

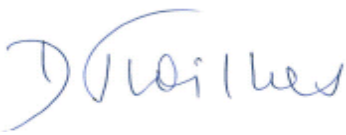
GROUND INVESTIGATION REPORT

for the land at

ELGEE PLASTICS, WILSON ROAD, READING RG30 2RS

on behalf of

THE KEEN PARTNERSHIP

Report:	GROUND INVESTIGATION REPORT
Site:	ELGEE PLASTICS, WILSON ROAD, READING RG30 2RS
Client:	THE KEEN PARTNERSHIP
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APPENDIX D	Statistical Analysis Summary Sheets
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EXECUTIVE SUMMARY		
Site Details	Site Address	Elgee Plastics, Wilson Road, Reading RG30 2RS
	National Grid Reference	469430, 173670
	Site Area	c. 0.04 Ha
	Form of Development	Construction of three terraced houses with private gardens, parking areas and associated utilities and infrastructure.
Encountered Conditions	Scope of works	A desk study report including a preliminary risk assessment (reference 65836R1, dated March 2017) was previously prepared by others. The investigation included an intrusive investigation, laboratory testing and ground gas monitoring to inform a geotechnical and geo-environmental assessment in the context of the proposed development.
	Ground Conditions	The ground conditions generally comprised shallow Made Ground soils overlying slightly gravelly sandy silty CLAY and orangeish brown very gravelly very clayey SAND and orange brown silty sandy or clayey sandy GRAVEL of the Taplow Gravel Formation, in turn overlying structureless CHALK of the White Chalk Subgroup.
	Groundwater	Groundwater was encountered at a depth of 4.0m bgl within borehole WS2 only during the investigation. Water was not encountered within the monitoring boreholes during the three return monitoring visits.
Geotechnical Considerations	Foundations	It is considered that conventional shallow foundations may be suitable for the proposed development, with foundations passing through any Made Ground, disturbed zones, root zones soft and weathered ground to terminate within the sandy silty clay, gravelly clayey sand or clayey sandy gravel of the Taplow Gravel Formation. A minimum founding depth of 0.75m bgl is recommended remote from trees in accordance with NHBC standards for low volume change potential soils. Where conventional foundations are proposed, a preliminary net allowable bearing capacity of 125kPa is recommended for the Taplow Gravel Formation for which total settlement should remain within tolerable limits.
	Floor Slabs	Given the presence of shrinkable soils at shallow depth suspended floor slabs are recommended throughout the development.
	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. Under no circumstances should personnel be permitted to enter excavations during construction or maintenance.
	Buried Concrete	The results of the water soluble sulphate and pH analyses indicate that buried concrete (shallow foundations) within the Taplow Gravel Formation should be designed in accordance with Class DS-1 of BRE Special Digest 1, with an ACEC class of AC-1.
Environmental Considerations	Human Health	Statistical assessment of shallow soils across the site has identified lead at concentrations above the respective screening criteria for a proposed residential land use. In the context of the proposed hard cover landscaping to be applied to external areas, formal remediation measures are not considered to be required. However, in the event that the proposed landscaping of external areas is changed to incorporate any areas of soft landscaping, remedial measures would be required for the protection of end users and these should be set out within a Remediation Method Statement with validation of the implementation of the remedial measures to be confirmed within a Validation Report to be submitted to the local authority or warrantors.
	Groundwater	It is considered that protection measures are not required in this respect.
	Ground Gases	Preliminary ground gas monitoring has identified the site to be classified as CS1/Green for which gas protection measures are not required.
	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 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.		
<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. GE16528/GIR/AUG17.</i>		



1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by The Keen Partnership to undertake investigation works to assess the geotechnical and geo-environmental factors pertaining to proposed development at the former Elgee Plastics factory, Wilson Road, Reading RG30 2RS (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 with the clearance of the site and the construction of three terraced houses with private gardens, driveway parking and associated infrastructure.

1.3 Objectives

The data from the geotechnical investigation was to form the basis of an interpretation with respect to foundation design, concrete specification, excavation stability and other pertinent construction issues.

A Preliminary Risk Assessment (PRA) was previously undertaken by others (report ref. 65836R1, dated March 2017). The report has been used to provide a basis for the scope and rationale of the subsequent Phase II ground investigation. 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.

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 DESK STUDY

For detailed information on the Phase I desk study reference should be made to the separate report prepared by others (reference 65836R1, dated March 2017). The main findings of the report are summarised below, for completeness, augmented with observations made by the Geo-Environmental engineer at the time of the intrusive investigation. Comments made in the following section regarding possible ground conditions on the site are based purely on the desk study.

2.1 Site Description

The site comprised an approximately rectangular shaped parcel of land located at National Grid Reference 469430, 173670. The site extended to approximately 0.04Ha and the ground within the site was noted to be generally level.

At the time of the investigation (June 2017) the site was vacant with previous structures on the site having been demolished and the site cleared.

The site was situated in a predominantly residential area with residential properties immediately to the east and south of the site, with Wilson Road and residential properties beyond located to the west of the site. Amenity land use comprising car parking associated with Grovelands Baptist Church was located to the north of the site. The wider area incorporated commercial premises along Oxford Road to the north of the site. The site was accessed via Wilson Road to the west of the site.

2.2 Geology

The desk study recorded that British Geological Survey geological (BGS) mapping indicated the geology of the site to consist of the superficial Taplow Gravel Formation underlain by the Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated).

2.3 Hydrogeology

The desk study indicated that the Taplow Gravel Formation is a Secondary A Aquifer, with the underlying chalk comprising a Principal Aquifer.

The site was reported to be located within an area in which the risk of groundwater flooding is high.

The desk study data search indicated that six groundwater abstraction licences were located within 1km of the site.

The desk study recorded that the site was indicated to not be located within a Source Protection Zone.

2.4 Hydrology

The desk study recorded that there were no significant surface water features within 250m of the site with the site indicated to be outside of any designated flood risk zone.

The desk study indicated that no surface water abstraction licences were present within 1km of the site.

2.5 Sensitive Land Uses

The desk study reported that the site was not located within or in close proximity to any areas of particular environmental sensitivity.



2.6 Radon

The desk study reported that the site lies in an area where less than 1% of homes are above the Action Level as defined by Public Health England and the BGS. No radon protective measures are therefore considered necessary by Public Health England in the construction of new houses or extensions.

2.7 Environmental Data

The desk study included a search of environmental data on potentially contaminative land uses, air pollution control sites, Part IIA contaminated land, Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC) sites, registered radioactive substances, COMAH sites, explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS) sites, planning permissions for sites involving hazardous substances, contemporary trade directories and fuel station registers.

The desk study recorded that no such listings were indicated within a 50m radius of the site. No Environment Agency recorded pollution incidents were indicated within 250m of the site.

2.8 Landfill and Waste Management Facilities

A search of BGS recorded landfill sites, IPC registered waste sites, licensed waste management facilities, local authority recorded landfill sites, other registered landfill sites, waste transfer stations and other waste treatment or disposal sites was and potentially infilled land was undertaken as part of the desk study. Such sites may form an artificial source of ground gases, such as carbon dioxide and methane, where wastes or other putrescible materials are buried or disposed of to landfill.

No such facility was identified by the desk study within a 250m radius of the site boundary.

2.9 Geotechnical Data

The desk study reported that the site was located within an area considered by the Coal Authority as being unlikely to be affected by coal mining activity.

The desk study data search indicated that there were no natural hazards (with a hazard rating of moderate or above) at or within 50m of the site.

The desk study report stated that artificial or Made Ground is anticipated on the site.

2.10 Historic Land Use

The desk study reported on an inspection of historic maps dating back to 1881.

The review of historical mapping indicated the site to have been developed prior to 1883, with adjoining square buildings in the north eastern corner of the site. Further development was indicated to have prior to the 1911 map extract, with a large rectangular building shown in the centre of the site. Residential development was indicated to have occurred in the surrounding area by this time. A third building was indicated in the south western corner of the site prior to 1932. The mapping was reported to indicate that the three aforementioned buildings were shown to have been demolished by the time of publication of the 1959 map extract, with the buildings having been replaced with a single large rectangular building named as a works. This building was named as a bakery in the 1968 map extract. The site layout was indicated to remain unchanged by the time of publication of the 2010 map extract. Anecdotal evidence confirmed that the building on site was utilised by Elgee Plastics



prior to the clearance of the site that was undertaken prior to the compilation of the desk study report and the current investigation.

2.11 Previous Ground Investigations

Geo-Environmental Services Limited is not aware of any previous physical investigations having been undertaken on the site.

2.12 Potential Contamination

The desk study report indicated that it is possible that a thickness of Made Ground may be present beneath the site due to the historic land use and development of the site. As such, should Made Ground be identified underlying the site the soil may contain contaminants of concern, to include metals, non-metal, inorganic pollutants, organic pollutants (including PAH/TPH), volatile organic pollutants and asbestos.

2.13 Asbestos

The desk study reported that a previous asbestos survey had confirmed the presence of asbestos containing materials (ACMs) in the former works building. Accordingly, in line with current best practice, asbestos and ACM should be assumed to be present until proven otherwise.

2.14 Ground Gas and Vapour Summary

In view of the previous development of the site the desk study indicated that there is the potential for Made Ground to be present and as such if Made Ground is present and is identified as containing a significant amount of organic matter or organic contamination, it could have the potential to represent a source of ground gases/vapours.



3.0 PRELIMINARY ASSESSMENT

The previous desk study report undertaken by others (report ref. 65836R1, dated March 2017) included a preliminary risk assessment of the environmental factors likely to impact the site.

3.1 Preliminary Risk Assessment Summary

The preliminary risk assessment contained within the desk study report identified that potential sources of contamination were present at the site, with viable pollutant linkages identified, with a risk classification presented for each of the source pathway receptor linkages identified. The findings of the preliminary risk assessment are summarised below.

The following potential contamination sources were identified and potential risks attributed to the site in the context of the proposed residential development:

- Inorganic and low volatility organic contaminants within subsurface soils – **Very Low to Moderate/Low Risk**
- Volatile organic contaminants within subsurface soils – **Very Low to Moderate/Low Risk**
- Asbestos containing materials within subsurface soils – **Moderate Risk**
- Dissolved phase contaminants within shallow groundwater – **Moderate/Low Risk**
- Elevated methane/carbon dioxide within subsurface soils – **Moderate/Low Risk**
- Radon within the subsurface – **Low Risk**

As a result of the findings of the above risk assessment an overall **Moderate Risk** was attributed to the site.

The potential pollutant linkages established within this 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, the desk study report recommended that a programme of site investigation and monitoring works should be undertaken to establish the presence or absence of contamination and to enable a quantitative assessment of the associated environmental risks.

3.2 Scope of Works

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

- Attendance of a Geo-Environmental/Geotechnical Engineer to set out and supervise the intrusive investigation. On site logging and sampling of soils/rock recovered from exploratory holes.
- The construction of 4No. window sampler boreholes to a depth of up to 5.0m bgl, with in situ testing, logging and sampling
- Installation of ground gas monitoring wells within window sampler boreholes WS1 and WS3.
- Return gas monitoring visits on 3No. occasions following completion of the fieldwork.
- Geotechnical laboratory testing on soil samples recovered from the exploratory holes to support the geotechnical assessment.
- Geochemical testing of soil samples recovered from exploratory holes to support the environmental assessment.
- Provision of a Ground Investigation Report.



3.5 Investigation Strategy

The positioning of exploratory holes was determined on site to provide general coverage. Table 3.7 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
Asbestos & ACMs	Exploratory holes located across the site, coupled with sampling and laboratory analysis.	All
General gassing regime	Spot monitoring within wells located on the site.	WS1 & WS3

Table 3.7 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.



4.0 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 June 2017.

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

4.1 Soils

The ground conditions encountered were broadly consistent with those anticipated from a review of the British Geological Survey mapping, i.e. Taplow Gravel Formation overlying the White Chalk Subgroup. Made Ground soils were found to overlie the Taplow Gravel Formation at all investigation locations. The ground conditions are summarised in Table 4.1.

Top (m bgl)	Base (m bgl)	Description
0.00	0.10 – 0.20	MADE GROUND: Orange brown slightly silty SAND with some fine to coarse grained gravel of brick, clinker and flint.
0.10 – 0.20	2.70 – 3.90	TAPLOW GRAVEL FORMATION: Brown slightly gravelly sandy silty CLAY and orangeish brown very gravelly very clayey SAND and orange brown silty sandy or clayey sandy GRAVEL.
2.70 – 3.90	5.00+	WHITE CHALK SUBGROUP: Structureless chalk arising as clasts of hard white chalk in a cream and buff silty matrix with some fine to coarse grained sub angular flint gravel.

Table 4.1 Summary of Ground Conditions

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

4.2 Groundwater

Groundwater was encountered at a depth of 4.0m bgl within borehole WS2 only during the investigation. Water was not encountered within the monitoring boreholes during the three return monitoring visits.

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.

4.3 Obstructions

No obstructions were encountered within the exploratory holes. However, the presence of obstructions elsewhere on the site cannot be completely discounted.



4.4 Geotechnical Testing

Geotechnical laboratory tests were undertaken on selected samples of the Taplow Gravel Formation and White Chalk Subgroup encountered on the site. The results are summarised in Table 4.2 below.

Eight pH and water soluble sulphate determinations were undertaken on samples of the Taplow Gravel Formation and the White Chalk Subgroup. The results indicate pH values ranging between pH7.84 and pH8.16 with water soluble sulphate concentrations ranging between 0.05g/l and 0.22g/l.

Four Atterberg Limit tests were undertaken on the more cohesive horizons of the Taplow Gravel Formation with the results indicating plasticity indices of between 13 and 23%. Modified Plasticity Indices of between 8 and 22% were calculated. Corresponding moisture contents of between 14% and 18% were also reported.

Five Particle Size Distribution (PSD) analyses were undertaken on samples of the more granular horizons of the Taplow Gravel Formation. The analysis indicated these soils to comprise clayey very sandy GRAVEL and very gravelly very clayey SAND.

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

Parameter	Taplow Gravel Formation/White Chalk Subgroup
Natural Moisture Content (%)	14 - 18
Liquid Limit (%)	26 - 40
Plastic Limit (%)	12 - 17
Plasticity Index Ip (%)	13 - 23
Modified Plasticity Index Ip' (%)	8 - 22
pH	7.84 - 8.16
Water soluble sulphate (g/l)	0.05 – 0.22

Table 4.2 Summary of Geotechnical Laboratory Test Results

4.5 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.

Six soil samples were submitted for analysis of a suite of commonly occurring brownfield contaminants, with four of these samples also analysed for speciated petroleum hydrocarbons and BTEX compounds and VOC and SVOC analysis. All of the six samples were also screened for the presence of asbestos. The results and implications thereof are discussed in Section 6 of this report.



4.6 Ground Gases

Two ground gas monitoring wells were installed (within boreholes WS1 and WS3) to enable three rounds of ground gas monitoring to be undertaken.

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

During the monitoring, the level of methane recorded was 0.0% v/v, whilst carbon dioxide and oxygen were present in the range 0.2 – 0.9% v/v and 17.4 – 20.7% v/v, respectively. No positive borehole gas flow was recorded. Atmospheric pressure was recorded to range between 1003mb and 1010mb.



5.0 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.

The results of the Atterberg Limit tests in conjunction with the field observations indicated that the soils of the Taplow Gravel Formation 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 low volume change potential, as defined by NHBC Standards, Chapter 4.2. Therefore a minimum founding depth of 0.75m 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.

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 Taplow Gravel Formation.

Based on the ground conditions encountered, a net allowable bearing capacity of 125kPa is recommended for foundations terminating wholly within the Taplow Gravel Formation. 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 shrinkable soils at shallow depth on the site it is recommended that suspended floor slabs are utilised throughout the development.

5.4 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.

5.5 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.

5.6 Sub-Surface Concrete

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



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 v1.06 calculations for a residential end use with plant uptake are presented in Table 6.1.

	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 including ground floor apartments with private gardens.
Soil Type	Sandy silt loam	pH 7.72	SOM 1.31%	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 & vapour		Default setting for land use.



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 (CLEA v1.06 Software)

Statistical analysis of the non-targeted samples within the dataset 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 determinand, with the critical concentration being the relevant SSAC or GAC (the soil screening value) for that determinand 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 indicated that the null hypothesis could be rejected for all determinands with the exception of lead.

The concentration of lead recorded in the samples taken from the shallow Made Ground soils in WS2 at 0.1m bgl (395mg/kg) and WS3 at 0.05m bgl (205mg/kg) were above the respective C4SL (200mg/kg) with neither of the results indicated to be statistical outliers. As a result it was not considered appropriate to remove the results from the dataset and the null hypothesis could not be rejected. Accordingly it is considered that the shallow Made Ground soils at the site are impacted with lead contamination. It is noted that the level of lead recorded in the sample of Made Ground taken at 0.3m bgl in WS3 was below the respective C4SL, indicating that the lead contamination may be confined to the shallow 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 levels of these determinands.

Furthermore the testing recorded for the presence of volatile and semi volatile organic compounds did not record significantly elevated levels of these determinands.

The asbestos screens undertaken on the six samples of shallow soils found that asbestos was not present within any of the samples.

In view of the lead contamination that has been recorded in shallow Made Ground it is considered that remedial measures for the protection of end users would be required within any areas of private gardens and soft landscaping.

In consideration of the current residential development proposals, it is considered that where contaminated soils lie beneath the footprint of the proposed houses that no source pathway receptor linkage exists and therefore no risk is posed to end users from the lead contamination identified and hence no remedial measures would be required in these areas. It is noted that hard cover landscaping is proposed for the external private garden areas to the rear of the properties, with driveway parking to the front. The use of hard cover landscaping in external areas would similarly serve to sever pollutant linkages between lead contaminated Made Ground soils and end users. However in light of the potential for future users to remove hardstanding areas to incorporate soft landscaping or for cultivation of foodstuffs it is recommended that Made Ground soils are removed from within proposed garden areas. To this end it is noted that the proposed construction of hard landscaped areas in the gardens within the



current development involves the excavation and removal of up to 300mm of soils from the garden areas to enable the construction of the hard landscaping. It is noted that the intrusive investigation encountered Made Ground soils to a maximum depth of 0.3m bgl, with the excavation work to be undertaken to allow incorporation of hard cover landscaping thereby removing lead contaminated Made Ground soils from these areas of the site, with the consequent removal of any source-pathway-receptor linkage.

It should be noted that in the event that the development proposals change to incorporate soft landscaping within garden areas without the excavation of Made Ground soils that remedial measures would be required for the protection of end users from the lead contamination identified. 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 with validation laboratory testing of soils at formation level with placement of a cover system of verified clean imported soils. 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.

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 with amenity use (a church car park) to the north. With reference to Section 6.2, no significantly elevated levels 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 site is underlain by a Secondary A Aquifer (Taplow Gravel Formation) and a Principal Aquifer (White Chalk Subgroup) and is outside of any groundwater Source Protection Zone. No significant mobile contaminants were recorded during the investigation and with the proposed hard landscaping to be adopted within garden areas 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.

6.6 Ground Gases vs. End Users



The desk study and preliminary risk assessment did not identify a significant risk from on or off-site sources of landfill gas, however the presence of Made Ground soils on the site containing organic or putrescible materials was considered to provide a potential source of ground gases. The ground investigation did not identify significant organic or putrescible material within the limited Made Ground on site. At this stage three rounds of confirmatory ground gas monitoring have been undertaken.

Recommendations on acceptable gas concentrations recorded in the ground beneath or adjacent to buildings are given in a variety of publications. For the purpose of this assessment, the results have been evaluated in terms of British Standard BS8485 entitled '*Code of practice for the characterisation and remediation from ground gas in affected developments*' (2015) and NHBC report 10627-R01(04) entitled '*Guidance on evaluation of development proposals where methane and carbon dioxide are present*' (2007). A summary of the BS8485 and NHBC assessment approaches is presented in Table 6.2.

Characteristic Gas Situation (CS)	Characteristic Hazardous Gas Flow (HGF) (CO ₂ or CH ₄) (l/hr)	Hazard Potential	NHBC Traffic Light	Additional Factors
1	<0.07l/hr	Very Low	Green	Typically methane <1% v/v and/or carbon dioxide <5% v/v. Otherwise consider increase to CS2.
2	<0.7l/hr	Low	Amber 1	Borehole air flow rate not to exceed 70l/h, methane not to exceed 5%v/v. Otherwise consider increase to CS3/Amber 2.
3	<3.5l/hr	Moderate	Amber 2	
4	<15l/hr	Moderate to High	Red	Quantitative risk assessment required to evaluate scope of protective measures.
5	<70l/hr	High		
6	>70l/hr	Very High		

Table 6.2 - Characteristic Gas Situation by Site Characteristic Hazardous Gas Flow Rate

During the monitoring, the level of methane recorded was 0.0% v/v, whilst carbon dioxide and oxygen were present in the range 0.2 – 0.9% v/v and 17.4 – 20.7% v/v, respectively. VOC was recorded at 0.1ppm. No positive borehole gas flow was recorded. Atmospheric pressure was recorded to range between 1003mb and 1010mb.

The Hazardous Gas Flows (HGF) for carbon dioxide and methane based on the data from the three monitoring visits undertaken were 0.00l/hr and 0.00l/hr, respectively. These HGFs are representative of CS1/Traffic Light Green, for which ground gas protection measures are not considered necessary.

On the basis of the ground gas monitoring undertaken, the ground gas assessment has indicated that ground gas protection measures are not required.

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

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

6.7 Ground Gases vs. Soft Landscaping



The ground gas monitoring undertaken to date has recorded low concentrations of carbon dioxide (maximum 0.9%v/v) with no detectable concentrations of methane recorded. In view of the levels of ground gases recorded no significant risk to soft landscaping is posed by ground gases.

6.8 Waste Classification

6.8.1 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

The results of the chemical testing undertaken indicate that any natural soil arisings removed are likely to be classified as 'Inert', suitable for disposal at an inert landfill site.

It is recommended that Waste Acceptance Criteria (WAC) testing is undertaken on any Made Ground soils identified for removal from site in order 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.

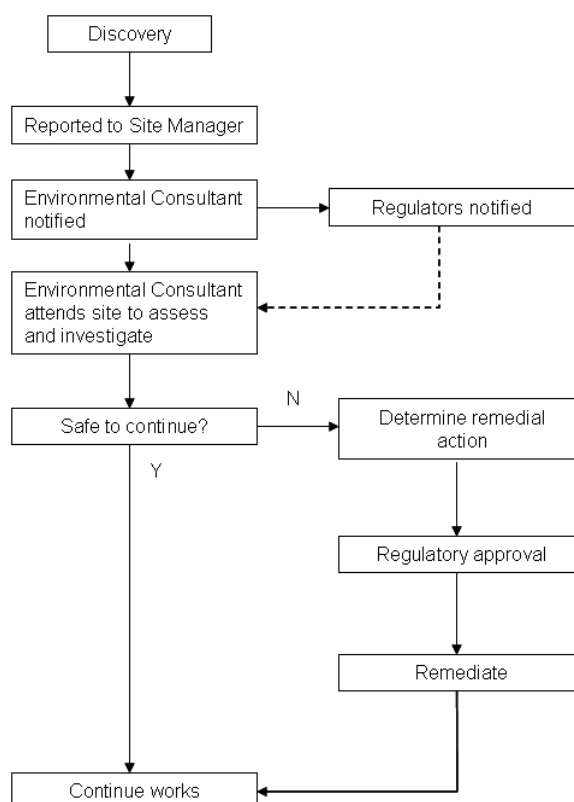


Whilst the investigation undertaken on the site to date is considered to be thorough, it remains possible that unexpected soil conditions may be encountered during the process of site clearance and construction.

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.

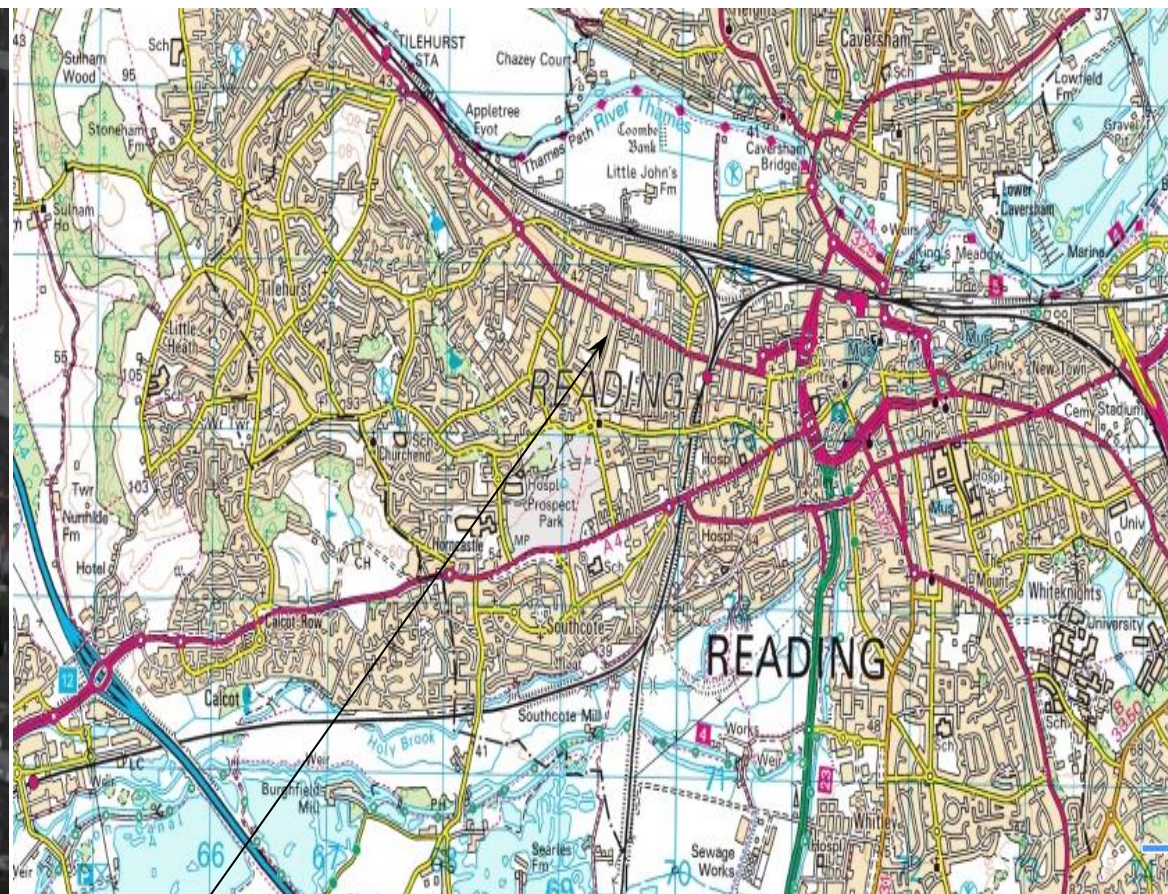
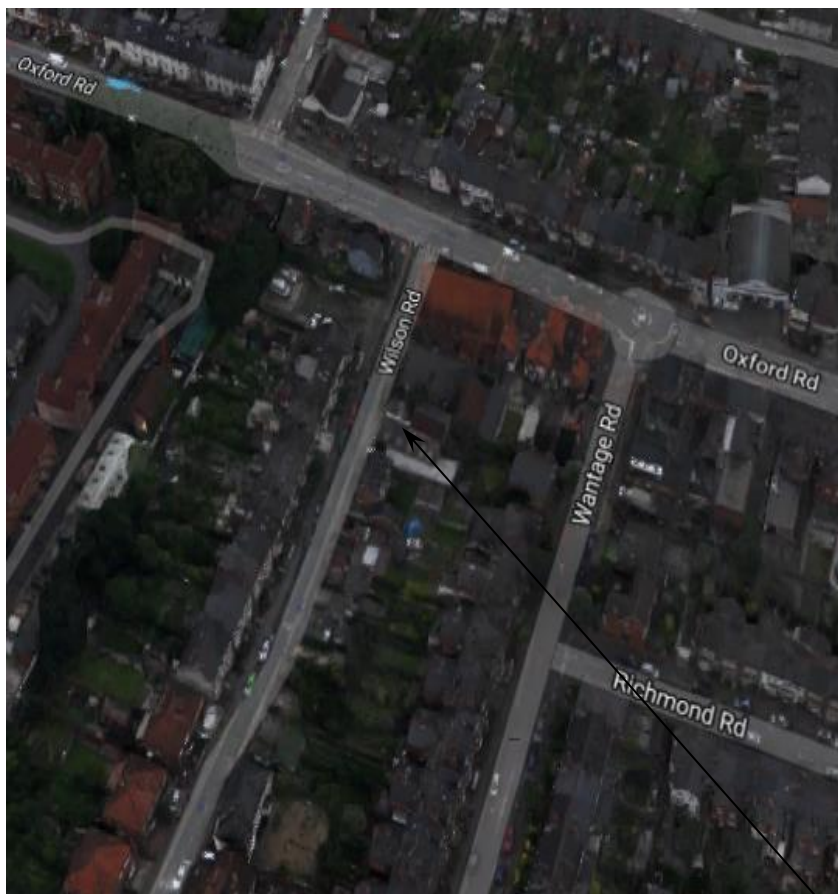


Discovery Strategy Process

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

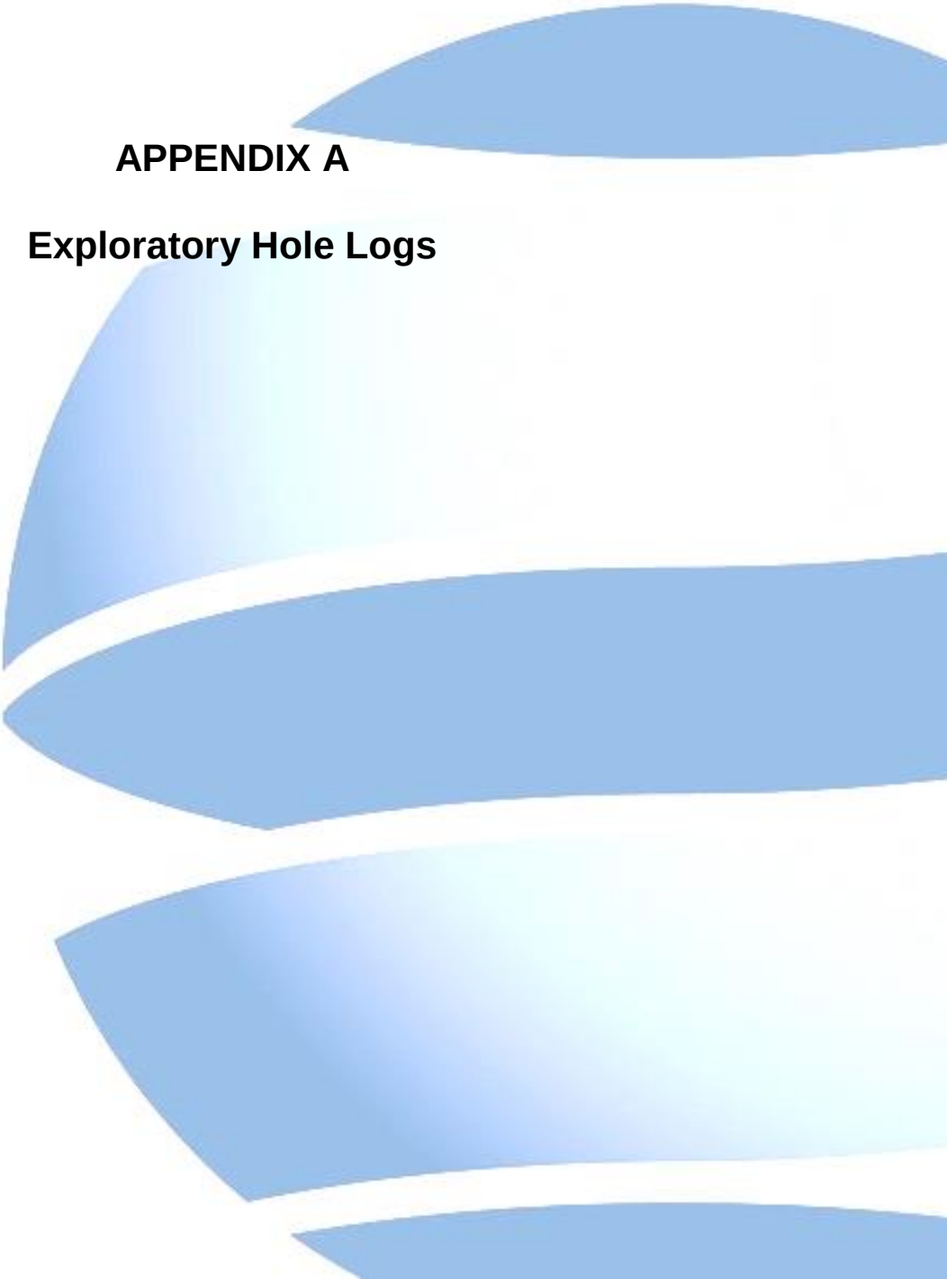


Site Location (buildings now demolished)

Project:	Former Elgee Plastics, Wilson Road, Reading RG30 2RS			Title	Site Location Plan		
Client:	The Keen Partnership			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:	GE16528	Revision:	0				
Drawn:	DW	Date:	Jun 2017				
Figure:	1	Scale:	Not To Scale				



Project:	Former Elgee Plastics, Wilson Road, Reading RG30 2RS			Title	Exploratory Hole Location Plan	
Client:	The Keen Partnership			 Geo-Environmental		
Ref No:	GE16528	Revision:	0			
Drawn:	DW	Date:	01/06/2017			
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



www.gesl.net

Borehole No.

Sheet 1 of 1

Hole Type	WS
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Scale
1:25

Logged By
DW





Geo-Environmental
www.gesl.net

Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL

Borehole Log

Borehole No.

WS2

Sheet 1 of 1

Project Name: Elgee Plastics, Reading

Project No.
GE16528

Co-ords: 469437E - 173664N

Hole Type
WS

Location: Elgee Plastics, Wilson Road, Reading RG30 2RS

Level:

Scale
1:25

Client: The Keen Partnership

Dates: 29/06/2017

Logged By
DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.20			Orange brown slightly silty SAND with some fine to coarse grained gravel of brick, clinker and flint MADE GROUND	1
		0.40	D					Brown slightly gravelly sandy silty CLAY. Gravel is fine to coarse grained sub angular flint TAPLOW GRAVEL FORMATION	
		0.40	ES						
		0.90	D						
		1.40	D		1.80			Orangeish brown very gravelly very clayey SAND. Gravel is fine to coarse grained sub angular flint TAPLOW GRAVEL FORMATION	2
		1.90	D						
		2.60	D						
		2.70	D		2.90			Orangeish brown silty sandy GRAVEL. Gravel is fine to coarse grained sub angular flint. TAPLOW GRAVEL FORMATION	3
		2.90	D						
		3.60	D						
		3.90	D						
		4.60	D		4.90			Structureless CHALK arising as clasts of hard white chalk in a cream and buff silty matrix with some fine to coarse grained sub angular flint gravel. WHITE CHALK SUBGROUP	4
		4.90	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				
		4.00	3.80						
Dynamic Probe adjacent to borehole. Water strike at 4.0m. Borehole stable									



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS3	
Project Name: Elgee Plastics, Reading		Project No. GE16528		Co-ords: 469425E - 173669N		Sheet 1 of 1	
Location: Elgee Plastics, Wilson Road, Reading RG30 2RS				Level:		Hole Type WS	
Client: The Keen Partnership				Dates: 29/06/2017		Scale 1:25	
Client: The Keen Partnership				Dates: 29/06/2017		Logged By DW	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05	ES		0.10		 Orange brown slightly silty SAND with some fine to coarse grained gravel of brick, clinker and flint and some fine rootlets MADE GROUND		
		0.30	D				 Brown slightly gravelly sandy silty CLAY. Gravel is fine to medium grained sub angular flint TAPLOW GRAVEL FORMATION		
		0.30	ES						
		0.50	D						
		1.00	D						
		1.50	D		1.40	 Orangeish brown slightly clayey very sandy GRAVEL. Gravel is fine to coarse grained sub angular flint TAPLOW GRAVEL FORMATION			
		2.00	D						
		2.50	D		2.60	 Orangeish brown slightly clayey sandy GRAVEL. Gravel is fine to coarse grained sub angular flint TAPLOW GRAVEL FORMATION			
		3.00	D		3.00	End of Borehole at 3.00m		3	
									4
									5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Borehole dry and stable





www.gesl.net

Borehole Log

Borehole No.

WS4

Sheet 1 of 1

Project Name: Elgee Plastics, Reading

Project No.
GE16528

Co-ords: 469427E - 173676N

Hole Type	WS
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
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57	57
58	58
59	59
60	60
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62	62
63	63
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67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Location: Elgee Plastics, Wilson Road, Reading RG30 2RS

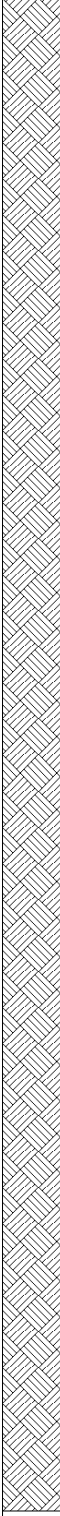
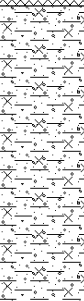
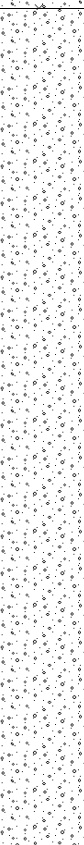
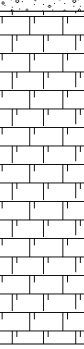
Level:

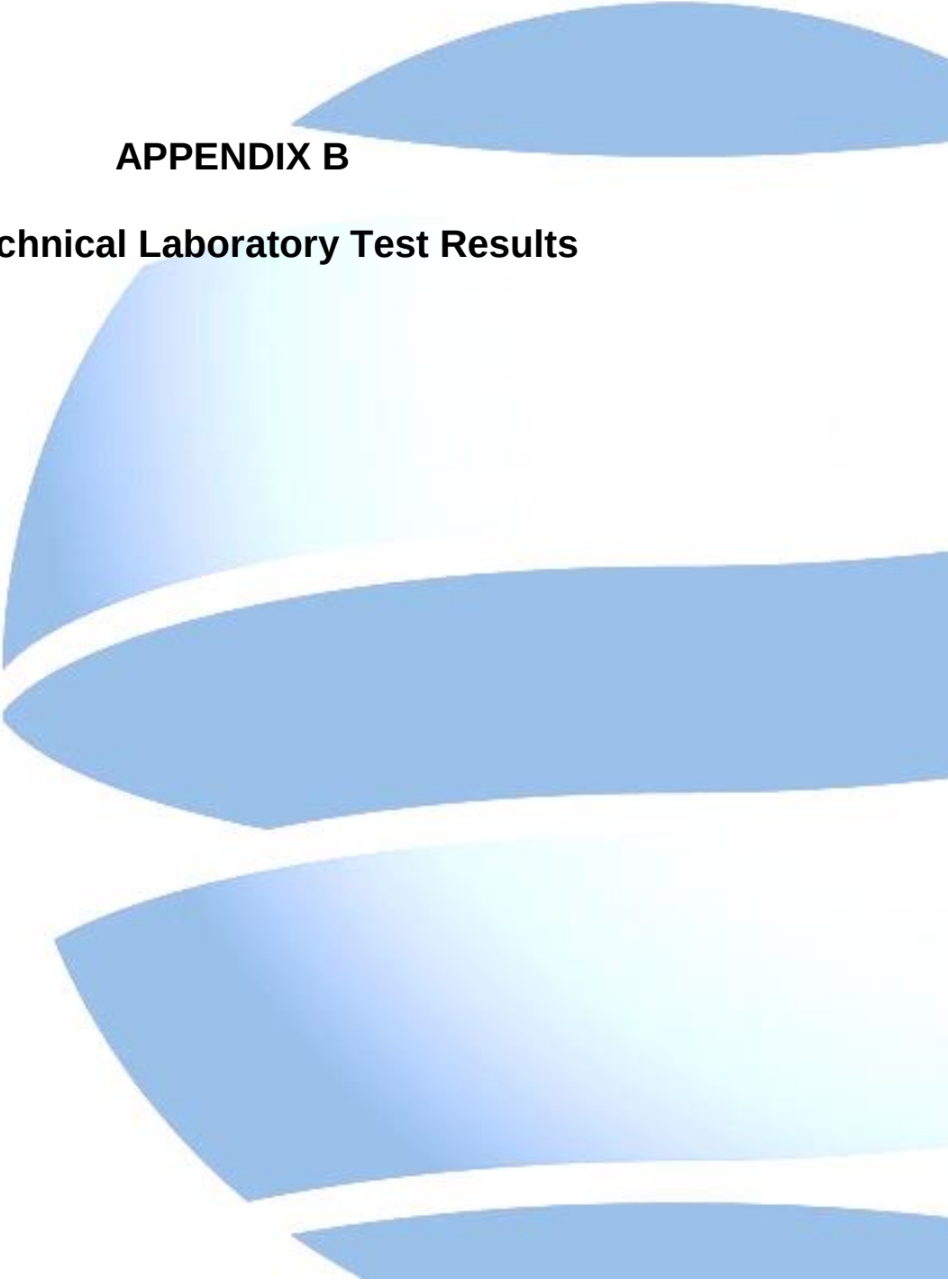
Scale
1:25

Client: The Keen Partnership

Dates: 29/06/2017

Logged By
DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05	ES		0.10			Orange brown slightly silty SAND with some fine to coarse grained gravel of brick, clinker and flint and some fine rootlets MADE GROUND Orangeish brown slightly gravelly sandy silty CLAY. Gravel is fine to medium grained sub angular flint TAPLOW GRAVEL FORMATION	1
		0.30 0.30	D ES						
		0.80	D		1.10			Orangeish brown clayey very sandy GRAVEL. Gravel is fine to coarse grained sub angular flint TAPLOW GRAVEL FORMATION	2
		1.30	D						
		1.80	D		3.90			Structureless CHALK arising as clasts of hard white chalk in a cream and buff silty matrix with some fine to coarse grained sub angular flint gravel. WHITE CHALK SUBGROUP	4
		2.30	D						
		2.80	D						
		3.30	D		5.00			End of Borehole at 5.00m	5
		4.00	D						
		4.50	D						
5.00	D								
Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks Dynamic Probe adjacent to borehole. Borehole dry and stable			
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to				
		5.00	4.70						
									



APPENDIX B

Geotechnical Laboratory Test Results



 2519	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: 20/07/201
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R1(b)



PARTICLE SIZE DISTRIBUTION

Job Ref 23040

Borehole/Pit No. WS1

Site Name Elgee Plastics, Reading

Sample No. -

Project No. GE16528 Client GESL

Depth 1.80 m

Soil Description Yellowish brown clayey very sandy GRAVEL (gravel is fmc and angular to rounded)

Sample Type D

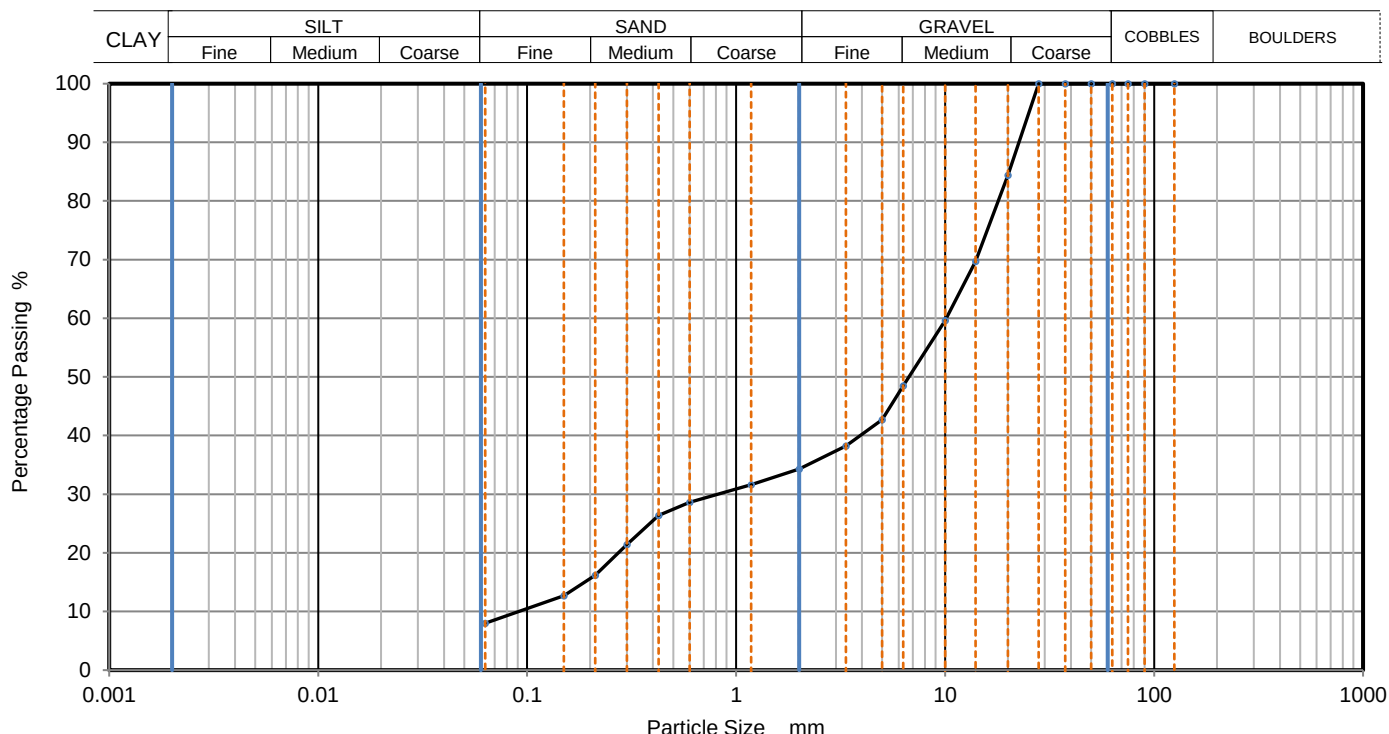
Samples received 04/07/2017

Schedules received 30/06/2017

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 05/07/2017

Date tested 17/07/2017



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	84		
14	70		
10	60		
6.3	49		
5	43		
3.35	38		
2	34		
1.18	32		
0.6	29		
0.425	26		
0.3	21		
0.212	16		
0.15	13		
0.063	8		

Dry Mass of sample, g 677

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	65.7
Sand	26.3
Fines <0.063mm	8.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	110
Curvature Coefficient	0.73

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: 20/07/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3



PARTICLE SIZE DISTRIBUTION

Job Ref 23040

Borehole/Pit No. WS2

Site Name Elgee Plastics, Reading

Sample No. -

Project No. GE16528 Client GESL

Depth 1.90 m

Soil Description Orangish brown very gravelly very clayey SAND (gravel is fmc and sub-rounded to sub-angular)

Sample Type D

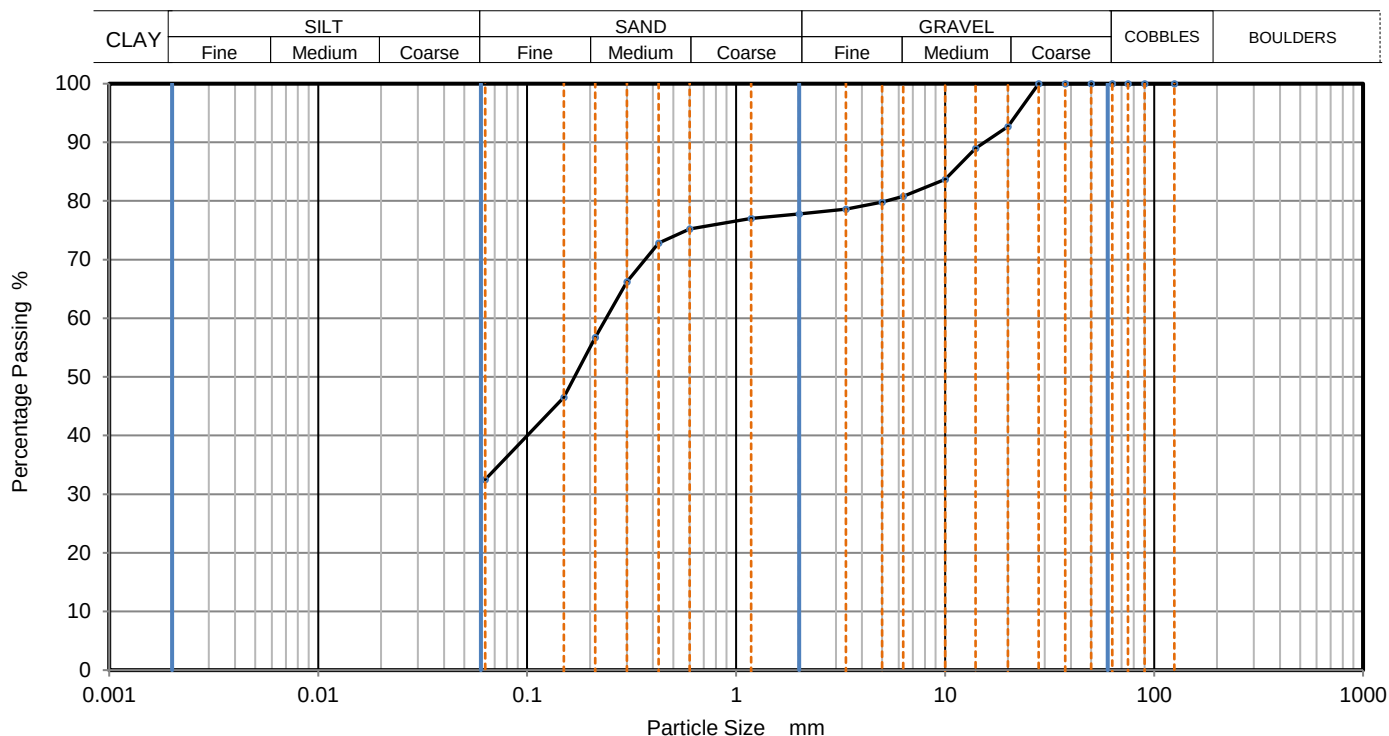
Samples received 04/07/2017

Schedules received 30/06/2017

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 05/07/2017

Date tested 17/07/2017



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	93		
14	89		
10	84		
6.3	81		
5	80		
3.35	79		
2	78		
1.18	77		
0.6	75		
0.425	73		
0.3	66		
0.212	57		
0.15	47		
0.063	33		

Dry Mass of sample, g 323

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	22.2
Sand	45.3
Fines <0.063mm	32.5

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



PARTICLE SIZE DISTRIBUTION

Job Ref 23040

Borehole/Pit No. WS3

Site Name Elgee Plastics, Reading

Sample No. -

Project No. GE16528 Client GESL

Depth 1.50 m

Soil Description Dark orangish brown slightly clayey very sandy GRAVEL (gravel is fmc and angular to rounded)

Sample Type D

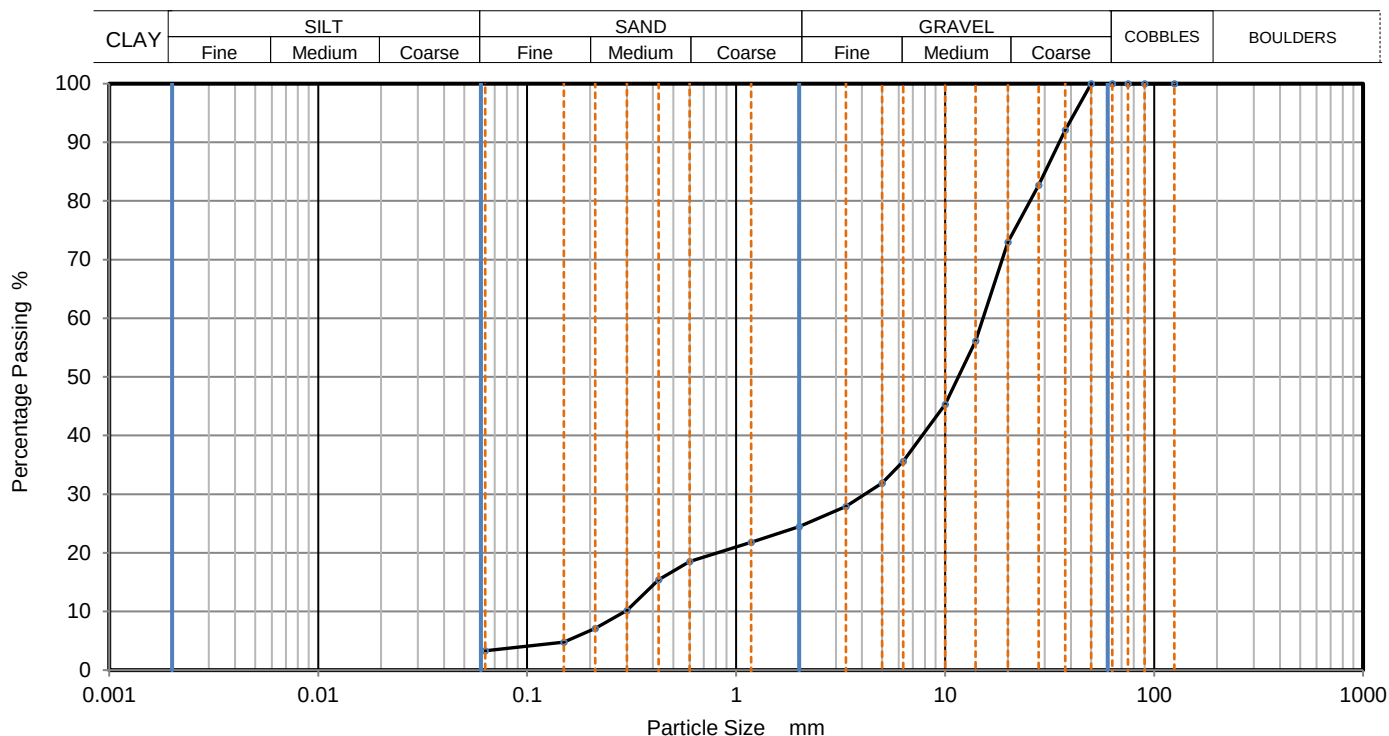
Samples received 04/07/2017

Schedules received 30/06/2017

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 05/07/2017

Date tested 17/07/2017



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	92		
28	83		
20	73		
14	56		
10	45		
6.3	36		
5	32		
3.35	28		
2	25		
1.18	22		
0.6	19		
0.425	15		
0.3	10		
0.212	7		
0.15	5		
0.063	3		

Dry Mass of sample, g 1028

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	75.5
Sand	21.1
Fines <0.063mm	3.3

Grading Analysis	
D100	mm
D60	mm 15.2
D30	mm 4.14
D10	mm 0.292
Uniformity Coefficient	52
Curvature Coefficient	3.9

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: 20/07/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3



PARTICLE SIZE DISTRIBUTION

Job Ref 23040

Borehole/Pit No. WS3

Site Name Elgee Plastics, Reading

Sample No. -

Project No. GE16528 Client GESL

Depth 3.00 m

Soil Description Dark orangish brown slightly clayey sandy GRAVEL (gravel is fmc and angular to rounded)

Sample Type D

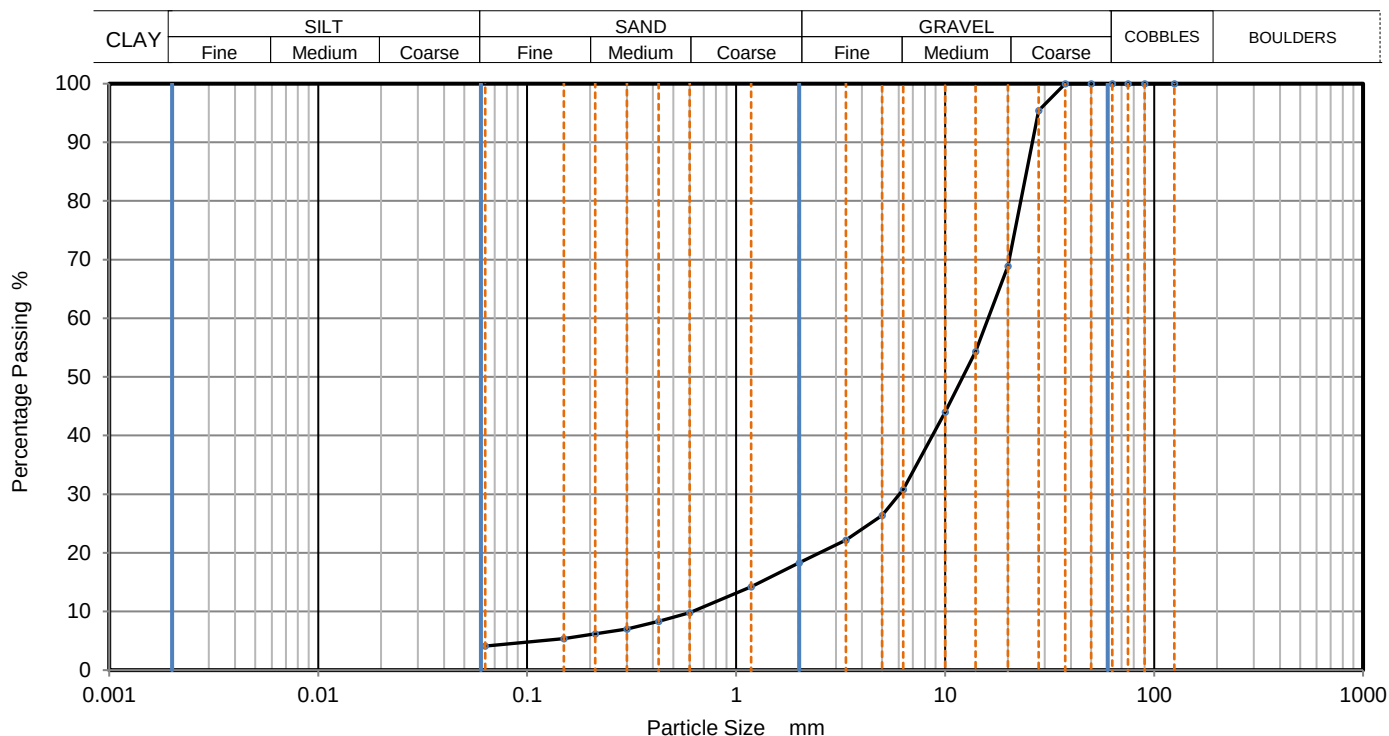
Samples received 04/07/2017

Schedules received 30/06/2017

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 05/07/2017

Date tested 17/07/2017



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	69		
14	54		
10	44		
6.3	31		
5	26		
3.35	22		
2	18		
1.18	14		
0.6	10		
0.425	8		
0.3	7		
0.212	6		
0.15	5		
0.063	4		

Dry Mass of sample, g 754

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	81.7
Sand	14.2
Fines <0.063mm	4.1

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	26
Curvature Coefficient	3.7

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: 20/07/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3



PARTICLE SIZE DISTRIBUTION

Job Ref 23040

Borehole/Pit No. WS4

Site Name Elgee Plastics, Reading

Sample No. -

Project No. GE16528 Client GESL

Depth 1.80 m

Soil Description Orangish brown clayey very sandy GRAVEL (gravel is fmc and angular to rounded)

Sample Type D

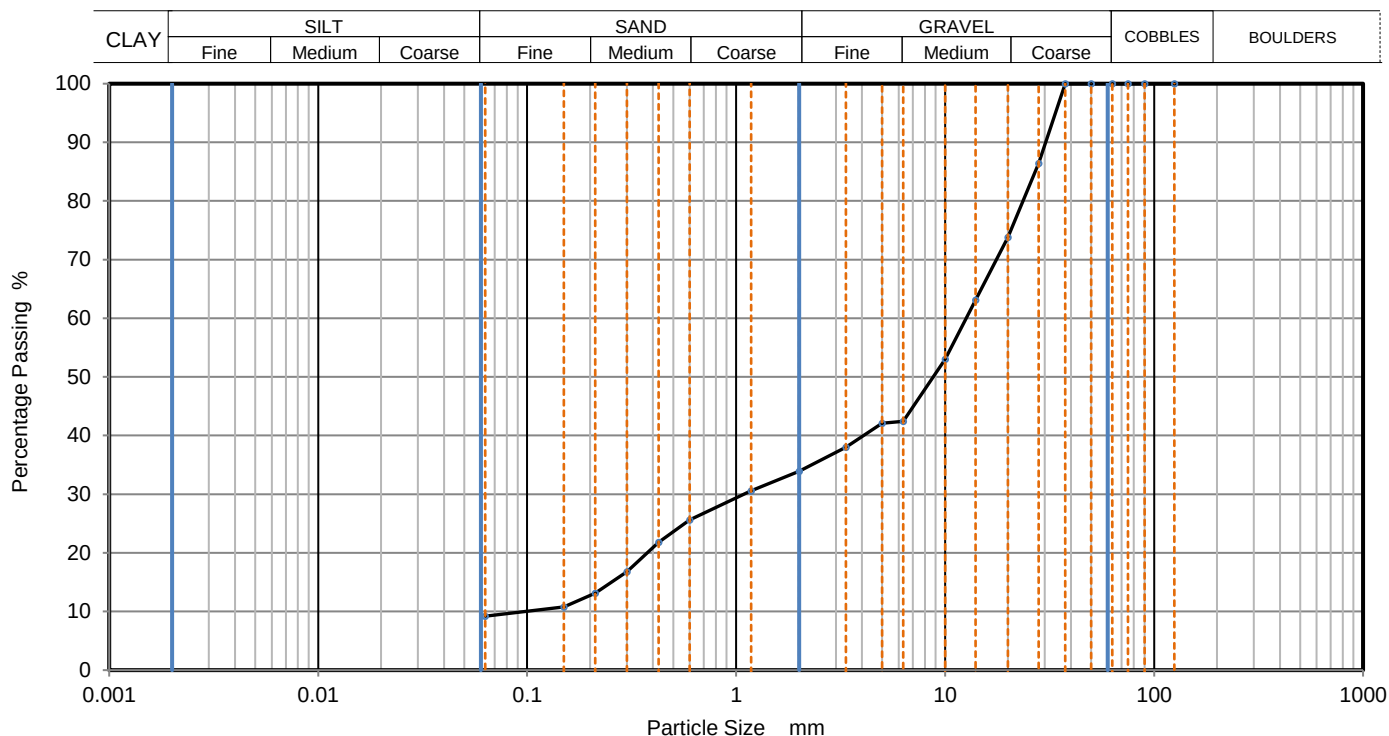
Samples received 04/07/2017

Schedules received 30/06/2017

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 05/07/2017

Date tested 17/07/2017



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	86		
20	74		
14	63		
10	53		
6.3	42		
5	42		
3.35	38		
2	34		
1.18	31		
0.6	26		
0.425	22		
0.3	17		
0.212	13		
0.15	11		
0.063	9		

Dry Mass of sample, g 986

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	66.1
Sand	24.7
Fines <0.063mm	9.2

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	130
Curvature Coefficient	0.96

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

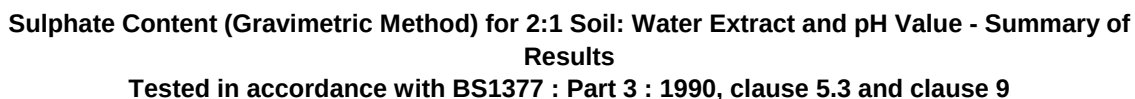
Checked and Approved
Initials: J.P
Date: 20/07/2017

2519

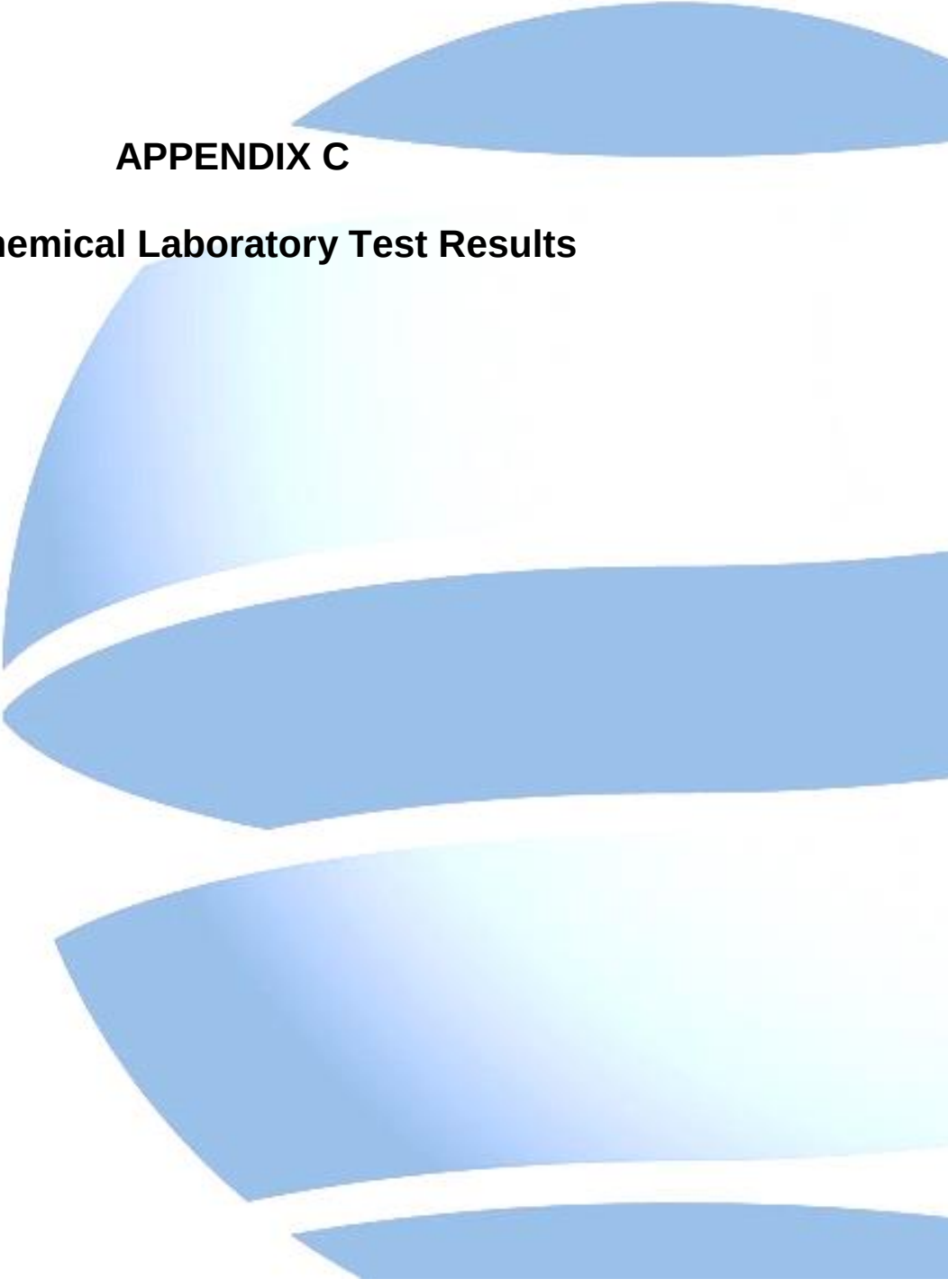
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3

					Saturation Moisture Content - Summary of Results Tested in accordance with BS1377 : Part 2 : 1990, clause 3.3 unless annotated otherwise.							
Job No. 23040					Project Name Elgee Plastics, Reading					Programme		
										Samples received	04/07/2017	
										Schedule received	30/06/2017	
Project No. GE16528					Client GESL					Project started	05/07/2017	
										Testing Started	19/07/2017	
Hole No.	Sample				Description	SMC %	NMC %	Bulk Density Mg/m3	Dry Density Mg/m3	Remarks - Sample size complies with BS1377:1990: Part 2 (Yes/No)		
	Ref	Top	Base	Type								
WS2	-	2.90	-	D	Off white putty CHALK with occasional fmc intact chalk fragments	25	25	2.01	1.61	No		
WS4	-	4.00	-	D	Off white putty CHALK with rare intact fine chalk fragments and occasional fmc flint gravel	-	20	-	-	Unsuitable		
 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: 20/07/2017	
2519		Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)								MSF-5-R18		

[illegible]

Checked and Approved	
Initials	J.P
Date:	20/07/2017



APPENDIX C

Geochemical Laboratory Test Results



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

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 17-12891

Issue: 1

Date of Issue: 06/07/2017

Contact: David Wilkes

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

Quotation No: Q14-00021

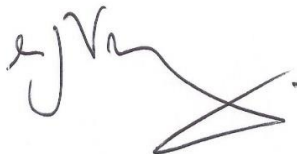
Order No: 2056

Customer Reference: GE16528

Date Received: 30/06/2017

Date Approved: 06/07/2017

Details: Elgee Plastics, Reading

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.: 17-12891

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
104876	WS1 0.05	29/06/2017	03/07/2017	Sandy silty loam	
104877	WS1 0.30	29/06/2017	03/07/2017	Sandy loam	
104878	WS2 0.10	29/06/2017	03/07/2017	Sandy silty loam	
104879	WS3 0.05	29/06/2017	03/07/2017	Sandy silty loam	
104880	WS3 0.30	29/06/2017	03/07/2017	Sandy silty loam	
104881	WS4 0.05	29/06/2017	03/07/2017	Sandy silty loam	
104882	WS2 0.40	29/06/2017	03/07/2017		
104883	WS4 0.30	29/06/2017	03/07/2017		

Results Summary

Report No.: 17-12891

ELAB Reference	104876	104877	104878	104879	104880	104881
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS1	WS2	WS3	WS3	WS4
Sample Depth (m)	0.05	0.30	0.10	0.05	0.30	0.05
Sampling Date	29/06/2017	29/06/2017	29/06/2017	29/06/2017	29/06/2017	29/06/2017

Determinand	Codes	Units	LOD						
Metals									
Arsenic	M	mg/kg	1	13.9	17.9	13.6	14.9	15.6	11.9
Barium	U	mg/kg	10	140	62.8	158	112	77.8	72.9
Beryllium	U	mg/kg	1	< 1.0	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	19.8	29.2	24.3	28.7	30.6	22.5
Copper	M	mg/kg	5	25.3	13.3	19.0	20.0	18.1	16.7
Lead	M	mg/kg	5	178	18.1	395	205	73.9	56.1
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	0.9	< 0.5	< 0.5
Nickel	M	mg/kg	5	18.1	27.2	19.9	19.7	22.6	15.7
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	31.3	45.3	30.4	37.2	45.9	33.9
Zinc	M	mg/kg	5	112	53.9	416	109	69.8	49.2
Anions									
Water Soluble Chloride	M	mg/kg	40	< 40	< 40	< 40	50	72	53
Water Soluble Sulphate	M	g/l	0.02	0.05	0.05	0.09	0.04	0.06	0.06
Inorganics									
Elemental Sulphur	N	mg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Sulphide	N	mg/kg	2	< 2	< 2	< 2	< 2	< 2	< 2
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Acid Soluble Sulphate (SO4)	U	%	0.02	0.07	0.04	0.07	0.05	0.06	0.06
Water Soluble Boron	N	mg/kg	0.5	0.6	< 0.5	< 0.5	0.7	0.7	< 0.5
Miscellaneous									
pH	M	pH units	0.1	8.0	7.9	8.4	7.7	7.4	6.8
Total Organic Carbon	N	%	0.01	0.89	0.22	0.65	0.70	0.50	0.80
Phenols									
Total Phenols	N	mg/kg	6	< 6	< 6	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons									
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	0.3	0.2	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	0.1	< 0.1	0.5	0.3	< 0.1	< 0.1
Pyrene	M	mg/kg	0.1	0.1	< 0.1	0.5	0.2	< 0.1	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	0.1	< 0.1	< 0.1
Chrysene	M	mg/kg	0.1	0.2	< 0.1	0.5	0.3	0.2	< 0.1
Benzo (b) fluoranthene	M	mg/kg	0.1	0.1	< 0.1	0.2	0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	0.2	< 0.1	0.4	0.2	< 0.1	< 0.1
Benzo (a) pyrene	M	mg/kg	0.1	0.1	0.3	0.3	0.1	0.3	1.2
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	0.1	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	0.9	< 0.4	3.4	1.9	0.5	1.2

Results Summary

Report No.: 17-12891

ELAB Reference	104876	104877	104878	104879	104880	104881
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS1	WS2	WS3	WS3	WS4
Sample Depth (m)	0.05	0.30	0.10	0.05	0.30	0.05
Sampling Date	29/06/2017	29/06/2017	29/06/2017	29/06/2017	29/06/2017	29/06/2017

Determinand	Codes	Units	LOD						
BTEX									
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
TPH CWG									
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic	N	mg/kg	1	2.1	< 1.0	6.7	< 1.0	< 1.0	< 1.0
>C35-C40 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	1.4	< 1.0	< 1.0	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	< 1.0	< 1.0	2.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	10.2	3.9	32.1	7.2	3.1	2.3
>C35-C40 Aromatic	N	mg/kg	1	4.5	1.5	10.2	3.3	1.2	< 1.0
Total (>C5-C40) Ali/Aro	N	mg/kg	1	16.7	5.4	52.3	10.5	4.4	2.3

Results Summary

Report No.: 17-12891

ELAB Reference	104876	104878	104879	104881
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS4
Sample Depth (m)	0.05	0.10	0.05	0.05
Sampling Date	29/06/2017	29/06/2017	29/06/2017	29/06/2017

Determinand	Codes	Units	LOD				
VOC							
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,2-dichloroethene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
VOC TIC							
Various	N	ug/kg	10	None Detected	None Detected	None Detected	None Detected

Results Summary

Report No.: 17-12891

ELAB Reference	104876	104878	104879	104881
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS4
Sample Depth (m)	0.05	0.10	0.05	0.05
Sampling Date	29/06/2017	29/06/2017	29/06/2017	29/06/2017

Determinand	Codes	Units	LOD				
SVOC							
Phenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bis(2-chloroethyl)ether	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Chlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzyl Alcohol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bis(2-chloroisopropyl)ether	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
3 and 4-methylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
N-Nitrosodi-n-propylamine	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachloroethane	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Isophorone	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Nitrophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dimethylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bis(2-chloroethoxy)methane	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-Trichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	N	mg/kg	0.01	< 0.01	0.02	< 0.01	< 0.01
3-Chloroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachloro-1,3-butadiene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-Chloro-3-methylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylnaphthalene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1-Methylnaphthalene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorocyclopentadiene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,4,5-Trichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1-Chloronaphthalene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-Dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dimethyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1-3-dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-6-dinitrotoluene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	N	mg/kg	0.01	< 0.01	0.03	< 0.01	< 0.01
1,2-Dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
3-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-nitrophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzofuran	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,3,5,6-Tetrachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,3,4,6-Tetrachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Diethyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1-chloro-4-phenoxybenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	N	mg/kg	0.01	< 0.01	0.01	< 0.01	< 0.01
4-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dinitro-o-cresol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Diphenylamine	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Azobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
1-bromo-4-phenoxybenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pentachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 17-12891

ELAB Reference	104876	104878	104879	104881
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS4
Sample Depth (m)	0.05	0.10	0.05	0.05
Sampling Date	29/06/2017	29/06/2017	29/06/2017	29/06/2017

Determinand	Codes	Units	LOD				
SVOC							
Phenanthrene	N	mg/kg	0.01	0.05	0.21	0.02	< 0.01
Anthracene	N	mg/kg	0.01	< 0.01	0.04	< 0.01	< 0.01
Carbazole	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibutyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	N	mg/kg	0.01	0.20	0.55	0.05	0.03
Pyrene	N	mg/kg	0.01	0.18	0.46	0.04	0.03
Butyl benzyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bis-2-ethylhexyladipate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Butyl benzyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	N	mg/kg	0.01	0.14	0.20	0.02	0.03
Chrysene	N	mg/kg	0.01	0.15	0.31	0.03	0.04
Bis(2-ethylhexyl)phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	N	mg/kg	0.01	0.18	0.49	0.04	0.05
Benzo(k)fluoranthene	N	mg/kg	0.01	0.11	0.25	0.03	0.03
Benzo(a)pyrene	N	mg/kg	0.01	0.12	0.30	0.02	0.03
Indeno(1,2,3-cd)pyrene	N	mg/kg	0.01	0.10	0.19	0.02	0.02
Dibenz(ah)anthracene	N	mg/kg	0.01	0.02	0.04	< 0.01	< 0.01
Benzo[g,h,i]perylene	N	mg/kg	0.01	0.12	0.22	0.03	0.04

Results Summary

Report No.: 17-12891

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 (%)
104876	0.05	WS1	Brown sandy soil, stones, clinker, metal	No asbestos detected	n/t	n/t	n/t	n/t
104877	0.30	WS1	Brown sandy soil, stones	No asbestos detected	n/t	n/t	n/t	n/t
104878	0.10	WS2	Brown sandy soil, stones, clinker, concrete, brick	No asbestos detected	n/t	n/t	n/t	n/t
104879	0.05	WS3	Brown sandy soil, stones, clinker	No asbestos detected	n/t	n/t	n/t	n/t
104880	0.30	WS3	Brown sandy soil, stones, clinker	No asbestos detected	n/t	n/t	n/t	n/t
104881	0.05	WS4	Brown sandy soil, stones, clinker, brick	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 17-12891

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
VOC in solids	M	As submitted sample	04/07/2017		GC-MS
Sulphide	N	As submitted sample	04/07/2017	109	Colorimetry
Hexavalent chromium	N	As submitted sample	05/07/2017	110	Colorimetry
pH	M	Air dried sample	05/07/2017	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	06/07/2017	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	05/07/2017	118	ICPMS
Phenols in solids	N	As submitted sample	04/07/2017	121	HPLC
Elemental Sulphur	N	Air dried sample	05/07/2017	122	HPLC
PAH (GC-FID)	M	As submitted sample	04/07/2017	133	GC-FID
SVOC in solids	N	As submitted sample	04/07/2017	167	GC-MS
Water soluble anions	M	Air dried sample	05/07/2017	172	Ion Chromatography
VOC in solids	M	As submitted sample	04/07/2017	181	GC-MS
BTEX in solids	M	As submitted sample	05/07/2017	181A	GC-MS
Water soluble boron	N	Air dried sample	04/07/2017	202	Colorimetry
Total cyanide	M	As submitted sample	04/07/2017	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	05/07/2017	210	IR
Aliphatic hydrocarbons in soil	N	As submitted sample	04/07/2017	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	06/07/2017	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	04/07/2017	214	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	05/07/2017	214	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	05/07/2017	214	GC-MS
Asbestos identification	U	As submitted sample	05/07/2017	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 17-12891

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) |

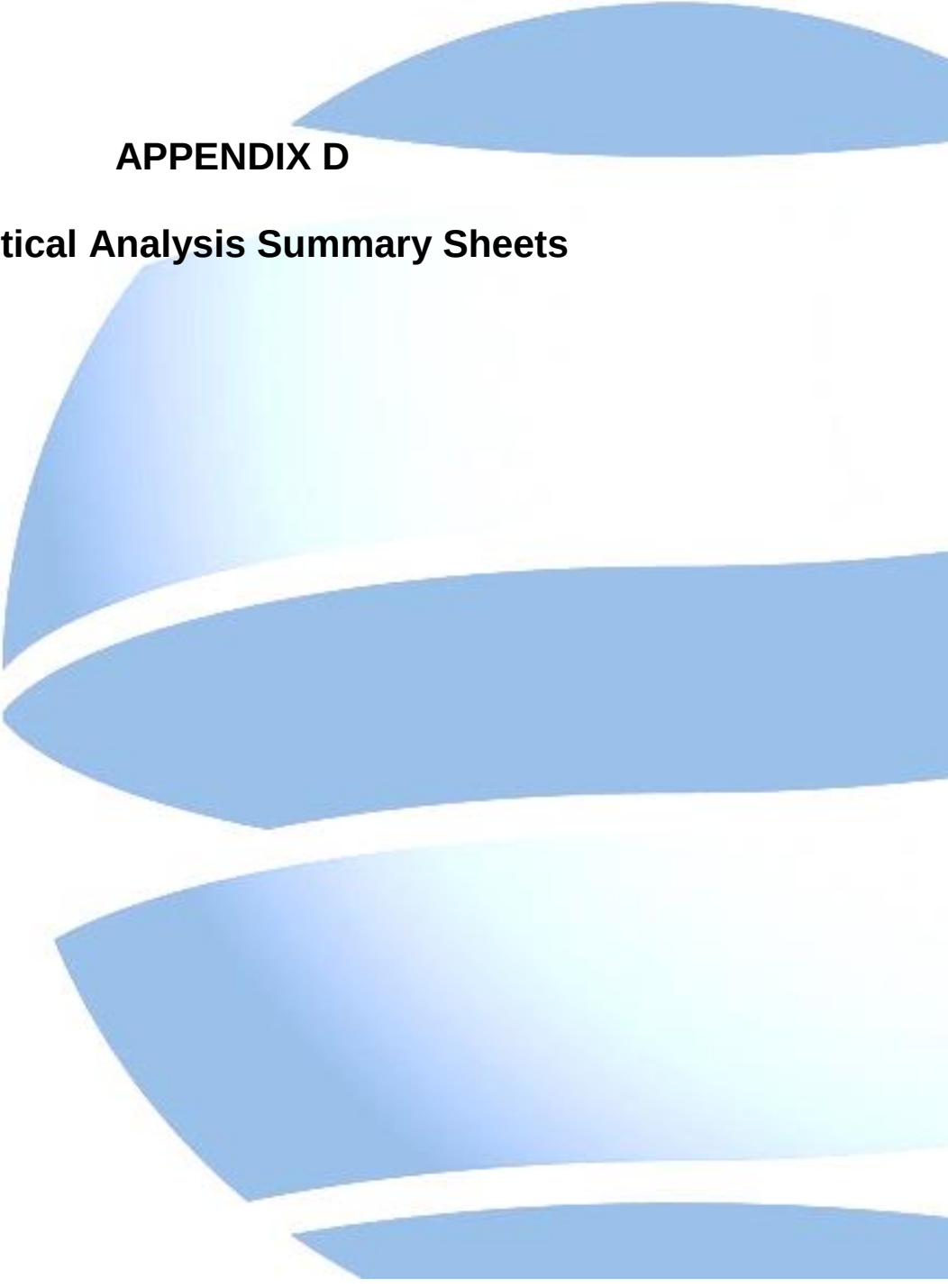
Where a sample has a deviation code, the applicable test result may be invalid.

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: The Keen Partnership
Project ref: GE16528
Site ref: Elgee Plastics, Reading
Data description:
Contaminant(s): Metals
Test scenario: Planning
Date: 1 July 2017
User details: DW

Client/client ref: The Keen Partnership Project ref: GE16528 Site ref: Elgee Plastics, Reading Data description: Contaminant(s): Metals Test scenario: Planning Date: 1 July 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	4	4	4	4	4	4	4	4	4	4	4	4	4	0
Outliers present?	No	Yes	No	No	Yes	No	No	Yes	No	No	No	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	4	4	4	4	4	4	4	4	4	4	4	4	4	0
Sample mean, $\bar{x}$	13.575	0.525	23.825	208.525	0.6	18.35	20.25	171.55	1	0.8	0.575	1.075	33.2	No Data
Standard deviation, s	1.24733048	0.05	3.73931812	140.179061	0.2	1.94164878	3.63913909	165.513373	0	0	0.09574271	0.15	3.05177544	
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	Normal	Non-normal	Normal	Normal	Normal	Single value	Single value	Normal	Non-normal	Normal	
Statistical approach	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto

[illegible]

Back to data

Go to outlier test

Go to normality test

Show individual summary

Client/client ref: The Keen Partnership
Project ref: GE16528
Site ref: Elgee Plastics, Reading
Data description:
Contaminant(s): Metals
Test scenario: Planning
Date: 1 July 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: The Keen Partnership
Project ref: GE16528
Site ref: Elgee Plastics Reading
Data description:
Contaminant(s): PAH
Test scenario: Planning
Date: 1 July 2017
User details: DW

Outliers: Naphthalene				
Critical concentration, C_c				
Notes				
Full dataset size	0	0	0	0
Outliers present?				
Number of outliers temporarily excluded				
Number removed by filter	0	0	0	0
Sample size, n	0	0	0	0
Sample mean, $\bar{x}$	No Data	No Data	No Data	No Data
Standard deviation, s				
Number of non-detects	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution				
Statistical approach	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: The Keen Partnership
Project ref: GE16528
Site ref: Elgee Plastics, Reading
Data description:
Contaminant(s): Petroleum Hydrocarbons
Test scenario: Planning
Date: 1 July 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	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Outliers present?	No	No	No	No	No	Yes	No	No	No	No	No	No	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	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Sample mean, $\bar{X}$	0.01	0.01	1	1	1	1.25	12.95	0.01	0.01	1	1	1	1	2.7
Standard deviation, s	0	0	0	0	0	0.5	13.1753558	0	0	0	0	0	0	2.71661554
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	Single value	Single value	Single value	Non-normal	Normal	Single value	Single value	Single value	Single value	Single value	Single value	Normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t

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	N/A	N/A	N/A	-995	-133.1349247	N/A	N/A	N/A	N/A	N/A	N/A	-33127.47005
Upper confidence limit (on true mean concentration, μ)	0.01	0.01	1	1	1	2.33972474	28.4532003	0.01	0.01	1	1	1	1	5.89659184
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: The Keen Partnership
Project ref: GE16528
Site ref: Elgee Plastics, Reading
Data description:
Contaminant(s): Petroleum Hydrocarbons
Test scenario: Planning
Date: 1 July 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	☐	☐	☐	☐	☐	☐

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STEP 5: RESULTS

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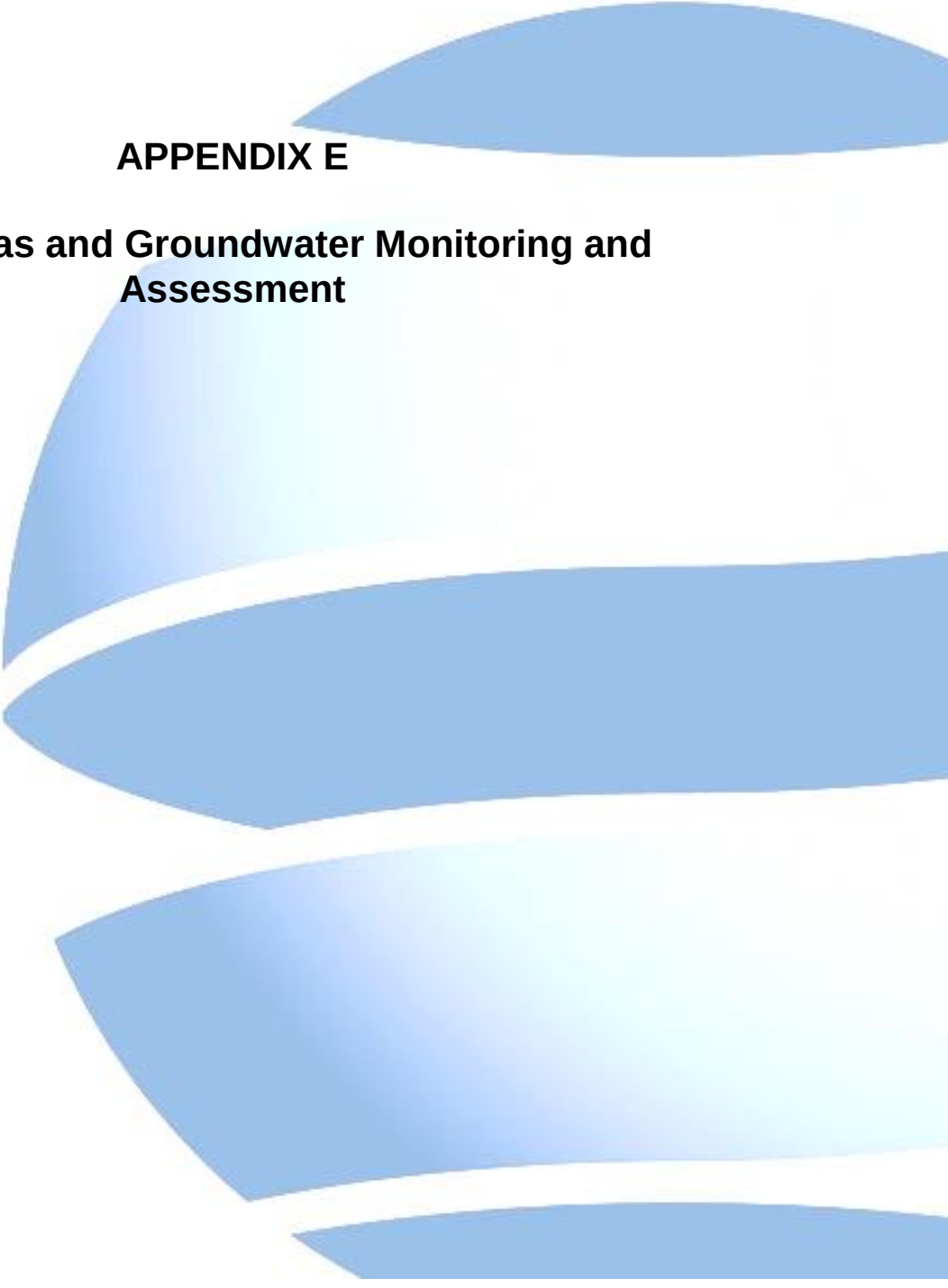
		Ratio of ADE to relevant Health	
		oral HCV	inhal HCV
Number	Chemical	(dimensionless)	(dimensionless)
1	Arsenic	1.00	0.38
2	Cadmium	0.91	0.10
3	Chromium III	0.15	0.85
4	Mercury, inorganic	0.93	0.07
5	Nickel	0.14	1.00
6	Copper	0.50	0.50
7	Zinc	1.00	0.00
8	Selenium	1.00	NR
9	Chromium VI	1.00	NR
10	Barium	1.00	NR
11	Beryllium	0.19	0.81
12	Vanadium	0.90	0.10
13	Phenol	0.38	0.62
14	Acenaphthylene	0.95	0.05
15	Acenaphthene	0.95	0.05
16	Flourene	0.96	0.04
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	0.45	0.55
22	Chrysene	0.68	0.32
23	Benzo(b)flouranthene	0.68	0.32
24	Benzo(k)flouranthene	0.67	0.33
25	Benzo(a)pyrene	0.68	0.32
26	Indeno(123-cd)pyrene	0.68	0.32
27	Dibenz(ah)anthracene	0.64	0.36
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	5.73E+02	3.45E+02	2.16E+02	5.24E+04
1.00	2.30E+02	4.63E+03	2.19E+02	1.12E+02
1.00	2.82E+02	5.37E+03	2.67E+02	7.45E+01
1.00	2.18E+02	5.69E+03	2.10E+02	4.04E+01
1.00	1.19E+02	5.68E+03	1.16E+02	4.71E+01
1.00	2.93E+03	1.23E+05	2.86E+03	1.53E+00
1.00	3.14E+02	3.03E+04	3.11E+02	2.48E+01
1.00	6.94E+02	7.01E+04	6.87E+02	2.88E+00
1.00	7.67E+00	6.22E+00	3.43E+00	2.24E+00
1.00	9.73E+00	2.10E+01	6.65E+00	5.76E-01
1.00	8.66E+00	1.84E+01	5.89E+00	1.59E+00
1.00	1.32E+01	2.71E+01	8.87E+00	8.99E-01
1.00	1.28E+00	2.67E+00	8.66E-01	1.19E+00
1.00	4.98E+00	1.08E+01	3.41E+00	8.04E-02
1.00	1.24E+00	2.22E+00	7.96E-01	5.15E-03
1.00	6.81E+01	1.29E+02	4.46E+01	2.02E-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
0.57	89.93	0.03	0.84	0.00	0.00
2.70	90.75	0.07	1.74	0.01	0.00
3.31	89.41	0.08	2.13	0.01	0.00
3.90	89.70	0.09	2.51	0.01	0.00
6.89	85.52	0.17	4.44	0.02	0.00
7.08	85.87	0.17	4.56	0.02	0.00
18.45	68.00	0.45	11.88	0.06	0.00
16.99	70.61	0.41	10.93	0.05	0.00
41.03	31.15	1.00	26.40	0.13	0.00
36.02	39.77	0.88	23.18	0.11	0.00
45.16	24.51	1.10	29.06	0.14	0.00
48.86	18.34	1.19	31.44	0.15	0.00
47.44	20.71	1.15	30.53	0.15	0.00
42.88	28.32	1.04	27.60	0.14	0.00
50.96	14.81	1.24	32.79	0.16	0.00
55.50	7.25	1.35	35.72	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
0.80	0.00	6.97	0.86	100.00
4.71	0.00	0.01	0.00	100.00
4.97	0.00	0.09	0.00	100.00
3.68	0.00	0.08	0.01	100.00
2.01	0.00	0.69	0.25	100.00
2.30	0.00	0.00	0.00	100.00
0.96	0.00	0.16	0.04	100.00
0.92	0.00	0.07	0.01	100.00
0.29	0.00	0.00	0.00	100.00
0.04	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
0.02	0.00	0.00	0.00	100.00
0.03	0.00	0.00	0.00	100.00
0.01	0.00	0.00	0.00	100.00



APPENDIX E

Ground Gas and Groundwater Monitoring and Assessment

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