

125 Highgrove Street, Reading, RG1 5EJ

GROUND INVESTIGATION



Oak and Lime Limited

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ISSUE	DATE	Written by	Comment
1	12/06/20	Stephen J Fisk BSc FGS	-
		Reviewed and approved by	
		Matt Paddock MSc FGS	
2	11/09/20	Matt Paddock MSc FGS	Including final gas monitoring
For and on behalf of Paddock Geo Engineering Limited			

1.0 INTRODUCTION

Paddock Geo Engineering Limited (PGE) were instructed by Oak and Lime Limited; the Client, to undertake a Ground Investigation and Generic Site Contamination Assessment as Phase 2 of a Site Contamination Assessment in relation to the proposed residential redevelopment of a parcel of land at 125 Highgrove Street, Reading, RG1 5EJ.

1.1 Terms of Reference

- British Standards BS 10175:2011 Investigation of Potentially Contaminated Sites – Code of Practice.
- CLR11 Model Procedures for the Management of Land Contamination, 2010, DEFRA/Environment Agency.
- PPG23 (PPS23) Planning and pollution control (contaminated land aspects), 2002
- GPLC1 Guiding Principles for Land Contamination, 2010, Environment Agency
- Environmental Protection Act: 1990 – Contaminated Land Statutory Guidance, April 2012, DEFRA
- BS 5930:2015 Site Investigation Code of Practice
- BS EN 1997-2, Eurocode 7. Geotechnical design. Ground investigation and Testing
- BS EN ISO 22475 Series (1-3), Geotechnical investigation and testing. Sampling methods and groundwater measurements.
- NHBC Standards Chapter 4.2 2006, Building Near Trees
- TRL Laboratory Report 1132:1984 – The Structure of Bituminous Road, Appendix C Table C1
- BS 5930:1999+A2:2010 Site Investigation Code of Practice
- BS EN 1997-2, Eurocode 7. Geotechnical design. Ground investigation and testing
- BS EN ISO 22475 Series (1-3), Geotechnical investigation and testing. Sampling methods and groundwater measurements.
- NHBC Standards Chapter 4.2 2006, Building Near Trees
- BRE412 1996 Desiccation in Clay Soils
- BRE240 1993 Low Rise Buildings on Shrinkable Clay Soils: Part 1
- BRE241 1990 Low Rise Buildings on Shrinkable Clay Soils: Part 2

1.2 Objective

The objective of the Ground Investigation for the site comprised the following elements:

- An Intrusive Investigation
- A Geotechnical Appraisal including falling head within boreholes infiltration testing
- A Site Contamination Assessment and Generic Human Health Risk Assessment

The scope of work was discussed and agreed with the Client prior to commencement. The investigation was carried out in order to provide data on the sub-soil characteristics of the site, the groundwater regime and also to recover samples for geotechnical laboratory testing and chemical analysis. This data was employed to derive a ground model for the site, foundation design criteria, infiltration data and a generic human health contamination risk assessment for the site.

2.0 THE SITE

2.1 Site Description

The subject site is an L-Shaped parcel of land located some 1km south of Reading town centre within a residential urban area. The site is currently occupied by several units of traditional masonry and concrete construction which are used for vehicle repair and storage. The site is currently surfaced with concrete. Access to the site is gained via Highgrove Street on the southwest corner of the site. The site extends east-west off Highgrove Street and then aligns north-south to the rear of the adjacent residential gardens.

The topography of the site and the surrounding areas slopes downwards to the north and west. The site is located within a predominantly residential area with dwellings and gardens in the immediate surroundings and some commercial properties further to the west.

The approximate centre of the site is located at a grid reference 472110, 172282 and the site is indicated to cover an approximate area of 0.14Ha.

Site Location Plans and Aerial Photograph are presented in Appendix A.

2.2 Proposed Development

The proposed development comprises the clearance of the structures and redevelopment of the site with eight residential dwellings. Associated new access road, car parking and soft landscaped areas are also included as part of the development.

It is indicated by the Client that to facilitate the required development levels the northern area of the site is to be reduced by some 1.50m below current ground level to reduce the level to a level similar to that of the surrounding gardens, with the exception of the far northern end of the site which is proposed to be rear garden and is to remain as current level.

Proposed development plans of the site area are presented in Appendix A.

3.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT SUMMARY

An associated Preliminary Contamination Risk Assessment (PRA) have been carried out for the site by Soil Environmental Services Ltd report reference SES/AL3D/HS/1#1 dated 19th May 2017, with which reference should be made. Salient data from the PRA are summarised and extracted from the PRA and presented in the following Sections.

3.1 Geology, Hydrogeology and Hydrology

The PRA report indicated that the superficial deposits underlying this site comprise sand and gravel of the Boyn Hill Gravel Member. The bedrock deposits are indicated as mudstone of the London Clay Formation.

The Boyn Hill Gravel Member is classified as a Secondary A aquifer with the London Clay Formation classified as Unproductive Strata.

The site is not located with a Source Protection Zones (SPZ).

The report indicates that no surface water is mapped downgradient within a 500m radius of the site.

The report listed two areas of potentially infilled ground, one (water) 140m west from 1900 and one (non-water) 244m northwest from 1995.

3.2 Historic Land Use on the Site and Surrounding Area

The summary of the available historical maps reviewed within the Soil Environmental Services Limited report indicated that the site was undeveloped until sometime between 1931-1958 when glasshouses were observed on site. Structures were developed on site from c.1958 with further structures noted on site and the site labelled as a builder' yard sometime between 1972-1990.

The surrounding area is mapped as residential dwellings from pre-1879 to current. A spring / reservoir is indicated 15m west from 1878-1958 and another reservoir is indicated 143m west mapped from 1879-1912, implying that these features have been infilled or covered / culverted. Electricity substations are indicated to have been developed by 1962 in the surrounding area and remain to the most recent historical maps, 132m southwest and 192m east.

No other information is given on the developments on site or within the surrounding areas.

3.3 Landfill Sites

The Soil Environmental Services Limited report states that there are no current or historical landfill sites within 600 m and no waste treatment, management or disposal sites within 800 m.

3.4 Potential Contaminant Sources Summary

The potential contaminants are based on the data within CL8, Department of the Environment (DoE) Industry Profiles, the current and historic site uses.

Potential Contamination Sources

Current Potential On-Site Contaminant Sources	Potential Contaminants
Current vehicle repair activities on site	Heavy metals, hydrocarbons (PAH, mineral / diesel oils, fuels, TPH and solvents)
Historic Potential On-Site Sources	Potential Contaminants

Builder's Yard (1972-1990)	Heavy metals, hydrocarbons (PAH, mineral / diesel oils, fuels, TPH and solvents) and asbestos
Current Potential Off-Site Contaminant Sources	Potential Contaminants
Residential dwellings and gardens	None advised
Electricity sub-stations 132m west and 192m east	PCB's and mineral oils
Historic Potential Off-Site Contaminant Sources	Potential Contaminants
Residential dwellings and gardens	None advised
Infilled former spring / reservoirs 15m west and 143m west.	Generation of ground gases (CO ₂ and CH ₄)
Infilled land (1995) 244m northwest	Generation of ground gases (CO ₂ and CH ₄)

3.5 Conceptual Contaminant-Pathway-Receptor Model

The information gathered from the associated Preliminary Contaminated Land Risk Assessment was compiled to produce a Contaminant-Pathway-Receptor (C-P-R) model, which has been extracted and presented below.

The risk posed to site construction workers has not been assessed as any risks are considered to be mitigated through good site practices.

Preliminary Contamination Source-Pathway-Receptor Table

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
Current – on site	Dermal / direct contact	Current site users (Vehicle repair garage)	N	
Existing vehicle repair garages.	Direct ingestion		N	
	Direct inhalation		N	
Historic – on site	Inhalation of Radon		N	
Builder's yard	Inhalation of wind-blown dust		N	
	Vapour migration		Y	Low
Current – off site	Ground gas migration	Future site users (Residential)	Y	Low
Residential housing. Some commercial land use further to west.	Dermal / direct contact		Y	Moderate
	Direct ingestion		Y	Moderate

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
Historic – off site Residential since late 1800. Infilled former reservoirs.	Direct inhalation	with plant uptake)	Y	Moderate
	Inhalation of Radon gas		N	
	Inhalation of wind-blown dust onto the site		Y	Moderate
	Vapour Migration onto the site		Y	Moderate
	Ground gas migration		Y	Low
	Direct contact	Services	Y	Low
	Migration of contaminants: non-aqueous phase		Y	Low
	Migration of contaminants: aqueous phase		Y	Low
	Migration of contaminants off-site: non-aqueous phase	Adjacent Properties	Y	Low
	Migration of contaminants off site: aqueous phase		Y	Low
	Vapour migration		Y	Low
	Inhalation of wind-blown dust	Ecological Impacts	Y	Low
	Migration of contaminants: non-aqueous phase		N	
	Migration of contaminants: aqueous phase		N	
	Migration of contaminants from site: non-aqueous phase	Controlled groundwater	Y	Low
	Migration of contaminants from site: aqueous phase		Y	Low
	Migration of Contaminants: non-aqueous phase	Surface Waters	N	
	Migration of contaminants: aqueous phase		N	

3.6 Preliminary Contamination Risk Assessment Conclusions

The preliminary contamination risk assessment has identified complete Contaminant-Pathway-Receptor (CPR) linkages with a maximum **Moderate** risk level from the potential contamination sources risk drivers identified on the site and surrounding area.

The most significant of these potential source drivers is considered to be the risk from the current use of the site as a vehicle repair garages and the former use as a builder's yard. The primary risk is considered to be the spillage and leakage of fuel and oils from damaged vehicles and during repairs/refilling.

A soakaway was also observed on the far north of the site during the site works outline within this report, but not mentioned in the previous PRA. The soakaway was noted to be filled with surface runoff residue potentially containing hydrocarbon derived materials. In addition, the concrete surfacing on site was noted to be in a poor state of repair with cracking observed in some locations. These factors could provide pathways for migration of contamination from surface into the sub-surface.

An additional significant source of contamination in the form of ground gas generation (CO_2 and CH_4) is present due to the former reservoirs and potentially infilled land. Although these features appear to have been infilled sometime ago, the source and type of backfill material, if any, is unknown and as such warrant further consideration to confirm the risk posed due to ground gases. In addition, the potential for hydrocarbon contamination on site indicates the potential for ingress and build-up of volatiles and break down components such as CO_2 gas within proposed structures.

In addition to the above the Soil Environmental Services Ltd report state there is a risk of PCBs and mineral oils on site due to the presence of two electricity substations both located over 100m from the site. Given that PCBs are typically insoluble or of low solubility in water (i.e. groundwater) and taking into account the distance from site and the much more significant potential for contamination from the onsite sources, contamination from the substation is not considered to be of concern to the site.

Based upon the age and historical use of the building on site there is the risk for the buildings to include asbestos containing material, especially within fibre cement roof and cladding sheeting, and a related risk of fibres within the near surface soils. Asbestos is also frequently contained in various vehicle parts which are utilised on site. It is recommended that prior to the clearance of the site and the commencement of the demolition works, that an asbestos survey is undertaken of all of the buildings on site to determine the presence of asbestos-containing materials. If present, removal works will need to be undertaken by a specialist contractor prior to the demolition phase.

Given the discussion above, to prevent 'Significant Possibility of Significant Harm' from potential volatile contamination sources to the proposed future residential site users it is recommended that an intrusive soil investigation be undertaken on the site to assess for heavy metals, organics, hydrocarbons and asbestos within the near surface soils and deeper soils should significant surface contamination be identified. If contamination migration is identified, then it may be necessary to carry out detailed risk assessment for the controlled aquifer beneath the site.

Further to this samples should be olfactory and PID screened for the presence of other volatile contaminants and if suspected, detailed testing should be undertaken.

Further to this, should any unexpected contamination be identified during the future development groundworks, then a suitably qualified and experienced Geo-Environmental Engineer should be consulted and if necessary further assessment should be carried out.

The superficial Boyn Hill Gravel Member deposits are likely to be coarse grained, however the underlying London Clay Formation soils are considered to have a volume change potential associated with their clay mineral content. Therefore, it is recommended that a geotechnical appraisal of the site be carried out to derive foundation design criteria.

4.0 INTRUSIVE INVESTIGATION FIELDWORKS

An intrusive investigation was designed with reference to the data from the associated Preliminary Contamination Risk Assessment and Geotechnical Desk Study to establish the ground conditions beneath the site in relation to the development of a Ground Model for the proposed development.

The works were also employed to gather geotechnical data to derive geotechnical design parameters, gather infiltration data and to assess the contamination status of the near surface soils and potential for ground gas contamination beneath the site.

The main fieldworks were carried out on 19th May 2020 and comprised the forming of 6no. boreholes, to assess the ground conditions, recover samples and infiltration testing.

The boreholes were located to focus on highlighted potential contamination sources and give general site coverage, but were constrained by buried services and site operations.

The boreholes were formed to assess the geological succession beneath the site, near surface contamination and to gather geotechnical and groundwater data to derive geotechnical design parameters and to add data to the Ground Model for the site.

Infiltration testing was also undertaken within boreholes WS2 and WS5 where potentially permeable strata was identified. The testing was carried out at falling head tests as per the methodology set out in BS5930.

Soil strength testing was undertaken in the field employing Standard Penetration Test (SPT) carried out at 1.0m intervals within the percussion liner sampler boreholes. Hand vane soil strength testing was carried out on any fine-grained soils encountered.

The depth of the boreholes, sample details, strata descriptions and comments on the groundwater conditions are detailed on the Logs which are presented in Appendix B along with an Exploratory Point Location Plan.

The boreholes were formed to a targeted depth of 4.00m below ground level (bgl). Some were terminated early due to the density of the granular soils encountered in the south of the site.

Some of the boreholes, namely WS1, WS3, WS4 and WS6 were installed with temporary groundwater and ground gas monitoring wells to full depth, comprising 2.00m – 4.00m of perforated 35mm internal diameter pipe with a screened 3-6mm gravel pack, with 1.00m of solid pipe at the surface and a wetted bentonite pellet seal. Full details of the installation pipework are shown on the logs. The top of the plain pipe was finished with a stainless steel well head flush with the ground surface.

A series of photographs taken during the fieldworks are presented in Appendix B.

4.1 Encountered Strata

The exploratory point arisings were logged by a Geotechnical Engineer generally in accordance with BS5930:2015. The geology beneath the site indicated a thin veneer of Made Ground over Boyn Hill Gravel Member, in the southern area of the site, subsequently over London Clay Formation deposits. The strata encountered is detailed below.

A log of the exploratory holes and Exploratory Point Location Plan showing the positions investigated are presented in Appendix B.

MADE GROUND / TOPSOIL

Made Ground was encountered across the site within all boreholes to between 0.50m and 0.90m depth. The Made Ground deposits comprised a thin surface layer of unreinforced concrete between 0.10m and 0.14m in thickness. Underlying the concrete across the site was generally dark brown and grey variably sandy variably gravelly CLAY with localised pockets of sand and gravel. The gravel fraction comprised predominantly brick and flint with ash / coal locally. An odour was noted within the Made Ground from borehole WS6 on the northern end of the site between 0.10m and 0.90m depth.

BOYN HILL GRAVEL MEMBER

Beneath the Made Ground across the site except within boreholes WS6, Boyn Hill Gravel Member deposits were encountered that comprised loose to very dense light brown to brown locally grey slightly clayey variably gravelly SAND and variably sandy GRAVEL, with the gravel fraction comprising flint.

Within boreholes WS4 and WS5 Boyn Hill Gravel Member soils were recovered as variably sandy variably gravelly CLAY from 0.70-1.4m depth and 0.50-1.90m depth respectively. This appears to represent a transition zone of material between the Gravel Member and the London Clay with high clay content likely scoured from the underlying weathered London Clay. This was noted on the central area of the site where the Gravel Member deposits begin to pinch out and reduce in thickness.

The Boyn Hill Gravel Member deposits were absent within borehole WS6. The Boyn Hill deposits extended beyond the base depth of boreholes WS1 and WS2 at 2m and 3m respectively. Within boreholes WS3 to WS5 they were proven to between 1.4m and 2.1m depth

LONDON CLAY FORMATION

Fine grained London Clay Formation soils were identified beneath the Boyn Hill Gravel Member deposits within boreholes WS3-WS5 and directly beneath the Made Ground within borehole WS6. These soils comprised firm to stiff light brown, orange brown and grey mottled brown silty CLAY. Localised sand / gravelly bands were noted, typically in the weathered upper surface of the strata in the transition zone between the superficial Gravel Member and the bedrock Clay. The London Clay Formation soils were proven to a maximum of 4.00m depth.

ROOTS

Roots were encountered within borehole WS3 only as rootlets within the Made Ground to a maximum of 0.70m depth.

VISUAL CONTAMINATION

The borehole arisings were assessed for visual contaminants and summarised below.

Visual Contamination

Borehole	Visual / Olfactory Evidence of Contamination and Strata
WS1	Brick and flint within Made Ground between 0.11m and 0.85m. No hydrocarbon or agrichemical odours, staining or VOCs.
WS2	Brick, ash and flint within Made Ground between 0.10m and 0.75m. No hydrocarbon or agrichemical odours, staining or VOCs.
WS3	Brick and flint within Made Ground between 0.10m and 0.70m. No hydrocarbon or agrichemical odours, staining or VOCs.
WS4	Brick, flint and occasional ash/coal within Made Ground between 0.12m and 0.70m. No hydrocarbon or agrichemical odours, staining or VOCs.
WS5	Brick, flint and concrete within Made Ground between 0.14m and 0.50. No hydrocarbon or agrichemical odours, staining or VOCs.
WS6	Brick and flint within Made Ground between 0.10m and 0.90m. Odours noted from material between 0.10m and 0.90m depth.

4.2 Groundwater Conditions

No significant groundwater strikes were encountered within any of the exploratory points undertaken. Lenses of sand were observed within boreholes WS6 that contained perched water within the sand lenses. The sand layer at the base of the Boyn Hill Gravel Member 1.90-2.10m in WS5 was also noted to be damp but did not lead to a steady groundwater level within the borehole at the time of drilling.

Subsequent monitoring of the groundwater level was carried out within the wells installed in WS1, WS3, WS4 and WS6. The groundwater levels to date are summarised below.

Groundwater Levels

Well	Depth (m begl)			
	19/05/20	26/05/20	02/06/20	09/06/20
	Struck Depth	Steady Level		
WS1	DRY	DRY	DRY	DRY
WS3	DRY	1.60	1.55	1.40
WS4	DRY	1.61	1.40	1.32
WS6	DRY	1.30	Inaccessible	1.31

4.3 Ground Gas Conditions

The PRA highlighted the potential for migration of ground gases from potential infilling of former reservoirs 15m and 143m to the west of site. There is also considered to be a potential risk from volatiles and ground gases due to the current use of the site and possible spillages / leakages and breakdown of fuels and other hydrocarbon compounds. The overall risk from ground gas and volatiles at the site is considered Low-Moderate.

Ground gas monitoring is ongoing to allow a ground risk assessment to apply a precautionary approach given the highly sensitive proposed residential land use on the site.

Four boreholes, WS1, WS3, WS4 and WS6 were installed in order to monitor groundwater and ground gas levels. The ground gas and groundwater levels were monitored on 9no. visits following the fieldworks on 19th May 2020.

4.4 Sampling Strategy

Disturbed samples of the strata encountered were recovered at regular intervals within all of the exploratory points to the full depth of the investigation for geotechnical laboratory testing.

Samples were also recovered in suitable containers for chemical analysis from the top metre of soils from the general site area. Shallow samples were also screened olfactorily and using headspace analysis and a PID for VOCs.

5.0 CONTAMINATION ASSESSMENT

5.1 Chemical Analysis

A total of 9no. soil samples were sent to an external laboratory to obtain total soil concentrations for a range of priority contaminants.

The suite of analysis was decided based on consultation of the Contamination Exposure Assessment (CLEA) supporting documents and consideration for the former site and surrounding area land uses.

The suite of testing included:

- Asbestos screen, for near surface Made Ground samples
- Metals and Inorganic compounds
- Polyaromatic Hydrocarbons (PAH) USPEA Priority 16 Compounds
- Total Petroleum Hydrocarbons (TPH) EC10-EC40 screen
- TPH CWG (Aliphatic / Aromatic split) for visual / olfactorily positive sample

Results of the chemical analysis are presented in Appendix C.

5.2 Human Health Assessment Criteria

The assessment has been carried out in accordance with the Contaminated Land Exposure Assessment (CLEA) methodology as detailed within CLR11 2004. The assessment criteria employed are based on the proposed final residential land use of the site. For this site, a worst-case proposed land use of 'Residential with Home Grown Produce' will be employed for all areas of the site.

In March 2014 DEFRA published new guidance detailing the Category 4 Screening Levels (C4SL) system for the classification of contaminated land. The C4SL system was published to assist with revised statutory guidance published in 2012 for Part 2a of the Environmental Protection Act.

It introduces a new four category system for the classification of land under Part 2a where a Significant Possibility of Significant Harm to human health has been concluded. The categories correspond to Category 1 – land where the level of risk is clearly unacceptable, to Category 4 – where the level of risk posed is acceptably low. In short, land that passes the category 4 test “should not be capable of being determined as contaminated land under Part 2a”.

Currently no statutory chemical guidance levels for land and controlled waters contamination exist in the UK. Therefore, the reported soil total contaminants concentrations will be compared to In-House Generic Assessment Criteria (GAC) used as C4SLs.

These In-House GACs are presented in Appendix C and are generally based on the LQM/CIEH S4UL values.

The S4UL values employed are based on a Soil Organic Material (SOM) concentration of 2.5% for the initial screening.

A S4UL has not been published for lead. The GAC value employed has been derived using the DEFRA C4SL¹ toxicological data and exposure parameters and the CLEA Software V1.071:2015.

The C4SL value employed for the lead GAC, for a residential with plant uptake land use scenario, is based on a blood lead level of 3.5ug/dl for the lower level of toxicological concern employing the Integrated Exposure Uptake Biokinetic model (IEBUK) estimated blood lead concentrations in children and employs the exposure parameters within the DEFRA C4SL report.

A minimal risk approach was employed to derive the S4UL values, whereas the C4SL model uses a lower level for risk model, which is deemed generally less conservative than the minimal risk approach. However, the use of a lower level for risk model screening criteria is considered strongly precautionary and is generally considered appropriate for use within the planning regime.

However, with consideration of the C4SL and S4UL values there still remains some gaps in the available chemical and/or toxicological data for non-priority contaminants and therefore a limited number of previously used CLEA SGVs and ICRL guideline values have been retained and include those for pH, sulphide, sulphur and water-soluble boron.

Should an exceedance be noted when site priority contaminant concentrations are compared to the employed GACs, a site specific assessment criteria can be derived using CLEA software or similar human health risk assessment software. This can also include consideration of bio-availability of the contaminants if required.

Further to the above, samples of near surface Topsoil and Made Ground are generally screened for asbestos presence. Generic assessment criteria do not exist currently for asbestos presence in soil within the UK. Therefore, where asbestos is identified in soil it is recommended that further risk assessment be carried out by suitably qualified and registered persons.

¹ DEFRA SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Final Project Report (Revision 2) 2014

5.3 Groundwater Assessment Criteria

A detailed controlled water risk assessment was outside the scope of this report.

6.0 GENERIC HUMAN HEALTH SITE CONTAMINATION RISK ASSESSMENT

Statistical analysis of the data set is carried out employing the statistical method detailed in CL:AIRE Document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', if exceedances are noted on individual comparison of the contaminant concentrations to the employed assessment criteria, which allows a derivation of a true mean concentration (μ).

The statistical analysis also assesses if the data is normally distributed and considers high levels to determine if they are part of the underlying data set due to 'site wide contamination' or due to contamination 'outliers'.

The statistical analysis derives a 95th percentile upper confidence limit of μ for each determinands for comparison to the suitable employed guidance level (GAC) or 'Critical Concentration (Cc)'.

The reported soil sample total contaminant concentrations data set was placed into a single averaging area comprising the near surface soils across the site. Further to the statistical analysis the chemical results were compared individually to the relevant GACs.

6.1 Total Soil Concentrations – Shallow Soils <1.0m Depth

The priority contaminant concentrations from the 9no. samples of shallow soils analysed, and a summary of the results are presented in Appendix C and are detailed in the following section.

Heavy Metals

The comparison of the reported heavy metal concentrations within the shallow soil samples analysed indicated 95th percentile upper confidence limit of μ concentrations for lead which was above the Human Health GAC for a Residential without Home Grown Produce land use employed.

Statistical analysis of the lead concentration data set indicated that the 95th percentile value was due to contamination hotspots.

Individual analysis of the heavy metal priority determinand concentration data indicated elevated arsenic and lead concentrations in excess of the employed GACs. The elevated samples are detailed below.

Heavy Metal GAC Exceedances – Less Than 1.0m depth

Determinand	Assessment Criteria (mgkg ⁻¹)	Trial Pit and Depth (m begl)	Maximum Reported Concentration (mgkg ⁻¹)	95th Percentile Upper Confidence Limit (mgkg ⁻¹) (with exceedances removed)
Arsenic	37	WS6 at 0.30m	73	N/A
Lead	190	WS1 at 0.40m	490	176
		WS3 at 0.40m	890	
		WS4 at 0.40m	250	
		WS6 at 0.30m	260	

Hydrocarbons

The comparison of the reported hydrocarbon concentrations within the shallow soil samples analysed indicated 95th percentile upper confidence limit of μ concentrations for the PAH indicative compounds benzo(a)pyrene and dibenzo(a,h,)anthracene which was above the Human Health GAC for a Residential without Home Grown Produce land use employed.

Statistical analysis of the benzo(a)pyrene and dibenzo(a,h,)anthracene concentration data set indicated that the 95th percentile value was due to contamination hotspots.

Individual analysis of the hydrocarbon priority determinand concentration data indicated elevated concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h,)anthracene in excess of the employed GACs. The elevated samples are detailed below.

Hydrocarbon GAC Exceedances – Less Than 1.0m depth

Determinand	Assessment Criteria (mgkg ⁻¹)	Borehole and Depth (m begl)	Maximum Reported Concentration (mgkg ⁻¹)	95th Percentile Upper Confidence Limit (mgkg ⁻¹) (with exceedances removed)
Benzo(a)anthracene	11	WS1 at 0.40m	20	7.17
Benzo(a)pyrene	2.7	WS1 at 0.40m WS3 at 0.40m	4.3 18	1.68
Benzo(b)fluoranthene	3.3	WS1 at 0.40m WS3 at 0.40m	5.6 23	2.19
Dibenzo(a,h,)anthracene	0.28	WS1 at 0.40m WS3 at 0.40m	0.71 2.7	0.05

Assessment of the arisings on site using a PID did not indicate any detectable VOCs. Olfactory assessment of the samples and soil arisings indicated an odour within the sample from WS6 between 0.1m and 0.90m depth. No other arising indicated any detectable hydrocarbon odours or staining.

A sample from WS6 at 0.30m depth was selected for additional testing for TPH CWG with aliphatic and aromatic split and BTEX / MTBE due to its odour. Individual analysis of the hydrocarbon priority determinand concentration data indicated concentration of such contaminants present at below the method detection limits. None of the samples with elevated PAH compound concentration indicated corresponding elevated TPH concentrations.

Other Priority Contaminants

The comparison of the reported total other priority contaminant concentrations within the shallow soil samples analysed indicated 95th percentile upper confidence limit of μ concentrations which were below the relevant Residential with Home Grown Produce GACs employed for all determined.

Individual comparison of the other priority contaminant concentrations data set to the relevant GAC did not indicated any exceedances.

Olfactory screening of the shallow samples did not indicate any significant odorous agrichemical concentrations.

Asbestos

Analysis for the presence of asbestos was also carried out on five samples. Asbestos was detected within the sample from WS3 at 0.40m as Chrysotile- Loose Fibrous Debris. Subsequent quantification testing was carried out and indicated an asbestos concentration of <0.001%. No asbestos was detected within the other four sample subject to testing. The laboratory testing results are included within Appendix C.

6.2 Controlled Groundwater Risk Assessment

A detailed controlled groundwater risk assessment was outside the scope of this report.

6.3 Ground Gas Risk Assessment

The PRA report concluded that there was a Low to Moderate risk of contamination of the site from ground gases. Therefore, monitoring standpipes were installed during the fieldworks for the purpose of monitoring ground gas and groundwater level.

6.3.1 Sources

The underlying natural strata comprises Made Ground over variable depths of Boyn Hill Gravel Member deposits overlying London Clay Formation deposits at depth. During the investigation Made Ground material were identified on site to between 0.50m and 0.90m depth and comprised essentially reworked sandy / gravelly CLAY fill type material over the natural GRAVEL and CLAY deposits. The Made Ground contained minor deleterious material such as brick and concrete and small amounts of ash and coal. An odour was noted within borehole WS6 only that could be liable to produce an odour nuisance, however, these soils are not considered likely to give rise to significant hydrocarbon vapour concentrations as PID VOC screening of the sample was negative and subsequent TPH CWG laboratory testing indicated low levels of lower mass potentially volatile hydrocarbon fractions.

The Soil Environmental Services Limited PRA report indicates former reservoirs located 15m west and 143m west and potentially infilled land 244m northwest. No information is provided on the type of material deposited, if any, into the above potential infilled ground and thus it should be assumed that they may have been infilled with a worst case non-inert materials with the potential for generation of ground gases.

Further to the above, as some hydrocarbon contamination has been identified, there is a potential for natural degradation in the ground with the generation of ground gases.

On the above basis there is the possibility that ground gases will be generated and have the potential to accumulate within any enclosed spaces on site.

Therefore, based upon the above discussion, a Low to Moderate Environmental Risk classification for the generation of carbon dioxide and methane gases on site has been concluded for the site in accordance with CIRIA C665 and BS8576:2013.

6.3.2 Pathways

The predominating pathway concluded in the CGM is for the migration of ground gases from the off-site potential gas generation sources and migration to impact any proposed structures through the higher permeable near surface strata. There is also a potential risk of generation of volatiles and ground gases from the on-site Made Ground.

No significant groundwater strikes were encountered within any of the boreholes during drilling. Groundwater levels were recorded between 1.30m and 1.61m depth during the subsequent monitoring visits. On this basis some retardation of ground gas flow beneath the site could occur due to groundwater, however, there is still a significant column of potentially permeable material above the groundwater.

6.3.3 Receptors

The main receptors of concern are the future site users of the proposed residential development on the site through inhalation of asphyxiant gases (CO_2) and explosion from flammable gases (CH_4) within any new structures.

6.3.4 Ground Gas Monitoring

Monitoring wells were installed within 4no. of the boreholes (WS1, WS3, WS4 and WS6) on the site during associated ground investigation works on 19th March 2020.

The borehole monitoring was each installed to between 2.00m and 4.00m bgl with 35mm internal diameter HDPE well pipe at the base and 1.00m of plain well pipe at the surface.

The borehole installations were backfilled with 3-6mm gravel and a pelleted bentonite seal was created for the top 1.0m of pipe. The well was finished with a cap and gas valve on the pipe and was finished with a flush steel cover. A Borehole Location Plan showing the monitoring well locations are presented in Appendix B.

The wells were positioned to give general site coverage for subsequent ground gas and groundwater monitoring. The monitoring has been undertaken on 9no. visits between May and August 2020 by PGE using a Geotech GA5000 Gas Analyser.

The results of the monitoring are summarised in the table below, with the highest gas level within each well highlighted. The monitoring data is presented in Appendix E.

The well within WS4 and WS6 was inaccessible on some of the monitoring visits due to vehicles parked over the position.

Ground Gas Monitoring Summary

Borehole	Date	GW Level (mbgl)	Atmospheric Pressure (Mb)	Maximum Methane (% v/v)	Maximum Carbon Dioxide (% v/v)	Lowest Oxygen (% v/v)	Max sustained Flow (l/hr)	VOC
WS1	26/05/2020	DRY	1037	0.0	4.6	18.2	0.0	0.0
WS3		1.60		0.0	10.4	7.5		
WS4		1.61		0.0	4.7	15.4		
WS6		1.30		0.3	3.0	10.5		
WS1	02/06/2020	DRY	1025	0.0	0.1	20.1	-0.1	
WS3		1.55		0.0	17.6	2.5		
WS4		1.40		0.0	4.1	17.6		
WS6		N/A		Well Inaccessible				
WS1	09/06/2020	DRY	1015	0.0	5.6	16.1	0.1	
WS3		1.40		0.0	14.0	16.3		
WS4		1.32		0.0	14.6	15.2		
WS6		1.31		0.2	6.0	14.3		
WS1	18/06/2020	1.87	1004	0.0	5.5	5.4	-0.2	
WS3		0.98		0.0	9.0	9.7		
WS4		0.83		0.0	3.9	16.3		
WS6		0.60		0.3	2.8	15.6		
WS1	24/06/2020	DRY	1020	0.0	5.8	14.0	0.2	
WS3		1.32		0.0	10.9	4.1		
WS4		1.06		0.0	6.9	10.0		
WS6		0.62		0.2	2.9	16.1		
WS1	06/07/2020	DRY	1023	0.0	5.9	78.8	-0.2	
WS3		N/A		0.0	14.2	85.7		
WS4		1.16		0.0	5.1	79.6		
WS6		0.5		0.7	2.5	80.0		

Report on behalf of Oak and Lime Limited

P20-060gi_v2 – 125 Highgrove Street, Reading, RG1 5EJ

Borehole	Date	GW Level (mbgl)	Atmospheric Pressure (Mb)	Maximum Methane (% v/v)	Maximum Carbon Dioxide (% v/v)	Lowest Oxygen (% v/v)	Max sustained Flow (l/hr)	VOC
WS1	14/07/2020	DRY	1019	0.0	6.5	14.0	0.0	
WS3		N/A		0.0	13.5	0.3		
WS4		1.2		0.0	10.7	3.3		
WS6		N/A		Well Inaccessible				
WS1	05/08/2020	DRY	1015	0.0	6.8	14.1	-0.1	
WS3		N/A		0.0	16.3	0.3		
WS4		N/A		Well Inaccessible				
WS6		N/A		0.4	0.7	19.1		
WS1	13/08/2020	DRY	1015	0.0	7.8	12.8	0.2	
WS3		N/A		0.0	16.0	1.2		
WS4		1.4		0.0	14.9	3.0		
WS6		N/A		Well Inaccessible				
Notes								
* - Where no flow detected assumed as 0.1 l/h								

The ground gas monitoring on the site indicated generally low flammable gas (methane) concentrations with a maximum of 0.7% v/v recorded on 06/07/2020 in WS6. Carbon dioxide concentrations were recorded at a maximum level of 17.6% v/v on 02/06/2020 in WS3. Several incidences of high CO₂ levels (~14% to 15%) were recorded as initial peaks that then settled into lower steady states of lower CO₂ concentrations.

A PID was also employed as a basic screening tool to identify potential hydrocarbon / vapour within the boreholes. No measurable concentrations of VOCs were identified during the monitoring visits.

Sustained gas flow were not recorded during the first visit but were recorded on all subsequent visits from 02/06/2020 to 13/08/2020; the maximum gas flow recorded within the monitoring standpipes occurred in WS3 with a recorded flow of 0.2l/hr, a sustained worst case flow of 0.2l/hr has been employed for modelling purposes during calculation of the GSV.

6.3.5 Ground Gas Risk Assessment

The results of all the monitoring were assessed in accordance with CIRIA C665 2007 – Assessing the risks posed by hazardous gases to building.

For the subject development of proposed residential development, a CIRIA C665 2007 Situation B for 'Low rise building with minimum ventilated under floor void (min 150mm)', was employed for the risk assessment of the identified gas concentrations.

A maximum methane concentration of 0.7% v/v and carbon dioxide concentration of 17.6% v/v were identified during the monitoring with a maximum sustained gas flow rate of 0.2l/hr detected.

This gives a maximum Gas Screening value of 0.0014l/hr for methane and 0.0352l/hr carbon dioxide.

The calculated gas screening values are less than 0.7 l/hr for methane and carbon dioxide, which allows a 'Green' classification employing the NHBC Traffic light system detailed in CIRIA C665 2007.

However, given the maximum carbon dioxide of 17.6% v/v recorded in WS3, this requires that the site classification is increased to 'Amber 2'.

6.3.6 Ground Gas Risk Assessment Conclusions

A Conceptual Gas Model has been produced for the site which indicates a low to moderate ground gas risk to the proposed residential end site users.

Ground gas contaminant monitoring comprising 9no. visits has been carried out on the site between May and August 2020. The atmospheric pressure was generally high to average although dropped to 1004mb on one occasion.

The gas monitoring results to date gave a worst-case gas screening value of 0.0352l/hr for CO₂ and 0.0014l/hr for CH₄. The calculated gas screening values are less than 0.7 l/hr for methane and carbon dioxide, which allows a 'Green' classification employing the NHBC Traffic light system detailed in CIRIA C665 2007.

However, given the maximum carbon dioxide of 17.6% v/v recorded in WS3, this requires that the site classification is increased to 'Amber 2'.

The protection measures should comprise:

"Intermediate to high gas regime identified, which requires high-level gas protection measures, comprising a membrane and ventilation sub-floor void to create a permeability contrast to prevent the ingress of gas into buildings. Gas protection measures should be as prescribed in BRE Report 414 (Johnson, 2001). Membranes should always be fitted by a specialist contractor. As with Amber 1, ventilation of the sub-floor void should facilitate a minimum of one complete volume change per 24 hours. Certification that these passive protection measures have been installed correctly should be provided."

The gas membrane should be fitted by a suitably qualified person and the fitment validated by the Remediation Engineer.

6.4 Soil Waste Assessment

The HazWaste online classification system was employed to assess the waste classification employing the total determinand concentrations within samples of the near surface Made Ground and separately, the near surface natural soils, in relation to groundworks arising disposal. This indicated

the Made Ground tested and all of the natural soils tested to have a Non-Hazardous classification with EWC code **17 05 04**.

Further to this, asbestos fibres were identified within one sample of the five tested. The sample from WS3 at 0.40m depth tested positive with the asbestos being identified as chrysotile - loose fibrous debris. Subsequent quantification testing was carried out and indicated an asbestos concentration of <0.001%. As such, based upon the testing to date the Made Ground soils on site is not necessarily considered as asbestos impacted soils as the concentration is below the hazardous waste threshold of 0.1%.

Waste Acceptance Criteria (WAC) testing was also carried out to determine if the soils tested could be disposed of into an inert facility on a composite sample of near surface soils. This indicates that the samples of soils had leachable determinand levels generally below the related guidance levels for disposal into an inert facility on the samples both from shallow Made Ground soils and natural soils at greater depth.

The results of the soil waste classification testing are presented in Appendix C.

On the above basis, it is considered that the natural soils and the Made Ground soils tested would classify as non-hazardous waste and may be suitable for disposal into an inert facility.

All waste classification should be confirmed with the waste receiving facility prior to disposal. The waste receiving facility, especially if not an inert landfill, may also require the total soil priority contaminant concentrations which are also presented in Appendix C.

6.5 Potable Water Supply Pipe

Guidance on the type of potable water supply pipe to be employed on residential development sites is given by UKWIR, who have published guidance for the type of potable water supply pipework to be employed for new structures on reused land.

Samples were recovered from shallow depth on the site. These samples were analysed for a suite of contaminants which are considered to be in accordance with the UKWIR requirements. The analysis results indicated several hydrocarbons (TPH(C10-C40) and PAH) concentrations in excess of the UKWIR Guidance concentrations.

Therefore, conventional PE pipe is not considered suitable for the entire site and barrier style pipe should be considered for the areas of the site where above detection level hydrocarbon concentrations were identified.

The classification will be decided by the local water company and their advice should be sought prior to the laying of any potable water supply pipework. The local water company may require furthermore detailed sampling, testing and assessment prior to pipe selection.

6.6 Site Contamination Assessment Discussion

Elevated heavy metal and hydrocarbon priority contaminants were identified in the near surface soils Made Ground beneath the site when compared to the Residential with plant uptake GACs employed.

The elevated levels were identified from samples of Made Ground recovered from boreholes WS1, WS3, WS4 and WS6. Fragments of brick and ash / clinker were observed within the boreholes and the sample from borehole WS6 was noted to exhibit an odour. Elevated lead, arsenic and various PAH concentration were recorded. In addition, chrysotile asbestos was confirmed within the sample from WS3 at 0.30m depth.

Given this, it is considered that risk reduction or remediation works will be required in proposed open areas of the site to protect the end site users. This would most likely consist of separation of the site users from any contaminated soils through the excavation of soil and importation of clean fill and Topsoil in open and garden areas of the proposed development.

We understand that the site levels on the northern end of the site are to be lowered by up to approximately 1.5m. As Made Ground was typically only encountered to depths of between 0.50m and 0.90m this proposed lowering of the site level will effectively remediate a large proportion of the site through the entire removal of the source of contamination, with the exception of the proposed garden areas on the far northern end of the site which are proposed to not have their levels reduced.

Asbestos fibres (chrysotile - loose fibrous debris) were identified within one sample (WS3 at 0.40m) of the five tested. Subsequent quantification testing was carried out and indicated an asbestos concentration of <0.001%. No fragments of suspected asbestos containing materials was noted within any of the boreholes. It is recommended that prior to the clearance of the site and the commencement of the demolition works, that an asbestos survey is undertaken of all of the buildings on site to determine the presence of asbestos-containing materials. If present, removal works will need to be undertaken by a specialist contractor prior to the demolition phase. The positive asbestos result appears to be an isolated result and is not deemed representative on the site as a whole. Should significant asbestos materials be proven within the building structure and dependent upon the condition of the asbestos materials encountered, further consideration to asbestos within soils may be warranted.

As no volatile contaminants were identified, remedial works involving removal of Made Ground are only deemed necessary in open areas of the site.

Based upon ground gas monitoring results to date the site is likely to be classified as 'Amber 2' classification employing the NHBC Traffic light system detailed in CIRIA C665 2007, due to high levels of CO₂. The monitoring is ongoing, and this report will be updated upon completion of the monitoring programme.

A Remediation Options Appraisal and Method Statement (RMS) would be required by concerned regulatory parties for any soil and ground gas remediation works on the site.

Notwithstanding the above assessment, if any unexpected or previously unidentified contamination is discovered during the site development works, a suitably qualified and experienced person should be contacted so any further assessment required can be carried out

6.7 Updated Conceptual Site Model

An assessment of the risk posed by the identified contaminant concentrations has been carried out employing the Source-Pathway-Receptor (S-P-R) methodology detailed within the CLEA methodology.

Updated SPR Flowchart

Potential On-Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
Elevated concentrations of lead, arsenic and PAH identified within the near surface Made Ground soils	Dermal/Direct Contact	Current site users (Disused Farm buildings)	N	
	Direct Ingestion		N	
	Direct Inhalation		N	
	Inhalation of Radon Gas		N	
	Inhalation of Wind Blown Dust		N	
	Vapour Migration		N	
	Gas Migration		N	
	Dermal/Direct Contact	Future site users (Residential with plant uptake)	Y	Low
	Direct Ingestion		Y	Low
	Direct Inhalation		Y	Low
	Inhalation of Radon Gas		N	
	Inhalation of Wind Blown Dust		Y	Low
	Vapour Migration		Y	Moderate - Odours only
	Ground Gas Migration		Y	Moderate
Chrysotile Asbestos identified with WS3 at 0.40m. Quantification testing indicated <0.001%.	Direct Contact	Services	Y	Low
	Migration of Contaminants – Non-Aqueous Phased		Y	Low
	Migration of Contaminants – Aqueous Phased		Y	Low
	Migration of Contaminants – Non-Aqueous Phased	Adjacent Properties	N	
	Migration of Contaminants – Aqueous Phased		N	
	Vapour Migration		N	
Elevated ground gases.	Inhalation of Wind Blown Dust	Ecological Impacts	N	
	Migration of Contaminants – Non-Aqueous Phased		N	
	Migration of Contaminants – Aqueous Phased		N	
	Migration of Contaminants from site – Non-Aqueous Phased	Controlled groundwater	N	
	Migration of Contaminants from site – Aqueous Phased		N	
	Migration of Contaminants – Non-Aqueous Phased	Surface Waters	N	

Potential On-Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
	Migration of Contaminants – Aqueous Phased		N	

The risk to construction workers has not been assessed as generally any risks posed to site construction workers from identified contamination can be mitigated through good site practices and robust sitework risk assessment. However, works carried out on sites where asbestos fibres have been identified must be carried out by a suitable contractor and a site specific Health and Safety Plan for site construction workers must be produced in line with CAR 2012².

7.0 FOUNDATION DESIGN CRITERIA

7.1 Geotechnical Laboratory Testing

Representative samples were sent to an external laboratory following visual assessment and logging of the borehole arisings. The testing programme was designed to classify the properties of the encountered soils and to determine the chemistry of the soil in relation to the design of buried concrete.

7.1.1 Atterberg Limits

The results of 5no. Atterberg Limit determinations carried out on samples of fine-grained soils encountered are presented in Appendix D. The results have also been plotted on a Casagrande Plasticity Chart, also presented in Appendix D.

The soils tested have been assessed for their volume change potential (VCP) in accordance with NHBC Standards Chapter 4.2 and are detailed in the table below.

Atterberg Limit Testing

Exploratory Point and Strata	Depth (m)	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing 0.425mm	Casagrande Classification	NHBC Modified Plasticity Index	NHBC Volume Change Potential
WS3	2.50	27	62	27	35	100	CH	35	Medium
WS4	1.50	14	64	27	37	55	CH	20	Medium
WS5	2.70	26	59	28	31	100	CH	31	Medium
WS6	1.60	20	55	27	28	100	CH	28	Medium
WS6	3.60	27	65	27	38	100	CH	38	Medium

The samples of fine grained London Clay Formation soils have Modified Plasticity Indices of between 20% and 38% and therefore can be classified as **Medium** Volume Change Potential employing the NHBC classification scheme.

² Control of Asbestos Regulations 2012

The fine grained transition zone soils encountered at the base of the Boyn Hill Gravel Member soils in the central area of the site are considered to be a mix of the underlying London Clay Formation and as such could be given a similar medium VCP.

7.1.2 Natural Moisture Content

Testing was performed to determine the natural moisture content (NMC) of the sample subjected to Atterberg Limit testing. These results are presented in the Laboratory Test Result Summaries in Appendix D.

7.1.3 Particle Size Distribution

Particle Size Distribution (PSD) testing was carried out to classify the grading of the granular soil encountered. The results of the testing are presented in Appendix D and on the logs presented in Appendix B.

The grading of the granular Boyn Hill Gravel Member soils encountered on the higher southern end of the site indicates a fines content of between 8.30% and 8.90% and thus, as below 35% fines, the soils can be considered as non-plastic and hence non-shrinkable with associated volume change potential as outlined in NHBC and LABC guidance.

7.1.4 pH and SO_x

The level of pH, sulphate and other determinands within the BRE SD1 Suite have been determined for selected samples from above and at the proposed likely shallow foundation invert level to assess the appropriate Design Sulphate Class for buried concrete in accordance with BRE Special Digest 1 Table 2. The results of the analysis are presented in Appendix C.

The table below summarises the reported pH values, Total Sulphate and 2:1 Water Soluble Sulphate concentrations.

Design Sulphate Class for Site

Exploratory Location	Depth	pH	Water Soluble Sulphate (2:1 Water Extract) (mg/l)	Total Sulphate (%)	Appropriate Design Sulphate Class
WS1	0.60	8.4	14	0.014	DS-1
WS3	0.90	7.9	13	0.013	DS-1
WS4	2.50	7.1	14	0.014	DS-1
WS5	1.50	7.9	30	0.030	DS-1
WS6	0.90	8.0	8.7	0.0087	DS-1

WS6	2.60	7.6	20	0.020	DS-1
WS2	1.50	8.2	68	0.068	DS-1

The assessment assumes that all of the Total Sulphate (%) is in a suitable form that following ground disturbance could oxidise.

Groundwater was not encountered within the exploratory points during drilling. Subsequent monitoring indicated groundwater levels of between 1.30m and 1.61m within monitoring standpipes.

The Design Sulphate Class was consistent across the site and with respect to depth indicating a classification of DS-1 with typically low levels of water soluble sulphate and total sulphates.

The worst case scenario for the site should be assumed as such **DS-1** should be adopted for design purposes. There is a worst case Aggressive Chemical Environment for Concrete (ACEC) site classification is **AC-1s**.

7.2 In-Situ Testing

Standard Penetration Testing (SPT) was carried out at 1.0m centres within the Window Sample boreholes. A Hand Vane was also employed on fine grained soils within the intact liner arisings to assess the shear strength of the fine-grained soils encountered. The SPT and Hand Shear vane values are presented with the Exploratory Point Logs in Appendix B.

The standard penetration testing indicated soil strengths on the site to be generally consistent. The fine grained London Clay Formation soils were typically of high strength at depth and hand shear vane readings of between 75kPa and 92kPa. The SPTs within the London Clay Formation recorded N values of between 11 to 23, which correlate to a soil strength of between 55kPa and 115kPa employing the correction by Stroud and Butler, 1975 for soils with a PI<40%.

The Boyn Hill Gravel Member soils were noted to be loose to very dense but generally medium dense with SPT N values of 9 to 50+.

8.0 ENGINEERING EVALUATION

8.1 Introduction

The proposed development comprises the clearance of the structures and redevelopment of the site with eight residential dwellings. Associated new access road, car parking and soft landscaped areas are also included as part of the development.

It is indicated by the Client that to facilitate the required development levels the northern area of the site is to be reduced by some 1.50m below current ground level to reduce the level to a level similar to that of the surrounding gardens, with the exception of the far northern end of the site which is proposed to be rear garden and is to remain as current level.

8.2 Foundation Design Considerations

Made Ground was present at surface ranging from 0.50m to 0.90m depth and comprised a thin surface layer of concrete, 0.10m-0.14m in thickness over brown / grey variably sandy variably gravelly CLAY fill.

Beneath the Made Ground across the site except within boreholes WS6, Boyn Hill Gravel Member deposits were encountered on the northern and central areas of the site that comprised loose to very dense light brown to brown locally grey slightly clayey variably gravelly SAND and variably sandy GRAVEL, with the gravel fraction comprising flint.

Within boreholes WS4 and WS5 in the central area of the site Boyn Hill Gravel Member soils were recovered as variably sandy variably gravelly CLAY from 0.70-1.4m depth and 0.50-1.90m depth respectively. This appears to represent a transition zone of material between the Gravel Member and the London Clay with high clay content likely scoured from the underlying weathered London Clay. This was noted on the northern half of the site where the Gravel Member deposits begin to pinch out and reduce in thickness.

The Boyn Hill Gravel Member deposits were absent within borehole WS6 on the northern end of the site. The Boyn Hill Gravel Member deposits were at their deepest in the south of the site, extending beyond the base depth of boreholes WS1 and WS2 at 2.00m and 3.00m respectively. Within boreholes WS3 to WS5 they were proven to between 1.4m and 2.1m depth, with a fine grained transitional zone at the base. Therefore, the Boyn Hill Gravel Member deposits appear to be thicker at the southern end of the site and thin towards the north of the site.

Fine grained London Clay Formation soils were identified beneath the Boyn Hill Gravel Member deposits within boreholes WS3-WS5 and directly beneath the Made Ground within borehole WS6. These soils comprised firm to stiff light brown, orange brown and grey mottled brown silty CLAY. Localised sand / gravelly bands were noted, typically in the weathered upper surface of the strata in the transition zone between the superficial Gravel Member and the bedrock Clay. The London Clay Formation soils were proven to a maximum of 4.00m depth.

Roots were encountered within borehole WS3 only as rootlets within the Made Ground to a maximum of 0.70m depth.

There were significant trees and other major vegetation noted on the adjacent properties.

No significant groundwater strikes were encountered during the fieldwork, however, subsequent monitoring of groundwater levels within standpipes indicated groundwater levels of between 1.30m and 1.61m.

The strength of the fine grained London Clay Formation soils on the site has been assessed using a Hand Vane in the field as generally high strength below 1.00m depth.

Insitu SPT testing within the Boyn Hill Gravel Member deposits indicated SPT N-value of 9 to 50+ at between 1.0m and 2.0m depth.

The results of the soil strength testing are summarised and presented with the logs in Appendix B.

The London Clay Formation deposits are indicated to be of Medium VCP, therefore a **Medium VCP** will be employed for design as a worst case scenario.

The shallow Boyn Hill Gravel Member deposits at the southern end of the site are coarse grained in nature, confirmed by PSD testing to have <35% fines (particles less than 63µm) content, and therefore, are deemed to be non-shrinkable employing the NHBC classification scheme. The fine grained transition zone Boyn Hill Gravel Member soils identified at the base of the stratum in the central area of the site could be classified as Medium VCP as the suspected underlying London Clay Formation partial source soils.

8.3 New Structure Foundation Design Criteria

Conventional foundations, such as strip and isolated pads, placed into Made Ground, variable soils, desiccated soils or soils containing significant organic matter are generally subjected to increased risk of settlement, especially differential settlement. Therefore, it is not recommended that foundation be placed into the Made Ground soils identified on the site.

8.3.1 Building Near Trees Assessment

Semi-mature trees of mixed species and shrubbery / hedgerows were noted on adjacent properties in all directions that may be within influencing distance of the proposed development. In addition, new hedgerows and planting are indicated on the proposed plans. Foundation will likely to be placed within the influence of the fine grained London Clay Formation deposits which are classified as Medium VCP.

A detailed assessment should be carried out using the data within this report once a final development plan including proposed planting and a tree survey plan have been produced by the scheme foundation design Engineer. Full details of the trees present, and proposed planting have not been forwarded by the Client. As such the services of an arborist is recommended to determine the existing tree species further and anticipated mature tree heights.

Outside of the zone of influence of any current trees NHBC and LABC guidance suggests a minimum foundation depth of 1.25m bgl to allow for some restrictive new planting where foundations are to be placed to bear onto the medium VCP fine grained soils.

Where foundations are greater than 1.5m depth or within the zone of influence of a tree, heave protection should be employed such as 'clay board'. However, it is likely to be difficult to place heave protection within the sides of relatively deep open excavations and inspection may require locally deeper excavations, prior to pouring of any concrete.

8.3.2 Excavations

Excavations should be readily achieved within the near surface soils using conventional plant. The existing surfacing is formed in concrete and as such a breaker is likely to be required to remove the existing hardstanding.

The soils encountered within the trial pits are considered to remain stable in the short to medium term.

At no time should any excavations be entered by personnel without correct shoring and only after an assessment of whether the task can be completed without entry to the excavation has been completed.

8.4 Foundation Options Discussion

Conventional foundations, such as spread and isolated pads, placed into Made Ground, variable soils and potentially desiccated soils are generally subjected to increased risk of settlement, especially differential settlement, therefore, foundations should bear at a depth below the Made Ground identified on the site to a depth of 0.90m bgl.

For the Plots on the southern area of the site, conventional foundations should be constructed to bear onto the Boyn Hill Gravel Member soils, which are considered to be non-shrinkable and of a sufficient thickness so that the underlying medium VCP London Clay will not affect the required foundation depths due to tree root action and other major vegetation.

Where foundations are likely to be placed within the influence of the fine grained London Clay Formation deposits on the central and northern areas of the site, consideration should be given to deepening foundation to account for the effects of tree and other major vegetation predominantly along the site boundaries, and / or new planting proposed within the development scheme.

Care should be taken when considering the bearing strata to not allow the foundations to straddle the Boyn Hill Gravel Member and fine grained soils, i.e. basal transition zone of the Boyn Hill Gravel member or London Clay Formation soils, or unacceptable differential settlement may occur. If this is unavoidable consideration should be made to deepening the foundation and the use of reinforcement within the foundation structure.

For the Plots to be founded upon the medium VCP soils on the central and northern area of the site a detailed assessment of minimum foundation depths should be carried out using the data within this report once a final development plan including proposed planting and a tree survey plan have been produced by the scheme foundation design Engineer.

For conventional foundation outside the influence of any trees and bearing onto the medium VCP fine grained soils a minimum foundation depth of 1.25m bgl should be employed to be protective of restrictive new planting.

Groundwater was not observed within any of the exploratory positions during the sitework, however, subsequent groundwater monitoring within standpipe indicated groundwater levels between 1.30m and 1.61m depth. Where site levels are lowered excavations will be at increasing risk of encountering groundwater and some provision for dewatering may be required.

Foundation of the existing structures were not confirmed as part of the investigations. New foundation should penetrate below disturbance caused by the existing footing following site clearance.

The above foundation options and design approaches are subject to detailed Structural Engineer design and regulator agreement.

8.5 Bearing Capacity

Should a conventional spread foundation option be considered, then at a minimum depth of 0.60m bgl or 0.2m into the Boyn Hill Gravel Member deposits on the southern end of site, an allowable bearing capacity would be of the order of **130kPa**.

At the northern end of site, for a conventional spread foundation at a minimum depth of 1.25m bgl into the fine grained London Clay Formation deposits, an allowable bearing capacity would be of the order of **160kPa**.

These estimates further include a factor of safety of 3 against general shear failure and should keep settlements within tolerable limits.

Any excavations for the footings should be inspected by a suitably qualified person to assess the variability of the soils and groundwater conditions. If, following inspection, the soil conditions differ from those identified within this geotechnical appraisal the recommendations may require reassessment. Any roots, organic matter, and in particular any 'soft/loose' or otherwise unsuitable material encountered at the founding depth should be removed prior to pouring of any concrete.

8.6 Piled Foundations

Should assessed minimum foundation depths be too deep for conventional foundations or the bearing capacities derived above not be sufficient for the proposed development then consideration of alternative foundation solutions such as piles.

Piled foundations are likely to provide a satisfactory foundation option for the proposed development with piles extending into the deeper London Clay Formation deposits at a greater depth than investigated during this ground investigation.

Where trees are removed, depending upon pile types and design, piles should be sleeved within the zone of potential desiccation to prevent uplift forces whilst the ground recovers soil water deficits to stable moisture contents.

A cable percussion borehole with attendant sampling, testing and supplementary ground investigation report will be required to provide a further range of geotechnical parameters and to assist structural engineer and piling contractor with the piled foundation design. The advice of a specialist piling contractor should be sought who can provide an assessment of the suitability of their piles.

8.7 Sub-Surface Concrete

The worst case for the site is Design Sulphate Class DS-1. The worst case Aggressive Chemical Environment for Concrete (ACEC) site classification is AC-1s.

8.8 Surface Water Soakaways and Soil Permeability

Infiltration testing was carried out on the site within the boreholes WS2 and WS5 within the Boyn Hill Gravel Member strata employing the BRE365 methodology. These tests indicated initial percolation into the disturbed near surface Made Ground and possibly the near surface Boyn Hill Gravel Member

but then infiltration halted with insufficient occurring in order to be able to calculate a infiltration rate and as such are considered a failure.

Infiltration Testing Results

Borehole	Cycle	Depth of Test (m begl)	Infiltration Factors (ms^{-1})
WS2	1	0.00 – 3.00m – N/A	Insufficient infiltration and collapse within boreholes – Test failed
WS5	1	0.00 – 3.00m – N/A	Insufficient infiltration and collapse within boreholes – Test failed

Given the infiltration values calculated, it is considered that conventional soakaways are likely to be ineffective on the site within the underlying natural Boyn Hill Gravel Member deposits. As such another method for disposal of surface water further down the hierarchy of preference should be sought.

However, it is recommended that more detailed testing within trial pits to the BRE365 methodology be carried out to confirm the potential for conventional soakaways following site clearance, especially in the southern area of the site underlain by granular soils.

8.9 Access Roadways and Parking Areas

In situ CBR determinations were not carried out at the time of the siteworks due to the hardstanding coverage of the site.

We understand that the site is to be levelled with some 1.5m removed at the northern end of the site. As such pavement foundations will likely be placed onto coarse grained Boyn Hill Gravel Member deposits on the southern end of the site and onto fine grained London Clay Formation deposits on the northern part of the site.

The TRL Laboratory Report 1132 – The Structure of Bituminous Road, Appendix C Table C1 allows an estimate or CBR value based on soil equilibrium suction index. Where a pavement foundation will bear onto the encountered fine grained London Clay Formation soils a CBR value of 2.5-4.0% can be employed.

The TRL Laboratory Report 1132 – The Structure of Bituminous Road, Appendix C Table C1 allows an estimate or CBR value based on soil equilibrium suction index. Where a pavement foundation will bear onto the encountered coarse grained Boyn Hill Gravel Member soils a CBR value of up to 20% can be employed.

Therefore, given the above results a conservative design CBR value of 2.5% is considered appropriate across the site for initial design and it is recommended that further in-situ CBR testing be performed employing plate loading once the site has been cleared to confirm these values.

9.0 CERTIFICATION

This report is produced for the sole use of the Client, and no responsibility of any kind, whether for negligence or otherwise, can be accepted for any Third Party who may rely upon it.

The conclusions and recommendations given in this report are based on our understanding of the future plans for the site and based on a scope of works agreed by the Client and afforded by the agreed budget. No responsibility is accepted for conditions not encountered, which are between exploratory points or outside of the agreed scope of work.

If the future plans for the site are changed, such as the site is developed for a more or less sensitive use, then a different interpretation might be appropriate.

The report has been prepared generally following the guidelines and principles established in the British Standards, BS5930:1999+A2:2010, BS 10175:2011, entitled 'Investigation of Potentially Contaminated Sites – Code of Practice' and the DEFRA/EA Contaminated Land Reports CLR7 and CLR8.

It necessarily relies on the co-operation of other organisations and the free availability of information and total access. No responsibility can, therefore, be accepted for conditions arising from information that was not available to the investigating team as a result of information being withheld or access being denied.

This report may suggest an opinion on a suspected configuration of strata or conditions between exploratory points and below the maximum depth of investigation. However, this is for guidance only and no liability can be accepted for its accuracy. Comments on the groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. It should be noted, however, that groundwater levels might vary due to seasonal or other effects.

It should be noted that this report is based solely on the samples collected in the borehole locations investigated. During the works and following general site clearance, should the sub-soil conditions in other areas of the site appear to be inconsistent with those found in the areas sampled then this geotechnical appraisal and site contamination assessment may need to be reviewed.

This report is prepared and written in the context of the proposals stated in the introduction to this report and it should not be used in a differing context. Furthermore, new information, improved practices and changes in legislation may require an alteration to the report in whole or in part after its submission. Therefore, with any changes in circumstances, or after one year from the date of the report, the report should be referred back to Paddock Geo Engineering Limited for re-assessment (and, if necessary, for an estimate for the cost of such).

The copyright of this report and any associated plans and documents prepared by Paddock Geo Engineering Limited is owned by them and should not be reproduced, published or adapted, in whole or part, without their written consent.

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P20-060gi_v2 – 125 Highgrove Street, Reading, RG1 5EJ

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APPENDIX A – MAPS AND PLANS

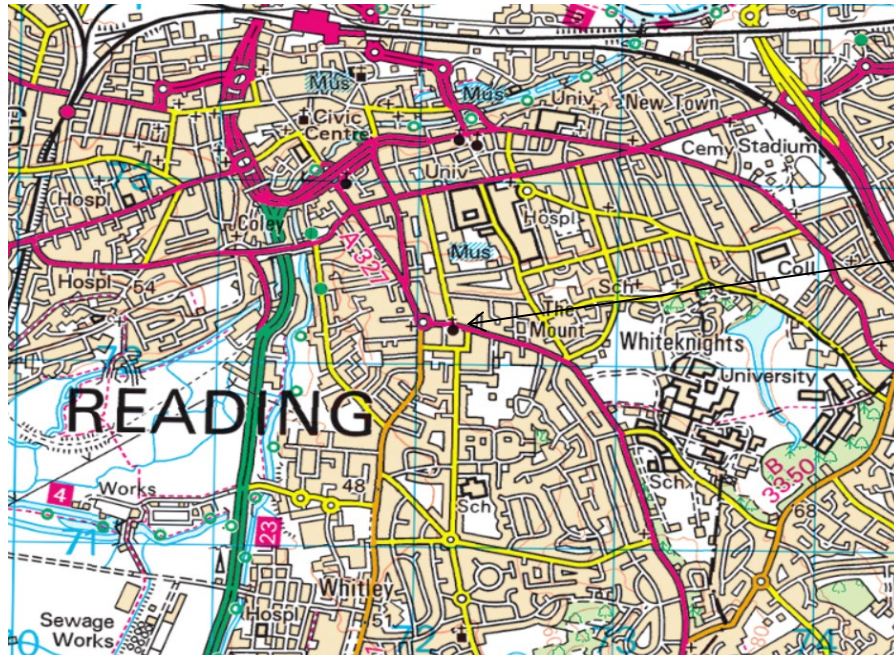
Site Location Plan

Site Plan

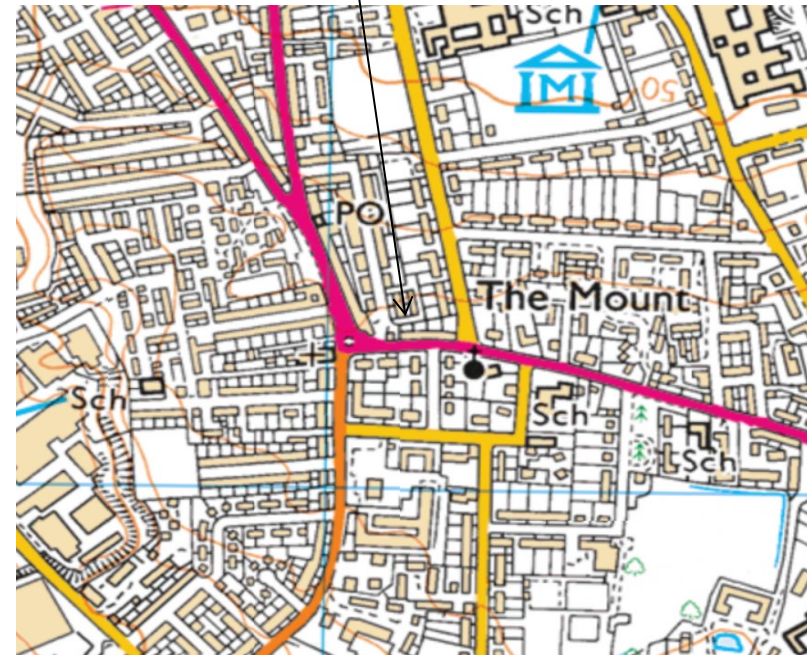
Aerial Photograph

Proposed Development Plans

SITE LOCATION PLAN



Site Location



PADDOCK
GEO ENGINEERING

CLIENT: Oak and Lime Limited
PROJECT No: P20-060
PROJECT TITLE: 125 Highgrove Street, Reading, RG1 5EJ

SITE PLAN



PADDOCK
GEO ENGINEERING

CLIENT: Oak and Lime Limited
PROJECT No: P20-060
PROJECT TITLE: 125 Highgrove Street, Reading, RG1 5EJ

AERIAL PHOTOGRAPH





0 m 50 m 100 m
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Location plan 1:1250



0 m 50 m

Proposed site plan 1:500

General Notes
Do not scale dimensions from this drawing. If in doubt ask! All dimensions should be checked on site.

This drawing is to be read in conjunction with all relevant other drawings, detailed specifications, Engineer's drawings, detail sheets and calculations. Assumptions have been made on some of the detail to existing fabric. Any discrepancies or differences to be reported back by the main contractor upon opening up.

Materials and workmanship
Any building work to be carried out with proper materials and in a workmanlike manner in accordance with regulation 7 of the Building Regulations. The builder may show compliance with regulation 7 in a number of ways including the appropriate use of a product bearing CE marking in accordance with the Construction Products Directive (89/106/EEC) as amended by the CE Marking Directive (93/68/EEC)1 or a product complying with an appropriate technical specification (as defined in those Directives), a British Standard or an alternative national technical specification of any state which is a contracting party to the European Economic Area which in use is equivalent, or a product covered by a national or European certificate issued by a European Technical Approval issuing body, and the conditions of use are in accordance with the terms of the certificate.

1	New scheme.	09/06/2017
0		01/11/2016
No.	Revisions	Date

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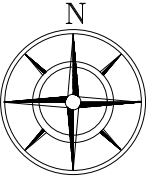
Unit 1 - The Hall
High Street,
Tetsworth,
Oxfordshire
OX9 7AB
01844 281715

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Project Name and Address
Proposed development.
Highgrove Yard.
125 Highgrove St.
Reading. RG1 5EJ
Berkshire.
Drawing Title
Location & site plan
Turning circles

Drawing No.	285/100	Scale	Rev
Date drawn	01 Nov. '16	As noted	2

2300N

172300N



- KEY TO SURVEYED ITEMS:
- CL = CEILING LEVEL
 - GSL = GENERAL SOFFIT LEVEL
 - SCL = SUSPENDED CEILING LEVEL
 - BL = BEAM LEVEL
 - BSL = BEAM SOFFIT LEVEL
 - FCSL = FIRE PROTECTION CLADDING SOFFIT LEVEL
 - DL = DOOR LEVEL
 - DSL = DOOR SOFFIT LEVEL
 - PTL = PIPE TOP LEVEL
 - RWP = RAIN WATER PIPE
 - SVP = SOIL & VENT PIPE
 - PSL = PIPE SOFFIT LEVEL
 - MSL = MISCELLANEOUS SOFFIT LEVEL
 - ESL = EXTERNAL SOFFIT LEVEL
 - ISL = INTERNAL SOFFIT LEVEL
 - TL = TOP LEVEL
 - BTOP = TOP OF BUSHES LEVEL
 - HTOP = TOP OF HEDGE LEVEL
 - FTOP = TOP OF FENCE LEVEL
 - WTOP = TOP OF WALL LEVEL
 - TTOP = TREE TOP LEVEL
 - RL = ROOF LEVEL
 - HEAD = TOP OF WINDOW OR APERTURE
 - SILL = BOTTOM OF WINDOW OR APERTURE
 - RFL = RAISED FLOOR LEVEL
 - FL = FLOOR LEVEL
 - GL = GROUND LEVEL
 - KL = KERB LEVEL
 - DKL = DROP KERB LEVEL
 - PH = FIRE HYDRANT
 - BT = BRITISH TELECOM
 - MH = MANHOLE
 - CUL = CULVERT LEVEL
 - INV = INVERT LEVEL
 - SV = STOP VALVE
 - DN = DRAIN
 - SP = SIGN POST
 - SB = SIGN BOARD
 - LP = LAMP POST
 - PM = PARKING METER
 - TLT = TRAFFIC LIGHT
 - BOL = BOLLARD
 - = LINE OF WALL
 - = HIDDEN WALL LINE
 - = ROOFING LINE
 - = LINE OF METAL CLADDING
 - = OVERHEAD LINE OF METAL CLADDING
 - = LINE OF PARTITION OR STUD WALL
 - = OVERHEAD LINE OF PARTITION OR STUD WALL
 - = HIDDEN LINE OF PARTITION OR STUD WALL
 - = LINE OF FIRE PROTECTION CLADDING
 - = OVERHEAD LINE OF FIRE PROTECTION CLADDING
 - = LINE OF PARTITION WITH GLASS
 - = WINDOW LINE
 - = OVERHEAD WINDOW LINE
 - = HIDDEN WINDOW LINE
 - = LINE OF BARRIER
 - = LINE OF TIMBER
 - = OVERHEAD LINE OF TIMBER (UPPER)
 - = OVERHEAD LINE OF TIMBER (LOWER)
 - = HIDDEN LINE OF TIMBER (UPPER, LOWER)
 - = LINE OF BEAM
 - = LINE OF STEEL
 - = CEILING LINE
 - = HIDDEN CEILING LINE
 - = SUSPENDED CEILING LINE
 - = FLOOR LINE
 - = CHANGE OF SURFACE TYPE
 - = MANHOLE COVER
 - = LIGHTING
 - = DRAIN
 - = FURNISHINGS
 - = VENTILATION
 - = PLANT EQUIPMENT
 - = OVERHEAD PLANT EQUIPMENT (OH)
 - = HEATING
 - = PIPE
 - = HIDDEN PIPE
 - = DOOR
 - = OVERHEAD DOOR MECHANISM
 - = ROAD
 - = FOOTPATH EDGE
 - = ROAD MARKINGS
 - = DETAIL BREAK
 - = TREE
 - = TOP OF BANK
 - = BOTTOM OF BANK

NOTE:
SURVEYED TO OS GRID & DATUM
LINEWORK SHOULD BE TREATED AS GENERIC
DOORS ARE SHOWN FOR ILLUSTRATION PURPOSES ONLY
PERIMETER WALLS HAVE AN ESTIMATED LINE SHOWN ON THE
NEIGHBOURS SIDE
WALL LINES ARE EXTENDED TO INCLUDE DOOR FRAMES
WALL LINES ABOVE DOOR FRAMES ARE OMITTED
DOOR APERTURES AND SOFFIT LEVELS EXCLUDE DOOR STOPS
WINDOW MULLIONS ARE OMITTED
GLAZING LINES ARE OMITTED
SILLS SKIRTINGS DOOR STOPS & ARCHITRAVE DETAILS ARE OMITTED
DETAILS ABOVE AREAS OF CEILING ARE OMITTED
PLANT EQUIPMENT LINES SHOULD BE TREATED AS INDICATIVE
PIPEWORK LINES ARE INDICATIVE
FLOOR DETAILS UNDER AREAS OF RAISED FLOOR ARE OMITTED
FURNISHINGS ARE SHOWN FOR ILLUSTRATION PURPOSES ONLY
HIDDEN LINES ARE SHOWN ABOVE OVERHEAD DETAIL AND WHERE
DETAIL PASSES BEYOND THE FOOTPRINT OF A ROOM

LOCATION
READING
125 HIGHGROVE STREET

TITLE
SITE PLAN
EXISTING LEVELS

SCALE 1:250 (A1)	DRAWING No RD04517
DATE 03.05.17	
DRAWN AB	REVISED * SURVEYED AB

Drawings produced by
C.H. Surveys Ltd.
11, Chandos Road, Staines
Middlesex TW19 3AT
Telephone (mobi) 07960 293724
Facsimile 01753 455953
Email: clive@chs-surveys.co.uk

0 1 2 3 4 5 10
METRES

67.2m+

472100E

A327 CHRISTCHURCH ROAD

68.0m+

472200E

General Notes
Do not scale dimensions from this drawing. If in doubt ask! All dimensions should be checked on site.

This drawing is to be read in conjunction with all relevant other drawings, detailed specifications, Engineer's drawings, detail sheets and calculations. Assumptions have been made on some of the detail to existing fabric. Any discrepancies or differences to be reported back by the main contractor upon opening up.

Materials and workmanship
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0 m 5 m 10 m

Proposed site plan Ground Floor scale 1:200



3	Rooflights added on units 6, 7 & 8.	24/08/2017
2	Units 5 & 6 updated.	17/08/2017
1	New layout	01/08/2017
0		26/05/2017

No. Revisions Date

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Unit 1 - The Hall
High Street,
Tetsworth,
Oxfordshire
OX9 7AB
01844 281715

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Project Name and Address
Proposed development.
Highgrove Yard,
125 Highgrove St.
Reading, RG1 5EJ
Berkshire.
Drawing Title
Proposed Site Plan
Ground Floor

Drawing No. 285/111
Date drawn 01 Nov. '16
Scale 1:200
Rev. 3

APPENDIX B – SITE DETAILS

Exploratory Point Location Plan

Borehole Logs

Site Photographs

Exploratory Location Plan

**125 Highgrove Street,
Reading,
RG1 5EJ.**

Oak and Lime Limited

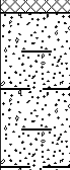
June 2020

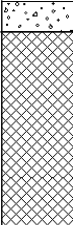


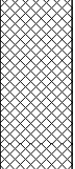
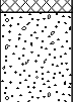
 **Window Sampling
Locations**

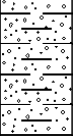
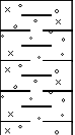
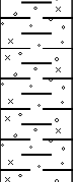
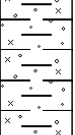
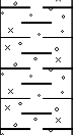
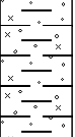
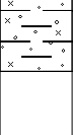
 **Window Sampling
Locations with
monitoring standpipe
installed**

**Not to scale.
All positions are approximate.
Based on plan provided by client.**

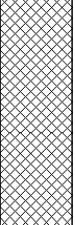
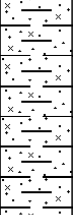
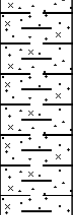
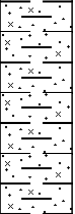
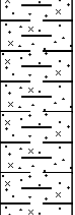
						Site 125 Highgrove Street, Reading, RG1 5EJ		Number WS1	
Excavation Method Percussion Sampling Techniques		Dimensions		Ground Level (mOD)		Client Oak and Lime Ltd		Job Number P20-060	
		Location		Dates 19/05/2020		Engineer MC		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.40	C		4,4/5,5,6,10		(0.11) 0.11	Grey unreinforced CONCRETE.			
0.60	D				(0.74)	Dark brown grey occasionally pale brown sandy very gravelly CLAY. Gravel of brick and flint. (MADE GROUND)			
0.90	C				0.85	Medium dense brown slightly clayey slightly gravelly to gravelly SAND. Gravel of fine to coarse sub-rounded to sub-angular flint. (BOYN HILL GRAVEL MEMBER)			
1.00-1.45	SPT(C) N=26				(0.55)				
1.60	D				1.40	Medium dense brown to light grey brown sandy to very sandy GRAVEL. Gravel of fine to coarse angular to sub-rounded flint. (BOYN HILL GRAVEL MEMBER)			
2.00-2.45	SPT(C) N=50		25/26,20,4		(0.60)				
					2.00	Complete at 2.00m			
Remarks Monitoring standpipe installed. Borehole remained stable upon completion. No groundwater encountered. Terminated at 2.0m depth, due to SPT refusal.							Scale (approx)		Logged By
							1:25		MC
							Figure No. P20-060.WS1		

						Site 125 Highgrove Street, Reading, RG1 5EJ		Number WS2	
Excavation Method Percussion Sampling Techniques		Dimensions		Ground Level (mOD)		Client Oak and Lime Ltd		Job Number P20-060	
		Location		Dates 19/05/2020		Engineer MC		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.50	C				(0.10) 0.10 (0.65) 0.75	Grey unreinforced CONCRETE. Dark grey to dark brown silty gravelly CLAY. Gravel of brick, ash-type material and flint. (MADE GROUND)	 		
0.80 0.90	C D				0.75	Medium dense light brown to brown slightly silty clayey silty gravelly SAND. Gravel of fine to coarse angular to sub-rounded flint. (BOYN HILL GRAVEL MEMBER)	         		
1.50	D				(2.25)				
2.50	D				3.00	Complete at 3.00m			
Remarks Borehole remained stable upon completion. No groundwater encountered.							Scale (approx) 1:25	Logged By MC	
							Figure No. P20-060.WS2		

						Site 125 Highgrove Street, Reading, RG1 5EJ		Number WS3	
Excavation Method Percussion Sampling Techniques		Dimensions		Ground Level (mOD)		Client Oak and Lime Ltd		Job Number P20-060	
		Location		Dates 19/05/2020		Engineer MC		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.40	C				0.10 0.10	Grey unreinforced CONCRETE.			
					(0.60)	Dark brown grey clayey silty gravelly SAND with rootlets. Gravel of flint and brick. (MADE GROUND)			
0.90	C				0.70	Medium dense light brown to brown slightly gravelly to gravelly SAND. Gravel of fine to coarse sub-angular to sub-rounded flint. (BOYN HILL GRAVEL MEMBER)			
1.00-1.45	SPT(C) N=22		2,4/6,5,6,5		(1.40)				
1.80	D								
2.00-2.45	SPT(C) N=18		3,3/4,5,4,5		2.10	Firm to stiff grey mottled brown silty CLAY. (LONDON CLAY FORMATION)			
2.50	D				(0.90)				
2.70	SV 80kPa				3.00	Complete at 3.00m			
Remarks No groundwater encountered. Borehole remained stable upon completion. Monitoring standpipe installed.							Scale (approx) 1:25		Logged By MC
							Figure No. P20-060.WS3		

						Site 125 Highgrove Street, Reading, RG1 5EJ		Number WS4	
Excavation Method Percussion Sampling Techniques		Dimensions		Ground Level (mOD)		Client Oak and Lime Ltd		Job Number P20-060	
		Location		Dates 19/05/2020		Engineer MC		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.40	C				(0.12) 0.12	Grey unreinforced CONCRETE.			
					(0.58)	Dark brown grey silty sandy gravelly to very gravelly CLAY. Gravel of flint, brick and occasional coal/ash-type material. (MADE GROUND)			
0.90 0.90 1.00-1.45	C D SPT(C) N=9		1,1/2,2,2,3		0.70 (0.70)	Firm grey brown to occasional brown slightly sandy slightly gravelly to gravelly CLAY. Gravel of fine to medium sub-angular flint. (BOYN HILL GRAVEL MEMBER - Transition Zone)			
1.50	D				1.40	Firm to stiff grey to light brown slightly gravelly silty CLAY. Gravel of fine to coarse sub-rounded to sub-angular flint. (WEATHERED LONDON CLAY FORMATION)			
1.90	SV 90kPa					...between 1.60m and 1.85m depth, very gravelly CLAY.			
2.00-2.45	SPT(C) N=11		2,2/2,2,3,4						
2.50 2.50	SV 90kPa D					...from 2.50m depth, becoming grey occasionally mottled brown.			
2.90	SV 75kPa				(2.60)				
3.00-3.45	SPT(C) N=14		2,2/3,3,4,4			...from 2.85m depth, gravel no longer encountered.			
3.50	D								
4.00-4.45	SPT(C) N=23		4,3/5,5,6,7		4.00	Complete at 4.00m			
Remarks Monitoring standpipe installed. Borehole remained stable upon completion. No groundwater encountered.							Scale (approx) 1:25	Logged By MC	Figure No. P20-060.WS4

PADDOCK GEO ENGINEERING						Site 125 Highgrove Street, Reading, RG1 5EJ		Number WS5		
Excavation Method Percussion Sampling Techniques		Dimensions		Ground Level (mOD)		Client Oak and Lime Ltd		Job Number P20-060		
		Location		Dates 19/05/2020		Engineer MC		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
0.40	C		2,2/2,3,4,3		(0.14)	Grey unreinforced CONCRETE.				
					0.14	Dark grey sandy GRAVEL. Gravel of flint and concrete. (MADE GROUND)				
					(0.11)					
					0.25	Dark grey mottled dark red brown slightly sandy gravelly CLAY. Gravel of fine to coarse sub-rounded to sub-angular flint and occasional brick. (MADE GROUND)				
				(0.25)						
					0.50	Firm brown to orange brown mottled grey slightly gravelly to gravelly CLAY. Gravel of fine to coarse sub-rounded flint. (BOYN HILL GRAVEL MEMBER - Transition Zone)				
0.80	C									
0.80	D									
1.00-1.45	SPT(C) N=12									
					(1.40)					
1.50	D									
1.90	D				1.90					
2.00-2.45	SPT(C) N=5		1,1/1,1,2,1		(0.20)	Loose to medium dense brown to light brown SAND. (BOYN HILL GRAVEL MEMBER)				
					2.10	Firm to stiff grey to light brown silty CLAY. (WEATHERED LONDON CLAY FORMATION)				
2.40	SV 75kPa									
					(0.90)					
2.70	D									
3.00-3.45	SPT(C) N=15		4,2/3,3,4,5		3.00	Complete at 3.00m				
Remarks No groundwater encountered. Borehole collapse to 1.90m depth.						Scale (approx) 1:25		Logged By MC		
						Figure No. P20-060.WS5				

						Site 125 Highgrove Street, Reading, RG1 5EJ		Number WS6	
Excavation Method Percussion Sampling Techniques		Dimensions		Ground Level (mOD)		Client Oak and Lime Ltd		Job Number P20-060	
		Location		Dates 19/05/2020		Engineer MC		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.30 0.30	C D				(0.10) 0.10	Grey unreinforced CONCRETE.			
					(0.80)	Dark grey to dark brown grey slightly sandy gravelly silty CLAY. Gravel of flint and brick. (MADE GROUND)			
0.90 1.00-1.45	C SPT(C) N=11		1,1/2,3,2,4		0.90	Firm to stiff dark orange brown mottled grey slightly sandy silty CLAY. (LONDON CLAY FORMATION) ...from 0.90m depth, occasional gravel sized sandy lenses holding water.			
1.60 1.70	D SV 78kPa								
2.00-2.45	SPT(C) N=17		3,3/3,4,5,5						
					(3.10)				
2.60 2.80	D SV 92kPa								
3.00-3.45	SPT(C) N=13		2,2/3,2,4,4						
3.60	D					...from 3.50m depth, becoming grey to blue grey silty CLAY.			
4.00-4.45	SPT(C) N=12		2,3/2,3,3,4		4.00	Complete at 4.00m			
Remarks Odour noted between 0.10m and 0.90m depth. No groundwater encountered. Borehole remained stable upon completion. Monitoring standpipe installed.							Scale (approx) 1:25	Logged By MC	Figure No. P20-060.WS4

Site : 125 Highgrove Street, Reading, RG1 5EJ

Client : Oak and Lime Ltd

Engineer: MC

Job Number
P20-060

Sheet
1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
WS1	1.00	1.15	1.45	CPT	4	4	5	5	6	10	N=26	4 blow for 5mm penetration
WS1	2.00	2.15	2.45	CPT	25		26	20	4		N=50	
WS3	1.00	1.15	1.45	CPT	2	4	6	5	6	5	N=22	
WS3	2.00	2.15	2.45	CPT	3	3	4	5	4	5	N=18	
WS4	1.00	1.15	1.45	CPT	1	1	2	2	2	3	N=9	
WS4	2.00	2.15	2.45	CPT	2	2	2	2	3	4	N=11	
WS4	3.00	3.15	3.45	CPT	2	2	3	3	4	4	N=14	
WS4	4.00	4.15	4.45	CPT	4	3	5	5	6	7	N=23	
WS5	1.00	1.15	1.45	CPT	2	2	2	3	4	3	N=12	
WS5	2.00	2.15	2.45	CPT	1	1	1	1	2	1	N=5	
WS5	3.00	3.15	3.45	CPT	4	2	3	3	4	5	N=15	
WS6	1.00	1.15	1.45	CPT	1	1	2	3	2	4	N=11	
WS6	2.00	2.15	2.45	CPT	3	3	3	4	5	5	N=17	
WS6	3.00	3.15	3.45	CPT	2	2	3	2	4	4	N=13	
WS6	4.00	4.15	4.45	CPT	2	3	2	3	3	4	N=12	



Photo of arisings from borehole WS1



Photo of arisings from borehole WS2



Photo of arisings from borehole WS3



Photo of arisings from borehole WS4



Photo of arisings from borehole WS5



Photo of arisings from borehole WS6



Photo of site access from Highgrove Street.



Photo of structures along northern boundary of the site.



Photo of the southern area of site.



Photo of storage locker observed on site.



Photo of site looking south from northern end of site showing fall of site levels to the north.



Photo of structure on site.



View showing materials stored within structures on site.



View from roughly centre of site looking north.



View of structures on western central area of site.



View of structures on northern end of site.



View of northern end of site showing materials and vehicles stored.



View of northern end of site showing materials and vehicles stored.



View showing materials and vehicles stored on site.



View for northern end of site looking northwest. The wall visible mark the western and northern boundaries of the site.



View of soakaway location.



View of soakaway on northern end of site.



View from northern end of site looking southwest.



View of structures and vehicles stored on site.

APPENDIX C – GEOCHEMICAL DATA

Chemical Analysis Reports

Chemical Analysis Results Summary

PGE In-House GACs

HazWaste Online Classification Report

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Analytical Report Number : 20-10467

Replaces Analytical Report Number : 20-10467, issue no. 1

Additional analysis undertaken.

Project / Site name:	Highgrove Street, Reading	Samples received on:	19/05/2020
Your job number:	P20 060 S01	Sample instructed/ Analysis started on:	19/05/2020
Your order number:	P20-060 GI	Analysis completed by:	04/06/2020
Report Issue Number:	2	Report issued on:	08/06/2020
Samples Analysed:	14 soil samples		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 20-10467-2 Highgrove Street, Reading P20 060 S01.XLS

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

Page 1 of 10

Analytical Report Number: 20-10467

Project / Site name: Highgrove Street, Reading

Your Order No: P20-060 GI

Lab Sample Number				1514600	1514601	1514602	1514603	1514604
Sample Reference				WS1	WS1	WS1	WS2	WS3
Sample Number				C	D	C	C	C
Depth (m)				0.40	0.60	0.90	0.80	0.40
Date Sampled				18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	7.1	7.0	5.4	12
Total mass of sample received	kg	0.001	NONE	0.50	0.80	0.50	0.50	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	< 0.001

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.4	8.4	8.1	8.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	470	-	200	210	830
Total Sulphate as SO ₄	%	0.005	MCERTS	-	0.039	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.014	-	-	-
Loss on Ignition @ 450°C	%	0.2	MCERTS	5.0	-	1.4	1.3	3.5

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	0.46
Acenaphthylene	mg/kg	0.05	MCERTS	0.35	-	< 0.05	< 0.05	1.4
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	0.25
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	0.47
Phenanthrene	mg/kg	0.05	MCERTS	1.6	-	< 0.05	< 0.05	8.2
Anthracene	mg/kg	0.05	MCERTS	0.34	-	< 0.05	< 0.05	2.0
Fluoranthene	mg/kg	0.05	MCERTS	6.4	-	< 0.05	1.1	29
Pyrene	mg/kg	0.05	MCERTS	5.9	-	< 0.05	0.89	27
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.2	-	< 0.05	0.42	20
Chrysene	mg/kg	0.05	MCERTS	3.2	-	< 0.05	0.51	14
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.6	-	< 0.05	0.60	23
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.5	-	< 0.05	0.26	8.7
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.3	-	< 0.05	0.39	18
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.6	-	< 0.05	0.25	9.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.71	-	< 0.05	< 0.05	2.7
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.9	-	< 0.05	0.25	10

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	40.4	-	< 0.80	4.64	175
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	27	-	6.5	7.0	13
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.4	-	0.39	0.37	0.66
Boron (water soluble)	mg/kg	0.2	MCERTS	1.0	-	0.6	0.8	1.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	-	< 0.2	< 0.2	0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	-	13	13	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	76	-	2.7	6.0	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	490	-	14	51	890
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.1	-	< 0.3	< 0.3	0.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	-	9.9	11	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	-	23	22	32
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	250	-	21	24	150

Analytical Report Number: 20-10467

Project / Site name: Highgrove Street, Reading

Your Order No: P20-060 GI

Lab Sample Number				1514600	1514601	1514602	1514603	1514604
Sample Reference				WS1	WS1	WS1	WS2	WS3
Sample Number				C	D	C	C	C
Depth (m)				0.40	0.60	0.90	0.80	0.40
Date Sampled				18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	54	-	< 10	19	550
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TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 20-10467

Project / Site name: Highgrove Street, Reading

Your Order No: P20-060 GI

Lab Sample Number				1514605	1514606	1514607	1514608	1514609
Sample Reference				WS3	WS4	WS4	WS5	WS5
Sample Number				C	C	D	C	D
Depth (m)				0.90	0.40	2.50	0.40	1.50
Date Sampled				18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	10	13	15	12	10
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50	0.50	0.90

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	7.5	7.1	8.2	7.9
Total Sulphate as SO ₄	mg/kg	50	MCERTS	160	460	-	380	-
Total Sulphate as SO ₄	%	0.005	MCERTS	0.016	-	0.011	-	0.020
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.013	-	0.014	-	0.030
Loss on Ignition @ 450°C	%	0.2	MCERTS	1.5	3.9	-	3.1	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.88	-	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.80	-	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.54	-	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.68	-	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.65	-	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.47	-	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.53	-	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.24	-	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.33	-	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	5.12	-	< 0.80	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	12	-	18	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.43	0.59	-	0.56	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.1	0.9	-	1.9	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	< 0.2	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	17	-	15	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	22	-	18	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	250	-	120	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.6	-	0.8	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.9	11	-	11	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	35	29	-	29	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	12	90	-	36	-

Analytical Report Number: 20-10467

Project / Site name: Highgrove Street, Reading

Your Order No: P20-060 GI

Lab Sample Number				1514605	1514606	1514607	1514608	1514609
Sample Reference				WS3	WS4	WS4	WS5	WS5
Sample Number				C	C	D	C	D
Depth (m)				0.90	0.40	2.50	0.40	1.50
Date Sampled				18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	< 10	10	-	< 10	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 20-10467

Project / Site name: Highgrove Street, Reading

Your Order No: P20-060 GI

Lab Sample Number				1514610	1514611	1514612	1516817
Sample Reference				WS6	WS6	WS6	WS2
Sample Number				C	C	D	D
Depth (m)				0.30	0.90	2.60	1.50
Date Sampled				18/05/2020	18/05/2020	18/05/2020	18/05/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.2	18	15	7.1
Total mass of sample received	kg	0.001	NONE	0.90	0.50	0.50	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0	8.0	7.6	8.2
Total Sulphate as SO ₄	mg/kg	50	MCERTS	380	110	-	-
Total Sulphate as SO ₄	%	0.005	MCERTS	-	0.011	0.010	0.022
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.0087	0.020	0.068
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.5	3.2	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Fluoranthene	mg/kg	0.05	MCERTS	0.64	< 0.05	-	-
Pyrene	mg/kg	0.05	MCERTS	0.62	< 0.05	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.35	< 0.05	-	-
Chrysene	mg/kg	0.05	MCERTS	0.43	< 0.05	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.43	< 0.05	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.34	< 0.05	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.36	< 0.05	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.17	< 0.80	-	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	73	11	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.82	1.1	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.1	1.3	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	45	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	13	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	260	14	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	28	27	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	56	70	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	180	55	-	-

Analytical Report Number: 20-10467

Project / Site name: Highgrove Street, Reading

Your Order No: P20-060 GI

Lab Sample Number				1514610	1514611	1514612	1516817	
Sample Reference				WS6	WS6	WS6	WS2	
Sample Number				C	C	D	D	
Depth (m)				0.30	0.90	2.60	1.50	
Date Sampled				18/05/2020	18/05/2020	18/05/2020	18/05/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	< 10	< 10	-	-	
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	-	-	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	-	-	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	-	-	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	-	-	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	-	-	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	-	-	



Analytical Report Number: 20-10467
Project / Site name: Highgrove Street, Reading
Your Order No: P20-060 GI

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1514604	WS3	0.40	155	Loose Fibrous Debris	Chrysotile	< 0.001	< 0.001

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.



Analytical Report Number : 20-10467

Project / Site name: Highgrove Street, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1514600	WS1	C	0.40	Brown loam and clay with gravel and vegetation.
1514601	WS1	D	0.60	Brown loam and clay with gravel and vegetation.
1514602	WS1	C	0.90	Brown clay and sand with gravel.
1514603	WS2	C	0.80	Brown clay and sand with gravel.
1514604	WS3	C	0.40	Brown loam and clay with gravel and vegetation.
1514605	WS3	C	0.90	Brown sand with gravel.
1514606	WS4	C	0.40	Brown loam and clay with gravel.
1514607	WS4	D	2.50	Brown clay.
1514608	WS5	C	0.40	Brown loam and clay with gravel.
1514609	WS5	D	1.50	Brown clay with gravel.
1514610	WS6	C	0.30	Brown loam and clay with gravel.
1514611	WS6	C	0.90	Brown clay.
1514612	WS6	D	2.60	Brown clay.
1516817	WS2	D	1.50	Brown clay and loam with gravel.

Analytical Report Number : 20-10467

Project / Site name: Highgrove Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Human Health Generic Contamination Risk Assessment - 125 Highgrove Street,, Reading, RG1 5EJ (9 Samples)

Determinand	Units	95th Percentile Upper Confidence Limit (Mean)	Assessment Criteria Residential with Home Grown Produce Concentration (cc)	Mean Exceeds cc	Outliers	True Mean (μ)	Exceeding Samples
Metals/Metaloids							
Arsenic	mg kg ⁻¹	33.64	37.0				
Beryllium	mg kg ⁻¹	0.93	1.7				
Cadmium	mg kg ⁻¹	0.23	11.0				
Chromium	mg kg ⁻¹	26	910				
Inorganic Mercury	mg kg ⁻¹	0.71	40.0				
Nickel	mg kg ⁻¹	22	180				
Lead	mg kg ⁻¹	426	190	Y	Y	176.0	WS1 at 0.40m WS3 at 0.40m
Selenium	mg kg ⁻¹	1.00	250				
Copper	mg kg ⁻¹	35	2400				
Zinc	mg kg ⁻¹	146	3700				
Vanadium	mg kg ⁻¹	48.08	410				

Phytotoxic Metals (Phytotoxicity)							
Copper	mg kg ⁻¹	35	111				
Zinc	mg kg ⁻¹	146	330				

Hydrocarbons							
Total Petroleum Hydrocarbons							
TPH EC6-EC10 (PRO)	mg kg ⁻¹	N/A	65				
TPH EC10-EC21 (DRO)	mg kg ⁻¹	N/A	300				
TPH EC21-EC40 (Min.Oil)	mg kg ⁻¹	N/A	1500				
Total TPH	mg kg ⁻¹	193.20	600				
Poly Aromatic Hydrocarbons							
Benzo(a)pyrene	mg kg ⁻¹	6.53	2.70	Y	Y	1.68	WS3 at 0.40m
Napthalene	mg kg ⁻¹	0.19	5.60				
Dibenzo(a,h) anthracene	mg kg ⁻¹	1.00	0.28	Y	Y	0.05	WS1 at 0.40m WS3 at 0.40m
Flourene	mg kg ⁻¹	0.19	400.00				
Phenols	mg kg ⁻¹	8.24	420.00				

OTHER							
pH	-	8.2	<5, >12				
Sulphate (Total)	mg kg ⁻¹	NE	2400				
Sulphur	mg kg ⁻¹	N/A	2500				
Water Soluble Boron	mg kg ⁻¹	1.39	290				
Asbestos Screen	Detection	Not Detected	Chrysotile				WS3 at 0.40m
Asbestos Quantification	%		<0.001				

NOTE:

na - Not applicable

ne - Not evaluated, all results below the appropriate guideline level

nc - not displayed as results are not meaningful due to large uncertainty from small data set

RESULTS SUMMARY - MAX VALUE TEST - LESS THAN 1.0M DEPTH (RESIDENTIAL WITH GARDENS)

125 Highgrove Street, Reading, RG1 5EJ

DETERMINAND

Lead

SITE ASSESSMENT
CRITERIA

190 mg/kg

LOCATION	DEPTH
WS1	0.4
WS1	0.9
WS2	0.8
WS3	0.4
WS3	0.9
WS4	0.4
WS5	0.4
WS6	0.3
WS6	0.9

CONC (mgkg ⁻¹)
490
14
51
890
11
250
120
260
14

N	T Values
2	6.314
3	2.92
4	2.353
5	2.132
6	2.015
7	1.943
8	1.895
9	1.86
10	1.833
11	1.812
12	1.796
13	1.782
14	1.771
15	1.761
16	1.753
17	1.746
18	1.74
19	1.734
20	1.729
21	1.725
22	1.721
23	1.717
24	1.714
25	1.711
26	1.708
27	1.706
28	1.703
29	1.701
30	1.699

MEAN CONC (x) 233.33

CONC ST. DEV. (s) 293.6439

Number (n) 9

Y Max 890.00

Calculated T value 2.2363

Representitive T value 1.86

Max Value Test	Failed
Outlier?	Contamination Hotspots Present



Client: Oak and Lime Limited
Project No: P20-060
Project: 125 Highgrove Street,
Reading, RG1 5EJ

RESULTS SUMMARY - MAX VALUE TEST - LESS THAN 1.0M DEPTH (RESIDENTIAL WITH GARDENS)

125 Highgrove Street, Reading, RG1 5EJ

DETERMINAND

Benzo[a]pyrene

SITE ASSESSMENT
CRITERIA

2.7 mg/kg

LOCATION	DEPTH
WS1	0.4
WS1	0.9
WS2	0.8
WS3	0.4
WS3	0.9
WS4	0.4
WS5	0.4
WS6	0.3
WS6	0.9

CONC (mgkg ⁻¹)
4.3
0.05
0.39
18
0.05
0.53
0.05
0.36
0.05

N	T Values
2	6.314
3	2.92
4	2.353
5	2.132
6	2.015
7	1.943
8	1.895
9	1.86
10	1.833
11	1.812
12	1.796
13	1.782
14	1.771
15	1.761
16	1.753
17	1.746
18	1.74
19	1.734
20	1.729
21	1.725
22	1.721
23	1.717
24	1.714
25	1.711
26	1.708
27	1.706
28	1.703
29	1.701
30	1.699

MEAN CONC (x)	2.64
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CONC ST. DEV. (s)	5.918515
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Number (n)	9
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Y Max	18.00
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Calculated T value	2.5949
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Representitive T value	1.86
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Max Value Test	Failed
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Outlier?	Contamination Hotspots Present
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Client: Oak and Lime Limited

Project No: P20-060
Project: 125 Highgrove Street,
Reading, RG1 5EJ

RESULTS SUMMARY - MAX VALUE TEST - LESS THAN 1.0M DEPTH (RESIDENTIAL WITH GARDENS)

125 Highgrove Street, Reading, RG1 5EJ

DETERMINAND

Dibenzo[a,h]anthracene

SITE ASSESSMENT
CRITERIA

0.28 mg/kg

LOCATION	DEPTH
WS1	0.4
WS1	0.9
WS2	0.8
WS3	0.4
WS3	0.9
WS4	0.4
WS5	0.4
WS6	0.3
WS6	0.9

CONC (mgkg ⁻¹)
0.71
0.05
0.05
2.7
0.05
0.05
0.05
0.05
0.05

N	T Values
2	6.314
3	2.92
4	2.353
5	2.132
6	2.015
7	1.943
8	1.895
9	1.86
10	1.833
11	1.812
12	1.796
13	1.782
14	1.771
15	1.761
16	1.753
17	1.746
18	1.74
19	1.734
20	1.729
21	1.725
22	1.721
23	1.717
24	1.714
25	1.711
26	1.708
27	1.706
28	1.703
29	1.701
30	1.699

MEAN CONC (x) 0.42

CONC ST. DEV. (0.88323

Number (n) 9

Y Max 2.70

Calculated T value 2.584

Representitive T value 1.86

Max Value Test Failed

Outlier? Contamination Hotspots Present



Client: Oak and Lime Limited
Project No: P20-060
Project: 125 Highgrove Street,
Reading, RG1 5EJ

GENERIC HUMAN HEALTH SCREENING TOTAL SOIL CONCENTRATION ASSESSMENT CRITERIA (GAC)

DETERMINAND		RESIDENTIAL (mg/kg)		COMMERCIAL (mg/kg)
Chemical	GAC Sources and units	With Home Grown produce	Without Home Grown produce	
Asbestos Screen & ID*	-	Detected	Detected	Detected
Cyanide - Total	SNIFFER	53.25	53.25	53.25
Cyanide - Free	SNIFFER	53.25	53.25	53.25
Loss on Ignition @ 450°C	-	-	-	-
Sulphate (as SO ₄) - Total	BRE****	2400	2400	2400
Sulphide	ICRCL	2500	2500	2500
Sulphur - Total	ICRCL	2500	2500	2500
Phenol (Total Monohydric)	CLEA	420	420	3200
pH	ICRCL	<5,>12	<5,>12	-
Metals and Metalloids (CLEA Metals)				
Arsenic	LQM S4UL	37	40	640
Beryllium	LQM S4UL	1.7	1.7	12
Cadmium	LQM S4UL	11	85	190
Chromium III	LQM S4UL	910	910	8600
Lead	DEFRA C4SL	190	310	2300
Mercury (Total)	LQM S4UL (Inorganic)	40	56	1100
Selenium	LQM S4UL	250	430	12000
Copper (phytotoxicity)	LQM S4UL	2400 (111)	7100	68000
Nickel	LQM S4UL	180	180	980
Zinc (phytotoxicity)	LQM S4UL	3700 (330)	40000	730000
Vanadium	LQM S4UL	410	1200	9000
Boron - Water Soluble	LQM S4UL	290	11000	240000
Total Petroleum Hydrocarbons**				
TPH (EC6-EC10) - PRO	LQM S4UL (2.5% SOM)	65	100	4800
TPH (EC10-EC21) - DRO	LQM S4UL (2.5% SOM)	300	600	23000
TPH (EC21-EC40) - Min. Oil	LQM S4UL (2.5% SOM)	1500	1900	28000
Total TPH (EC10-EC40)	LQM S4UL (2.5% SOM)	600	900	23000
Polycyclic Aromatic Hydrocarbons***				
Naphthalene	LQM S4UL (2.5% SOM)	5.6	5.6	460
Flourene	LQM S4UL (2.5% SOM)	400	3800	68000
Benzo[a]pyrene	LQM S4UL (2.5% SOM)	2.7	3.2	35
Dibenzo[a,h]anthracene	LQM S4UL (2.5% SOM)	0.28	0.32	3.6

Notes

The Generic Assessment Criteria (GAC) are based on CLEA Soil Guidance Values published values and CIEH/LQM S4CLs where available or ICRCL, DoE, BRE and HSE levels where necessary. Where gaps remain GACs were calculated using the latest CLEA spreadsheet using DEFRA C4SL toxicology and physiochemical parameters from DEFRA SP1010.

* Guidance level set at any fibre identification.

** TPH 3 band is employed as a screening tool to instigate detailed speciated analysis to the TPHCWG methodology. Based on mean of fractions included Testing based on USEPA Priority 16 compounds. GACs for four compounds and total PAH with published GACs only, used as a screening tool.

*** BRE SD1 - DS-1 Concrete Sulphate Design Class limit. Sulphate is not considered to pose a significant risk to human health under normal circumstances.



CLIENT:

PROJECT No:

PROJECT TITLE:

Oak and Lime Limited

P20-060

125 Highgrove Street,
Reading, RG1 5EJ

GENERIC HUMAN HEALTH HYDROCARBON TOTAL SOIL CONCENTRATION ASSESSMENT CRITERIA (GAC)

DETERMINAND		RESIDENTIAL (mg/kg)		COMMERCIAL (mg/kg)
Chemical	GAC Sources and units	With Home Grown produce	Without Home Grown produce	
TPH CWG				
Aliphatic EC 5-6	LQM S4UL (2.5% SOM)	78	78	5900
Aliphatic EC >6-8	LQM S4UL (2.5% SOM)	230	230	17000
Aliphatic EC >8-10	LQM S4UL (2.5% SOM)	65	65	4800
Aliphatic EC >10-12	LQM S4UL (2.5% SOM)	330	330	23000
Aliphatic EC >12-16	LQM S4UL (2.5% SOM)	2400	2400	82000
Aliphatic EC >16-35	LQM S4UL (2.5% SOM)	92000	92000	1700000
Aliphatic EC >35-44	LQM S4UL (2.5% SOM)	92000	92000	1700000
Aromatic EC 5-7 (Benzene)	LQM S4UL (2.5% SOM)	140	690	46000
Aromatic EC >7-8 (Toluene)	LQM S4UL (2.5% SOM)	290	1800	110000
Aromatic EC >8-10	LQM S4UL (2.5% SOM)	83	110	8100
Aromatic EC >10-12	LQM S4UL (2.5% SOM)	180	590	28000
Aromatic EC >12-16	LQM S4UL (2.5% SOM)	330	2300	37000
Aromatic EC >16-21	LQM S4UL (2.5% SOM)	540	1900	28000
Aromatic EC >21-35	LQM S4UL (2.5% SOM)	1500	1900	28000
Aromatic EC >35-44	LQM S4UL (2.5% SOM)	1500	1900	28000
Aliphatic and Aromatic EC >44	LQM S4UL (2.5% SOM)	1500	1900	28000
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	LQM S4UL (2.5% SOM)	510	4700	97000
Acenaphthylene	LQM S4UL (2.5% SOM)	420	4600	97000
Anthracene	LQM S4UL (2.5% SOM)	5400	35000	540000
Benzo[a]anthracene	LQM S4UL (2.5% SOM)	11	14	170
Benzo[a]pyrene	LQM S4UL (2.5% SOM)	2.7	3.2	35
Benzo[b]fluoranthene	LQM S4UL (2.5% SOM)	3.3	4	44
Benzo[ghi]perylene	LQM S4UL (2.5% SOM)	340	360	4000
Benzo[k]fluoranthene	LQM S4UL (2.5% SOM)	93	110	1200
Chrysene	LQM S4UL (2.5% SOM)	22	31	350
Dibenzo[ah]anthracene	LQM S4UL (2.5% SOM)	0.28	0.32	3.6
Fluoranthene	LQM S4UL (2.5% SOM)	560	1600	23000
Fluorene	LQM S4UL (2.5% SOM)	400	3800	68000
Indeno[123-cd]pyrene	LQM S4UL (2.5% SOM)	36	46	510
Naphthalene	LQM S4UL (2.5% SOM)	5.6	5.6	460
Phenanthrene	LQM S4UL (2.5% SOM)	220	1500	22000
Pyrene	LQM S4UL (2.5% SOM)	1200	3800	54000
Coal Tar (BaP as marker)	LQM S4UL (2.5% SOM)	0.98	1.2	15

Notes

The Generic Assessment Criteria (GAC) are based on CIEH/LQM S4ULs.



CLIENT:

PROJECT No:

PROJECT TITLE:

Oak and Lime Limited

P20-060

125 Highgrove Street,
Reading, RG1 5EJ

**Matt Paddock**

Paddock Geo Engineering
14 Burns Road
Bletchley
Milton Keynes
MK3 5AL

t: 01908 271366

e: Paddock Engineering

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 20-10470

Project / Site name:	Highgrove Street, Reading	Samples received on:	19/05/2020
Your job number:	P20-060 S01	Sample instructed/ Analysis started on:	19/05/2020
Your order number:	P20-060 GI	Analysis completed by:	29/05/2020
Report Issue Number:	1	Report issued on:	29/05/2020
Samples Analysed:	10:1 WAC sample		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404

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email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	20-10470						
					Client: Paddock		
Location	Highgrove Street, Reading						
Lab Reference (Sample Number)	1514634 / 1514635				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	18/05/2020				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS1 1.60+ WS4 0.90+WS5 0.8 C+WS5 0.80 D + WS6 2.60 D						
Depth (m)							
Solid Waste Analysis							
TOC (%)**	0.2				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.9				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test		
					using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
	mg/l			mg/kg			
Arsenic *	< 0.0011			< 0.0110	0.5	2	25
Barium *	0.0037			0.0328	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0012			0.011	0.5	10	70
Copper *	0.0071			0.063	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0007			0.0062	0.5	10	30
Nickel *	0.0014			0.012	0.4	10	40
Lead *	0.0012			0.011	0.5	10	50
Antimony *	0.0028			0.025	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0069			0.061	4	50	200
Chloride *	0.84			7.5	800	15000	25000
Fluoride	0.65			5.8	10	150	500
Sulphate *	2.9			26	1000	20000	50000
TDS*	28			250	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	4.95			44.1	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	2.0						
Dry Matter (%)	89						
Moisture (%)	11						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					*= UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and I2 cannot be held responsible for any discrepancies with current legislation					** = MCERTS accredited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



Analytical Report Number : 20-10470

Project / Site name: Highgrove Street, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1514634	D+ WS4 0.90	0.80 D + WS6	None Supplied	Brown clay and sand with gravel.

Analytical Report Number : 20-10470

Project / Site name: Highgrove Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

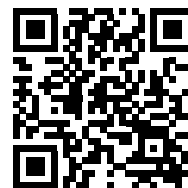
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Waste Classification Report



LF65K-UK8C9-9DRQ9

Job name

125 Highgrove Street, Reading, RG1 5EJ

Description/Comments

Project

P20-060

Site

125 Highgrove Street, Reading, RG1 5EJ

Related Documents

#	Name	Description
None		

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name:
Matthew Paddock

Date:
03 Jun 2020 09:33 GMT

Telephone:
07377 422528

Company:
Paddock Geo Engineering

**The Annex,
14 Burns Road**

**Milton Keynes
MK3 5A**

HazWasteOnline™ Training Record:

Course	Date
Hazardous Waste Classification	-
Advanced Hazardous Waste Classification	-

Report

Created by: Matthew Paddock
Created date: 03 Jun 2020 09:33 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	WS1	0.4	Non Hazardous		3
2	WS1[2]	0.9	Non Hazardous		5
3	WS2	0.8	Non Hazardous		7
4	WS3	0.4	Non Hazardous		9
5	WS3[2]	0.9	Non Hazardous		11
6	WS4	0.4	Non Hazardous		13
7	WS5	0.4	Non Hazardous		15
8	WS6	0.3	Non Hazardous		17
9	WS6[2]	0.9	Non Hazardous		20

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	22
Appendix B: Rationale for selection of metal species	23
Appendix C: Version	24

Classification of sample: WS1

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

Sample details

Sample Name:	WS1	LoW Code:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	0.4 m	Chapter:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
		Entry:	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		arsenic { arsenic trioxide }				27	mg/kg	1.32	35.649	mg/kg	0.00356 %		
		033-003-00-0	215-481-4	1327-53-3									
2		beryllium { beryllium oxide }				1.4	mg/kg	2.775	3.885	mg/kg	0.000389 %		
		004-003-00-8	215-133-1	1304-56-9									
3		boron { diboron trioxide; boric oxide }				1	mg/kg	3.22	3.22	mg/kg	0.000322 %		
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				0.3	mg/kg	1.142	0.343	mg/kg	0.0000343 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds {  chromium(III) oxide (worst case) }				20	mg/kg	1.462	29.231	mg/kg	0.00292 %		
			215-160-9	1308-38-9									
6		copper { dicopper oxide; copper (I) oxide }				76	mg/kg	1.126	85.568	mg/kg	0.00856 %		
		029-002-00-X	215-270-7	1317-39-1									
7		lead { lead chromate }			1	490	mg/kg	1.56	764.309	mg/kg	0.049 %		
		082-004-00-2	231-846-0	7758-97-6									
8		mercury { mercury dichloride }				1.1	mg/kg	1.353	1.489	mg/kg	0.000149 %		
		080-010-00-X	231-299-8	7487-94-7									
9		nickel { nickel chromate }				23	mg/kg	2.976	68.454	mg/kg	0.00685 %		
		028-035-00-7	238-766-5	14721-18-7									
10		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1	mg/kg	2.554	2.554	mg/kg	0.000255 %		
		034-002-00-8											
11		zinc { zinc chromate }				250	mg/kg	2.774	693.537	mg/kg	0.0694 %		
		024-007-00-3	236-878-9	13530-65-9									
12		TPH (C6 to C40) petroleum group				54	mg/kg		54	mg/kg	0.0054 %		
				TPH									
13		pH				8.4	pH		8.4	pH	8.4 pH		
				PH									
14		naphthalene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
		601-052-00-2	202-049-5	91-20-3									
15		acenaphthylene				0.35	mg/kg		0.35	mg/kg	0.000035 %		
			205-917-1	208-96-8									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
17	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
18	phenanthrene	201-581-5	85-01-8		1.6 mg/kg		1.6 mg/kg	0.00016 %		
19	anthracene	204-371-1	120-12-7		0.34 mg/kg		0.34 mg/kg	0.000034 %		
20	fluoranthene	205-912-4	206-44-0		6.4 mg/kg		6.4 mg/kg	0.00064 %		
21	pyrene	204-927-3	129-00-0		5.9 mg/kg		5.9 mg/kg	0.00059 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		4.2 mg/kg		4.2 mg/kg	0.00042 %		
23	chrysene	601-048-00-0	205-923-4		3.2 mg/kg		3.2 mg/kg	0.00032 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		5.6 mg/kg		5.6 mg/kg	0.00056 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		2.5 mg/kg		2.5 mg/kg	0.00025 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		4.3 mg/kg		4.3 mg/kg	0.00043 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		2.6 mg/kg		2.6 mg/kg	0.00026 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.71 mg/kg		0.71 mg/kg	0.000071 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		2.9 mg/kg		2.9 mg/kg	0.00029 %		
Total:								0.151 %		

Key

- User supplied data
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0054%)

Classification of sample: WS1[2]

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

Sample details

Sample Name:	LoW Code:
WS1[2]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.9 m	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number					
1	arsenic { arsenic trioxide }							
	033-003-00-0	215-481-4	1327-53-3					
2	beryllium { beryllium oxide }							
	004-003-00-8	215-133-1	1304-56-9					
3	boron { diboron trioxide; boric oxide }							
	005-008-00-8	215-125-8	1303-86-2					
4	cadmium { cadmium oxide }							
	048-002-00-0	215-146-2	1306-19-0					
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }							
		215-160-9	1308-38-9					
6	copper { dicopper oxide; copper (I) oxide }							
	029-002-00-X	215-270-7	1317-39-1					
7	lead { lead chromate }							
	082-004-00-2	231-846-0	7758-97-6	1				
8	mercury { mercury dichloride }							
	080-010-00-X	231-299-8	7487-94-7					
9	nickel { nickel chromate }							
	028-035-00-7	238-766-5	14721-18-7					
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }							
	034-002-00-8							
11	zinc { zinc chromate }							
	024-007-00-3	236-878-9	13530-65-9					
12	TPH (C6 to C40) petroleum group							
			TPH					
13	pH							
			PH					
14	naphthalene							
	601-052-00-2	202-049-5	91-20-3					
15	acenaphthylene							
		205-917-1	208-96-8					

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
17	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
18	phenanthrene	201-581-5	85-01-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
19	anthracene	204-371-1	120-12-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
20	fluoranthene	205-912-4	206-44-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
21	pyrene	204-927-3	129-00-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
23	chrysene	601-048-00-0	205-923-4		0.05 mg/kg		0.05 mg/kg	0.000005 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		0.05 mg/kg		0.05 mg/kg	0.000005 %		
Total:								0.0149 %		

Key

- User supplied data
 - Determinand defined or amended by HazWasteOnline (see Appendix A)
 - Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.001%)

Classification of sample: WS2

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

Sample details

Sample Name:	WS2	LoW Code:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	0.8 m	Chapter:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
		Entry:	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				7 mg/kg	1.32	9.242 mg/kg	0.000924 %			
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				0.37 mg/kg	2.775	1.027 mg/kg	0.000103 %			
	004-003-00-8	215-133-1	1304-56-9								
3	boron { diboron trioxide; boric oxide }				0.8 mg/kg	3.22	2.576 mg/kg	0.000258 %			
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.2 mg/kg	1.142	0.228 mg/kg	0.0000228 %			
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				13 mg/kg	1.462	19 mg/kg	0.0019 %			
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				6 mg/kg	1.126	6.755 mg/kg	0.000676 %			
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead chromate }			1	51 mg/kg	1.56	79.551 mg/kg	0.0051 %			
	082-004-00-2	231-846-0	7758-97-6								
8	mercury { mercury dichloride }				0.3 mg/kg	1.353	0.406 mg/kg	0.0000406 %			
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel chromate }				11 mg/kg	2.976	32.739 mg/kg	0.00327 %			
	028-035-00-7	238-766-5	14721-18-7								
10	selenium { selenium compounds with the exception of cadmium selenide and those specified elsewhere in this Annex }				1 mg/kg	2.554	2.554 mg/kg	0.000255 %			
	034-002-00-8										
11	zinc { zinc chromate }				24 mg/kg	2.774	66.58 mg/kg	0.00666 %			
	024-007-00-3	236-878-9	13530-65-9								
12	TPH (C6 to C40) petroleum group				19 mg/kg		19 mg/kg	0.0019 %			
			TPH								
13	pH				8.1 pH		8.1 pH	8.1 pH			
			PH								
14	naphthalene				0.05 mg/kg		0.05 mg/kg	0.000005 %			
	601-052-00-2	202-049-5	91-20-3								
15	acenaphthylene				0.05 mg/kg		0.05 mg/kg	0.000005 %			
		205-917-1	208-96-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
17	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
18	phenanthrene	201-581-5	85-01-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
19	anthracene	204-371-1	120-12-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
20	fluoranthene	205-912-4	206-44-0		1.1 mg/kg		1.1 mg/kg	0.00011 %		
21	pyrene	204-927-3	129-00-0		0.89 mg/kg		0.89 mg/kg	0.000089 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.42 mg/kg		0.42 mg/kg	0.000042 %		
23	chrysene	601-048-00-0	205-923-4		0.51 mg/kg		0.51 mg/kg	0.000051 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.6 mg/kg		0.6 mg/kg	0.00006 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.26 mg/kg		0.26 mg/kg	0.000026 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.39 mg/kg		0.39 mg/kg	0.000039 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		0.25 mg/kg		0.25 mg/kg	0.000025 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		0.25 mg/kg		0.25 mg/kg	0.000025 %		
Total:								0.0216 %		

Key

- User supplied data
 - Determinand defined or amended by HazWasteOnline (see Appendix A)
 - Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0019%)

Classification of sample: WS3

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

Sample details

Sample Name:	WS3	LoW Code:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	0.4 m	Chapter:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
		Entry:	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number										
1		arsenic { arsenic trioxide }				13	mg/kg	1.32	17.164	mg/kg	0.00172 %			
		033-003-00-0	215-481-4	1327-53-3										
2		beryllium { beryllium oxide }				0.66	mg/kg	2.775	1.832	mg/kg	0.000183 %			
		004-003-00-8	215-133-1	1304-56-9										
3		boron { diboron trioxide; boric oxide }				1.5	mg/kg	3.22	4.83	mg/kg	0.000483 %			
		005-008-00-8	215-125-8	1303-86-2										
4		cadmium { cadmium oxide }				0.2	mg/kg	1.142	0.228	mg/kg	0.0000228 %			
		048-002-00-0	215-146-2	1306-19-0										
5		chromium in chromium(III) compounds {  chromium(III) oxide (worst case) }				15	mg/kg	1.462	21.923	mg/kg	0.00219 %			
			215-160-9	1308-38-9										
6		copper { dicopper oxide; copper (I) oxide }				31	mg/kg	1.126	34.903	mg/kg	0.00349 %			
		029-002-00-X	215-270-7	1317-39-1										
7		lead { lead chromate }			1	890	mg/kg	1.56	1388.235	mg/kg	0.089 %			
		082-004-00-2	231-846-0	7758-97-6										
8		mercury { mercury dichloride }				0.6	mg/kg	1.353	0.812	mg/kg	0.0000812 %			
		080-010-00-X	231-299-8	7487-94-7										
9		nickel { nickel chromate }				18	mg/kg	2.976	53.573	mg/kg	0.00536 %			
		028-035-00-7	238-766-5	14721-18-7										
10		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1	mg/kg	2.554	2.554	mg/kg	0.000255 %			
		034-002-00-8												
11		zinc { zinc chromate }				150	mg/kg	2.774	416.122	mg/kg	0.0416 %			
		024-007-00-3	236-878-9	13530-65-9										
12		TPH (C6 to C40) petroleum group				550	mg/kg		550	mg/kg	0.055 %			
				TPH										
13		pH				8	pH		8	pH	8pH			
				PH										
14		naphthalene				0.46	mg/kg		0.46	mg/kg	0.000046 %			
		601-052-00-2	202-049-5	91-20-3										
15		acenaphthylene				1.4	mg/kg		1.4	mg/kg	0.00014 %			
			205-917-1	208-96-8										

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.25 mg/kg		0.25 mg/kg	0.000025 %		
17	fluorene	201-695-5	86-73-7		0.47 mg/kg		0.47 mg/kg	0.000047 %		
18	phenanthrene	201-581-5	85-01-8		8.2 mg/kg		8.2 mg/kg	0.00082 %		
19	anthracene	204-371-1	120-12-7		2 mg/kg		2 mg/kg	0.0002 %		
20	fluoranthene	205-912-4	206-44-0		29 mg/kg		29 mg/kg	0.0029 %		
21	pyrene	204-927-3	129-00-0		27 mg/kg		27 mg/kg	0.0027 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		20 mg/kg		20 mg/kg	0.002 %		
23	chrysene	601-048-00-0	205-923-4		14 mg/kg		14 mg/kg	0.0014 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		23 mg/kg		23 mg/kg	0.0023 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		8.7 mg/kg		8.7 mg/kg	0.00087 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		18 mg/kg		18 mg/kg	0.0018 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		9.4 mg/kg		9.4 mg/kg	0.00094 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		2.7 mg/kg		2.7 mg/kg	0.00027 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		10 mg/kg		10 mg/kg	0.001 %		
Total:								0.217 %		

Key

- User supplied data
 - Determinand defined or amended by HazWasteOnline (see Appendix A)
 - Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.055%)

Classification of sample: WS3[2]

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

Sample details

Sample Name:	LoW Code:	
WS3[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.9 m		

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number										
1		arsenic { arsenic trioxide }				12	mg/kg	1.32	15.844	mg/kg	0.00158 %			
		033-003-00-0	215-481-4	1327-53-3										
2		beryllium { beryllium oxide }				0.43	mg/kg	2.775	1.193	mg/kg	0.000119 %			
		004-003-00-8	215-133-1	1304-56-9										
3		boron { diboron trioxide; boric oxide }				1.1	mg/kg	3.22	3.542	mg/kg	0.000354 %			
		005-008-00-8	215-125-8	1303-86-2										
4		cadmium { cadmium oxide }				0.2	mg/kg	1.142	0.228	mg/kg	0.0000228 %			
		048-002-00-0	215-146-2	1306-19-0										
5		chromium in chromium(III) compounds {  chromium(III) oxide (worst case) }				17	mg/kg	1.462	24.846	mg/kg	0.00248 %			
			215-160-9	1308-38-9										
6		copper { dicopper oxide; copper (I) oxide }				1	mg/kg	1.126	1.126	mg/kg	0.000113 %			
		029-002-00-X	215-270-7	1317-39-1										
7		lead { lead chromate }			1	11	mg/kg	1.56	17.158	mg/kg	0.0011 %			
		082-004-00-2	231-846-0	7758-97-6										
8		mercury { mercury dichloride }				0.3	mg/kg	1.353	0.406	mg/kg	0.0000406 %			
		080-010-00-X	231-299-8	7487-94-7										
9		nickel { nickel chromate }				9.9	mg/kg	2.976	29.465	mg/kg	0.00295 %			
		028-035-00-7	238-766-5	14721-18-7										
10		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1	mg/kg	2.554	2.554	mg/kg	0.000255 %			
		034-002-00-8												
11		zinc { zinc chromate }				12	mg/kg	2.774	33.29	mg/kg	0.00333 %			
		024-007-00-3	236-878-9	13530-65-9										
12		TPH (C6 to C40) petroleum group				10	mg/kg		10	mg/kg	0.001 %			
				TPH										
13		pH				7.9	pH		7.9	pH	7.9 pH			
				PH										
14		naphthalene				0.05	mg/kg		0.05	mg/kg	0.000005 %			
		601-052-00-2	202-049-5	91-20-3										
15		acenaphthylene				0.05	mg/kg		0.05	mg/kg	0.000005 %			
			205-917-1	208-96-8										

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
17	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
18	phenanthrene	201-581-5	85-01-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
19	anthracene	204-371-1	120-12-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
20	fluoranthene	205-912-4	206-44-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
21	pyrene	204-927-3	129-00-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
23	chrysene	601-048-00-0	205-923-4		0.05 mg/kg		0.05 mg/kg	0.000005 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		0.05 mg/kg		0.05 mg/kg	0.000005 %		
Total:								0.0134 %		

Key

- User supplied data
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.001%)

Classification of sample: WS4

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

Sample details

Sample Name:	WS4	LoW Code:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	0.4 m	Chapter:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
		Entry:	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				12 mg/kg	1.32	15.844 mg/kg	0.00158 %			
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				0.59 mg/kg	2.775	1.637 mg/kg	0.000164 %			
	004-003-00-8	215-133-1	1304-56-9								
3	boron { diboron trioxide; boric oxide }				0.9 mg/kg	3.22	2.898 mg/kg	0.00029 %			
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.2 mg/kg	1.142	0.228 mg/kg	0.0000228 %			
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17 mg/kg	1.462	24.846 mg/kg	0.00248 %			
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				22 mg/kg	1.126	24.77 mg/kg	0.00248 %			
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead chromate }			1	250 mg/kg	1.56	389.954 mg/kg	0.025 %			
	082-004-00-2	231-846-0	7758-97-6								
8	mercury { mercury dichloride }				0.6 mg/kg	1.353	0.812 mg/kg	0.0000812 %			
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel chromate }				11 mg/kg	2.976	32.739 mg/kg	0.00327 %			
	028-035-00-7	238-766-5	14721-18-7								
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1 mg/kg	2.554	2.554 mg/kg	0.000255 %			
	034-002-00-8										
11	zinc { zinc chromate }				90 mg/kg	2.774	249.673 mg/kg	0.025 %			
	024-007-00-3	236-878-9	13530-65-9								
12	TPH (C6 to C40) petroleum group				10 mg/kg		10 mg/kg	0.001 %			
			TPH								
13	pH				7.5 pH		7.5 pH	7.5 pH			
			PH								
14	naphthalene				0.05 mg/kg		0.05 mg/kg	0.000005 %			
	601-052-00-2	202-049-5	91-20-3								
15	acenaphthylene				0.05 mg/kg		0.05 mg/kg	0.000005 %			
		205-917-1	208-96-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
17	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
18	phenanthrene	201-581-5	85-01-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
19	anthracene	204-371-1	120-12-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
20	fluoranthene	205-912-4	206-44-0		0.88 mg/kg		0.88 mg/kg	0.000088 %		
21	pyrene	204-927-3	129-00-0		0.8 mg/kg		0.8 mg/kg	0.00008 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.54 mg/kg		0.54 mg/kg	0.000054 %		
23	chrysene	601-048-00-0	205-923-4		0.68 mg/kg		0.68 mg/kg	0.000068 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.65 mg/kg		0.65 mg/kg	0.000065 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.47 mg/kg		0.47 mg/kg	0.000047 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.53 mg/kg		0.53 mg/kg	0.000053 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		0.24 mg/kg		0.24 mg/kg	0.000024 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		0.33 mg/kg		0.33 mg/kg	0.000033 %		
Total:								0.0621 %		

Key

- User supplied data
 - Determinand defined or amended by HazWasteOnline (see Appendix A)
 - Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.001%)

Classification of sample: WS5

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

Sample details

Sample Name:	LoW Code:	
WS5	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.4 m		

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	arsenic { arsenic trioxide }				18 mg/kg	1.32	23.766 mg/kg	0.00238 %		
	033-003-00-0	215-481-4	1327-53-3							
2	beryllium { beryllium oxide }				0.56 mg/kg	2.775	1.554 mg/kg	0.000155 %		
	004-003-00-8	215-133-1	1304-56-9							
3	boron { diboron trioxide; boric oxide }				1.9 mg/kg	3.22	6.118 mg/kg	0.000612 %		
	005-008-00-8	215-125-8	1303-86-2							
4	cadmium { cadmium oxide }				0.2 mg/kg	1.142	0.228 mg/kg	0.0000228 %		
	048-002-00-0	215-146-2	1306-19-0							
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				15 mg/kg	1.462	21.923 mg/kg	0.00219 %		
		215-160-9	1308-38-9							
6	copper { dicopper oxide; copper (I) oxide }				18 mg/kg	1.126	20.266 mg/kg	0.00203 %		
	029-002-00-X	215-270-7	1317-39-1							
7	lead { lead chromate }			1	120 mg/kg	1.56	187.178 mg/kg	0.012 %		
	082-004-00-2	231-846-0	7758-97-6							
8	mercury { mercury dichloride }				0.8 mg/kg	1.353	1.083 mg/kg	0.000108 %		
	080-010-00-X	231-299-8	7487-94-7							
9	nickel { nickel chromate }				11 mg/kg	2.976	32.739 mg/kg	0.00327 %		
	028-035-00-7	238-766-5	14721-18-7							
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1 mg/kg	2.554	2.554 mg/kg	0.000255 %		
	034-002-00-8									
11	zinc { zinc chromate }				36 mg/kg	2.774	99.869 mg/kg	0.00999 %		
	024-007-00-3	236-878-9	13530-65-9							
12	TPH (C6 to C40) petroleum group				10 mg/kg		10 mg/kg	0.001 %		
			TPH							
13	pH				8.2 pH		8.2 pH	8.2 pH		
			PH							
14	naphthalene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
	601-052-00-2	202-049-5	91-20-3							
15	acenaphthylene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		205-917-1	208-96-8							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
17	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
18	phenanthrene	201-581-5	85-01-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
19	anthracene	204-371-1	120-12-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
20	fluoranthene	205-912-4	206-44-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
21	pyrene	204-927-3	129-00-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
23	chrysene	601-048-00-0	205-923-4		0.05 mg/kg		0.05 mg/kg	0.000005 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		0.05 mg/kg		0.05 mg/kg	0.000005 %		
Total:								0.0341 %		

Key

- User supplied data
 - Determinand defined or amended by HazWasteOnline (see Appendix A)
 - Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.001%)

Classification of sample: WS6

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

Sample details

Sample Name:	WS6	LoW Code:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	0.3 m	Chapter:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
		Entry:	

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				73 mg/kg	1.32	96.384 mg/kg	0.00964 %			
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				0.82 mg/kg	2.775	2.276 mg/kg	0.000228 %			
	004-003-00-8	215-133-1	1304-56-9								
3	boron { diboron trioxide; boric oxide }				1.1 mg/kg	3.22	3.542 mg/kg	0.000354 %			
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.2 mg/kg	1.142	0.228 mg/kg	0.0000228 %			
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				21 mg/kg	1.462	30.693 mg/kg	0.00307 %			
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				11 mg/kg	1.126	12.385 mg/kg	0.00124 %			
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead chromate }			1	260 mg/kg	1.56	405.552 mg/kg	0.026 %			
	082-004-00-2	231-846-0	7758-97-6								
8	mercury { mercury dichloride }				0.4 mg/kg	1.353	0.541 mg/kg	0.0000541 %			
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel chromate }				28 mg/kg	2.976	83.335 mg/kg	0.00833 %			
	028-035-00-7	238-766-5	14721-18-7								
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1 mg/kg	2.554	2.554 mg/kg	0.000255 %			
	034-002-00-8										
11	zinc { zinc chromate }				180 mg/kg	2.774	499.346 mg/kg	0.0499 %			
	024-007-00-3	236-878-9	13530-65-9								
12	TPH (C6 to C40) petroleum group				10 mg/kg		10 mg/kg	0.001 %			
			TPH								
13	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				1 mg/kg		1 mg/kg	0.0001 %			
	603-181-00-X	216-653-1	1634-04-4								
14	benzene				1 mg/kg		1 mg/kg	0.0001 %			
	601-020-00-8	200-753-7	71-43-2								
15	toluene				1 mg/kg		1 mg/kg	0.0001 %			
	601-021-00-3	203-625-9	108-88-3								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	ethylbenzene				1 mg/kg		1 mg/kg	0.0001 %		
	601-023-00-4	202-849-4	100-41-4							
17	xylene				1 mg/kg		1 mg/kg	0.0001 %		
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
18	pH				8 pH		8 pH	8pH		
			PH							
19	naphthalene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
	601-052-00-2	202-049-5	91-20-3							
20	acenaphthylene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		205-917-1	208-96-8							
21	acenaphthene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		201-469-6	83-32-9							
22	fluorene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		201-695-5	86-73-7							
23	phenanthrene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		201-581-5	85-01-8							
24	anthracene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		204-371-1	120-12-7							
25	fluoranthene				0.64 mg/kg		0.64 mg/kg	0.000064 %		
		205-912-4	206-44-0							
26	pyrene				0.62 mg/kg		0.62 mg/kg	0.000062 %		
		204-927-3	129-00-0							
27	benzo[a]anthracene				0.35 mg/kg		0.35 mg/kg	0.000035 %		
	601-033-00-9	200-280-6	56-55-3							
28	chrysene				0.43 mg/kg		0.43 mg/kg	0.000043 %		
	601-048-00-0	205-923-4	218-01-9							
29	benzo[b]fluoranthene				0.43 mg/kg		0.43 mg/kg	0.000043 %		
	601-034-00-4	205-911-9	205-99-2							
30	benzo[k]fluoranthene				0.34 mg/kg		0.34 mg/kg	0.000034 %		
	601-036-00-5	205-916-6	207-08-9							
31	benzo[a]pyrene; benzo[def]chrysene				0.36 mg/kg		0.36 mg/kg	0.000036 %		
	601-032-00-3	200-028-5	50-32-8							
32	indeno[123-cd]pyrene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		205-893-2	193-39-5							
33	dibenz[a,h]anthracene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
	601-041-00-2	200-181-8	53-70-3							
34	benzo[ghi]perylene				0.05 mg/kg		0.05 mg/kg	0.000005 %		
		205-883-8	191-24-2							
Total:								0.101 %		

Key

- User supplied data
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration

CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

Flam. Liq. 2; H225 "Highly flammable liquid and vapour."

Because of determinands:

tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane: (conc.: 0.0001%)

benzene: (conc.: 0.0001%)
toluene: (conc.: 0.0001%)
ethylbenzene: (conc.: 0.0001%)

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

Because of determinands:

TPH (C6 to C40) petroleum group: (conc.: 0.001%)
xylene: (conc.: 0.0001%)

Classification of sample: WS6[2]

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

Sample details

Sample Name:	LoW Code:
WS6[2]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.9 m	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				11 mg/kg	1.32	14.524	mg/kg	0.00145 %		
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				1.1 mg/kg	2.775	3.053	mg/kg	0.000305 %		
	004-003-00-8	215-133-1	1304-56-9								
3	boron { dicobalt trioxide; boric oxide }				1.3 mg/kg	3.22	4.186	mg/kg	0.000419 %		
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.2 mg/kg	1.142	0.228	mg/kg	0.0000228 %		
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				45 mg/kg	1.462	65.77	mg/kg	0.00658 %		
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				13 mg/kg	1.126	14.637	mg/kg	0.00146 %		
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead chromate }			1	14 mg/kg	1.56	21.837	mg/kg	0.0014 %		
	082-004-00-2	231-846-0	7758-97-6								
8	mercury { mercury dichloride }				0.3 mg/kg	1.353	0.406	mg/kg	0.0000406 %		
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel chromate }				27 mg/kg	2.976	80.359	mg/kg	0.00804 %		
	028-035-00-7	238-766-5	14721-18-7								
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1 mg/kg	2.554	2.554	mg/kg	0.000255 %		
	034-002-00-8										
11	zinc { zinc chromate }				55 mg/kg	2.774	152.578	mg/kg	0.0153 %		
	024-007-00-3	236-878-9	13530-65-9								
12	TPH (C6 to C40) petroleum group				10 mg/kg		10	mg/kg	0.001 %		
			TPH								
13	pH				8 pH		8	pH	8pH		
			PH								
14	naphthalene				0.05 mg/kg		0.05	mg/kg	0.000005 %		
	601-052-00-2	202-049-5	91-20-3								
15	acenaphthylene				0.05 mg/kg		0.05	mg/kg	0.000005 %		
		205-917-1	208-96-8								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
16	acenaphthene	201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
17	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
18	phenanthrene	201-581-5	85-01-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
19	anthracene	204-371-1	120-12-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
20	fluoranthene	205-912-4	206-44-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
21	pyrene	204-927-3	129-00-0		0.05 mg/kg		0.05 mg/kg	0.000005 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
23	chrysene	601-048-00-0	205-923-4		0.05 mg/kg		0.05 mg/kg	0.000005 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		0.05 mg/kg		0.05 mg/kg	0.000005 %		
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.05 mg/kg		0.05 mg/kg	0.000005 %		
29	benzo[ghi]perylene	205-883-8	191-24-2		0.05 mg/kg		0.05 mg/kg	0.000005 %		
Total:								0.0363 %		

Key

- User supplied data
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration

CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because In house threshold.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.001%)

Appendix A: Classifier defined and non CLP determinands

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

Conversion factor: 1.462

Description/Comments: Data from C&L Inventory Database

Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

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

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: Aquatic Chronic 2 H411 , Repr. 2 H361d , Carc. 1B H350 , Muta. 1B H340 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Flam. Liq. 3 H226

■ **pH** (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 1 H310 , Acute Tox. 1 H330 , Acute Tox. 4 H302

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 2 H411 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315

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

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Carc. 2 H351

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

• **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Description/Comments:

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Hazard Statement(s): Carc. 2 H351

Reason for additional Hazards Statement(s):

03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

beryllium {beryllium oxide}

Reasonable case CLP species based on hazard statements/molecular weight. Industrial sources include: most common (non alloy) form, used in ceramics (edit as required)

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

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

Harmonised group entry used as most reasonable case. Pigment cadmium selenosulfide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil. (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.1, May 2018**

HazWasteOnline Classification Engine Version: 2020.141.4306.8485 (20 May 2020)

HazWasteOnline Database: 2020.143.4308.8487 (22 May 2020)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004

1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010

2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

APPENDIX D – GEOTECHNICAL DATA

Geotechnical Laboratory Testing Results

Infiltration Testing Data



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Paddock Geo Engineering

Client Reference: P20-060

Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Job Number: 20-10263

Date Sampled: 18/05/2020

Date Received: 19/05/2020

Date Tested: 26/05/2020

Sampled By: Not Given

Contact: Matt Paddock

Site Address: Highgrove Street, Reading

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1513539

Depth Top [m]: 2.50

Hole No.: WS3

Depth Base [m]: Not Given

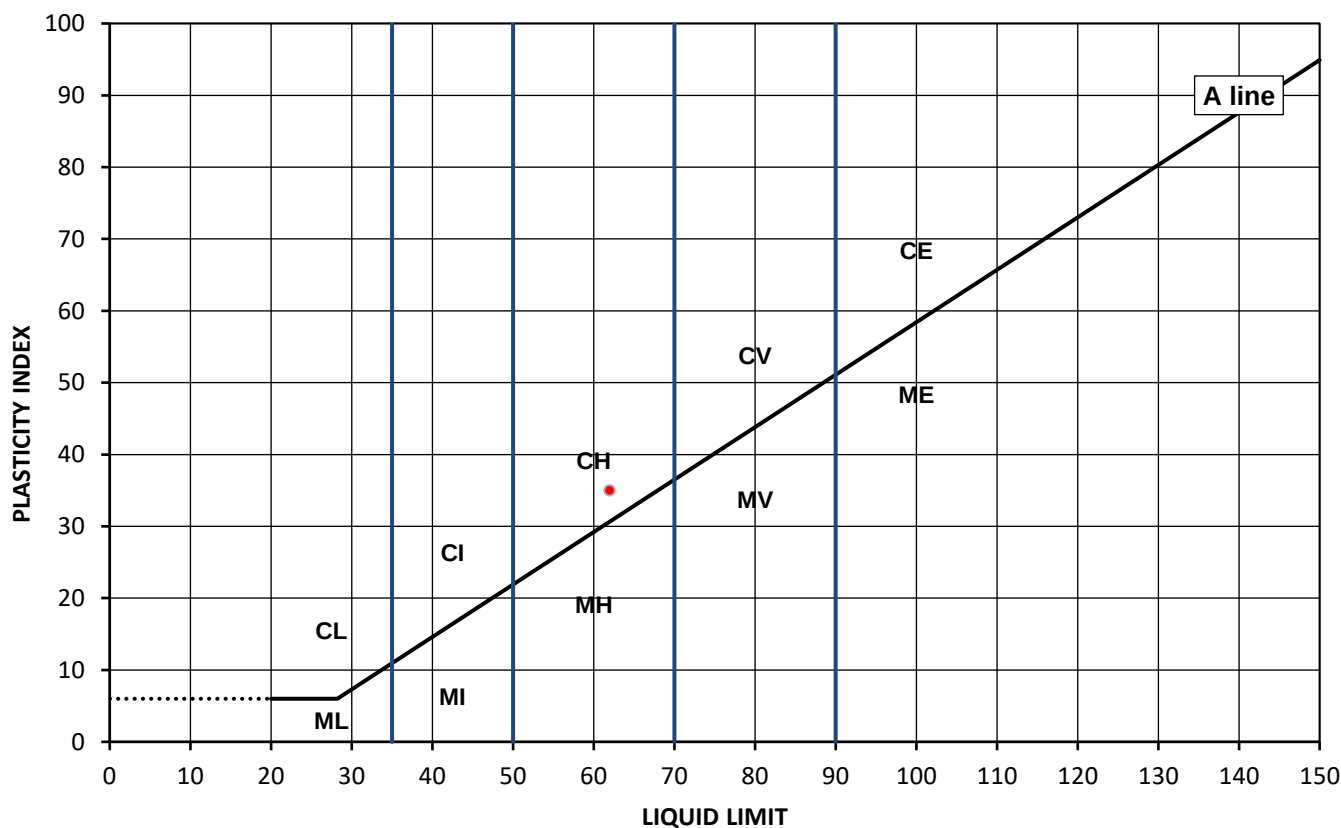
Sample Reference: Not Given

Sample Type: D

Soil Description: Brown to grey CLAY

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	62	27	35	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	below 35
		I	35 to 50
		H	50 to 70
		V	70 to 90
		E	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Paddock Geo Engineering

Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Contact: Matt Paddock

Site Address: Highgrove Street, Reading

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: P20-060

Job Number: 20-10263

Date Sampled: 18/05/2020

Date Received: 19/05/2020

Date Tested: 26/05/2020

Sampled By: Not Given

Test Results:

Laboratory Reference: 1513540

Hole No.: WS4

Sample Reference: Not Given

Soil Description: Brown to grey gravelly CLAY

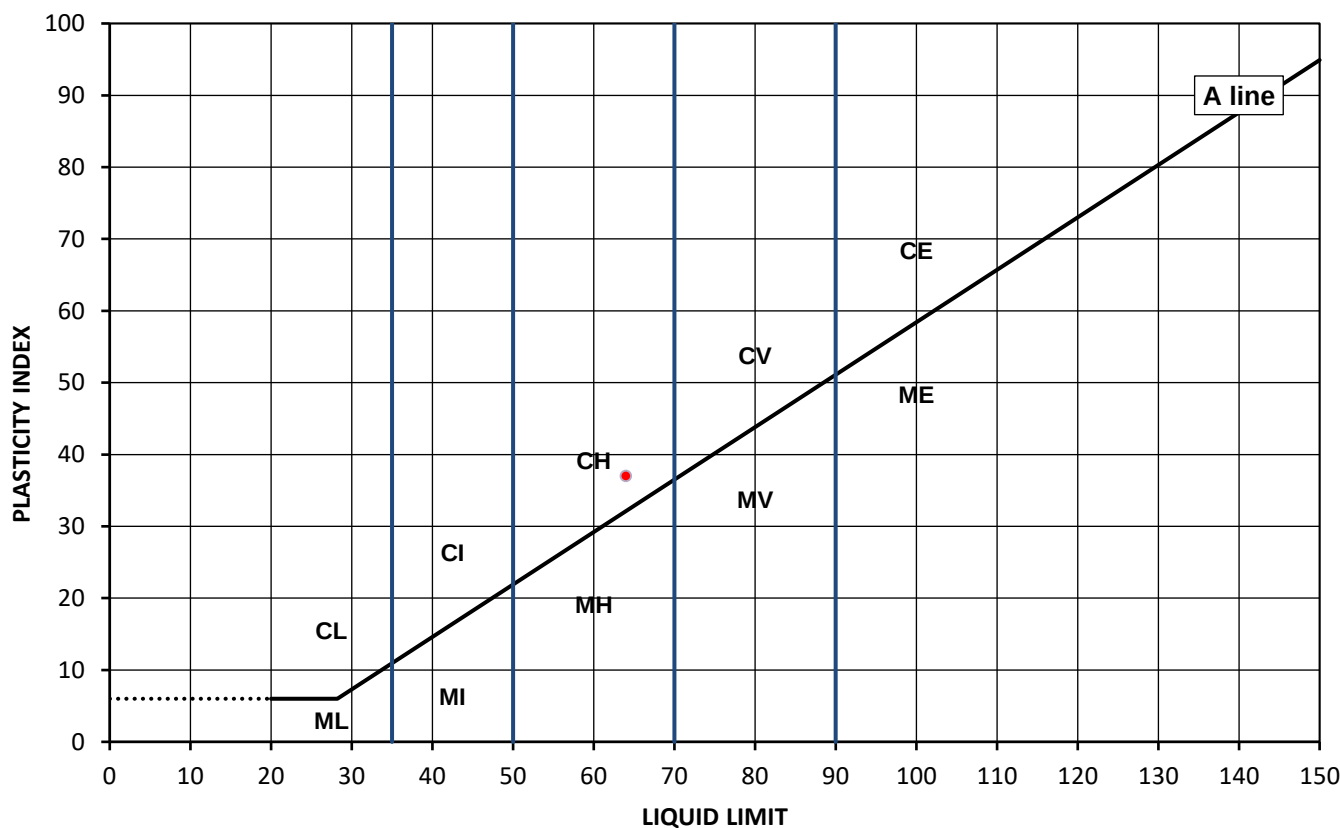
Depth Top [m]: 1.50

Depth Base [m]: Not Given

Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
14	64	27	37	55



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	below 35
		I	35 to 50
		H	50 to 70
		V	70 to 90
		E	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 03/06/2020

GF 232.9



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Paddock Geo Engineering

Client Reference: P20-060

Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Job Number: 20-10263

Date Sampled: 18/05/2020

Date Received: 19/05/2020

Date Tested: 26/05/2020

Sampled By: Not Given

Contact: Matt Paddock

Site Address: Highgrove Street, Reading

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1513541

Depth Top [m]: 2.70

Hole No.: WS5

Depth Base [m]: Not Given

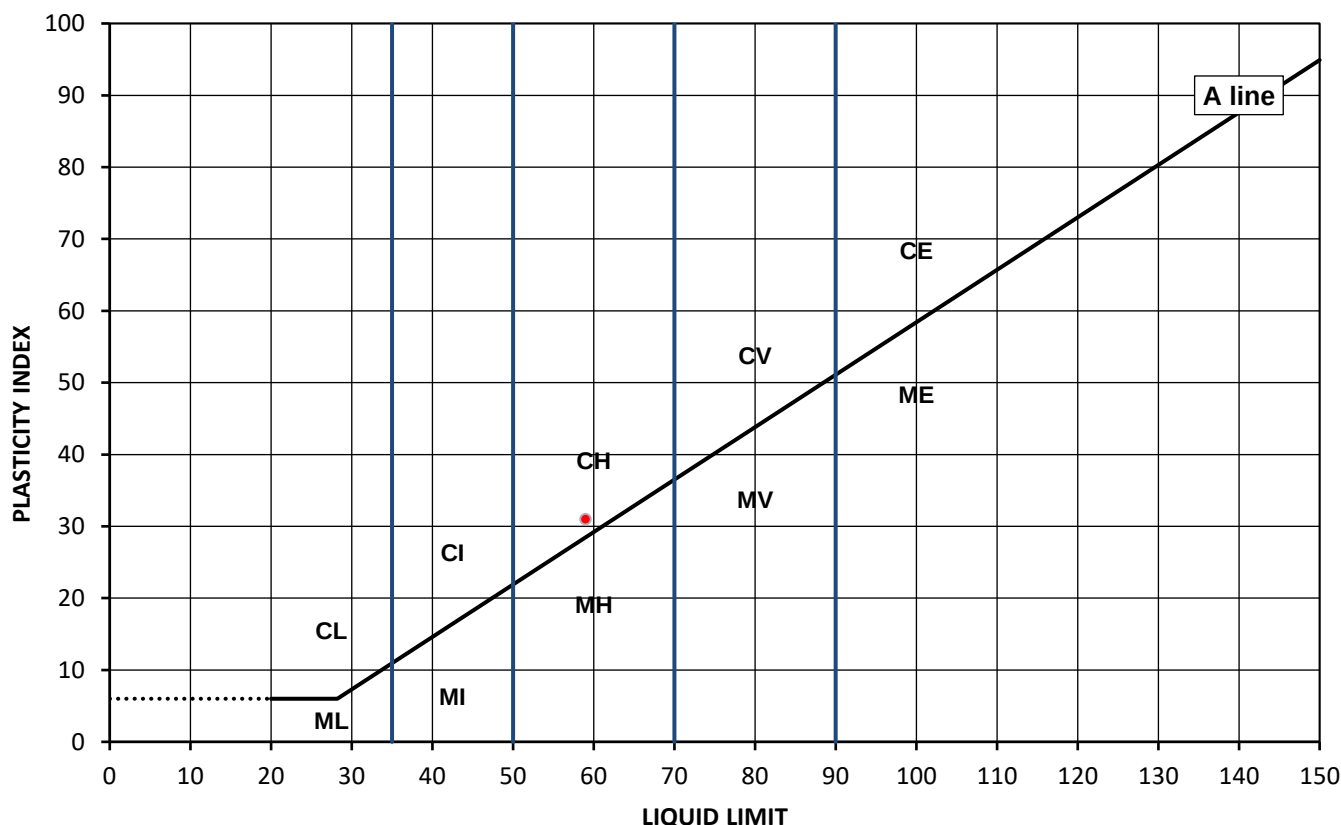
Sample Reference: Not Given

Sample Type: D

Soil Description: Brown to grey slightly sandy CLAY

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	59	28	31	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	below 35
		I	35 to 50
		H	50 to 70
		V	70 to 90
		E	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Paddock Geo Engineering
Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Client Reference: P20-060
Job Number: 20-10263
Date Sampled: 18/05/2020
Date Received: 19/05/2020
Date Tested: 26/05/2020
Sampled By: Not Given

Contact: Matt Paddock
Site Address: Highgrove Street, Reading

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

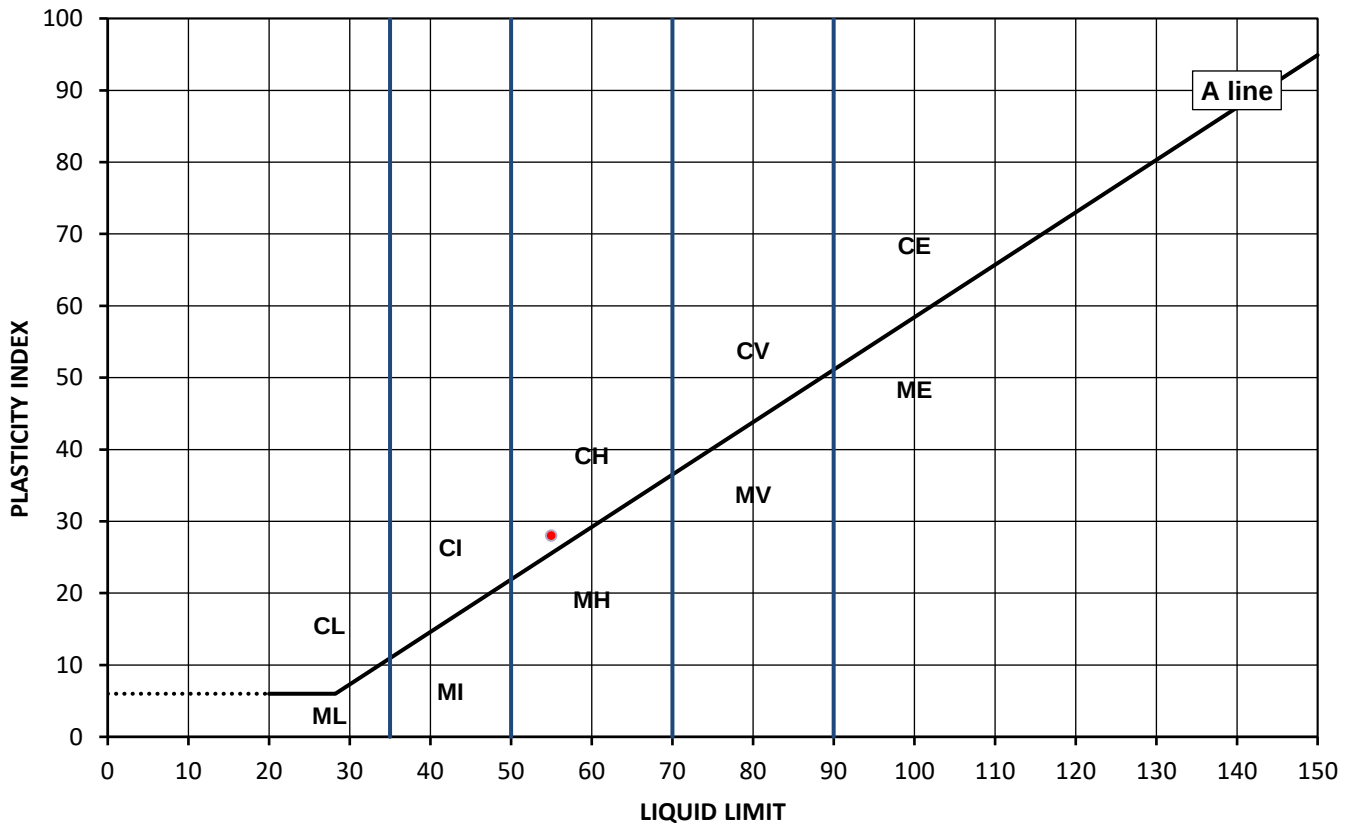
Test Results:

Laboratory Reference: 1513542
Hole No.: WS6
Sample Reference: Not Given
Soil Description: Brown to grey slightly sandy CLAY

Depth Top [m]: 1.60
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
20	55	27	28	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	below 35
		I	35 to 50
		H	50 to 70
		V	70 to 90
		E	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Paddock Geo Engineering

Client Reference: P20-060

Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Job Number: 20-10263

Date Sampled: 18/05/2020

Date Received: 19/05/2020

Date Tested: 26/05/2020

Sampled By: Not Given

Contact: Matt Paddock

Site Address: Highgrove Street, Reading

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1513543

Depth Top [m]: 3.60

Hole No.: WS6

Depth Base [m]: Not Given

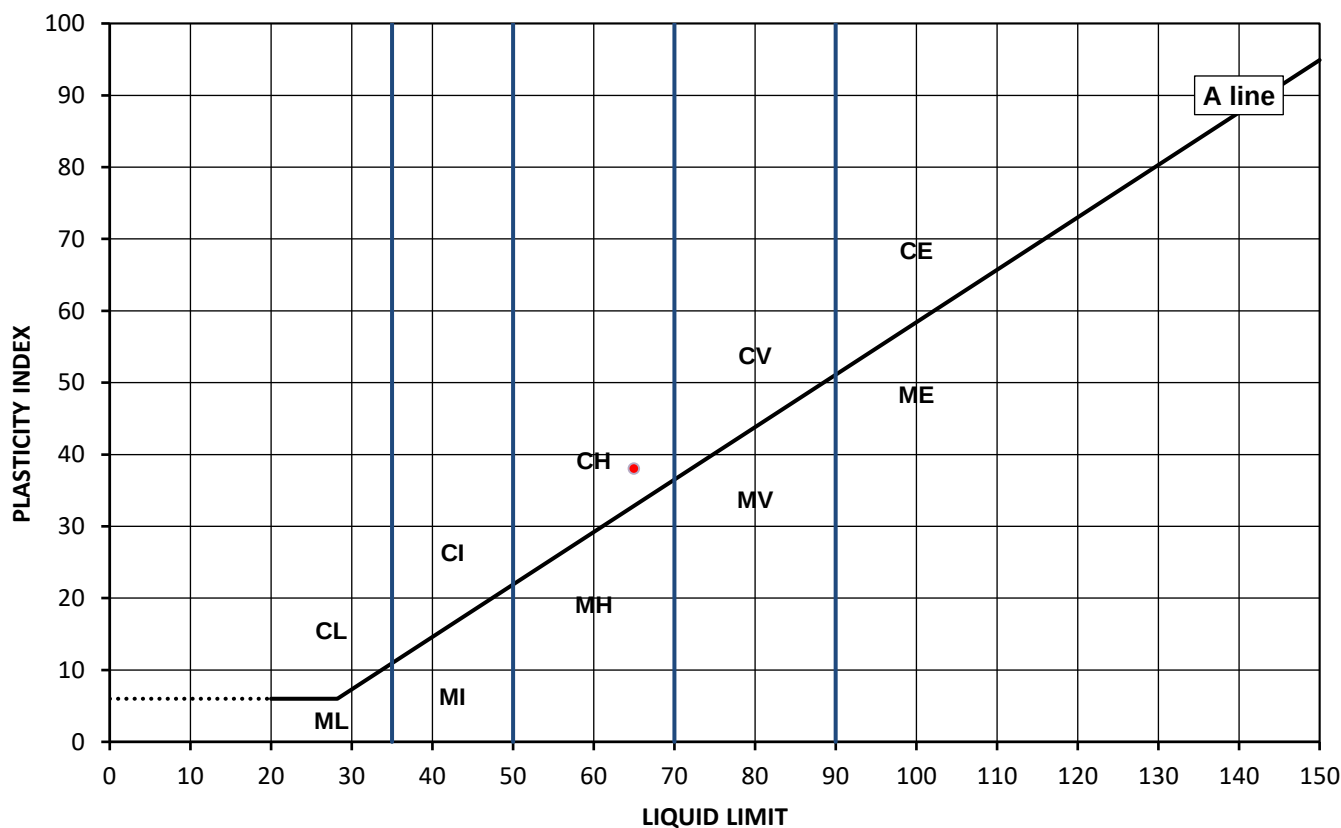
Sample Reference: Not Given

Sample Type: D

Soil Description: Dark grey to yellowish brown CLAY

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	65	27	38	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	below 35
		I	35 to 50
		H	50 to 70
		V	70 to 90
		E	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with:

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg
by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990:
Clause 8.2

Client Reference: P20-060

Job Number: 20-10263

Date Sampled: 18/05/2020

Date Received: 19/05/2020

Date Tested: 26/05/2020

Sampled By: Not Given

Client: Paddock Geo Engineering

Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Contact: Matt Paddock

Site Address: Highgrove Street, Reading

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	MC	WC	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	LL	PL	PI	bulk	dry	PD			
			m	m															
1513539	WS3	Not Given	2.50	Not Given	D	Brown to grey CLAY	Atterberg 1 Point	27		100	62	27	35						
1513540	WS4	Not Given	1.50	Not Given	D	Brown to grey slightly gravelly CLAY	Atterberg 1 Point	14		55	64	27	37						
1513541	WS5	Not Given	2.70	Not Given	D	Brown to grey slightly sandy CLAY	Atterberg 1 Point	26		100	59	28	31						
1513542	WS6	Not Given	1.60	Not Given	D	Brown to grey slightly sandy CLAY	Atterberg 1 Point	20		100	55	27	28						
1513543	WS6	Not Given	3.60	Not Given	D	Dark grey to yellowish brown CLAY	Atterberg 1 Point	27		100	65	27	38						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

4041

Client: Paddock Geo Engineering
Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Contact: Matt Paddock
Site Address: Highgrove Street, Reading

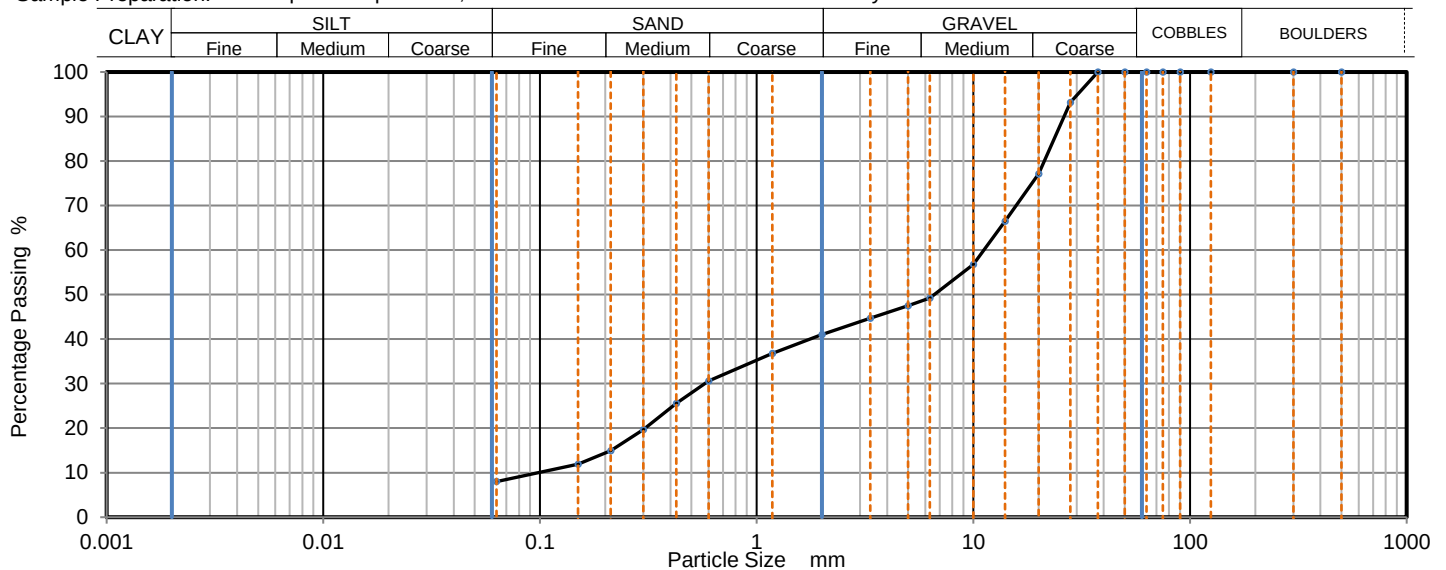
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: P20-060
Job Number: 20-10263
Date Sampled: 18/05/2020
Date Received: 19/05/2020
Date Tested: 26/05/2020
Sampled By: Not Given

Test Results:

Laboratory Reference: 1513537
Hole No.: Combine WS1+WS2
Sample Reference: Not Given
Sample Description: Orangish brown to grey very sandy slightly clayey GRAVEL
Sample Preparation: Sample was quartered, oven dried at 108.2 °C and broken down by hand.

Depth Top [m]: 0.80
Depth Base [m]: 2.50
Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	93		
20	77		
14	67		
10	57		
6.3	49		
5	48		
3.35	45		
2	41		
1.18	37		
0.6	31		
0.425	26		
0.3	20		
0.212	15		
0.15	12		
0.063	8		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	59.00
Sand	32.60
Fines <0.063mm	8.30

Grading Analysis	
D100	mm 37.5
D60	mm 11.2
D30	mm 0.574
D10	mm 0.0946
Uniformity Coefficient	120
Curvature Coefficient	0.31

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Tested in Accordance with: BS 1377-2: 1990

4041

Client: Paddock Geo Engineering

Client Address: 14 Burns Road, Bletchley,
Milton Keynes, MK3 5AL

Contact: Matt Paddock

Site Address: Highgrove Street, Reading

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: P20-060

Job Number: 20-10263

Date Sampled: 18/05/2020

Date Received: 19/05/2020

Date Tested: 26/05/2020

Sampled By: Not Given

Test Results:

Laboratory Reference: 1513538

Hole No.: Combine WS3+WS5

Sample Reference: Not Given

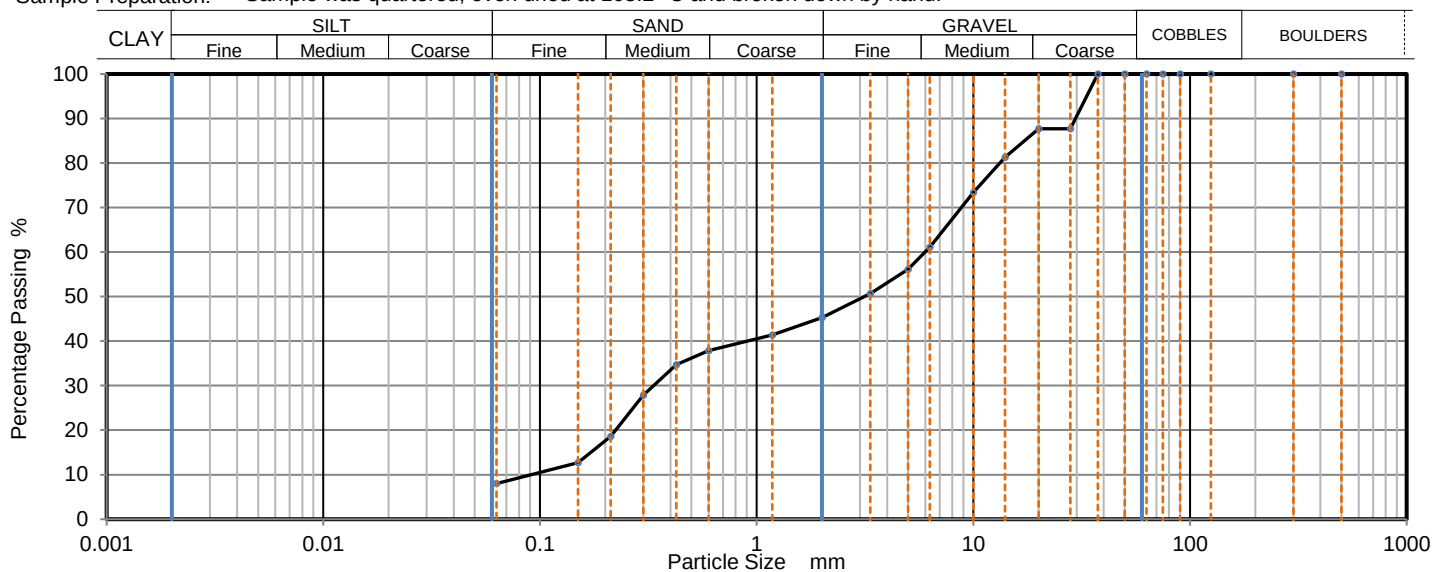
Sample Description: Brown very sandy slightly clayey GRAVEL with fragments of flintstones

Sample Preparation: Sample was quartered, oven dried at 108.2 °C and broken down by hand.

Depth Top [m]: 1.80

Depth Base [m]: 1.90

Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	88		
20	88		
14	81		
10	73		
6.3	61		
5	56		
3.35	51		
2	45		
1.18	41		
0.6	38		
0.425	35		
0.3	28		
0.212	19		
0.15	13		
0.063	9		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	54.70
Sand	36.40
Fines <0.063mm	8.90

Grading Analysis	
D100	mm 37.5
D60	mm 6
D30	mm 0.335
D10	mm 0.0816
Uniformity Coefficient	74
Curvature Coefficient	0.23

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed:

Aleksandra Jurochnik
PL Technical Reviewer
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Site : 125 Highgrove Street, Reading, RG1 5EJ

Client : Oak and Lime Ltd

Engineer: MC

Job Number
P20-060

Sheet
1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
WS1	1.00	1.15	1.45	CPT	4	4	5	5	6	10	N=26	4 blow for 5mm penetration
WS1	2.00	2.15	2.45	CPT	25		26	20	4		N=50	
WS3	1.00	1.15	1.45	CPT	2	4	6	5	6	5	N=22	
WS3	2.00	2.15	2.45	CPT	3	3	4	5	4	5	N=18	
WS4	1.00	1.15	1.45	CPT	1	1	2	2	2	3	N=9	
WS4	2.00	2.15	2.45	CPT	2	2	2	2	3	4	N=11	
WS4	3.00	3.15	3.45	CPT	2	2	3	3	4	4	N=14	
WS4	4.00	4.15	4.45	CPT	4	3	5	5	6	7	N=23	
WS5	1.00	1.15	1.45	CPT	2	2	2	3	4	3	N=12	
WS5	2.00	2.15	2.45	CPT	1	1	1	1	2	1	N=5	
WS5	3.00	3.15	3.45	CPT	4	2	3	3	4	5	N=15	
WS6	1.00	1.15	1.45	CPT	1	1	2	3	2	4	N=11	
WS6	2.00	2.15	2.45	CPT	3	3	3	4	5	5	N=17	
WS6	3.00	3.15	3.45	CPT	2	2	3	2	4	4	N=13	
WS6	4.00	4.15	4.45	CPT	2	3	2	3	3	4	N=12	

Falling Head Permeability Test - WS2 Test 1

Field Data

Time	Time Elapsed minutes	Depth of Water Below Casing (d_t)	$h_t = (d_1 - d_t)$	$\frac{h_t}{h_0}$
	0	0.40	1.600	0.800
	2	0.55	1.450	0.725
	7	0.67	1.330	0.665
	12	0.77	1.230	0.615
	26	0.83	1.170	0.585
	50	0.86	1.140	0.570
	75	0.90	1.100	0.550

Borehole: WS2

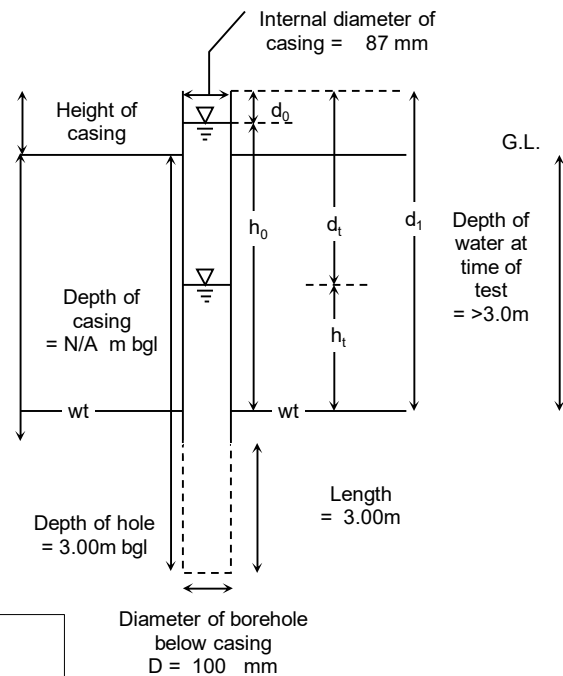
Test: 1

Weather: Sunny

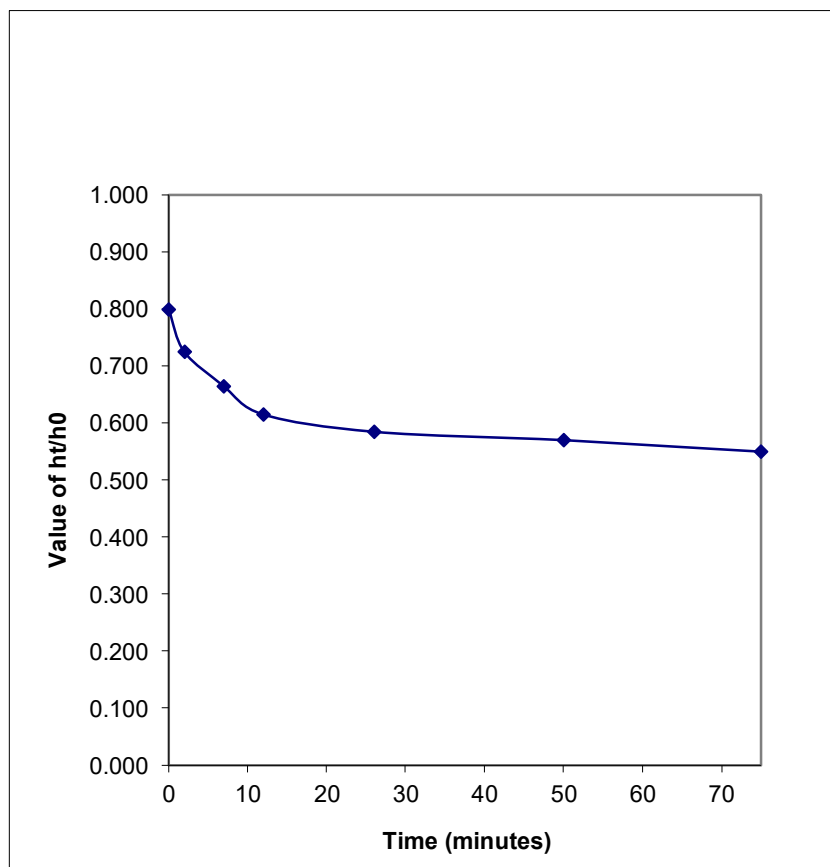
Engineer: MIP

Date: 19/05/2020

Strata Tested: Boyn Hill Gravel Member



Linear extrapolated value



Notes:

Collapsed to 1.0m bgl during test.

Calculations

$$K = \frac{A}{FT}$$

Where :

$$A = \pi(r^2) = 0.008$$

$$F = 1.82$$

$$T = N/A_{min} \quad N/A$$

(based upon $h_t/h_0 = 0.370$)

Therefore :

$$K = \frac{A}{FT} = \frac{0.008}{1.82 \times 300}$$

Test Failed

ms-1

Falling Head Permeability Test - WS5 Test 1

Field Data

Time	Time Elapsed minutes	Depth of Water Below Casing (d_t)	$h_t = (d_1 - d_t)$	$\frac{h_t}{h_0}$
	0	0.20	1.800	0.900
	17	0.30	1.700	0.850
	25	0.36	1.640	0.820
	42	0.43	1.570	0.785

Borehole: WS5

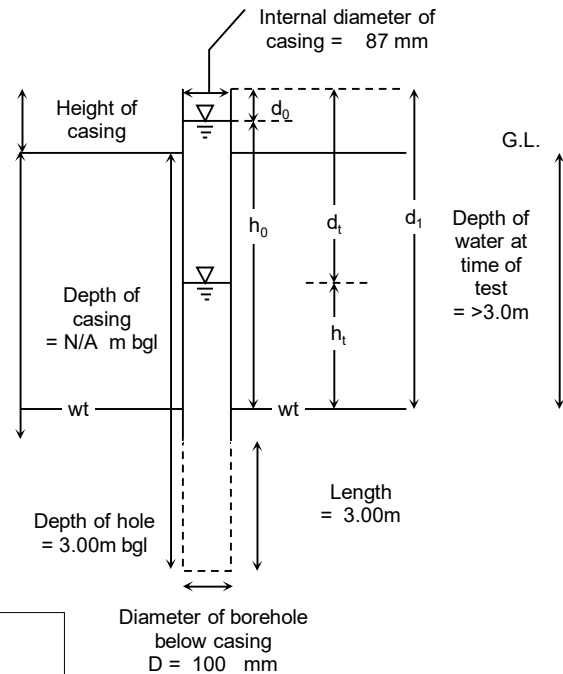
Test: 1

Weather: Sunny

Engineer: MIP

Date: 18/05/2020

Strata Tested Boyn Hill Gravel Member



Notes:

Collapsed to 1.90m bgl due to wet sand.

Calculations

$$K = \frac{A}{FT}$$

Where :

$$A = \pi(r^2) = 0.008$$

$$F = 1.82$$

$$T = N/A_{min} \quad N/A$$

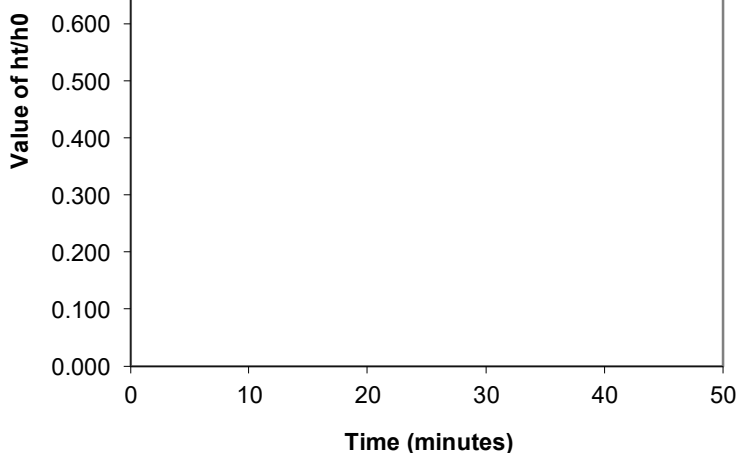
(based upon $h_t/h_0 = 0.370$)

Therefore :

$$K = \frac{A}{FT} = \frac{0.008}{1.82 \times 360}$$

Test Failed

ms-1



APPENDIX E – GROUND GAS MONITORING DATA

Ground Gas Conceptual Ground Model

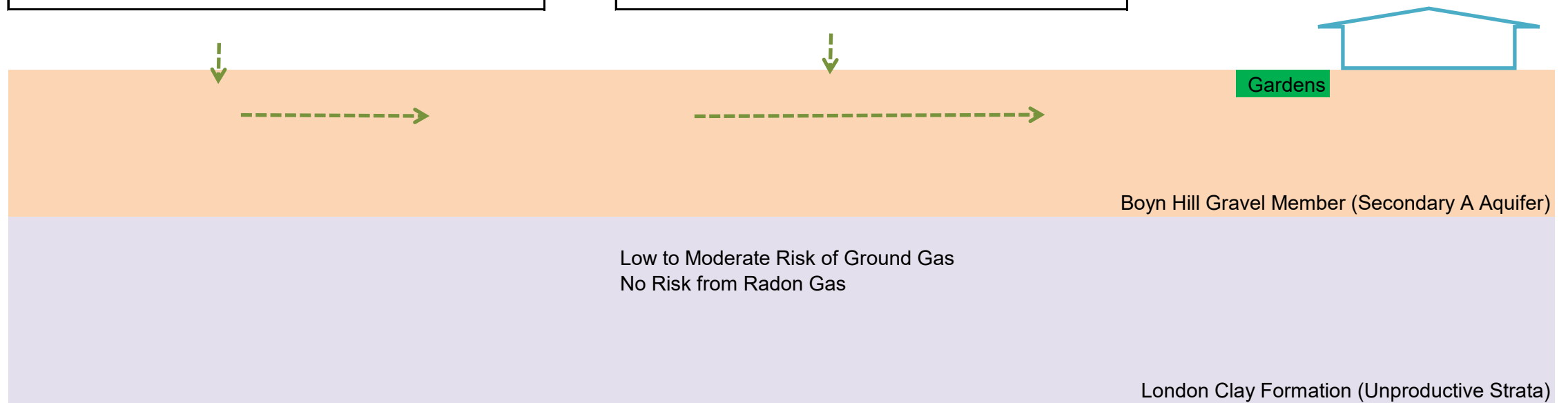
Ground Gas Monitoring Data

CONCEPTUAL GROUND GAS MODEL

Offsite Potential Sources -
Current: Infilled former spring / reservoir 15m to 143m west.
Potentially infilled land 244m northwest.
Previous: As above

Onsite Potential Sources -
Current: Made Ground - hydrocarbon decay with build up of volatiles and decay components such as CO₂.
Previous: Made Ground - hydrocarbon decay with build up of volatiles and decay components such as CO₂.

Proposed Residential Development



PADDOCK
GEO ENGINEERING

CLIENT: Oak and Lime Limited
PROJECT No: P20-060
PROJECT TITLE: 125 Highgrove Street, Reading, RG1 5EJ

GROUND GAS MONITORING SHEET



SITE: 125 Highgrove Street, Reading, RG1 5EJ
 JOB No.: P20-060
 DATE: 26/05/2020

BOREHOLE	WS1				Initial/ 30 secs	2 mins	Stable / 3 mins	GSV (l/h)
TIME:	12:06	Flow l/h:	0.00	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Fine	GW m:	DRY	CO2 %	4.40	4.60	4.60	0.0000
Atm Pressure mb:	1037	BH Level	1.95	O2 %	15.70	15.00	14.90	
Operator:	DR	mAOD		H2S ppm				
				VOCs %				
Comments								

BOREHOLE	WS3							
TIME:	12:20	Flow l/h:	0.2	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Fine	GW m:	1.6	CO2 %	5.70	10.40	10.10	0.0208
Atm Pressure mb:	1037	BH Level	2.92	O2 %	12.90	7.50	7.50	
Operator:	DR	mAOD		H2S ppm				
				VOCs %				
Comments								

BOREHOLE	WS4							
TIME:	12:15	Flow l/h:	0.20	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Fine	GW m:	1.61	CO2 %	3.20	4.40	4.70	0.0094
Atm Pressure mb:	1037	BH Level	2.20	O2 %	15.40	15.60	15.40	
Operator:	DR	mAOD		H2S ppm				
				VOCs %				
Comments								

BOREHOLE	WS6							
TIME:	12:10	Flow l/h:	0.00	CH4 %	0.30	0.30	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Fine	GW m:	1.30	CO2 %	2.50	2.50	3.00	0.0000
Atm Pressure mb:	1037	BH Level	4.21	O2 %	14.10	13.50	10.50	
Operator:	DR	mAOD		H2S ppm				
				VOCs %				
Comments								

Additional Notes

GROUND GAS MONITORING SHEET



SITE: 125 Highgrove Street, Reading, RG1 5EJ
 JOB No.: P20-060
 DATE: 02/06/2020

BOREHOLE	WS1				Initial/ 30 secs	2 mins	Stable / 3 mins	GSV (l/h)
TIME:	09:30	Flow l/h:	-0.1	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Fine	GW m:	DRY	CO2 %	0.10	0.10	0.10	-0.0001
Atm Pressure mb:	1025	BH Level	1.95	O2 %	20.10	20.20	20.20	
Operator:	DR	mAOD		H2S ppm				
				VOCs %				

Comments

BOREHOLE	WS3							
TIME:	09:25	Flow l/h:	0.2	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Fine	GW m:	1.55	CO2 %	17.60	17.70	14.00	0.0354
Atm Pressure mb:	1025	BH Level	2.92	O2 %	9.20	2.50	6.00	
Operator:	DR	mAOD		H2S ppm				
				VOCs %				

Comments

BOREHOLE	WS4							
TIME:	09:15	Flow l/h:	0.2	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Fine	GW m:	1.4	CO2 %	3.60	3.80	4.10	0.0082
Atm Pressure mb:	1025	BH Level	2.2	O2 %	19.10	17.90	17.60	
Operator:	DR	mAOD		H2S ppm				
				VOCs %				

Comments

BOREHOLE	WS6							
TIME:		Flow l/h:		CH4 %				0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:		GW m:		CO2 %				0.0000
Atm Pressure mb:		BH Level		O2 %				
Operator:		mAOD		H2S ppm				
				VOCs %				

Comments Inaccessible due to parked cars.

Additional Notes

PADDOCK
GEO ENGINEERING

Additional Notes	
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GROUND GAS MONITORING SHEET



SITE: 125 Highgrove Street, Reading, RG1 5EJ
 JOB No.: P20-060
 DATE: 18/06/2020

BOREHOLE	WS1					Initial/ 30		Stable /		GSV (l/h)
						secs	2 mins	3 mins		
TIME:	09:20	Flow l/h:	0.00	CH4 %	0.00	0.00	0.00	0.0000		
TEMP deg C:		DP Pa:		LEL						
Weather:	Rain	GW m:	1.87	CO2 %	5.40	5.40	5.50	0.0000		
Atm Pressure mb:	1004	BH Level	1.95	O2 %	18.60	15.20	15.10			
Operator:	DR	mAOD		H2S ppm						
				VOCs %	0.00					
Comments										

BOREHOLE	WS3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			</
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BOREHOLE	WS6										
TIME:	09:40	Flow l/h:	0.20	CH4 %	0.30	0.00	0.00	0.0006			
TEMP deg C:		DP Pa:		LEL							
Weather:	Rain	GW m:	0.60	CO2 %	2.80	0.10	0.10	0.0056			
Atm Pressure mb:	1004	BH Level	4.21	O2 %	15.60	21.10	21.10				
Operator:	DR	mAOD		H2S ppm							
				VOCs %	0.00						
Comments											

Additional Notes

PADDOCK
GEO ENGINEERING

BOREHOLE	WS1				Initial/ 30 secs	2 mins	Stable / 3 mins	GSV (l/h)
TIME:	09:20	Flow l/h:	0.00	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	DRY	CO2 %	3.50	5.40	5.80	0.0000
Atm Pressure mb:	1020	BH Level	1.95	O2 %	19.10	14.50	14.00	
Operator:	DR	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS3							
TIME:	09:45	Flow l/h:	0.20	CH4 %	0.00	0.30	0.10	0.0006
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	1.32	CO2 %	10.30	10.70	10.90	0.0218
Atm Pressure mb:	1020	BH Level	2.92	O2 %	4.10	0.20	0.10	
Operator:	DR	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS4							
TIME:	09:30	Flow l/h:	0.20	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	MC	GW m:	0.83	CO2 %	2.80	1.80	6.90	0.0138
Atm Pressure mb:	1020	BH Level	2.20	O2 %	17.70	19.00	10.00	
Operator:	DR	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS6							
TIME:	09:35	Flow l/h:	-0.10	CH4 %	0.20	0.10	0.00	-0.0002
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	0.60	CO2 %	2.90	0.60	0.90	-0.0029
Atm Pressure mb:	1020	BH Level	4.21	O2 %	16.10	19.30	19.20	
Operator:	DR	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

Additional Notes	
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GROUND GAS MONITORING SHEET



SITE: 125 Highgrove Street, Reading, RG1 5EJ
 JOB No.: P20-060
 DATE: 06/07/2020

BOREHOLE	WS1				Initial/ 30		Stable /		GSV (l/h)
					secs	2 mins	3 mins		
TIME:	14:58	Flow l/h:	0.00	CH4 %	0.00	0.00	0.00	0.0000	
TEMP deg C:		DP Pa:		LEL					
Weather:	Sunny	GW m:	DRY	CO2 %	3.50	5.40	5.80	0.0000	
Atm Pressure mb:	1019	BH Level	1.95	O2 %	19.10	14.50	14.00		
Operator:	MC	mAOD		H2S ppm					
				VOCs %	0.00				
Comments									

BOREHOLE	WS3							
TIME:	15:05	Flow l/h:	0.20	CH4 %	0.00	0.30	0.10	0.0006
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	N/A	CO2 %	13.40	14.30	14.20	0.0286
Atm Pressure mb:	1019	BH Level	N/A	O2 %	0.50	0.20	0.40	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS4							
TIME:	15:13	Flow l/h:	0.20	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	1.16	CO2 %	1.60	3.20	5.10	0.0102
Atm Pressure mb:	1019	BH Level	2.20	O2 %	18.80	15.90	11.50	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS6							
TIME:	15:20	Flow l/h:	-0.10	CH4 %	0.70	-	-	-0.0007
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	0.50	CO2 %	2.50	-	-	-0.0025
Atm Pressure mb:	1019	BH Level	4.20	O2 %	16.80	-	-	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments	Issue with suction from standpipe.							

Additional Notes

GROUND GAS MONITORING SHEET



SITE: 125 Highgrove Street, Reading, RG1 5EJ
 JOB No.: P20-060
 DATE: 14/07/2020

BOREHOLE	TIME:	TEMP deg C:	Weather:	Atm Pressure mb:	Operator:		Initial/ 30 secs	2 mins	Stable / 3 mins	GSV (l/h)
WS1	12:58		Overcast	1019	MC	Flow l/h: 0.00	0.00	0.00	0.00	0.0000
						DP Pa:				
						GW m: DRY	6.00	6.40	6.50	0.0000
						BH Level 1.95	14.80	14.10	14.00	
						mAOD				
						CH4 %				
						LEL				
						CO2 %				
						O2 %				
						H2S ppm				
						VOCs %	0.00			
Comments										

BOREHOLE	WS3							
TIME:	13:04	Flow l/h:	0.20	CH4 %	0.00	0.30	0.10	0.0006
TEMP deg C:		DP Pa:		LEL				
Weather:	Overcast	GW m:	N/A	CO2 %	12.60	13.10	13.50	0.0270
Atm Pressure mb:	1019	BH Level	N/A	O2 %	0.70	0.30	0.60	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS4							
TIME:	13:11	Flow l/h:	0.20	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Overcast	GW m:	1.20	CO2 %	6.00	9.80	10.70	0.0214
Atm Pressure mb:	1019	BH Level	2.20	O2 %	11.80	12.20	4.10	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS6								
TIME:		Flow l/h:		CH4 %					0.0000
TEMP deg C:		DP Pa:		LEL					
Weather:		GW m:		CO2 %					0.0000
Atm Pressure mb:		BH Level		O2 %					
Operator:		mAOD		H2S ppm					
				VOCs %	0.00				
Comments	Inaccessible due to parked cars.								

Additional Notes

Inaccessible due to parked cars.

GROUND GAS MONITORING SHEET



SITE: 125 Highgrove Street, Reading, RG1 5EJ
 JOB No.: P20-060
 DATE: 05/08/2020

BOREHOLE	TIME:	TEMP deg C:	Weather:	Atm Pressure mb:	Operator:			Initial/ 30 secs	2 mins	Stable / 3 mins	GSV (l/h)
WS1	12:08		Sunny	1015	MC	Flow l/h:	0.00	CH4 %	0.00	0.00	0.0000
						DP Pa:		LEL			
						GW m:	DRY	CO2 %	6.70	6.80	0.0000
						BH Level	1.95	O2 %	14.90	14.10	
						mAOD		H2S ppm			
								VOCs %	0.00		
Comments											

BOREHOLE	WS3							
TIME:	12:16	Flow l/h:	0.20	CH4 %	0.00	0.30	0.10	0.0006
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	N/A	CO2 %	14.50	16.30	11.50	0.0326
Atm Pressure mb:	1015	BH Level	N/A	O2 %	0.70	0.30	7.20	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS4								
TIME:		Flow l/h:	0.20	CH4 %				0.0000	
TEMP deg C:		DP Pa:		LEL					
Weather:		GW m:		CO2 %				0.0000	
Atm Pressure mb:		BH Level		O2 %					
Operator:		mAOD		H2S ppm					
				VOCs %	0.00				
Comments	Inaccessible due to parked cars.								

Inaccessible due to parked cars.

BOREHOLE	WS6							
TIME:	12:22	Flow l/h:	-0.10	CH4 %	0.40			-0.0004
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:		CO2 %	0.70			-0.0007
Atm Pressure mb:	1015	BH Level		O2 %	19.10			
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments	Issue with suction from standpipe.							

Issue with suction from standpipe.

Additional Notes

GROUND GAS MONITORING SHEET



SITE: 125 Highgrove Street, Reading, RG1 5EJ
 JOB No.: P20-060
 DATE: 05/08/2020

BOREHOLE	WS1				Initial/ 30		Stable /		GSV (l/h)
					secs	2 mins	3 mins		
TIME:	12:54	Flow l/h:	0.00	CH4 %	0.00	0.00	0.00	0.0000	
TEMP deg C:		DP Pa:		LEL					
Weather:	Sunny	GW m:	DRY	CO2 %	7.70	7.80	7.80	0.0000	
Atm Pressure mb:	1015	BH Level	1.95	O2 %	12.80	12.60	12.60		
Operator:	MC	mAOD		H2S ppm					
				VOCs %	0.00				
Comments									

BOREHOLE	WS3							
TIME:	13:01	Flow l/h:	0.20	CH4 %	0.00	0.30	0.10	0.0006
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	N/A	CO2 %	13.90	16.00	15.00	0.0320
Atm Pressure mb:	1015	BH Level	N/A	O2 %	1.20	0.20	2.30	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS4							
TIME:	13:08	Flow l/h:	0.20	CH4 %	0.00	0.00	0.00	0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:	Sunny	GW m:	1.40	CO2 %	14.40	14.70	14.90	0.0298
Atm Pressure mb:	1015	BH Level	2.20	O2 %	3.90	3.00	3.00	
Operator:	MC	mAOD		H2S ppm				
				VOCs %	0.00			
Comments								

BOREHOLE	WS6							
TIME:		Flow l/h:		CH4 %				0.0000
TEMP deg C:		DP Pa:		LEL				
Weather:		GW m:		CO2 %				0.0000
Atm Pressure mb:		BH Level		O2 %				
Operator:		mAOD		H2S ppm				
				VOCs %	0.00			
Comments	Inaccessible due to parked cars.							

Additional Notes