determine a suitable source of action in line with a Discovery Strategy to be in place throughout the course of the development. • Remedial measures are considered to be required for the protection of end users from Lead contamination in shallow soils. The measures should be set out within a Remediation Method Statement to be submitted to the local authority for their approval prior to the implementation of the remedial measures. • Additional gas monitoring is recommended to provide a robust ground gas assessment for the site in accordance with current guidance.		
<i>This Executive Summary is intended to provide a brief summary of the main findings and conclusions of the investigation. For detailed information, the reader is referred to the main report ref. GE16698/GIR/OCT17.</i>		



1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by Lee Johnson to undertake investigation works to assess the geotechnical and geo-environmental factors pertaining to proposed development at the site at 36 Station Road, Hayling Island, Hampshire PO11 0EQ (the site). The site's location is presented in Figure 1.

1.2 Form of Development

It is understood that the site is proposed to be developed for commercial and residential end uses, with shops and apartments in a building over three stories, together with parking areas and associated development infrastructure. It is understood that some ground floor flats will incorporate private garden areas.

1.3 Objectives

The data from the investigation was to form the basis of an interpretation with respect to an updated environmental assessment and a geotechnical assessment for foundation design purposes.

1.4 Standards and References

Where practicable, the ground investigation and subsequent geotechnical and environmental assessments were undertaken in accordance with the following documents and guidance.

- National Planning Policy Framework – March 2012
- Planning Policy Statement 23 – Planning and Pollution Control;
- Model Procedures for the Management of Contaminated Land, CLR11, DEFRA and Environment Agency 2004;
- Environment Agency Guidance on Requirements for Land Contamination Reports, Version 1 dated July 2005;
- BS10175:2011+A1:2013 - Investigation of Potentially Contaminated Sites - Code of Practice, BSI 2013;
- BS5930: 2015 - Code of Practice for Site Investigations, BSI 2015;
- EN ISO 14688 Geotechnical Investigation and Testing Part 1-2002 and Part 2-2004;
- BS1377: 1990 - Soils for Civil Engineering Purposes, BSI1990;
- NHBC Standards Chapter 4.1 Land Quality - Managing Ground Conditions, September 1999;
- NHBC Standards Chapter 4.2 Building Near Trees;
- CIRIA C665 – Assessing risks posed by hazardous ground gases to buildings (2007);
- NHBC 10627-R01(04)- Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (2007);
- BS8485:2015 Code of practice for the characterisation and remediation from ground gas in affected developments.

1.5 Conditions

This report does not purport to be a “Geotechnical Design Report” as defined in Clause 2.8 of Eurocode 7 (Geotechnical Design BS EN 1997-1:2004) and some of the data used to support this preliminary geotechnical assessment may not be fully compliant with that design code. It is considered possible that further detailed ground investigations could be required to facilitate the detailed geotechnical design process and should be carried out on a structure specific basis if necessary.



The data collected from the investigations have been used to provide an interpretation of the geotechnical and/or environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that either have not been revealed in the available records, or that occur between or under points of physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

It should be noted that in particular the concentrations and levels of mobile liquid and gaseous materials are likely to vary with time. The results obtained may therefore only be representative of the conditions at the time of sampling. This report should not be taken as any guarantee that a site is free of hazardous or potentially contaminative materials.

Information contained in this report is intended for the use of the Client and Geo-Environmental can take no responsibility for the use of this information by any party for uses other than that described in this report. Geo-Environmental makes no warranty or representation whatsoever express or implied with respect to the use of this information by any third party. Geo-Environmental does not indemnify the Client or any third parties against any dispute or claim arising from any finding or other result of this investigation report or any consequential losses.

Assessment criteria or other parameters developed for the evaluation of contamination on this site are based on a number of assumptions regarding exposure and toxicology. Exposure to contaminants and levels of adverse effects may therefore vary. Whilst reasonable care and expertise has been employed in the development of such criteria, no liability is accepted in this respect. Other criteria or guidance on the development of assessment criteria may be published in the future and no liability is accepted in this respect.



2.0 PRELIMINARY ASSESSMENT

2.1 Desk Study Report

A Preliminary Risk Assessment (PRA) was previously undertaken by others and reported in a Phase I Environmental Risk Assessment Report (report ref. 15.8909, dated January 2016) to which the reader is referred for further details of the Preliminary Risk Assessment findings. The report has been used to provide a basis for the scope and rationale of the subsequent Phase II ground investigation reported herein. The data from Phase I and Phase II were then to form the basis of a subsequent Tier 1 Generic Quantitative Risk Assessment (GQRA). The objective of the risk assessments was to evaluate the risks posed to the proposed redevelopment, adjacent land uses and the wider environment, in the context of likely planning requirements, immediate liabilities under the Environment Act 1990 and risks posed to Controlled Waters under the Water Resources Act.

2.2 Preliminary Risk Assessment Summary

The preliminary risk assessment contained within the Phase I Environmental Risk Assessment report identified several plausible potential pollutant linkages which could require action to mitigate the risk of harm to human health and to buildings.

The Desk Study Report considered that investigation and assessment were likely to be required to further characterise contamination on site as result of current and historical land uses of the site and surrounding land and thus clarify the associated risk to human health and the environment.

In summary, the following potential contamination sources were identified and potential risks attributed to the site in the context of the proposed residential and commercial development:

- Possible Made Ground associated with development of site, on site external waste storage and possible ACMs – **Low to Moderate Risk**
- Historical gas works 100m west of site – **Low to Moderate Risk**
- General industrial off-site land uses – **Low to Low to Moderate Risk**
- Activities associated with launderette 10m south of site – **Low Risk**

The potential pollutant linkages established within the preliminary risk assessment are not considered to prevent development on the subject site, but could require investigation and assessment to support further characterisation, calibration of the CSM and where/if necessary determine a remedial strategy to reduce, remove or otherwise control any risk within the site to key receptors.

On the basis of the findings of the preliminary risk assessment and given the potential for significant contamination to be present at the site, with potential Low to Moderate risks to end users in the context of a residential development (and by inference the proposed commercial development to be undertaken in part of the site), the Desk Study Report recommended that a programme of site investigation and ground gas monitoring works should be undertaken to establish the presence or absence of contamination and ground gases within the current site to enable a quantitative assessment of the associated environmental risks.

2.3 Scope of Works

In summary, the following scope of works for the intrusive investigation was agreed with the Client.

- Attendance of a Geo-Environmental Engineer to set out and supervise the intrusive investigation, undertake sampling, in-situ testing and logging of recovered soils from exploratory holes.



- The construction of 6No. dynamic sampler boreholes to depths of up to 5m bgl at locations around the site to target the proposed building, gardens and the boundary closest to the former off-site gas works.
- Installation of 3No. groundwater monitoring wells within the dynamic sampler boreholes to facilitate return monitoring.
- Undertake a falling head permeability test within the monitoring wells to inform the drainage strategy.
- Geotechnical laboratory testing on soil samples recovered from the exploratory holes to support the geotechnical assessment for foundations, ground floor construction and buried concrete design.
- Geochemical testing of soil samples recovered from exploratory holes to support the environmental assessment.
- Provision of a Ground Investigation Report.

2.4 Investigation Strategy

The positioning of the window sampler boreholes was determined in advance of the works and whilst on site to provide general coverage for the purposes of providing soil samples from the underlying soils for the purposes of the environmental and geotechnical assessments. Table 2.1 sets out the investigation strategy adopted.

Area of Concern	Investigation	Positions
General ground conditions	Exploratory holes located across the site, coupled with sampling and laboratory analysis.	All
Potential contamination of near surface soils	Exploratory holes located across the site, coupled with sampling and laboratory analysis.	All
Geotechnical ground conditions	Exploratory holes located across the site, coupled with sampling and laboratory analysis.	All
Ground gas	Installation of monitoring wells within selected boreholes.	WS1, WS2 & WS3

Table 2.1 Summary of the Investigation Strategy

Soil samples were collected and placed into amber jars and cool boxes on site for transit to the office, where they were stored under chilled conditions (<4°C) prior to final transportation in cool boxes to the laboratory by in-house courier. Both the geotechnical and contamination testing were undertaken by UKAS accredited laboratories. Contamination testing of soil samples was also undertaken in accordance with accredited MCERTs protocols. Samples were stored in temperature controlled conditions from sampling until receipt at the laboratory from which time sample preparation and storage was determined by testing requirements and in line with laboratory's protocols.



3.0 ENCOUNTERED CONDITIONS

A factual record of the conditions encountered during the physical investigation of the site is presented in the following sections.

For further details of the ground conditions, reference should be made to the exploratory hole logs presented in Appendix A, the geotechnical testing results in Appendix B, geochemical testing results in Appendix C and ground gas and groundwater monitoring results in Appendix E.

The physical ground investigation works were undertaken during August 2017.

Unless stated otherwise, all depths are reported as metres below ground level (m bgl).

3.1 Soils

The ground conditions encountered were broadly consistent with those anticipated from a review of the British Geological Survey mapping and from the Desk Study Report, i.e. the River Terrace Deposits. The underlying London Clay Formation was not encountered during the investigation. Made Ground soils were found to be present within all investigation locations overlying the River Terrace Deposits. The ground conditions are summarised in Table 3.1.

Top (m bgl)	Base (m bgl)	Description
0.00	0.40 – 0.80	MADE GROUND: Brown silty or sandy clay or grey, orange or brown gravelly or clayey sand or dark brown clayey gravel with varying proportions of gravel of brick, concrete and flint.
0.40 – 0.80	1.50 – 5.00	RIVER TERRACE DEPOSITS: Brown or orangish brown silty CLAY or SAND or clayey SAND or greyish brown sandy clayey GRAVEL. Gravel is fine to coarse grained subangular to subrounded flint

Table 3.1 Summary of Ground Conditions

For more detailed descriptions at specific locations, reference should be made to the exploratory hole logs presented in Appendix A.

3.2 Groundwater

Groundwater was encountered at depths between 0.80m bgl and 1.23m bgl within the window sampler boreholes during the intrusive investigation. Groundwater was also recorded at depths between 0.60m bgl and 1.53m bgl during the return gas and groundwater monitoring and at a depth of 0.55m bgl within WS1 during the return groundwater monitoring.

It should be noted that changes in groundwater levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a series of standpipes or piezometers installed within appropriate response zones.

3.3 Obstructions

No artificial obstructions were encountered within the exploratory holes. However, the presence of artificial obstructions elsewhere on the site cannot be completely discounted. It should also be noted that Boreholes WS1, WS2, WS4 and WS6 were terminated prematurely within dense sand and/or gravel.



3.4 Geotechnical Testing

Geotechnical laboratory tests were undertaken on selected samples of the River Terrace Deposits encountered on the site. The results are summarised in Table 3.2 below.

Three pH and water soluble sulphate determinations were undertaken on samples of the River Terrace Deposits. The results indicate pH values ranging between pH7.57 and pH7.80 with water soluble sulphate concentrations ranging between 0.33g/l and 0.74g/l.

Four Atterberg Limit tests were undertaken on the more cohesive horizons of the River Terrace Deposits with the results indicating plasticity indices of between 19% and 23%. Modified Plasticity Indices of between 16% and 23% were calculated. Corresponding moisture contents of between 22% and 28% were also reported.

Three Particle Size Distribution (PSD) analyses were undertaken on samples of the more granular horizons of the River Terrace Deposits. The analysis indicated these soils to comprise clayey sandy GRAVEL and slightly clayey and slightly gravelly clayey SAND.

A summary of the results of the geotechnical testing is presented below.

Parameter	River Terrace Deposits
Natural Moisture Content (%)	22 - 28
Liquid Limit (%)	35 - 41
Plastic Limit (%)	16 - 18
Plasticity Index Ip (%)	19 - 23
Modified Plasticity Index Ip' (%)	16 - 23
pH	7.57 - 7.80
Water soluble sulphate (g/l)	0.33 – 0.74

Table 3.2 Summary of Geotechnical Laboratory Test Results

3.5 Geochemical Analysis

In order to assess the general chemical quality of the strata encountered, samples of soils recovered from the exploratory holes were submitted for analysis for a range of potential contaminants selected on the basis of the findings of the desk study and supported by the joint National House Building Council (NHBC), Environment Agency (EA) and Chartered Institute of Environmental Health (CIEH) publication, '*Guidance for the Safe Development of Housing on Land Affected by Contamination*' (2008).

Soil samples were placed into plastic containers for general inorganic analysis and into amber jars for organic analysis. Samples were stored in temperature controlled conditions from sampling until receipt at the laboratory from which time sample preparation and storage was determined by testing requirements and in line with the laboratory's protocols.

Eight soil samples were submitted for analysis of a suite of commonly occurring brownfield contaminants, with these samples also analysed for speciated petroleum hydrocarbons and BTEX compounds and three samples submitted for VOC and SVOC analysis. All of the samples were also screened for the presence of asbestos. The results and implications thereof are discussed in Section 5 of this report.

One sample of groundwater was submitted for analysis of a suite of commonly occurring brownfield contaminants, with this sample also analysed for speciated petroleum hydrocarbons and BTEX compounds and VOC and SVOCs.



3.6 Ground Gases

Three ground gas monitoring wells were installed (within boreholes WS1, WS2 and WS3) to enable a single round of ground gas monitoring (spot monitoring) to be undertaken.

During the monitoring, methane was recorded at a level of 0.0%v/v with carbon dioxide recorded in the range 0.0 – 5.5% v/v. Oxygen was recorded in the range 15.3 - 20.7%. Gas flow was recorded at 0.0l/hr. Atmospheric pressure was measured at 1010mb, with data from the St Catherine's Point monitoring station on the Isle of Wight indicating relatively stable atmospheric pressure conditions around the time of the monitoring. Marginally elevated VOCs were recorded within Borehole WS2 at a concentration of 0.3ppm.

The ground gas monitoring was undertaken during August 2017. The results of the monitoring are included in Appendix E.



4.0 ENGINEERING CONSIDERATIONS

Subsequent to intrusive investigation of the site and receipt of the laboratory test results, the following geotechnical assessments have been made.

5.1 Foundations

Based on the ground and groundwater conditions encountered in the boreholes, shallow conventional foundations are considered to be appropriate for the proposed development. However, any design and proposed construction methodology should account for the potential presence and implications of shallow groundwater as encountered during the investigation and subsequent monitoring.

The results of the Atterberg Limit tests in conjunction with the field observations indicated that the soils of the River Terrace Deposits are of low to medium volume change potential with more cohesive soils generally at shallow depth grading into more granular soils with depth. In view of the results of the lab testing and the ground conditions encountered during the physical investigation it is considered that the natural soils should be classified '*en-masse*' as being of medium volume change potential, as defined by NHBC Standards, Chapter 4.2. Therefore a minimum founding depth of 0.9m bgl is recommended remote from trees. Any foundations within the zone of influence of trees (existing, removed and/or proposed) would require deepening in accordance with the NHBC Standards, Chapter 4.2.

Heave precautions would be required for any foundations in excess of 1.5m deep, as detailed in NHBC Standards Chapter 4.2.

Foundations should be taken below any Made Ground, root zones and disturbed ground and into or onto the sandy silty clay, gravelly clayey sand or clayey sandy gravel of the River Terrace Deposits.

Based on the ground conditions encountered, a net allowable bearing capacity of 100kPa is recommended for foundations terminating wholly within the River Terrace Deposits. Total settlement should remain within tolerable limits for the recommended allowable bearing capacity. Mesh reinforcement is recommended within the foundations due to the likelihood of foundations terminating on soils of varying composition.

It is recommended that foundation excavations be concreted or blinded as soon after excavation as possible. Where concreting could take place the following day it is recommended that excavations are not taken to full depth overnight and that the final 0.5m of cover is only removed immediately prior to concreting.

5.2 Floor Slabs

Given the presence of Made Ground locally in excess of 600mm deep and shrinkable soils at shallow depth on the site it is recommended that suspended floor slabs are utilised throughout the development.

5.3 Excavations

Excavations are likely to remain stable in the short to medium term, however may require support and battering back to a safe angle where left open for prolonged periods.

Ground works should be designed in such a manner to avoid any requirement for construction or maintenance personnel to enter into or work within excavations. If such work cannot be avoided, then it should only be permitted once a safe system of work, supported by a robust risk assessment, has been determined and implemented.



It should be noted that relatively shallow groundwater was encountered during the course of the investigation and return monitoring. It is considered likely that excavations may require dewatering and possible trench support during the construction phase. For foundations this may result in a requirement for sacrificial shuttering. Furthermore, Made Ground and/or granular soils may be prone to instability with cohesive soils prone to softening should shallow groundwater be encountered.

5.4 Pavements

Given the presence of mixed soils including shrinkable soils at shallow depth soils should be assumed to be frost susceptible thus requiring a minimum pavement construction thickness of 450mm.

Any hard or soft spots in the formation level may induce reflective cracking in the pavement and allowance should be made for removing hard or soft spots that may be present.

5.5 Sub-Surface Concrete

The results of the water soluble sulphate and pH analyses indicate that buried concrete (shallow foundations) within the River Terrace Deposits should be designed in accordance with Class DS-2 of BRE Special Digest 1, with an ACEC class of AC-2. As such it is recommended that the advice of this publication should be taken for the design and specification of all sub surface concrete.

5.6 Soakaways

Preliminary falling head soakage testing was undertaken within the window sampler boreholes during the intrusive investigation with standing water recorded at depths between 1.12m bgl and 1.35m bgl. In view of the relatively shallow groundwater level recorded it was not possible to calculate meaningful infiltration rates from the testing undertaken. It is considered therefore that soakaway drainage is unlikely to perform effectively on this site and that an alternative means of drainage should be sought, such as connection to the mains drainage system.



6.0 ENVIRONMENTAL CONSIDERATIONS

A Generic Quantitative Risk Assessment (GQRA) incorporating the results of the desk study and ground investigation was undertaken in accordance with CLR11, the findings of which are presented in the following sections.

Site workers involved in the preparation and construction of the development have not been considered further in this report as the principal contractor of any future development is duty bound under the current CDM Regulations to undertake their own risk assessments with respect to their employees.

6.1 Outline Risk Assessment

A number of plausible pollutant linkages were identified as part of the desk study undertaken by others, as summarised in Section 2.

6.2 Soil Contamination vs. Human Health

The presence of a possible contaminant does not necessarily imply that a site or area is contaminated or that there is any unacceptable risk to human health. A Preliminary Quantitative Risk Assessment has been undertaken in accordance with CLR11, in order to evaluate any unacceptable risks posed to human health with respect to the proposed residential end use of the site. It should be noted that this assessment is protective of the chronic long-term effects of contaminants, which is also likely to be protective of any possible immediate acute effects.

A quantitative risk assessment has been undertaken by comparing the results of the laboratory chemical testing of shallow soils against Site Specific Assessment Criteria (SSAC) generated using the Contaminated Land Exposure Assessment (CLEA) model v1.06 published by the Environment Agency, or against the Category 4 Screening Levels (C4SL) published by DEFRA. Although the C4SLs were released for Part 2a use, the associated policy companion document for the C4SLs indicated that they may also be used for planning. Although the C4SLs represent a marginally higher risk level than the GACs (low risk rather than minimal risk) it is considered that the risk levels remain very low. Therefore, the final C4SLs are considered to be suitable to assess soils under the planning regime.

The assumptions made as part of the CLEA calculations for a residential end use with plant uptake are presented in Table 6.1, as this is considered the worst case scenario in the context of the mixed residential and commercial use building and therefore provides a conservative assessment, protective of end users.

	Assumptions			Comments
Land Use	Residential with home grown produce			Commensurate with proposed development.
Receptor	Female (res)			A conservative assumption using the most sensitive possible receptor.
Receptor Age	1 to 6			Critical receptor age from birth to age 6.
Building	Small Terraced House			A conservative assumption of the proposed building incorporating ground floor apartments with private gardens.
Soil Type	Sandy silt loam	pH8.78	SOM 3.09%	Based on an average of the chemical laboratory results.
Exposure Pathways	Oral	Direct soil & dust ingestion, consumption of soil & home-grown produce		Default setting for land use.
	Dermal	Indoor & outdoor		Default setting for land use.
	Inhalation	Indoor & outdoor dust &		Default setting for land use.



		vapour		
Occupancy	days/year	hours/day (indoors)	hour/day (outdoors)	Default settings for the critical receptor.
	180 - 365	19 - 23	1	

Table 6.1 Assumptions for SSAC Calculation

Statistical analysis of the non-targeted samples within the datasets has been undertaken in accordance with guidance contained in the CIEH/CL:AIRE report '*Comparing Soil Contamination Data with a Critical Concentration*' (May 2008). If the contamination status of the soils is considered in a planning context, the null hypothesis tested by the analysis is whether the true mean concentration is equal to or greater than the critical concentration for a given determinant, with the critical concentration being the relevant SSAC or GAC (the soil screening value) for that determinant in the context of the intended end use of the site. If the analysis shows that the true mean concentration is less than the critical concentration the null hypothesis can be rejected. The guidance recommends that for the null hypothesis to be rejected the analysis should show that there is a 95% (or higher) likelihood that the true mean concentration is below the critical concentration. Where this is the case the site is considered to be acceptable for the planned end use without remediation.

The results of the statistical analysis for both a residential and commercial end use indicated that the null hypothesis could be rejected for all determinants tested with the exception of Lead.

The concentrations of Lead recorded in the samples of Made Ground soils taken from WS1 at 0.3m bgl (458mg/kg), WS2 at 0.7m bgl (544mg/kg), WS3 at 0.7m bgl (599mg/kg) and WS5 at 0.3m bgl (2860mg/kg) were above the C4SL for Lead (200g/kg) for a residential end use. The analysis indicated that the result from WS5 at 0.3m bgl should be considered to be a statistical outlier, however the three other results indicating elevated Lead were not statistical outliers and therefore it was not considered appropriate to remove the results from the dataset. As a result the shallow Made Ground soils beneath the site are considered to be impacted with Lead contamination.

It should be noted that the concentration of Lead recorded in the samples of natural soils taken from Borehole WS5 at 0.9m bgl was below the C4SL for Lead, indicating that the Lead contamination is likely to be confined to the near surface Made Ground soils.

The statistical analysis summary sheets are included in Appendix D.

The testing for the presence of petroleum hydrocarbons did not record significantly elevated concentrations of these determinants. It should be noted that a hydrocarbon malodour was recorded within the silty CLAY of the River Terrace Deposits in Borehole WS4 during the investigation. As a result soil samples from WS4 at depths of 0.6m bgl and 2.4m bgl were selected for analysis of speciated petroleum hydrocarbons, BTEX and VOC and SVOCs. The results of this analysis did not record significantly elevated concentrations of any of the determinants tested.

The asbestos screens undertaken found that asbestos was not present within any of the samples.

In view of the Lead contamination that has been recorded in the shallow Made Ground it is considered that remedial measures for the protection of end users are likely to be required within areas of private gardens and soft landscaping. Examples of suitable remedial measures include the removal of Made Ground soils in their entirety within areas of proposed soft landscaping with placement of verified clean imported soils, or removal of sufficient depth of Made Ground to enable placement of a cover system of verified clean imported soils.

Should the Made Ground soils at the above locations remain on site at the time of development, remedial measures such as removal of sufficient depth of Made Ground and the introduction of a clean soil cover system in private garden or soft landscaped areas would be required for the protection of end users. Any such soil cover system should incorporate a cover thickness of 600mm of clean subsoil and Topsoil incorporating a minimum of



150mm Topsoil as a suitable growing medium. Where Made Ground remains under imported clean cover, it is recommended that a Deter-to-dig geomembrane is laid over the Made Ground prior to placement of the cover soils.

The remedial measures should be set out within a Remediation Method Statement, which should be forwarded to the Local Authority for their approval prior to the implementation of the remedial measures.

6.3 Soil Contamination vs. Building Materials

The current guidance on selection of materials for water supply pipes to be laid in contaminated land is contained in UKWIR Report 10/WM/03/02 (re-issued 2010). However, the guidance is not mandatory and there has been concerns raised by various industry technical associations regarding the document and the methodologies proposed.

The presumption in the guidance is that barrier pipe will be adopted for any brownfield site. It is recommended that the results of this investigation be presented to the water utility company as soon as reasonably practicable in order to confirm the pipe material.

As a matter of good practice, and to maximise the protection to utilities, it is recommended that clean, granular backfill is used in service runs and that marker tapes are used for all buried services.

6.4 Soil Contamination vs. Adjacent land Users

Surrounding land uses were identified to comprise residential properties to the north, with amenity use to the west, open fields to the east and commercial use to the south. With reference to Section 6.2, no significantly elevated concentrations of potentially mobile harmful contaminants were identified by the laboratory analyses that are likely to affect neighbouring properties. It is therefore concluded that on the basis of this preliminary assessment the soils on this site pose no significant risk to surrounding residential land uses and no remedial measures are deemed necessary in respect of off-site migration of contaminants.

Nonetheless, it is recommended that dust suppression techniques, e.g. damping down exposed soils, are employed during the demolition and construction phases on site in order to minimise the potential for airborne migration of specific hazards and to manage potential nuisance issues for adjacent land users.

6.5 Soil Contamination vs. Groundwater

The Desk Study has indicated that the site is underlain by a Secondary 'A' Aquifer (inferred to be the River Terrace Deposits) over Unproductive Strata (inferred to be the London Clay Formation) and is outside of any groundwater Source Protection Zone. No significant mobile contaminants were recorded during the investigation and as a result it is considered that the site presents a generally low risk to groundwater resources, and no remedial action in this regard is considered to be warranted.

The Preliminary Risk Assessment identified a potential risk to groundwater beneath the site from possible on-site contamination and from historic off-site sources. Accordingly a sample of groundwater was obtained from the monitoring standpipe installed within Borehole WS1 with this sample tested for a range of commonly occurring brownfield contaminants, including heavy metals and speciated PAH, augmented with speciated petroleum hydrocarbons, VOCs and SVOCs. The testing recorded PAH levels in exceedance of the UK drinking water standard (UKDWS) (sum of 4 PAH), with heavy range petroleum hydrocarbons marginally in excess of WHO drinking water guidelines. It is considered however, that the levels of these determinants recorded within the groundwater beneath the site are not indicative of gross groundwater contamination, given that the UKDWS and WHO drinking water guidelines are highly protective of groundwater as they are guidelines for water quality at the consumer's



tap. Furthermore it is considered that the concentrations of all of the determinants tested are representative of levels likely to be found within shallow groundwater within an urban environment such as that within which the site is situated. As a result of the above and given the relatively low sensitivity hydrogeological site setting, together with the absence of significant mobile contaminants within soils underlying the site, it is considered that no remedial actions are warranted in respect of groundwater beneath the site.

6.6 Ground Gases

The Desk Study Report considered that ground gas monitoring should be undertaken in the event that soils with the potential to generate ground gases (i.e. Made Ground) were encountered on the site. Accordingly, a single round of confirmatory ground gas monitoring has been undertaken within standpipes installed within three window sampler boreholes (WS1-WS3) as part of the investigation.

During the monitoring, methane was not detected, i.e. 0.0%v/v, with carbon dioxide recorded in the range 0.0 – 5.5% v/v. Oxygen was recorded in the range 15.3 - 20.7%. Gas flow was recorded at 0.0l/hr (flow accuracy ± 0.1 l/hr). Atmospheric pressure was measured at 1010mb. Marginally elevated VOCs were recorded within Borehole WS2 at a level of 0.3ppm.

The gas monitoring data indicate that the site's gassing regime ranges from Characteristic Situation 1 (CS1) to Characteristic Situation 2 (CS2), the latter only due to carbon dioxide exceeding the limiting threshold for CS1 within borehole WS3. In line with best practice guidance, this should be assessed further and consider possible sources, flow regime and additional monitoring data to determine whether the current data are truly indicative or representative of CS2 conditions.

On the basis of the single round of confirmatory ground gas monitoring undertaken it is considered that protection measures may be required for end users due to marginally elevated concentrations of carbon dioxide recorded. However, it is considered that additional gas monitoring and assessment should be undertaken in order to allow a robust assessment of the site's ground gas climate to be made in accordance with current guidance.

The results of the ground gas monitoring undertaken are presented in Appendix E.

Furthermore, the site is situated within an area where radon protection measures are not considered necessary for new dwellings or extensions.

6.7 Waste Classification

6.7.1 Reuse of Material

In accordance with CL:AIRE Code of Practice (2011) materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded by the holder'.

The Code of Practice therefore allows soils to be reused on site where the following criteria are met:

- The soils are required to be used
- The soils are suitable both in terms of chemical and geotechnical properties for the intended use
- Only the required volume is used.

In order to comply with the Code of Practice, a material management plan that confirms the above criteria are met has to be prepared. The material management plan must be reviewed by a 'Qualified Person' who then issues a declaration to the Environment Agency. Geo-Environmental can provide this service should it be required.



Where materials do not meet the required criteria, it may be possible to treat them under an environmental permit so that they may be re-used on site.

6.8.2 Reuse of Waste

Where material is discarded as waste, it may still be possible to reuse the waste on site under a standard rules environmental permit or a U1 waste exemption. However, strict limits on the volumes that can be reused apply in these cases.

6.8.3 Disposal to Landfill

Under current legislation, where wastes are to be disposed of to landfill they may, depending on their classification, require pre-treatment. Pre-treatment shall comprise a chemical, physical (including sorting), thermal or biological process. The pre-treatment is required to change the characteristics of the waste, reduce its volume, reduce its hazardous nature, and facilitate its handling and enhance its recovery.

6.8.4 Waste Classification

One sample of shallow soils was submitted for Waste Acceptance Criteria (WAC) analysis with the testing indicating that this soil would be likely to be regarded as 'inert' for the purposes of waste disposal on the basis of the determinants tested, with the exception of antimony, which recorded a marginal exceedance of the inert waste criteria. It is recommended that any soils earmarked for disposal should be subject to further WAC testing to determine their likely waste classification with the results of this testing to be forwarded to the recipient landfill site to confirm their classification for waste disposal purposes.

6.9 Discovery Strategy

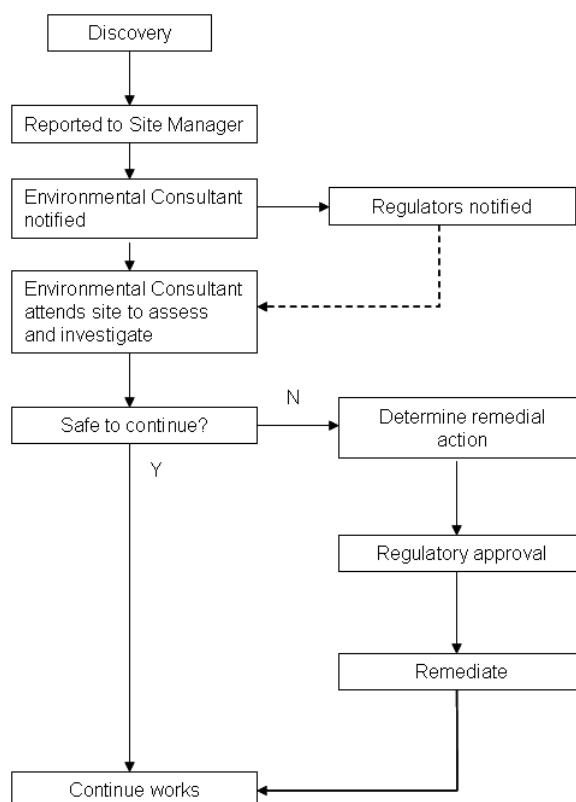
A preliminary investigation has been undertaken on the site and additional investigation including intrusive investigation, laboratory chemical testing and assessment has been undertaken to provide a robust contamination assessment for the site.

Whilst the investigation undertaken on the site to date is considered to be thorough, it remains possible that unexpected soil conditions may be encountered during the process of site clearance and construction.

Examples may include oily pockets within the soil, pockets of cement boarding or fibrous materials within the soil, black ashy materials, soils exhibiting strong odours, brightly coloured materials, and former structures or brickwork.

Should previously undiscovered contamination be encountered during construction by the ground worker's, this should be reported to the site manager immediately in order that any necessary inspection may be made. Records should be kept, and samples submitted for analysis where conditions encountered are not as anticipated. The results of any such testing should be sent to the authorities for consultation.

The process is shown below.

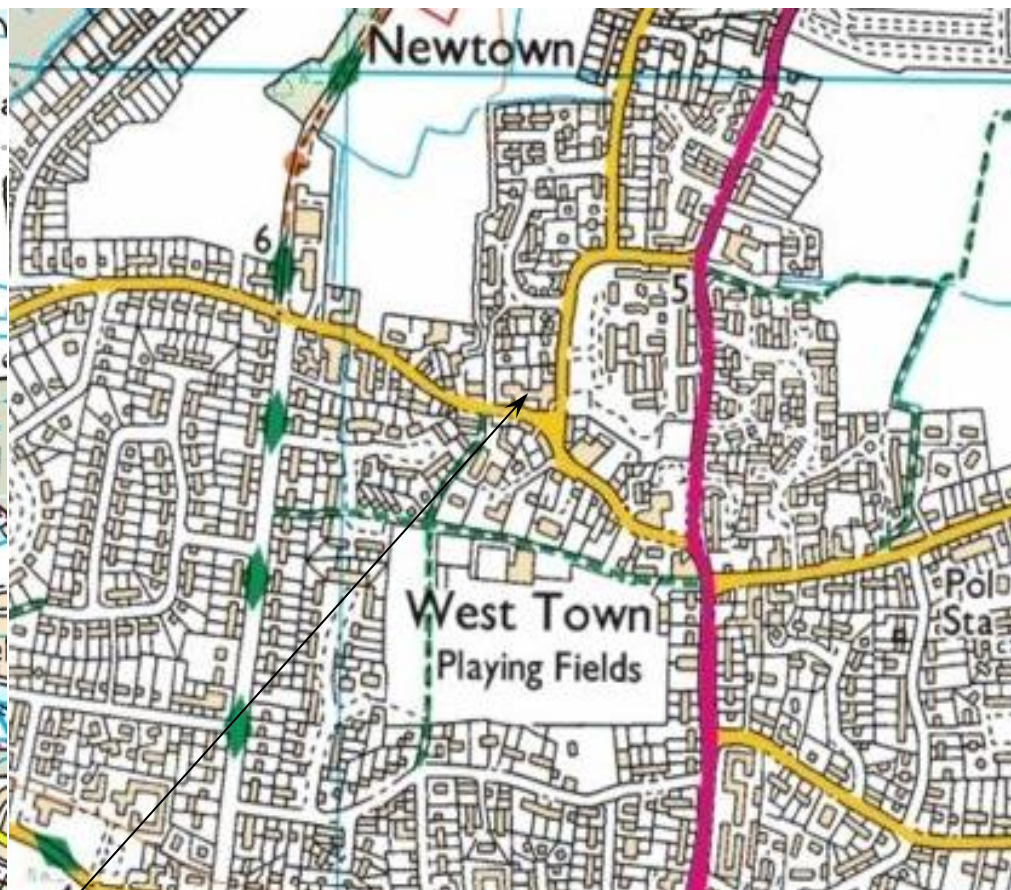
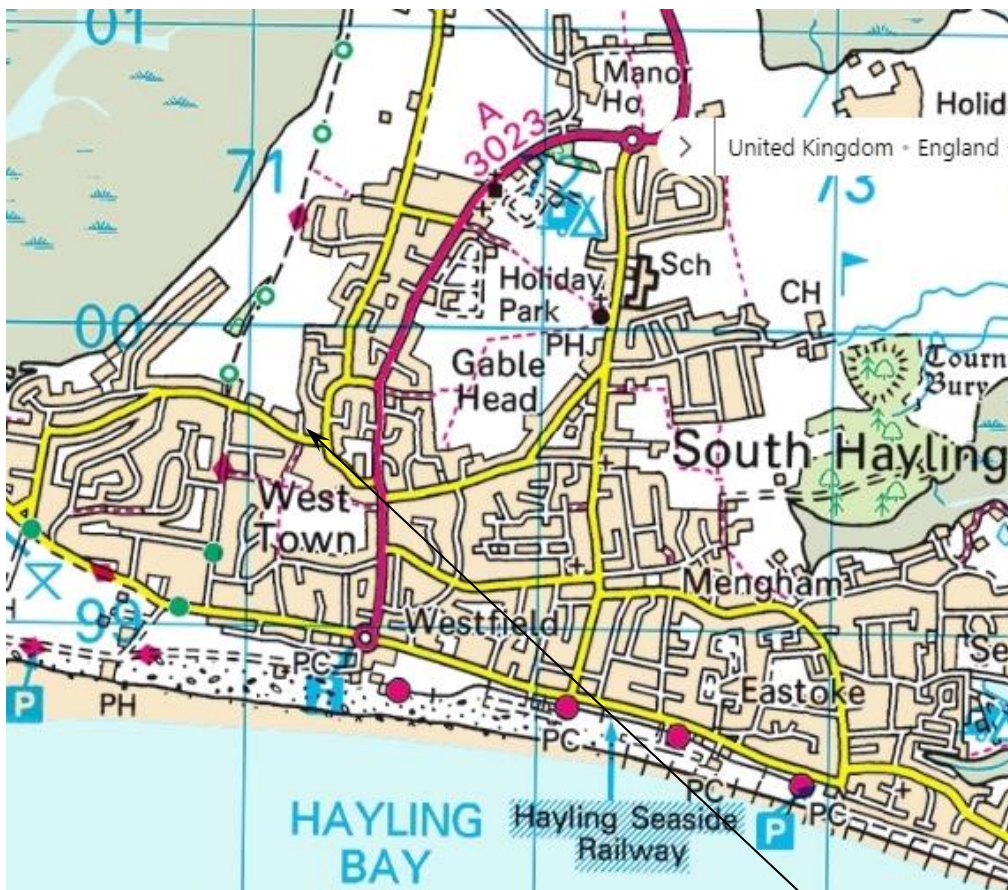


Discovery Strategy Process

A copy of the discovery strategy should be lodged on site and provisions made to ensure that all workers are made aware of their responsibility to observe, report and act on any potentially suspicious or contaminated materials they may encounter.



FIGURES

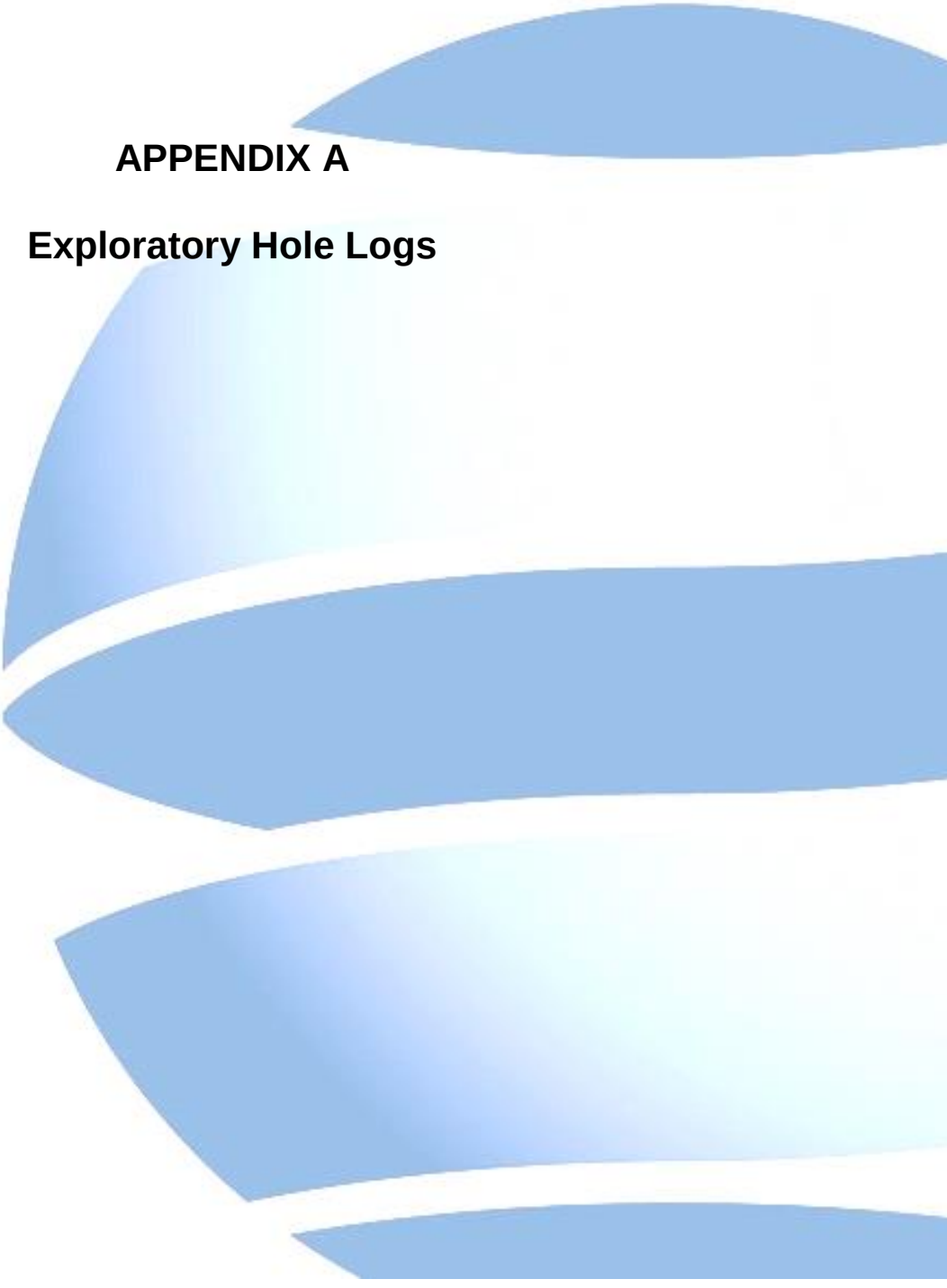


Site Location

Project:	Station Road, Hayling Island			Title	Site Location Plan		
Client:	Lee Johnson			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Hurstpierpoint BN6 9GL T: 01273 832 972 E: mail@gesl.net W: www.gesl.net		 Geo-Environmental	
Ref No:	GE16698	Revision:	0				
Drawn:	DW	Date:	01/10/2017				
Figure:	1	Scale:	Not To Scale				



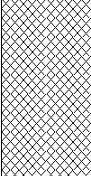
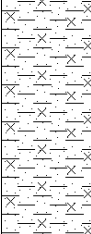
Project:	Station Road Hayling Island			Title	Exploratory Hole Location Plan	
Client:	Lee Johnson			 Geo-Environmental		
Ref No:	GE16698	Revision:	0			
Drawn:	DW	Date:	01/10/2017			
Figure:	2	Scale:	Not To Scale			
				Geo-Environmental Services Ltd		
				Unit 7 Danworth Farm, Hurstpierpoint BN6 9GL		
				T: 01273 832 972		
				E: mail@gesl.net W: www.gesl.net		



APPENDIX A

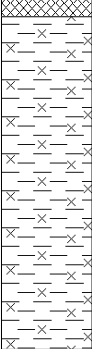
Exploratory Hole Logs

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS1 Sheet 1 of 1	
Project Name: 36 Station Road, Hayling Island		Project No. GE16698		Co-ords: 471244E - 99624N		Hole Type WLS	
Location: 36 Station Rd, Hayling Island PO11 0EQ				Level:		Scale 1:25	
Client: Lee Johnson				Dates:		Logged By LS	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.60			Brown silty clay with abundant fine brick and frequent flint gravel MADE GROUND	1
		0.50	D					Brown and orange soft slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded flint gravel RIVER TERRACE DEPOSITS	
		0.60 - 0.90	ES						
		1.00	D		1.40 1.50		Greyish brown sandy clayey GRAVEL. Gravel is fine to coarse subangular to subrounded flint RIVER TERRACE DEPOSITS End of Borehole at 1.50m	2	
		1.30	ES						
1.50	D						3		
									4
									5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
		0.80	0.00				

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS2 Sheet 1 of 1	
Project Name: 36 Station Road, Hayling Island		Project No. GE16698		Co-ords: 471265E - 99625N		Hole Type WLS	
Location: 36 Station Rd, Hayling Island PO11 0EQ				Level:		Scale 1:25	
Client: Lee Johnson				Dates:		Logged By LS	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10			0.10			Tarmac over grey gravelly sand with frequent fine to medium brick fragments	1	
		0.30	ES					MADE GROUND		
		0.50	D			0.40				Orange to brown sand with occasional fine to medium brick fragments and flint gravel
		0.70	ES					MADE GROUND		
		1.00	D			0.80				Dark brown slightly sandy clay with frequent fine brick fragments
		1.40	ES					MADE GROUND		
		1.50	D							
		2.00	D			1.90				Brown mottled orangish brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to medium subangular to sub rounded flint
		2.50	D					RIVER TERRACE DEPOSITS		
		2.70	D			2.70				Very dense medium light greyish brown and orange clayey SAND with rare fine subangular flint gravel
							End of Borehole at 2.70m	2		
								3		
								4		
								5		

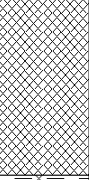
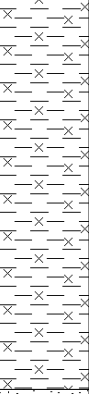
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
		1.19	0.00				

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net				Borehole Log				Borehole No. WS3 Sheet 1 of 1	
Project Name: 36 Station Road, Hayling Island				Project No. GE16698		Co-ords: 471269E - 99639N		Hole Type WLS	
Location: 36 Station Rd, Hayling Island PO11 0EQ						Level:		Scale 1:25	
Client: Lee Johnson						Dates:		Logged By LS	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			Tarmac over grey gravelly sand with frequent fine to medium brick fragments	1
		0.30	ES					MADE GROUND	
		0.50	D		0.40			Orange to brown sand with occasional fine to medium brick fragments and flint gravel	
		0.70	ES					MADE GROUND	
					0.80			Dark brown slightly sandy clay with frequent fine brick fragments	
		1.00	D					MADE GROUND	
					1.70			Brown, greyish brown and orangish brown slightly sandy silty CLAY with occasional fine to medium subangular to rounded flint gravel	2
		1.50	D					RIVER TERRACE DEPOSITS	
		1.70	ES					Orangish brown and grey slightly gravelly clayey medium SAND. Gravel is fine to medium sub angular flint	
		2.00	D					RIVER TERRACE DEPOSITS	
2.50	D								
3.00	D								
3.50	D								
								4	
4.00	D								
4.50	D								
								5	
5.00	D			5.00			End of Borehole at 5.00m		

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
		1.21	0.00			

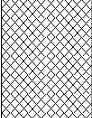
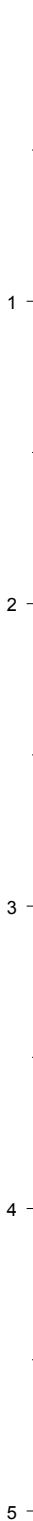
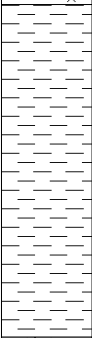


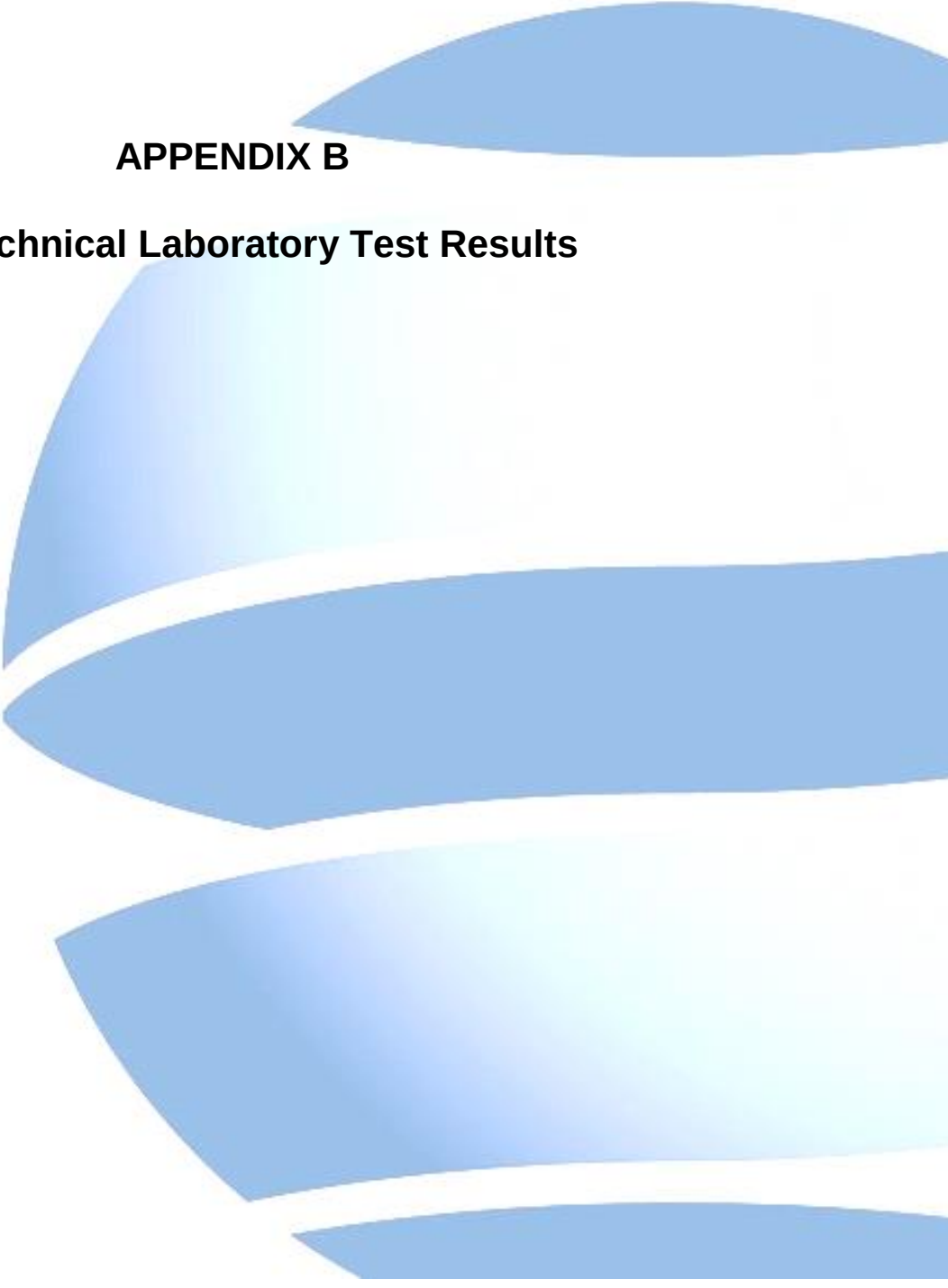
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS4 Sheet 1 of 1	
Project Name: 36 Station Road, Hayling Island		Project No. GE16698		Co-ords: 471265E - 99652N		Hole Type WLS	
Location: 36 Station Rd, Hayling Island PO11 0EQ				Level:		Scale 1:25	
Client: Lee Johnson				Dates:		Logged By LS	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.60			Concrete over dark brown clayey SAND MADE GROUND	1
		0.50	D					Brown, grey and orangish brown mottled slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse sub angular flint. Hydrocarbon malodour recorded. RIVER TERRACE DEPOSITS	
		0.60	ES						
		1.00	D		1.90			Grey to orange medium SAND with occasional fine subangular flint gravel RIVER TERRACE DEPOSITS	2
		1.50	D						
		1.80	ES						
		2.00	D		2.90				3
		2.50	D						
2.90	D								
End of Borehole at 2.90m									4
									5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
		1.20	0.00				

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net				Borehole Log				Borehole No. WS5 Sheet 1 of 1	
Project Name: 36 Station Road, Hayling Island				Project No. GE16698		Co-ords: 471253E - 99652N		Hole Type WLS	
Location: 36 Station Rd, Hayling Island PO11 0EQ						Level:		Scale 1:25	
Client: Lee Johnson						Dates:		Logged By LS	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			Concrete MADE GROUND	1
		0.30	ES					Dark brown sandy CLAY with frequent fine brick and concrete flints MADE GROUND	
		0.50	D		0.55				
		0.60	ES						
		0.90	ES						
		1.00	D						
		1.50	D						
		2.00	D		2.10				
		2.50	D						
		3.00	D						
		3.50	D						
		4.00	D						
		4.50	D						
5.00	D		5.00					5	
End of Borehole at 5.00m									
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks			
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to				
		1.23	0.00						
									

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net				Borehole Log				Borehole No. WS6 Sheet 1 of 1			
Project Name: 36 Station Road, Hayling Island				Project No. GE16698		Co-ords: 471244E - 99660N		Hole Type WLS			
Location: 36 Station Rd, Hayling Island PO11 0EQ						Level:		Scale 1:25			
Client: Lee Johnson						Dates:		Logged By LS			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.30	ES		0.40			Dark brown clayey gravel comprising concrete flints MADE GROUND			
		0.50	D					Brown silty CLAY with frequent fine to medium subangular flint gravel RIVER TERRACE DEPOSITS			
		0.60	ES								
		0.90	ES		0.70			Orange to brown slightly silty CLAY RIVER TERRACE DEPOSITS			
		1.00	D								
		1.50	D								
		2.00	D		1.80			Grey to orange medium SAND with occasional fine subangular flint gravel RIVER TERRACE DEPOSITS End of Borehole at 1.80m			
					2.00						
		Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks			
		Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to				
		1.20	0.00								
											



APPENDIX B

Geotechnical Laboratory Test Results



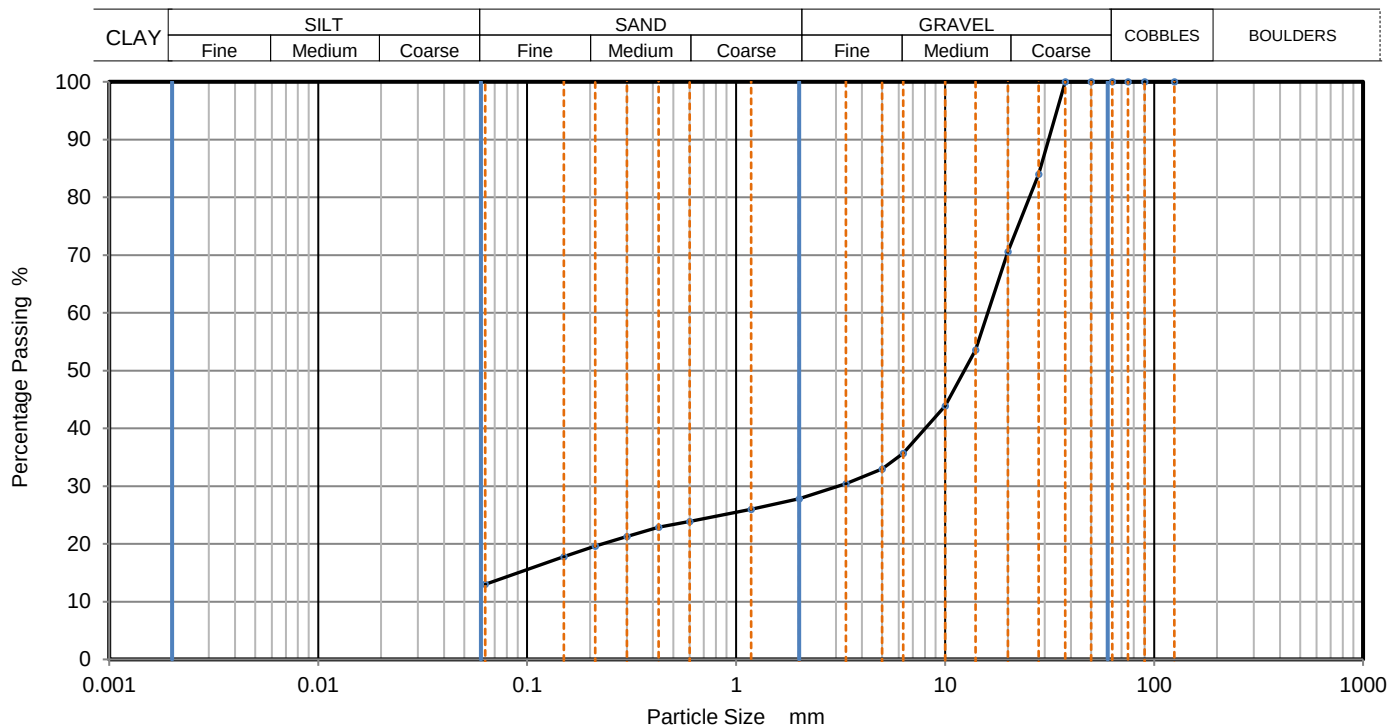
 UKAS TESTING	Test Methods: BS1377: Part 2: 1990: Natural Moisture Content : clause 3.2 Atterberg Limits: clause 4.3 and 5.0	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com	Checked and Approved Initials J.P Date: 15/09/201
	2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R1(b)



PARTICLE SIZE DISTRIBUTION

Job Ref	23332
Borehole/Pit No.	WS1
Sample No.	-
Depth Top	1.50 m
Depth Base	- m
Sample Type	D
Samples received	29/08/2017
Schedules received	08/09/2017
Project started	11/09/2017
Date tested	14/09/2017

Site Name	Station Road, Hayling Island		
Project No.	GE16698	Client	GESL
Soil Description	Grey slightly mottled clayey sandy GRAVEL (gravel is fmc and sub-angular)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	84		
20	71		
14	54		
10	44		
6.3	36		
5	33		
3.35	30		
2	28		
1.18	26		
0.6	24		
0.425	23		
0.3	21		
0.212	20		
0.15	18		
0.063	13		

Dry Mass of sample, g 865

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	72.2
Sand	14.8
Fines <0.063mm	13.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below



K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved

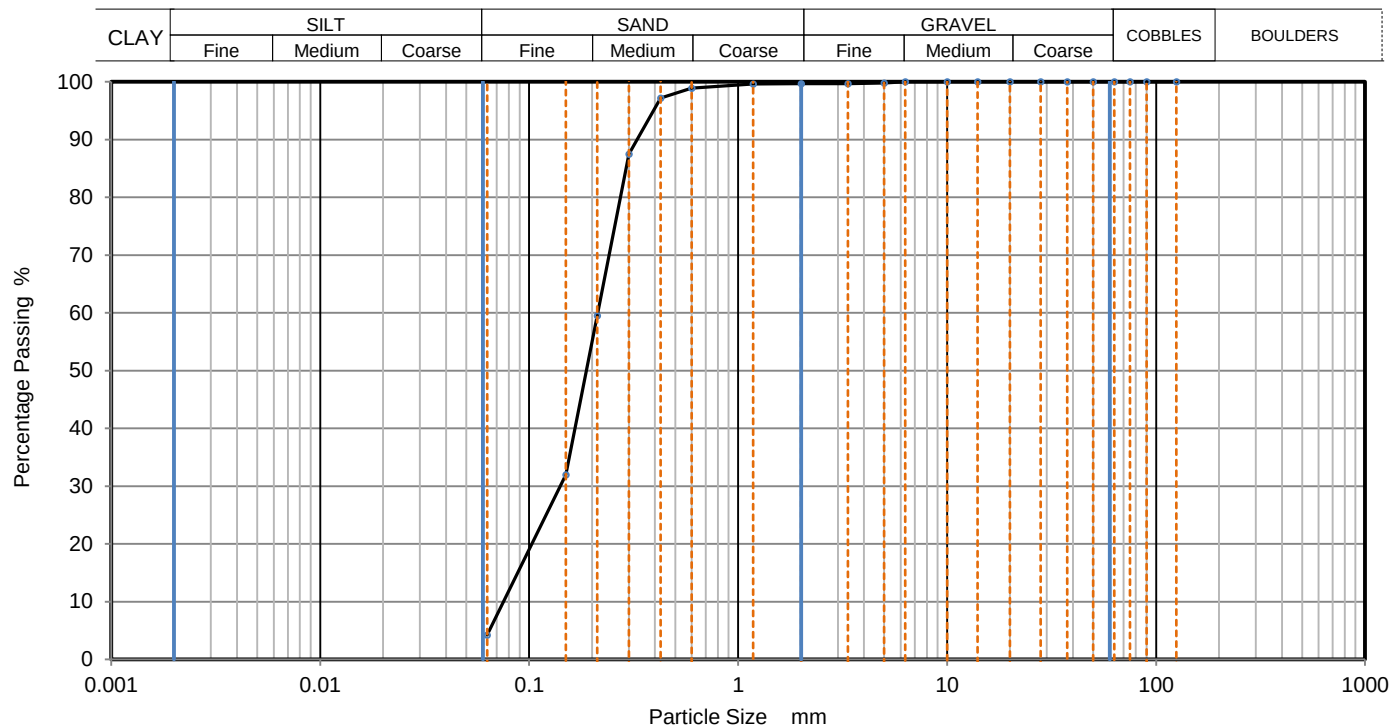
Initials: J.P
Date: 15/09/2017



PARTICLE SIZE DISTRIBUTION

Job Ref	23332
Borehole/Pit No.	WS2
Sample No.	-
Depth Top	2.00 m
Depth Base	- m
Sample Type	D
Samples received	29/08/2017
Schedules received	08/09/2017
Project started	11/09/2017
Date tested	14/09/2017

Site Name	Station Road, Hayling Island		
Project No.	GE16698	Client	GESL
Soil Description	Light greyish brown slightly clayey SAND with rare fine sub-angular gravel		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	97		
0.3	88		
0.212	60		
0.15	32		
0.063	4		

Dry Mass of sample, g 426

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.3
Sand	95.4
Fines <0.063mm	4.2

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	2.8
Curvature Coefficient	1.2

Remarks
Preparation and testing in accordance with BS1377 unless noted below



K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved

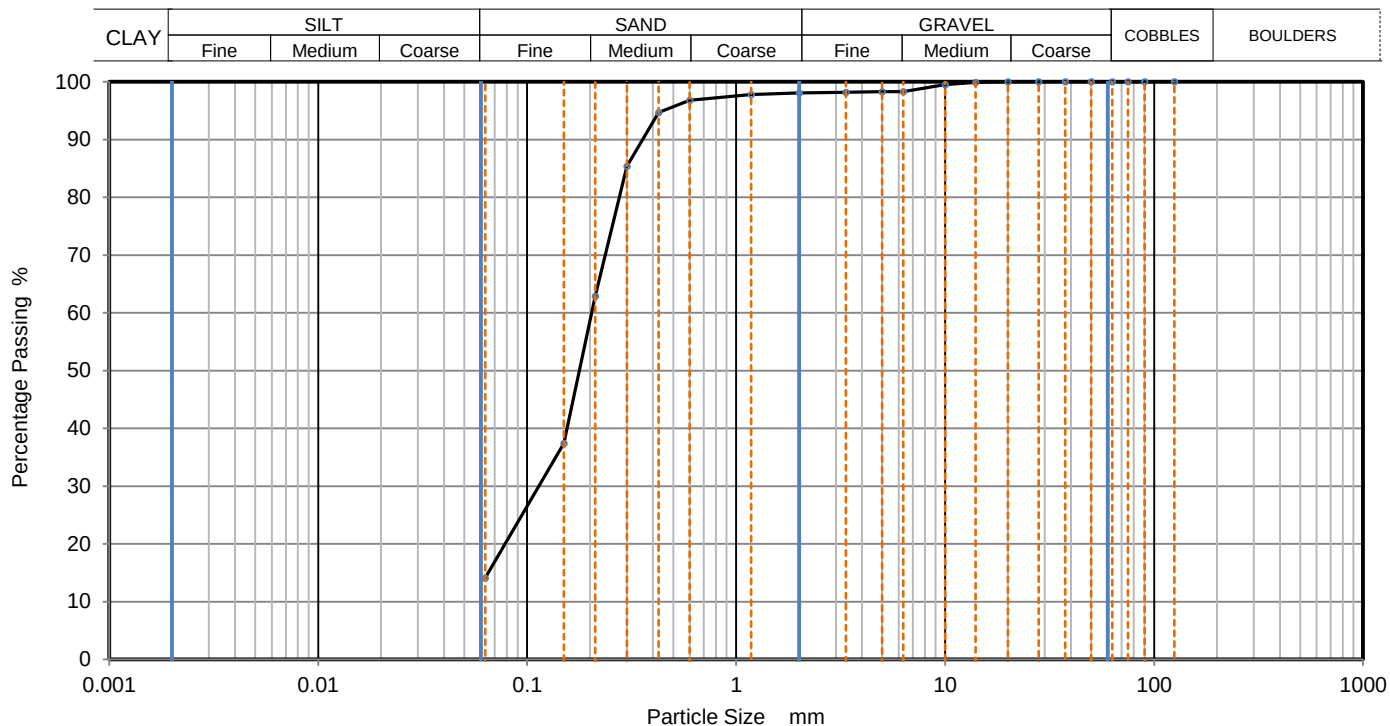
Initials: J.P
Date: 15/09/2017



PARTICLE SIZE DISTRIBUTION

Job Ref	23332
Borehole/Pit No.	WS3
Sample No.	-
Depth Top	2.00 m
Depth Base	- m
Sample Type	D
Samples received	29/08/2017
Schedules received	08/09/2017
Project started	11/09/2017
Date tested	14/09/2017

Site Name	Station Road, Hayling Island		
Project No.	GE16698	Client	GESL
Soil Description	Orangish brown and occasional grey slightly gravelly clayey SAND (gravel is fm and sub-angular)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	98		
5	98		
3.35	98		
2	98		
1.18	98		
0.6	97		
0.425	95		
0.3	85		
0.212	63		
0.15	37		
0.063	14		

Dry Mass of sample, g 502

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	1.9
Sand	84.0
Fines <0.063mm	14.1

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below



K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved

Initials: J.P
Date: 15/09/2017

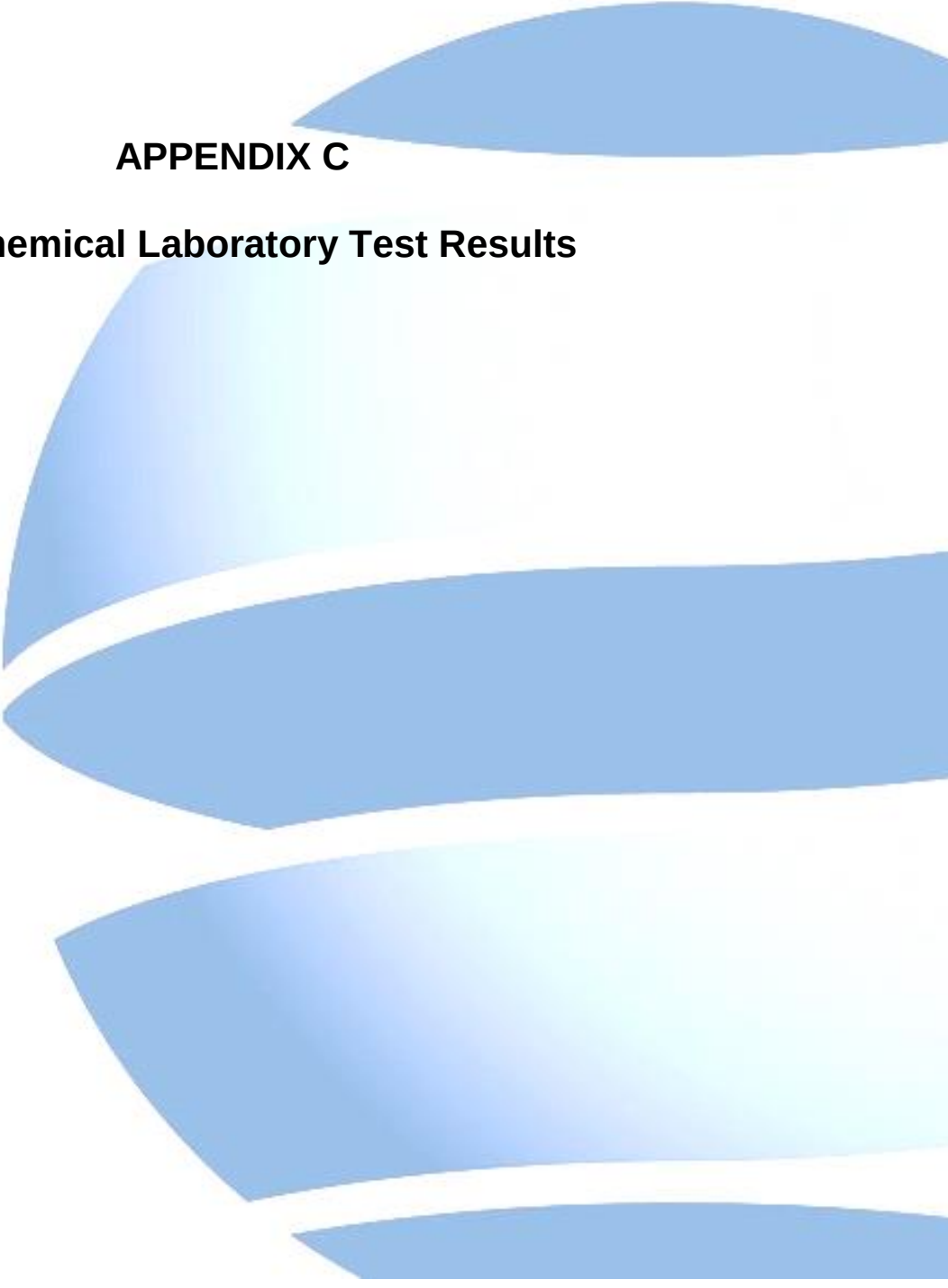


Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results
Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No. 23332	Project Name Station Road, Hayling Island	Programme	
		Samples received	29/08/2017
		Schedule received	08/09/2017
Project No. GE16698	Client GESL	Project started	11/09/2017
		Testing Started	14/09/2017

Hole No.	Sample				Soil description	Dry Mass passing 2mm %	SO3 Content g/l	SO4 Content g/l	pH	Remarks
	Ref	Top	Base	Type						
WS1	-	1.00	-	D	Brown slightly gravelly sandy silty CLAY (gravel is fmc and angular to sub-rounded)	91	0.62	0.74	7.57	
WS2	-	1.00	-	D	Grey and brown mottled slightly gravelly silty CLAY with rare fine roots (gravel is fmc and sub-angular)	92	0.43	0.52	7.80	
WS4	-	1.50	-	D	Brown, grey and orangish brown mottled slightly gravelly slightly fine sandy silty CLAY (gravel is fmc and sub-angular)	99	0.27	0.33	7.60	

 2519	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com								Checked and Approved Initials J.P Date: 15/09/2017	
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)								MSF-5-R29	



APPENDIX C

Geochemical Laboratory Test Results



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Ponswood Industrial Estate
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TN38 9BY
Telephone: (01424) 718618
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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 17-13761

Issue: 1

Date of Issue: 04/09/2017

Contact: Luke Stock

Customer Details: GESL
Unit 7
Danworth Farm
Hurstpierpoint
West Sussex BN6 9GL

Quotation No: Q14-00021

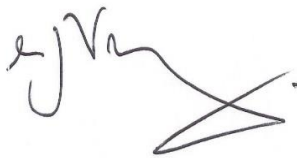
Order No: 2262

Customer Reference: GE16698

Date Received: 25/08/2017

Date Approved: 04/09/2017

Details: Hayling Island

Approved by: 

Mike Varley, Technical Manager

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



Sample Summary

Report No.: 17-13761

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
110362	WS1 0.30	23/08/2017	29/08/2017	Sandy silty loam	
110363	WS1 0.60	23/08/2017	29/08/2017	Silty loam	
110364	WS2 0.70	23/08/2017	29/08/2017	Sandy loam	
110365	WS3 0.70	23/08/2017	29/08/2017	Sandy silty loam	
110366	WS4 0.60	23/08/2017	29/08/2017	Silty loam	
110367	WS4 2.40	23/08/2017	29/08/2017	Loamy sand	
110368	WS5 0.30	23/08/2017	29/08/2017	Sandy silty loam	
110369	WS5 0.90	23/08/2017	29/08/2017	Silty clayey loam	
110370	WS6 0.90	23/08/2017	29/08/2017	Silty loam	
110371	WS1 0.90	23/08/2017	29/08/2017		
110372	WS1 1.30	23/08/2017	29/08/2017		
110373	WS2 0.30	23/08/2017	29/08/2017		
110374	WS2 1.40	23/08/2017	29/08/2017		
110375	WS3 0.30	23/08/2017	29/08/2017		
110376	WS3 1.70	23/08/2017	29/08/2017		
110377	WS4 0.30	23/08/2017	29/08/2017		
110378	WS4 1.80	23/08/2017	29/08/2017		
110379	WS5 0.60	23/08/2017	29/08/2017		
110380	WS6 0.30	23/08/2017	29/08/2017		
110381	WS6 0.60	23/08/2017	29/08/2017		

Results Summary

Report No.: 17-13761

ELAB Reference	110362	110363	110364	110365	110366	110367
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS1	WS2	WS3	WS4	WS4
Sample Depth (m)	0.30	0.60	0.70	0.70	0.60	2.40
Sampling Date	23/08/2017	23/08/2017	23/08/2017	23/08/2017	23/08/2017	23/08/2017

Determinand	Codes	Units	LOD						
Metals									
Arsenic	M	mg/kg	1	8.6	n/t	10.7	18.6	13.6	40.9
Barium	U	mg/kg	10	376	n/t	128	244	81.8	24.4
Beryllium	U	mg/kg	1	< 1.0	n/t	< 1.0	1.5	< 1.0	< 1.0
Cadmium	M	mg/kg	0.5	< 0.5	n/t	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	15.0	n/t	18.2	25.6	29.8	16.0
Copper	M	mg/kg	5	33.0	n/t	20.0	50.0	28.2	7.4
Lead	M	mg/kg	5	458	n/t	544	599	107	12.2
Mercury	M	mg/kg	0.5	< 0.5	n/t	< 0.5	2.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	11.1	n/t	12.1	19.6	16.5	8.1
Selenium	M	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	15.6	n/t	27.4	37.1	34.5	43.7
Zinc	M	mg/kg	5	306	n/t	124	191	86.0	26.3
Anions									
Water Soluble Chloride	M	mg/kg	40	< 40	n/t	< 40	< 40	< 40	< 40
Water Soluble Sulphate	M	g/l	0.02	0.09	n/t	1.48	0.20	0.05	0.04
Inorganics									
Elemental Sulphur	N	mg/kg	20	< 20	n/t	< 20	< 20	< 20	< 20
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	n/t	< 0.8	< 0.8	< 0.8	< 0.8
Total Sulphide	N	mg/kg	2	< 2	n/t	< 2	< 2	< 2	< 2
Total Cyanide	M	mg/kg	1	< 1.0	n/t	1.7	< 1.0	< 1.0	< 1.0
Acid Soluble Sulphate (SO4)	U	%	0.02	0.09	n/t	0.75	0.14	0.07	0.06
Water Soluble Boron	N	mg/kg	0.5	< 0.5	n/t	0.7	0.8	1.4	< 0.5
Miscellaneous									
Acid Neutralisation Capacity	N	mol/kg	0.1	n/t	< 0.1	n/t	n/t	n/t	n/t
Loss On Ignition (450°C)	M	%	0.01	n/t	6.51	n/t	n/t	n/t	n/t
pH	M	pH units	0.1	9.7	8.3	7.7	8.3	7.7	7.5
Total Organic Carbon	N	%	0.01	0.73	1.0	0.44	4.7	1.6	0.02
Phenols									
Total Phenols	N	mg/kg	6	< 6	n/t	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons									
Naphthalene	M	mg/kg	0.1	< 0.1	n/t	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	n/t	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	n/t	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	n/t	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	0.7	n/t	0.1	0.2	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	0.2	n/t	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	2.1	n/t	0.5	1.0	0.3	< 0.1
Pyrene	M	mg/kg	0.1	1.8	n/t	0.4	0.9	0.3	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	1.3	n/t	0.3	0.7	0.2	< 0.1
Chrysene	M	mg/kg	0.1	1.5	n/t	0.4	0.8	0.3	< 0.1
Benzo (b) fluoranthene	M	mg/kg	0.1	1.3	n/t	0.4	0.7	0.3	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	1.5	n/t	0.4	0.8	0.3	< 0.1
Benzo (a) pyrene	M	mg/kg	0.1	1.4	n/t	0.4	0.8	0.3	< 0.1
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.1	1.1	n/t	0.3	0.7	0.2	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	0.3	n/t	0.1	0.2	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	1.1	n/t	0.3	0.7	0.2	< 0.1
Total PAH(16)	M	mg/kg	0.4	14.5	n/t	3.7	7.7	2.7	< 0.4
Total PAH (Including Coronene)	N	mg/kg	2	n/t	15	n/t	n/t	n/t	n/t

Results Summary

Report No.: 17-13761

ELAB Reference	110362	110363	110364	110365	110366	110367
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS1	WS2	WS3	WS4	WS4
Sample Depth (m)	0.30	0.60	0.70	0.70	0.60	2.40
Sampling Date	23/08/2017	23/08/2017	23/08/2017	23/08/2017	23/08/2017	23/08/2017

Determinand	Codes	Units	LOD						
BTEX									
Benzene	M	ug/kg	10	< 10.0	n/t	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	n/t	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	n/t	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	n/t	< 10.0	< 10.0	< 10.0	< 10.0
Total BTEX	M	mg/kg	0.01	n/t	< 0.01	n/t	n/t	n/t	n/t
TPH CWG									
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	n/t	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	n/t	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic	N	mg/kg	1	48.3	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C35-C40 Aliphatic	N	mg/kg	1	17.9	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	n/t	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	n/t	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	2.1	n/t	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	75.6	n/t	< 1.0	3.1	2.8	< 1.0
>C35-C40 Aromatic	N	mg/kg	1	44.9	n/t	< 1.0	3.6	< 1.0	< 1.0
Total (>C5-C40) Ali/Aro	N	mg/kg	1	189	n/t	< 1.0	6.7	2.8	< 1.0
Total Petroleum Hydrocarbons									
Mineral Oil	U	mg/kg	5	n/t	< 5	n/t	n/t	n/t	n/t
PCB (ICES 7 congeners)									
PCB (Total of 7 Congeners)	M	mg/kg	0.03	n/t	< 0.03	n/t	n/t	n/t	n/t

Results Summary

Report No.: 17-13761

ELAB Reference	110368	110369	110370
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	WS5	WS5	WS6
Sample Depth (m)	0.30	0.90	0.90
Sampling Date	23/08/2017	23/08/2017	23/08/2017

Determinand	Codes	Units	LOD			
Metals						
Arsenic	M	mg/kg	1	16.7	13.0	14.6
Barium	U	mg/kg	10	2310	159	105
Beryllium	U	mg/kg	1	< 1.0	< 1.0	1.1
Cadmium	M	mg/kg	0.5	1.9	< 0.5	< 0.5
Chromium	M	mg/kg	5	43.4	30.8	35.7
Copper	M	mg/kg	5	249	23.2	21.7
Lead	M	mg/kg	5	2860	116	27.4
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	24.2	25.3	30.0
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	27.8	38.7	46.6
Zinc	M	mg/kg	5	2120	141	77.2
Anions						
Water Soluble Chloride	M	mg/kg	40	71	< 40	< 40
Water Soluble Sulphate	M	g/l	0.02	0.14	0.04	0.04
Inorganics						
Elemental Sulphur	N	mg/kg	20	< 20	< 20	< 20
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8
Total Sulphide	N	mg/kg	2	< 2	< 2	< 2
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Acid Soluble Sulphate (SO4)	U	%	0.02	0.34	0.08	0.07
Water Soluble Boron	N	mg/kg	0.5	< 0.5	0.7	1.3
Miscellaneous						
Acid Neutralisation Capacity	N	mol/kg	0.1	n/t	n/t	n/t
Loss On Ignition (450°C)	M	%	0.01	n/t	n/t	n/t
pH	M	pH units	0.1	10.5	8.2	7.6
Total Organic Carbon	N	%	0.01	1.5	0.20	0.22
Phenols						
Total Phenols	N	mg/kg	6	< 6	< 6	< 6
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	0.5	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	0.2	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	2.1	< 0.1	< 0.1
Pyrene	M	mg/kg	0.1	1.8	< 0.1	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	1.4	< 0.1	< 0.1
Chrysene	M	mg/kg	0.1	1.4	< 0.1	< 0.1
Benzo (b) fluoranthene	M	mg/kg	0.1	1.2	< 0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	1.4	< 0.1	< 0.1
Benzo (a) pyrene	M	mg/kg	0.1	1.5	< 0.1	< 0.1
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.1	1.0	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	0.3	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	1.0	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	14.2	< 0.4	< 0.4
Total PAH (Including Coronene)	N	mg/kg	2	n/t	n/t	n/t

Results Summary

Report No.: 17-13761

ELAB Reference	110368	110369	110370
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	WS5	WS5	WS6
Sample Depth (m)	0.30	0.90	0.90
Sampling Date	23/08/2017	23/08/2017	23/08/2017

Determinand	Codes	Units	LOD			
BTEX						
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Total BTEX	M	mg/kg	0.01	n/t	n/t	n/t
TPH CWG						
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	1.2	< 1.0	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C35-C40 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	2.3	< 1.0	< 1.0
>C35-C40 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
Total (>C5-C40) Ali/Aro	N	mg/kg	1	3.5	< 1.0	< 1.0
Total Petroleum Hydrocarbons						
Mineral Oil	U	mg/kg	5	n/t	n/t	n/t
PCB (ICES 7 congeners)						
PCB (Total of 7 Congeners)	M	mg/kg	0.03	n/t	n/t	n/t

Results Summary

Report No.: 17-13761

ELAB Reference	110366	110367	110369
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	WS4	WS4	WS5
Sample Depth (m)	0.60	2.40	0.90
Sampling Date	23/08/2017	23/08/2017	23/08/2017

Determinand	Codes	Units	LOD			
VOC						
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
cis-1,2-dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0

Results Summary

Report No.: 17-13761

ELAB Reference	110366	110367	110369
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	WS4	WS4	WS5
Sample Depth (m)	0.60	2.40	0.90
Sampling Date	23/08/2017	23/08/2017	23/08/2017

Determinand	Codes	Units	LOD			
SVOC						
Phenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
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	< 0.01
1,2-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 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	< 0.01	< 0.01	< 0.01
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	< 0.01	< 0.01	< 0.01
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	0.10	< 0.01	< 0.01
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	0.11	< 0.01	< 0.01
1-Methylnaphthalene	N	mg/kg	0.01	0.11	< 0.01	< 0.01
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	< 0.01	< 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	< 0.01	< 0.01
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	0.03	0.02	< 0.01
4-nitrophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Dibenzofuran	N	mg/kg	0.01	0.05	< 0.01	< 0.01
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	0.02	0.01	< 0.01
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

Results Summary

Report No.: 17-13761

ELAB Reference	110366	110367	110369
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	WS4	WS4	WS5
Sample Depth (m)	0.60	2.40	0.90
Sampling Date	23/08/2017	23/08/2017	23/08/2017

Determinand	Codes	Units	LOD			
SVOC						
Phenanthrene	N	mg/kg	0.01	0.25	0.02	< 0.01
Anthracene	N	mg/kg	0.01	0.10	< 0.01	< 0.01
Carbazole	N	mg/kg	0.01	0.03	< 0.01	< 0.01
Dibutyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	N	mg/kg	0.01	0.91	0.01	< 0.01
Pyrene	N	mg/kg	0.01	0.91	< 0.01	< 0.01
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	0.52	< 0.01	< 0.01
Chrysene	N	mg/kg	0.01	0.75	< 0.01	< 0.01
Bis(2-ethylhexyl)phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	N	mg/kg	0.01	0.48	< 0.01	< 0.01
Benzo(k)fluoranthene	N	mg/kg	0.01	0.70	< 0.01	< 0.01
Benzo(a)pyrene	N	mg/kg	0.01	0.72	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	N	mg/kg	0.01	0.49	< 0.01	< 0.01
Dibenz(ah)anthracene	N	mg/kg	0.01	0.21	< 0.01	< 0.01
Benzo[g,h,i]perylene	N	mg/kg	0.01	0.61	< 0.01	< 0.01

Results Summary

Report No.: 17-13761

2683

WAC Analysis

Elab Ref:	110363					Landfill Waste Acceptance Criteria Limits		
Sample Date:	23/08/2017					Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:	WS1							
Depth (m)	0.6							
Site:	Hayling Island							
Determinand		Code	Units					
Total Organic Carbon		N	%		1.00	3	5	6
Loss on Ignition		M	%		6.5	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		< 5	500	--	--
Total (of 17) PAHs		N	mg/kg		15.0	100	--	--
pH		M			8.3	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		< 0.1	--	To evaluate	To evaluate

Eluate Analysis

			10:1	10:1	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg		
			mg/l	mg/kg			
Arsenic		N	0.007	0.07	0.5	2	25
Barium		N	0.006	0.06	20	100	300
Cadmium		N	< 0.001	< 0.01	0.04	1	5
Chromium		N	< 0.005	< 0.05	0.5	10	70
Copper		N	0.008	0.08	2	50	100
Mercury		N	< 0.005	< 0.01	0.01	0.2	2
Molybdenum		N	< 0.005	< 0.05	0.5	10	30
Nickel		N	0.001	< 0.05	0.4	10	40
Lead		N	0.009	0.09	0.5	10	50
Antimony		N	0.007	0.07	0.06	0.7	5
Selenium		N	< 0.005	< 0.05	0.1	0.5	7
Zinc		N	0.005	0.05	4	50	200
Chloride		N	< 5	< 50	800	15000	25000
Fluoride		N	< 5	< 10	10	150	500
Sulphate		N	2	23.80	1000	20000	50000
Total Dissolved Solids		N	< 10	< 100	4000	60000	100000
Phenol Index		N	< 0.01	< 0.10	1	-	-
Dissolved Organic Carbon		N	13.800	138.00	500	800	1000

Leach Test Information

pH		N	8.0				
Conductivity (uS/cm)		N	104				
Dry mass of test portion (g)			101.000				
Dry Matter (%)			83				
Moisture (%)			21				
Eluent Volume (ml)			951				

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

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



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Results Summary
Report No.: 17-13761

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 (%)
110362	0.30	WS1	Brown soil,Brick,stones,clinker	No asbestos detected	n/t	n/t	n/t	n/t
110364	0.70	WS2	Brown soil,Stones	No asbestos detected	n/t	n/t	n/t	n/t
110365	0.70	WS3	Brown Soil,Stones	No asbestos detected	n/t	n/t	n/t	n/t
110366	0.60	WS4	Brown soil,Stones	No asbestos detected	n/t	n/t	n/t	n/t
110367	2.40	WS4	Sand	No asbestos detected	n/t	n/t	n/t	n/t
110368	0.30	WS5	Brown sandy soil,Stones,Nail,Glass	No asbestos detected	n/t	n/t	n/t	n/t
110369	0.90	WS5	Brown soil	No asbestos detected	n/t	n/t	n/t	n/t
110370	0.90	WS6	Brown soil	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 17-13761

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Sulphide	N	As submitted sample	01/09/2017	109	Colorimetry
Hexavalent chromium	N	As submitted sample	31/08/2017	110	Colorimetry
Acid Soluble Sulphate	U	Air dried sample	01/09/2017	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	31/08/2017	118	ICPMS
Phenols in solids	N	As submitted sample	31/08/2017	121	HPLC
Elemental Sulphur	N	Air dried sample	31/08/2017	122	HPLC
PAH (GC-FID)	M	As submitted sample	31/08/2017	133	GC-FID
SVOC in solids	N	As submitted sample	31/08/2017	167	GC-MS
Water soluble anions	M	Air dried sample	31/08/2017	172	Ion Chromatography
VOC in solids	M	As submitted sample	30/08/2017	181	GC-MS
Water soluble boron	N	Air dried sample	01/09/2017	202	Colorimetry
Total cyanide	M	As submitted sample	31/08/2017	204	Colorimetry
Aliphatic hydrocarbons in soil	N	As submitted sample	31/08/2017	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	01/09/2017	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	31/08/2017	214	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	31/08/2017	214	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	31/08/2017	214	GC-MS
Asbestos identification	U	As submitted sample	04/09/2017	PMAN	Microscopy
Leachate					
Arsenic*	N		04/09/2017	101	ICPMS
Cadmium*	N		04/09/2017	101	ICPMS
Chromium*	N		04/09/2017	101	ICPMS
Lead*	N		04/09/2017	101	ICPMS
Nickel*	N		04/09/2017	101	ICPMS
Copper*	N		04/09/2017	101	ICPMS
Zinc*	N		04/09/2017	101	ICPMS
Mercury*	N		04/09/2017	101	ICPMS
Selenium*	N		04/09/2017	101	ICPMS
Antimony	N		04/09/2017	101	ICPMS
Barium*	N		04/09/2017	101	ICPMS
Molybdenum*	N		04/09/2017	101	ICPMS
pH Value*	N		04/09/2017	113	Electrometric
Electrical Conductivity*	N		04/09/2017	136	Probe
Dissolved Organic Carbon	N		04/09/2017	102	TOC analyser
Chloride*	N		04/09/2017	131	Ion Chromatography
Fluoride*	N		04/09/2017	131	Ion Chromatography
Sulphate*	N		04/09/2017	131	Ion Chromatography
Total Dissolved Solids	N		04/09/2017	144	Gravimetric
Phenol index	N		04/09/2017	121	HPLC
WAC Solids analysis	N				
pH Value**	M	Air dried sample	01/09/2017	113	Electrometric
Total Organic Carbon	N	Air dried sample	01/09/2017	210	IR
Loss on Ignition**	M	Air dried sample	01/09/2017	129	Gravimetric
Acid Neutralization Capacity to pH 7	N	Air dried sample	01/09/2017	NEN 737	Electrometric
Total BTEX**	M	As submitted sample	31/08/2017	181	GCMS
Mineral Oil**	U	As submitted sample	31/08/2017	117	GCFID
Total PCBs (7 congeners)	M	Air dried sample	31/08/2017	120	GCMS
Total PAH (17)**	N	As submitted sample	01/09/2017	133	GCFID

Tests marked N are not UKAS accredited

Report Information

Report No.: 17-13761

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



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 17-14312

Issue: 1

Date of Issue: 10/10/2017

Contact: Katie Brayne

Customer Details: GESL
Unit 7
Danworth Farm
Hurstpierpoint
West Sussex BN6 9GL

Quotation No: Q14-00021

Order No: 2409

Customer Reference: GE16698

Date Received: 06/10/2017

Date Approved: 10/10/2017

Details: Hayling Island

Approved by:

Mike Varley, Technical Manager

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



Sample Summary

Report No.: 17-14312

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
114238	WS1 1 0.55	05/10/2017	06/10/2017		



Results Summary

Report No.: 17-14312

ELAB Reference	114238
Customer Reference	1
Sample ID	
Sample Type	WATER
Sample Location	WS1
Sample Depth (m)	0.55
Sampling Date	05/10/2017

Determinand	Codes	Units	LOD	
Dissolved Metals				
Arsenic	U	ug/l	5	< 5
Boron	N	ug/l	5	28
Barium	U	ug/l	5	47
Beryllium	U	ug/l	5	< 5
Cadmium	U	ug/l	1	< 1
Chromium	U	ug/l	5	< 5
Copper	U	ug/l	5	< 5
Mercury	U	ug/l	0.1	< 0.1
Nickel	U	ug/l	5	< 5
Lead	U	ug/l	1	< 1
Selenium	U	ug/l	5	< 5
Vanadium	N	ug/l	5	< 5
Zinc	U	ug/l	5	< 5
Anions				
Chloride	U	mg/l	0.5	18.5
Sulphate	U	mg/l	0.5	13.6
Inorganics				
Elemental Sulphur	N	mg/l	0.1	< 0.1
Hexavalent Chromium	U	ug/l	100	< 100
Sulphide	N	mg/l	0.1	0.1
Miscellaneous				
Dissolved organic carbon	U	mg/l	1.5	3.5
pH	U	pH units	0.1	7.3
Phenols				
Phenol	N	ug/l	1	< 1
M,P-Cresol	N	ug/l	1	< 1
O-Cresol	N	ug/l	1	< 1
3,4-Dimethylphenol	N	ug/l	1	< 1
2,3-Dimethylphenol	N	ug/l	1	< 1
2,3,5-trimethylphenol	N	ug/l	1	< 1
Total Monohydric Phenols	N	ug/l	1	< 1



Results Summary

Report No.: 17-14312

ELAB Reference	114238
Customer Reference	1
Sample ID	
Sample Type	WATER
Sample Location	WS1
Sample Depth (m)	0.55
Sampling Date	05/10/2017

Determinand	Codes	Units	LOD	
Polyaromatic hydrocarbons				
Naphthalene GCMS	N	ug/l	0.01	0.27
Acenaphthylene GCMS	N	ug/l	0.01	1.04
Acenaphthene GCMS	N	ug/l	0.01	0.44
Fluorene GCMS	N	ug/l	0.01	0.49
Phenanthrene GCMS	N	ug/l	0.01	9.00
Anthracene GCMS	N	ug/l	0.01	2.62
Fluoranthene GCMS	N	ug/l	0.01	28.9
Pyrene GCMS	N	ug/l	0.01	24.0
Benzo (a) anthracene GCMS	N	ug/l	0.01	15.9
Chrysene GCMS	N	ug/l	0.01	17.6
Benzo (b) fluoranthene GCMS	N	ug/l	0.01	13.2
Benzo (k) fluoranthene GCMS	N	ug/l	0.01	15.4
Benzo (a) pyrene GCMS	N	ug/l	0.01	17.3
Indeno (1,2,3-cd) pyrene GCMS	N	ug/l	0.01	10.2
Dibenzo(a,h)anthracene GCMS	N	ug/l	0.01	3.34
Benzo(ghi)perylene GCMS	N	ug/l	0.01	10.5
Total PAH(16) GCMS	N	ug/l	0.01	170
TPH CWG				
>C5-C6 Aliphatic	N	ug/l	1	< 1.0
>C6-C8 Aliphatic	N	ug/l	1	< 1.0
>C8-C10 Aliphatic	N	ug/l	5	< 5.0
>C10-C12 Aliphatic	N	ug/l	5	< 5.0
>C12-C16 Aliphatic	N	ug/l	5	< 5.0
>C16-C21 Aliphatic	N	ug/l	5	< 5.0
>C21-C35 Aliphatic	N	ug/l	5	57.7
>C35-C40 Aliphatic	N	ug/l	5	< 5.0
Total (>C5-C40) Aliphatic	N	ug/l	5	57.7
>C5-C7 Aromatic	N	ug/l	1	< 1.0
>C7-C8 Aromatic	N	ug/l	1	< 1.0
>C8-C10 Aromatic	N	ug/l	5	< 5.0
>C10-C12 Aromatic	N	ug/l	5	< 5.0
>C12-C16 Aromatic	N	ug/l	5	< 5.0
>C16-C21 Aromatic	N	ug/l	5	< 5.0
>C21-C35 Aromatic	N	ug/l	5	97.6
>C35-C40 Aromatic	N	ug/l	5	42.1
Total (>C5-C40) Aromatic	N	ug/l	5	140
Total (>C5-C40) Ali/Aro	N	ug/l	5	197

Results Summary

Report No.: 17-14312

ELAB Reference	114238
Customer Reference	1
Sample ID	
Sample Type	WATER
Sample Location	WS1
Sample Depth (m)	0.55
Sampling Date	05/10/2017

Determinand	Codes	Units	LOD	
VOC				
MTBE	U	ug/l	1	< 1
Heptane	N	ug/l	1	< 1
Octane	N	ug/l	1	< 1
Nonane	N	ug/l	1	< 1
Benzene	U	ug/l	1	< 1
Toluene	U	ug/l	1	< 1
Ethylbenzene	U	ug/l	1	< 1
m+p-xylene	U	ug/l	1	< 1
o-xylene	U	ug/l	1	< 1
cis-1,2-dichloroethene	U	ug/l	1	< 1
1,1-Dichloroethane	U	ug/l	1	< 1
Chloroform	U	ug/l	1	< 1
Tetrachloromethane	U	ug/l	1	< 1
1,1,1-Trichloroethane	U	ug/l	1	< 1
Trichloroethylene	N	ug/l	1	< 1
Tetrachloroethylene	U	ug/l	1	< 1
1,1,1,2-Tetrachloroethane	U	ug/l	1	< 1
1,1,2,2-Tetrachloroetha	N	ug/l	1	< 1
Chlorobenzene	U	ug/l	1	< 1
Bromobenzene	U	ug/l	1	< 1
Bromodichloromethane	U	ug/l	1	< 1
Methylethylbenzene	U	ug/l	1	< 1
1,1-Dichloro-1-propene	U	ug/l	1	< 1
Trans - 1-2 -dichloroethylene	U	ug/l	1	< 1
2,2-Dichloropropane	N	ug/l	1	< 1
Bromochloromethane	N	ug/l	1	< 1
1,2-Dichloroethane	U	ug/l	1	< 1
Dibromomethane	U	ug/l	1	< 1
1,2-Dichloropropane	U	ug/l	1	< 1
cis-1,3-Dichloro-1-propene	U	ug/l	1	< 1
trans-1,3-Dichloro-1-propene	U	ug/l	1	< 1

Results Summary

Report No.: 17-14312

ELAB Reference	114238
Customer Reference	1
Sample ID	
Sample Type	WATER
Sample Location	WS1
Sample Depth (m)	0.55
Sampling Date	05/10/2017

Determinand	Codes	Units	LOD	
VOC				
1,1,2-Trichloroethane	U	ug/l	1	< 1
Dibromochloromethane	U	ug/l	1	< 1
1,3-Dichloropropane	U	ug/l	1	< 1
Dibromoethane	U	ug/l	1	< 1
Styrene	U	ug/l	1	< 1
Propylbenzene	U	ug/l	1	< 1
2-Chlorotoluene	U	ug/l	1	< 1
1,2,4-Trimethylbenzene	U	ug/l	1	< 1
4-Chlorotoluene	U	ug/l	1	< 1
t-butylbenzene	U	ug/l	1	< 1
1,3,5-Trimethylbenzene	U	ug/l	1	< 1
1-methylpropylbenzene	U	ug/l	1	< 1
o-cymene	U	ug/l	1	< 1
1,3-Dichlorobenzene	U	ug/l	1	< 1
Butylbenzene	U	ug/l	1	< 1
1,2-Dibromo-3-chloropropane	U	ug/l	1	< 1
Hexachlorobutadiene	U	ug/l	1	< 1
1,2,4-Trichlorobenzene	N	ug/l	1	< 1
Naphthalene	U	ug/l	1	< 1
1,2,3-Trichlorobenzene	N	ug/l	1	< 1
1,4-Dichlorobenzene	U	ug/l	1	< 1
1,2-Dichlorobenzene	U	ug/l	1	< 1
Bromoform	U	ug/l	1	< 1
VOC TIC				
Various	N	ug/l	1	None Detected
TIC				

Results Summary

Report No.: 17-14312

ELAB Reference	114238
Customer Reference	1
Sample ID	
Sample Type	WATER
Sample Location	WS1
Sample Depth (m)	0.55
Sampling Date	05/10/2017

Determinand	Codes	Units	LOD	
SVOC				
Phenol	N	ug/l	1	< 1.00
Aniline	N	ug/l	1	< 1.00
Bis(2-chloroethyl)ether	N	ug/l	1	< 1.00
2-Chlorophenol	N	ug/l	1	< 1.00
1,3-Dichlorobenzene	N	ug/l	1	< 1.00
1,4-Dichlorobenzene	N	ug/l	1	< 1.00
Benzyl Alcohol	N	ug/l	1	< 1.00
1,2-Dichlorobenzene	N	ug/l	1	< 1.00
2-Methylphenol	N	ug/l	1	< 1.00
Bis(2-chloroisopropyl)ether	N	ug/l	1	< 1.00
3 and 4-methylphenol	N	ug/l	1	< 1.00
N-Nitrosodi-n-propylamine	N	ug/l	1	< 1.00
Hexachloroethane	N	ug/l	1	< 1.00
Nitrobenzene	N	ug/l	1	< 1.00
Isophorone	N	ug/l	1	< 1.00
2-Nitrophenol	N	ug/l	1	< 1.00
2,4-Dimethylphenol	N	ug/l	1	< 1.00
Bis(2-chloroethoxy)methane	N	ug/l	1	< 1.00
2,4-Dichlorophenol	N	ug/l	1	< 1.00
1,3,5-Trichlorobenzene	N	ug/l	1	< 1.00
Naphthalene	N	ug/l	0.01	0.30
3-Chloroaniline	N	ug/l	1	< 1.00
Hexachloro-1,3-butadiene	N	ug/l	1	< 1.00
4-Chloro-3-methylphenol	N	ug/l	1	< 1.00
2-Methylnaphthalene	N	ug/l	1	< 1.00
1-Methylnaphthalene	N	ug/l	1	< 1.00
Hexachlorocyclopentadiene	N	ug/l	1	< 1.00
2,4,6-Trichlorophenol	N	ug/l	1	< 1.00
2,4,5-Trichlorophenol	N	ug/l	1	< 1.00
1-Chloronaphthalene	N	ug/l	1	< 1.00
2-Nitroaniline	N	ug/l	1	< 1.00
1,4-Dinitrobenzene	N	ug/l	1	< 1.00
Dimethyl phthalate	N	ug/l	1	< 1.00
1-3-dinitrobenzene	N	ug/l	1	< 1.00
2-6-dinitrotoluene	N	ug/l	1	< 1.00
Acenaphthylene	N	ug/l	0.01	1.02
1,2-Dinitrobenzene	N	ug/l	1	< 1.00
3-Nitroaniline	N	ug/l	1	< 1.00
Acenaphthene	N	ug/l	0.01	0.52
4-nitrophenol	N	ug/l	1	< 1.00
Dibenzofuran	N	ug/l	1	< 1.00

Results Summary

Report No.: 17-14312

ELAB Reference	114238
Customer Reference	1
Sample ID	
Sample Type	WATER
Sample Location	WS1
Sample Depth (m)	0.55
Sampling Date	05/10/2017

Determinand	Codes	Units	LOD	
SVOC				
2,3,5,6-Tetrachlorophenol	N	ug/l	1	< 1.00
2,3,4,6-Tetrachlorophenol	N	ug/l	1	< 1.00
Diethyl phthalate	N	ug/l	1	< 1.00
1-chloro-4-phenoxybenzene	N	ug/l	1	< 1.00
Fluorene	N	ug/l	0.01	0.48
4-Nitroaniline	N	ug/l	1	< 1.00
Dinitro-o-cresol	N	ug/l	1	< 1.00
Diphenylamine	N	ug/l	1	< 1.00
Azobenzene	N	ug/l	1	< 1.00
1-bromo-4-phenoxybenzene	N	ug/l	1	< 1.00
Hexachlorobenzene	N	ug/l	1	< 1.00
Pentachlorophenol	N	ug/l	1	< 1.00
Phenanthrene	N	ug/l	0.01	7.93
Anthracene	N	ug/l	0.01	2.17
Carbazole	N	ug/l	1	< 1.00
Dibutyl phthalate	N	ug/l	1	< 1.00
Fluoranthene	N	ug/l	0.01	28.3
Pyrene	N	ug/l	0.01	24.8
Butyl benzyl phthalate	N	ug/l	1	< 1.00
Bis-2-ethylhexyladipate	N	ug/l	1	< 1.00
Butyl benzyl phthalate	N	ug/l	1	< 1.00
Benzo(a)anthracene	N	ug/l	0.01	13.8
Chrysene	N	ug/l	0.01	16.4
Bis(2-ethylhexyl)phthalate	N	ug/l	1	< 1.00
Benzo(b)fluoranthene	N	ug/l	0.01	12.2
Benzo(k)fluoranthene	N	ug/l	0.01	13.3
Benzo(a)pyrene	N	ug/l	0.01	17.9
Indeno(1,2,3-CD)pyrene	N	ug/l	0.01	9.43
Dibenz(ah)anthracene	N	ug/l	0.01	3.19
Benzo(ghi)perylene	N	ug/l	0.01	10.8
SVOCTIC				
Various	N	ug/l	1	Y
TIC				
1(2H)-Phenanthrenone, 3,4,9,10-tetrahydro-7-methoxy-	N	ug/l	1	5.77
1H-Cyclopropa[1]phenanthrene,1a,9b-dihydro-	N	ug/l	1	1.72
Benz[d]isoxazol-4(5H)-one, 6,7-dihydro-3-methyl-6-phenyl-, oxime	N	ug/l	1	8.16
Benzo[e]pyrene	N	ug/l	1	17.75
Benzo[ghi]fluoranthene	N	ug/l	1	3.23
Dibenzo[def,mno]chrysene	N	ug/l	1	19.01
Dichloroacetaldehyde	N	ug/l	1	< 1
Diphenylethyne	N	ug/l	1	1.05
Fluoranthene, 2-methyl-	N	ug/l	1	4.73
Phenanthrene, 2,5-dimethyl-	N	ug/l	1	1.9

Method Summary

Report No.: 17-14312

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Water					
Aliphatic/Aromatic hydrocarbons in water	N		10/10/2017		GC-FID
Aromatic hydrocarbons in water	N		10/10/2017		GC-FID
Phenols in waters	N		10/10/2017		HPLC
VOC in waters	U		09/10/2017		GC-MS
Dissolved metals by ICP in waters	U		10/10/2017	101	ICPMS
Dissolved organic carbon	U		10/10/2017	102	IR
pH of waters	U		10/10/2017	113	Electromeric
Chromium Hexavalent in waters	U		10/10/2017	123	Colorimetry
Anions	U		10/10/2017	131	Ion Chromatography
PAHs and/or PCBs in waters	N		10/10/2017	135	GC-MS
SVOC in waters	N		10/10/2017	167	GC-MS
VOC in waters	U		09/10/2017	200	GC-MS
Elemental Sulphur by HPLC in waters	N	As submitted sample	10/10/2017	206	HPLC
Aliphatic hydrocarbons in water	N		10/10/2017	215	GC-FID
Aromatic hydrocarbons in water	N		10/10/2017	215	GC-FID
Low range Aliphatic hydrocarbons water	N		09/10/2017	215	GC-MS
Low range Aromatic hydrocarbons water	N		09/10/2017	215	GC-MS

Tests marked N are not UKAS accredited

Report Information

Report No.: 17-14312

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) |

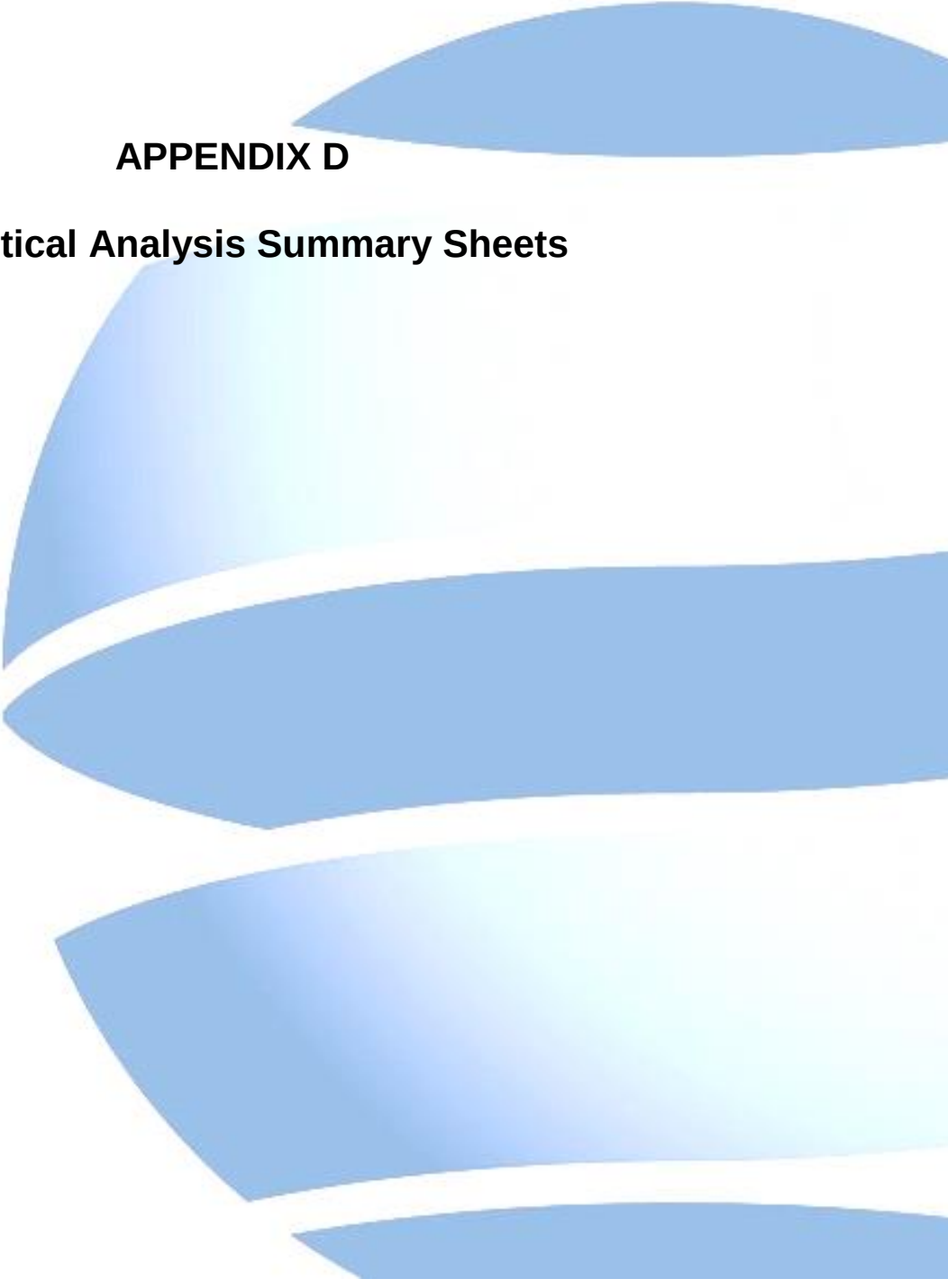
Where a sample has a deviation code, the applicable test result may be invalid.

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 D

Statistical Analysis Summary Sheets

Client/client ref: Lee Johnson
Project ref: GE16698
Site ref: Station Road, Hayling Island
Data description:
Contaminant(s): Metals
Test scenario: Planning
Date: 1 October 2017
User details: DW

	Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	Copper	Zinc	Selenium	Chromium VI	Boron	Beryllium	Vanadium	
Critical concentration, C_c	32.4	5.17	3010	200	169	127	5200	19400	350	48.9	291	41.2	107	
Notes														
Full dataset size	5	5	5	5	5	5	5	5	5	5	5	5	5	0
Outliers present?	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	No	
Number of outliers temporarily excluded	0													
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	5	5	5	5	5	5	5	5	5	5	5	5	5	0
Sample mean, $\bar{X}$	13.64	0.78	26.4	913.6	0.9	16.7	76.04	565.4	1	0.8	0.78	1.1	28.48	No Data
Standard deviation, s	4.12346941	0.62609903	11.162437	1104.7879	0.89442719	5.41340928	97.3072865	873.055439	0	0	0.37013511	0.2236068	8.33768553	
Number of non-detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Normal	Non-normal	Normal	Non-normal	Non-normal	Normal	Non-normal	Non-normal	Single value	Single value	Normal	Non-normal	Normal	
Statistical approach	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto

Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?					Evidence level required:	95%	Use Normal distribution to test for outliers						
t statistic, t_0 (or k_0)	-10.17314088	-15.67857143	-597.6770495	1.444311719	-420.25	-45.56062276	-117.7457854	-48.23914271	N/A	N/A	-1753.283139	-401	-21.05812902	
Upper confidence limit (on true mean concentration, μ)	17.5712781	2.0004917	37.0421655	3067.22809	2.64355958	21.861095	265.726822	2267.29836	1	0.8	1.13288343	1.53588989	36.4290732	
Evidence level	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \geq C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	
Select dataset	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Back to data

Go to outlier test

Go to normality test

Show individual summary

Client/client ref: Lee Johnson
Project ref: GE16698
Site ref: Station Road, Hayling Island
Data description:
Contaminant(s): Metals
Test scenario: Planning
Date: 1 October 2017
User details: DW

Critical concentration, C_c						
Notes						
Full dataset size	0	0	0	0	0	0
Outliers present?						
Number of outliers temporarily excluded						
Number removed by filter	0	0	0	0	0	0
Sample size, n	0	0	0	0	0	0
Sample mean, $\bar{X}$	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s						
Number of non-detects	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution						
Statistical approach	Auto	Auto	Auto	Auto	Auto	Auto

Test scenario:	
t statistic, t_0 (or k_0)	
Upper confidence limit (on true mean concentration, μ)	
Evidence level	
Base decision on:	
Result	
Select dataset	☐ ☐ ☐ ☐ ☐ ☐

Back to data

--

Client/client ref: Lee Johnson
Project ref: GE16698
Site ref: Station Road, Hayling Island
Data description:
Contaminant(s): PAH
Test scenario: Planning
Date: 1 October 2017
User details: DW

Outliers:	
Naphthalene	
Critical concentration, C_c	
Notes	
Full dataset size	0
Outliers present?	
Number of outliers temporarily excluded	
Number removed by filter	0
Sample size, n	0
Sample mean, $\bar{x}$	No Data
Standard deviation, s	
Number of non-detects	0
Set non-detect values to:	Half detection limit
Distribution	
Statistical approach	Auto

Test scenario:	
t statistic, t_0 (or k_0)	
Upper confidence limit (on true mean concentration, μ)	
Evidence level	
Base decision on:	
Result	
Select dataset	☐

Back to data

Client/client ref: Lee Johnson
Project ref: GE16698
Site ref: Station Road, Hayling Island
Data description:
Contaminant(s): Petroleum Hydrocarbons
Test scenario: Planning
Date: 1 October 2017
User details: DW

	Ar>EC5-EC7	Ar>EC7-EC8	Ar>EC8-EC10	Ar>EC10-EC12	Ar>EC12-EC16	Ar>EC16-EC21	Ar>EC21-EC35	Al>EC5-EC7	Al>EC7-EC8	Al>EC8-EC10	Al>EC10-EC12	Al>EC12-EC16	Al>EC16-EC21	Al>EC21-EC35
Critical concentration, C_c	65	120	27	69	140	250	890	30	73	19	93	740	45000	45000
Notes														
Full dataset size	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Outliers present?	No	No	Yes	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes
Number of outliers temporarily excluded														0
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Sample mean, $\bar{X}$	0.01	0.01	1.16	1	1	1.22	16.96	0.01	0.01	1	1	1.04	1	10.46
Standard deviation, s	0	0	0.35777088	0	0	0.49193496	32.7905932	0	0	0	0	0.08944272	0	21.1532031
Number of non-detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Single value	Single value	Non-normal	Single value	Single value	Non-normal	Non-normal	Single value	Single value	Single value	Single value	Non-normal	Single value	Non-normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev

Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?			Evidence level required:		95%	Use Normal distribution to test for outliers							
t statistic, t_0 (or k_0)	N/A	N/A	-161.5	N/A	N/A	-1130.818182	-59.53465914	N/A	N/A	N/A	N/A	-18474	N/A	-4755.765328
Upper confidence limit (on true mean concentration, μ)	0.01	0.01	1.85742383	1	1	2.17895777	80.8806336	0.01	0.01	1	1	1.21435596	1	51.695184
Evidence level	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$
Select dataset	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒

Back to data

Go to outlier test

Go to normality test

Show individual summary

Client/client ref: Lee Johnson
Project ref: GE16698
Site ref: Station Road, Hayling Island
Data description:
Contaminant(s): Petroleum Hydrocarbons
Test scenario: Planning
Date: 1 October 2017
User details: DW

Critical concentration, C_c						
Notes						
Full dataset size	0	0	0	0	0	0
Outliers present?						
Number of outliers temporarily excluded						
Number removed by filter	0	0	0	0	0	0
Sample size, n	0	0	0	0	0	0
Sample mean, $\bar{X}$	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s						
Number of non-detects	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution						
Statistical approach	Auto	Auto	Auto	Auto	Auto	Auto

Test scenario:						
t statistic, t_0 (or k_0)						
Upper confidence limit (on true mean concentration, μ)						
Evidence level						
Base decision on:						
Result						
Select dataset	☐	☐	☐	☐	☐	☐

Back to data

STEP 5: RESULTS

[Find AC](#)
[Print Report](#)

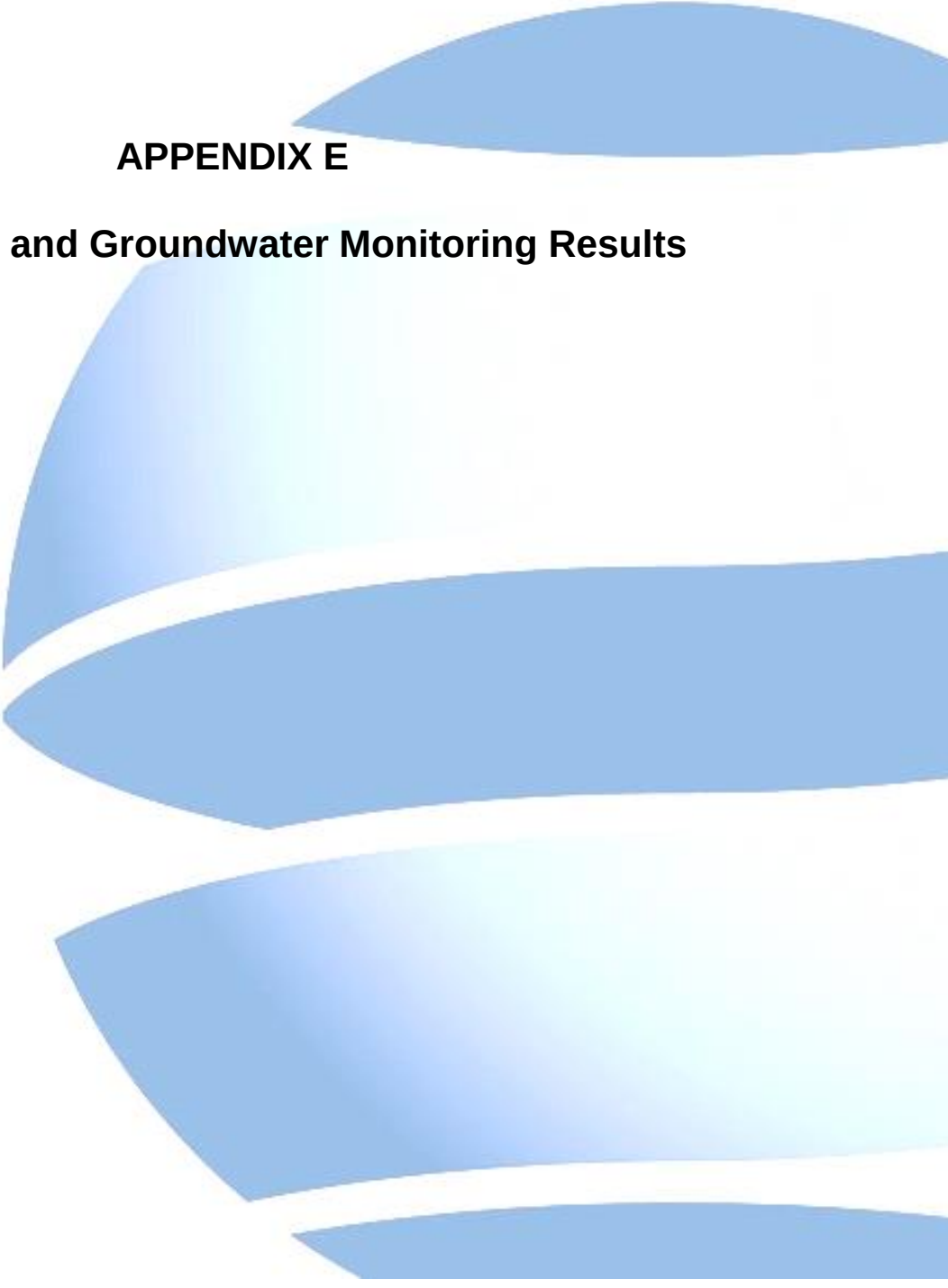
		Ratio of ADE to relevant Health	
		oral HCV	inhal HCV
Number	Chemical	(dimensionless)	(dimensionless)
1	Arsenic	1.00	0.38
2	Cadmium	0.91	0.10
3	Chromium III	0.15	0.85
4	Mercury, inorganic	0.93	0.07
5	Nickel	0.14	1.00
6	Copper	0.50	0.50
7	Zinc	1.00	0.00
8	Selenium	1.00	NR
9	Chromium VI	1.00	NR
10	Barium	1.00	NR
11	Beryllium	0.19	0.81
12	Vanadium	0.90	0.10
13	Phenol	0.28	0.72
14	Acenaphthylene	0.96	0.04
15	Acenaphthene	0.95	0.05
16	Flourene	0.97	0.03
17	Phenanthrene	0.98	0.02
18	Anthracene	0.98	0.02
19	Flouranthene	0.99	0.01
20	Pyrene	0.99	0.01
21	Benz(a)anthracene	0.53	0.47
22	Chrysene	0.67	0.33
23	Benzo(b)flouranthene	0.66	0.34
24	Benzo(k)flouranthene	0.66	0.34
25	Benzo(a)pyrene	0.66	0.34
26	Indeno(123-cd)pyrene	0.67	0.33
27	Dibenz(ah)anthracene	0.65	0.35
28	Benzo(ghi)perylene	0.65	0.35
29			
30			

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Criteria Value	Soil Assessment Criteria			Soil Saturation Limit
Combined	oral HCV	inhal HCV	Combined	
(dimensionless)	mg kg ⁻¹	mg kg ⁻¹	mg kg ⁻¹	mg kg ⁻¹
NR	3.24E+01	8.50E+01	NR	NR
1.00	5.45E+00	2.97E+01	5.17E+00	NR
1.00	1.95E+04	3.55E+03	3.01E+03	NR
1.00	1.81E+02	2.55E+03	1.69E+02	NR
NR	5.31E+02	1.27E+02	NR	NR
1.00	7.81E+03	1.04E+04	5.20E+03	NR
1.00	1.94E+04	2.55E+07	1.94E+04	NR
NR	3.50E+02	NR	NR	NR
NR	4.89E+01	NR	NR	NR
NR	1.33E+03	NR	NR	NR
1.00	1.48E+02	5.10E+01	4.12E+01	NR
1.00	1.18E+02	6.08E+02	1.07E+02	NR
1.00	1.15E+03	4.47E+02	3.22E+02	9.97E+04
1.00	5.05E+02	1.08E+04	4.82E+02	2.62E+02
1.00	6.12E+02	1.25E+04	5.83E+02	1.74E+02
1.00	4.70E+02	1.33E+04	4.54E+02	9.45E+01
1.00	2.41E+02	1.32E+04	2.37E+02	1.11E+02
1.00	5.92E+03	2.86E+05	5.80E+03	3.59E+00
1.00	5.20E+02	6.62E+04	5.16E+02	5.84E+01
1.00	1.18E+03	1.53E+05	1.17E+03	6.78E+00
1.00	9.32E+00	1.03E+01	4.90E+00	5.29E+00
1.00	1.26E+01	NR	8.39E+00	1.36E+00
1.00	1.01E+01	NR	6.67E+00	3.75E+00
1.00	1.47E+01	NR	9.70E+00	2.12E+00
1.00	1.45E+00	NR	9.59E-01	2.81E+00
1.00	5.93E+00	1.18E+01	3.95E+00	1.90E-01
1.00	1.35E+00	2.46E+00	8.71E-01	1.21E-02
1.00	7.08E+01	NR	4.62E+01	4.76E-02

Pathway Contributions (%)					
direct soil ingestion	sum of consumption of homegrown produce and attached soil	dermal contact (indoor)	dermal contact (outdoor)	inhalation of dust (indoor)	inhalation of dust (outdoor)
%	%	%	%	%	%
79.89	7.54	0.45	11.86	0.25	0.00
11.21	38.70	0.00	0.06	0.04	0.00
85.63	1.03	0.00	0.00	0.27	0.00
66.71	30.08	0.00	0.00	0.21	0.00
32.77	16.18	0.03	0.81	0.10	0.00
36.15	13.78	0.00	0.00	0.11	0.00
23.95	26.00	0.00	0.00	0.08	0.00
40.59	28.46	0.00	0.00	0.13	0.00
36.29	26.02	0.00	0.00	0.00	0.00
49.28	0.57	0.00	0.00	0.16	0.00
47.43	2.49	0.00	0.00	0.15	0.00
27.91	26.36	0.00	0.00	0.09	0.00
1.09	86.26	0.06	1.62	0.00	0.00
5.96	85.55	0.15	3.84	0.02	0.00
7.21	83.21	0.18	4.64	0.02	0.00
8.41	82.45	0.20	5.41	0.03	0.00
14.00	73.92	0.34	9.01	0.04	0.00
14.35	74.04	0.35	9.23	0.05	0.00
30.58	48.01	0.74	19.68	0.10	0.00
28.84	51.06	0.70	18.56	0.09	0.00
49.93	16.40	1.21	32.13	0.16	0.00
46.59	22.12	1.13	29.98	0.15	0.00
52.41	12.41	1.27	33.73	0.17	0.00
54.44	9.02	1.32	35.03	0.17	0.00
53.68	10.29	1.31	34.55	0.17	0.00
51.07	14.64	1.24	32.87	0.16	0.00
55.52	7.21	1.35	35.73	0.18	0.00
57.70	3.58	1.40	37.13	0.18	0.00

inhalation of vapour (indoor)	inhalation of vapour (outdoor)	oral background	inhalation background	Total
%	%	%	%	%
0.00	0.00	0.00	0.00	100.00
0.00	0.00	49.96	0.04	100.00
0.00	0.00	13.01	0.06	100.00
0.00	0.00	3.00	0.00	100.00
0.00	0.00	49.90	0.10	99.90
0.00	0.00	49.92	0.04	100.00
0.00	0.00	49.95	0.02	100.00
0.00	0.00	30.82	0.00	100.00
0.00	0.00	37.70	0.00	100.00
0.00	0.00	50.00	0.00	100.00
0.00	0.00	49.92	0.00	100.00
0.00	0.00	45.56	0.09	100.00
0.81	0.00	9.03	1.11	100.00
4.46	0.00	0.01	0.00	100.00
4.64	0.00	0.09	0.00	100.00
3.39	0.00	0.08	0.01	100.00
1.74	0.00	0.69	0.25	100.00
1.98	0.00	0.00	0.00	100.00
0.68	0.00	0.16	0.04	100.00
0.67	0.00	0.07	0.01	100.00
0.15	0.00	0.00	0.00	100.00
0.02	0.00	0.00	0.00	100.00
0.01	0.00	0.00	0.00	100.00
0.01	0.00	0.00	0.00	100.00
0.01	0.00	0.00	0.00	100.00
0.01	0.00	0.00	0.00	100.00
0.01	0.00	0.00	0.00	100.00
0.01	0.00	0.00	0.00	100.00
0.00	0.00	0.00	0.00	100.00



APPENDIX E

Ground Gas and Groundwater Monitoring Results

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