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GEO-ENVIRONMENTAL & GEOTECHNICAL ASSESSMENT (GROUND INVESTIGATION) REPORT

104 LOWER HYTHE STREET
DARTFORD
KENT

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Report Title: **Geo-environmental & Geotechnical Assessment Ground Investigation Report for 104 Lower Hythe Street, Dartford, Kent, DA1 1BW**

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EXECUTIVE SUMMARY

Crown Coast Property Group commissioned Jomas Associates Ltd to undertake a Geo-environmental and Geotechnical ground investigation at the site located at 104 Lower Hythe Street, Dartford, Kent.

The principal objectives of the study were as follows:

- To determine the nature and where possible, the extent of contaminants potentially present at the site;
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within the Environment Agency (EA) report R&D CLR11 and relevant guidance within the National Planning Policy Framework (NPPF);
- To assess whether the site is safe and suitable for the purpose for which it is intended, or can be made so by remedial action; and,
- To obtain geotechnical parameters to inform preliminary foundation design.

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

Site History and Ground Investigation	
Current Site Use	Disused garage/vehicle workshop
Proposed Site Use	Demolition of the existing structures to allow the construction of a 5-storey building comprising commercial use at ground floor level and eleven residential units with associated parking and limited landscaping. No private gardens are proposed.
Desk Study Overview	A Desk Study report has been produced for the site and issued separately (Ashdown Site Investigation, 2019). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information. A review of historical ordnance survey maps indicated that at the time of the earliest edition (1885) the site was occupied by residential and school buildings. Maps from the 1960s indicate a garage on the centre of the site and by the 1970s a second garage is identified in the west of site. The second garage was subsequently removed and is no longer present. The site is reportedly located within an area of extensive industrial activity, including chemical works (1209m south-east), iron foundries (60m south-west) and gas works (50m north-west). Information provided by the British Geological Survey indicated that the site is directly underlain by superficial alluvial deposits underlain by the White Chalk Subgroup. Jomas review of mapping suggests the alluvium is likely to be underlain by further superficial deposits of the Taplow Gravel Member. The superficial deposits directly underlying the site are identified as a Secondary (undifferentiated) aquifer with the underlying solid deposits identified as a Principal Aquifer. The site is reported to lie within a Source Protection Zone 1, with the closest abstraction reported 165m south-east of site. The nearest surface water feature is reported to be a pond 89m south-east. Preliminary intrusive investigation was recommended to determine if contamination, vapours or landfill gas are present on the site.
Intrusive Investigation	The ground investigation was undertaken on 18th, 19th and 23rd November 2020, and consisted of the following: - 5No window sampling boreholes, drilled up to 4.45m below ground level (bgl), with associated in situ testing and sampling;

Site History and Ground Investigation	
	) 2No cable percussive boreholes to 20.4mbgl with associated in situ testing and sampling;) Laboratory analysis for chemical and geotechnical purposes,) 4No. return visits to monitor ground gas concentrations and groundwater levels have been completed.
Ground Conditions	The results of the ground investigation revealed a ground profile comprising a variable thickness of Made Ground (up to 1.10mbgl depth), overlying predominantly granular alluvial deposits to a maximum depth of 1.50mbgl, overlying gravelly sand and sandy gravel of the Taplow Gravel Member to the base of the deepest borehole at a maximum proven depth of 20.4mbgl. Groundwater was reported between 2.00mbgl and 4.00mbgl during drilling, and between 1.47-2.50mbgl during return monitoring visits.
Environmental Considerations	Following generic risk assessments and statistical analysis, elevated concentrations of lead, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene were detected in soils in excess of generic assessment criteria for the protection of human health within a "residential without plant uptake" end-use scenario. No asbestos fibres were detected in the samples analysed in the laboratory. The site proposal indicates that the majority of the site will remain covered by a combination of the proposed building footprint and hard surfacing. Where this is the case, no formal remedial measures are considered necessary in terms of human health, as the building and hard surfacing are expected to provide a barrier to potential receptors. In areas of soft landscaping, existing site soils should be encapsulated with a minimum 450mm of imported clean topsoil, placed on a membrane. A pollutant linkage to controlled waters is not considered to exist. However, in the event that previously undetected contamination is encountered during any tank decommissioning or groundworks at the site, it is recommended that remedial targets for soils are derived for high to medium mobility petroleum hydrocarbon compounds, and tetrachloroethene. Calculating the Gas Screening Value using worst case results indicates Characteristic Situation 1; meaning no formal gas protection measures are considered necessary. PID screening of the monitoring well headspace has revealed maximum concentrations of VOCs of 0.1ppm. A remedial strategy should be prepared, and submitted to the Local Authority for approval. As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.
Geotechnical Considerations	Based on the findings of this investigation, it is considered that traditional strip or pad footings up to 1.2m wide may be formed at a minimum depth of 0.75m within the underlying Taplow Gravel Member for an allowable bearing capacity of 125kPa. Total and differential settlements should be contained within tolerable limits. If a greater bearing capacity is required, a pile foundation could be considered. Indicative pile capacities for a single pile are provided in Table 9.4. Foundations must be deepened beneath any Made Ground and Alluvium. Suspended floor slabs are recommended due to the presence of Made Ground in excess of 600mm thick. During the investigation groundwater was reported within cable percussive boreholes BH1 and BH2 between 43.00-4.10mbgl, rising to 2.10mbgl in BH1 after 20 minutes' monitoring. Groundwater was reported within WS1 and WS4 at 2.00mbgl, with no strikes reported in WS2, WS3 or WS5.

Site History and Ground Investigation	
	During return monitoring groundwater was reported at depths of between 1.47m and 2.50mbgl. Excavations during the intrusive works, although open for a relatively short period of time remained reasonably stable. However, it is recommended that the stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter should be assessed and battered back to a safe angle. Based on the results of chemical testing, the required concrete class for the site is DS-2 assuming an Aggressive Chemical Environment for Concrete classification of AC-2 within the Made Ground, and DS-1 AC-1 within the natural deposits in accordance with the procedures outlined in BRE Special Digest 1.
Recommended Further Work	The following works are recommended: - Seek approval of the Ground Investigation report from the Local Authority, NHBC and other relevant stakeholders; - Derivation of site specific remedial targets for soils with respect to controlled waters; - Production of a Remediation Method Statement (RMS); - Seek confirmation of the water supply pipe requirements by the appropriate service provider.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Crown Coast Property Group ("The Client") has commissioned Jomas Associates Ltd, to assess the risk of contamination posed by the ground conditions at a site referred to as 104 Lower Hythe Street, Dartford, Kent and to provide indicative recommendations for foundation design prior to the redevelopment of the site.

1.1.2 A Desk Study has been produced for the site (Ashdown Site Investigation, October 2019) and provided for information, followed by an intrusive investigation (detailed in this report). Prior to the undertaking of the ground investigation, a scheme of proposed investigation was produced by Jomas.

1.1.3 A full list of previous reports undertaken for the site are detailed in Table 1.1:

Table 1.1: Previous Reports

Title	Author	Reference	Date
Preliminary Ground Contamination Risk Assessment Report	Ashdown Site Investigation Ltd	P13653R13615	24th October 2019
Proposed Scheme of Investigation at 104 Lower Hythe Street, Dartford, Kent, DA1 1BW	Jomas Associates	P2883J2099	December 2020

1.1.4 The intrusive investigation was undertaken in accordance with Jomas proposal dated 13th October 2020.

1.2 Proposed Development

1.2.1 The proposed development is understood to comprise the demolition of the existing structures to allow the construction of a 5-storey building comprising commercial use at ground floor level and eleven residential units with associated parking and limited landscaping. No private gardens are proposed.

1.2.2 A plan of the proposed development is provided as Figure 3.

1.2.3 For the purposes of the contamination risk assessment, the proposed development is classified as 'residential without plant uptake'.

1.2.4 For the purpose of geotechnical assessment, it is considered that the project could be classified as a Geotechnical Category (GC) 2 site in accordance with BS EN 1997. GC 2 projects are defined as involving:

- Conventional structures.
- Quantitative investigation and analysis.
- Normal risk.

- No difficult soil and site conditions.
- No difficult loading conditions.
- Routine design and construction methods.

1.3 Objectives

1.3.1 The objectives of Jomas' investigation were as follows:

- To conduct an intrusive investigation, to determine the nature and extent of contaminants potentially present at the site;
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within Part IIA of the Environmental Protection Act 1990, associated statutory guidance and current best practice including the EA report R&D CLR 11; and,
- To obtain geotechnical parameters to inform preliminary foundation design.

1.4 Scope of Works

1.4.1 The following tasks were undertaken to achieve the objectives listed above:

- Intrusive ground investigation to determine shallow ground conditions, and potential for contamination at the site;
- Undertaking of laboratory chemical and geotechnical testing upon samples obtained;
- The compilation of this report, which collects and discusses the above data, and presents an assessment of the site conditions, conclusions and recommendations.

1.5 Limitations

1.5.1 Jomas Associates Ltd has prepared this report for the sole use of Crown Coast Property Group, in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas Associates Limited. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.

1.5.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas Associates Limited has actual knowledge to the contrary, information obtained from public sources or provided to Jomas Associates Limited by site personnel and other information sources, have been assumed to be correct. Jomas Associates Limited does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.

1.5.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

1.5.4 Any reports provided to Jomas Associates Limited have been reviewed in good faith. Jomas Associates Limited cannot be held liable for any errors or omissions in these reports, or for any incorrect interpretation contained within them.

1.5.5 This investigation and report has been carried out in accordance with the relevant standards and guidance in place at the time of the works. Future changes to these may require a re-assessment of the recommendations made within this report.

1.5.6 ***This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.***

2 SITE SETTING

2.1 Site Information

2.1.1 The site location plan is appended to this report in Figure 1, Appendix 1.

Table 2.1: Site Information

Name of Site	-
Address of Site	104 Lower Hythe Street, Dartford Kent DA1 1BW
Approx. National Grid Ref.	TQ 5420 7450
Site Occupation	Disused car workshop/garage
Local Authority	Dartford Borough Council
Proposed Site Use	Demolition of existing buildings for the construction of new mixed commercial and residential development.

2.2 Desk Study Overview

2.2.1 As referenced in Table 1.1, a Desk Study report has been produced for the site and issued separately (Ashdown Site Investigation, 2019). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.

2.2.2 A review of historical ordnance survey maps indicated that at the time of the earliest edition (1885) the site was occupied by residential and school buildings. Maps from the 1960s indicate a garage on the centre of the site and by the 1970s a second garage is identified in the west of site. The second garage was subsequently removed and is no longer present.

2.2.3 The site is reportedly located within an area of extensive industrial activity, including chemical works (1209m south-east), iron foundries (60m south-west) and gas works (50m north-west).

2.2.4 Information provided by the British Geological Survey indicated that the site is directly underlain by superficial alluvial deposits underlain by the White Chalk Subgroup. Jomas review of mapping suggests the alluvium is likely to be underlain by further superficial deposits of the Taplow Gravel Member.

2.2.5 The superficial deposits directly underlying the site are identified as a Secondary (undifferentiated) aquifer with the underlying solid deposits identified as a Principal Aquifer.

2.2.6 The site is reported to lie within a Source Protection Zone 1, with the closest abstraction reported 165m south-east of site.

2.2.7 The nearest surface water feature is reported to be a pond 89m south-east.

2.2.8 Preliminary intrusive investigations were recommended to assess land contamination risks at the site.

2.2.9 The conceptual site model is reproduced in Table 2.2 overleaf, adapted from that provided within the Ashdown report.

Table 2.2: Conceptual Site Model (Modified from Ashdown 2019)

Potential Source	Potential Receptor	Potential Contaminants	Potential Pathway	Complete Linkage Present?	Probability	Consequence	Risk
Existing/historical garage workshops, including vehicle inspection pit within existing building	End Users	Petroleum Hydrocarbons, VOC Compounds and Land Gases	Dermal contact with soil and dust (indoor & outdoor)	Yes	High	Moderate	High
			Ingestion of soil and indoor dust	Yes	High	Moderate	High
			Consumption of home-grown produce and attached soil	No private gardens proposed			N/A
			Inhalation of soil dust (indoor and outdoor)	Yes	High	Moderate	High
			Inhalation of vapours	Yes	High	Moderate	High
			Inhalation of soil gases/Risk of explosion	Yes	Low	Moderate	Low/Moderate
	End Users (via Water Supply Pipework)	Petroleum Hydrocarbons and VOC Compounds	Contamination of incoming services	Yes	High	Moderate	High
	Groundwater	Petroleum Hydrocarbons and VOC Compounds	Migration to groundwater	Yes	Moderate	Severe	High
Underground fuel/waste oil storage tanks within eastern area of site	End Users	Petroleum Hydrocarbons, VOC Compounds and Land Gases	Dermal contact with soil and dust (indoor & outdoor)	Yes	High	Moderate	High
			Ingestion of soil and indoor dust	Yes	High	Moderate	High
			Consumption of home-grown produce and attached soil	No private gardens proposed			N/A
			Inhalation of soil dust (indoor and outdoor)	Yes	High	Moderate	High
			Inhalation of vapours	Yes	High	Moderate	High
			Inhalation of soil gases/Risk of explosion	Yes	Moderate	Moderate	Moderate
	End Users (via Water Supply Pipework)	Petroleum Hydrocarbons and VOC Compounds	Contamination of incoming services	Yes	High	Moderate	High
	Groundwater	Petroleum Hydrocarbons and VOC Compounds	Migration to groundwater	Yes	Moderate	Severe	High
Made ground associated with historical site development/ demolition of buildings	End Users	Dermal contact with soil and dust (indoor & outdoor)	Dermal contact with soil and dust (indoor & outdoor)	Yes	Moderate	Moderate	Moderate
		Ingestion of soil and indoor dust	Ingestion of soil and indoor dust	Yes	Moderate	Moderate	Moderate
		Consumption of home-grown produce	Consumption of home-grown produce and attached soil	No private gardens proposed			N/A

		and attached soil					
		Inhalation of soil dust (indoor and outdoor)	Inhalation of soil dust (indoor and outdoor)	Yes	Moderate	Moderate	Moderate
		Inhalation of soil vapours	Inhalation of vapours	Identified contaminant(s) do not pose a risk via this pathway			N/A
		Inhalation of soil gases/ Risk of explosion	Inhalation of soil gases/Risk of explosion	Identified contaminant(s) do not pose a risk via this pathway			N/A
	End Users (via Water Supply Pipework)	Contamination of incoming services	Contamination of incoming services	Identified contaminant(s) do not pose a risk via this pathway			N/A
	Groundwater	Migration to groundwater	Migration to groundwater	Yes	Very Low	Minor	Very Low
Off-site industrial land use	End Users	Petroleum Hydrocarbons and VOC Compounds	Dermal contact with soil and dust (indoor & outdoor)	Yes	Low	Moderate	Low/Moderate
			Ingestion of soil and indoor dust	Yes	Low	Moderate	Low/Moderate
			Consumption of home-grown produce and attached soil	No private gardens proposed			N/A
			Inhalation of soil dust (indoor and outdoor)	Yes	Low	Moderate	Low/Moderate
			Inhalation of vapours	Yes	Low	Moderate	Low/Moderate
			Inhalation of soil gases/Risk of explosion	No potential gas source identified			N/A
	End Users (via Water Supply Pipework)	Petroleum Hydrocarbons and VOC Compounds	Contamination of incoming services	Yes	Very Low	Moderate	Low
	Groundwater	Petroleum Hydrocarbons and VOC Compounds	Migration to groundwater	Yes	Very Low	Severe	Low/Moderate

3 GROUND INVESTIGATION

3.1 Rationale for Ground Investigation

3.1.1 The site investigation has been undertaken generally in accordance with BS5930, Contaminated Land Report 11, BS10175, NHBC Standards Chapter 4.1, and other associated Statutory Guidance. If required, further targeted investigations and remedial option appraisal would be dependent on the findings of this site investigation.

3.1.2 The soil sampling rationale for the site investigation was developed with reference to EA guidance 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination' (Technical Report P5-066/TR).

3.1.3 The sampling proposal was designed in order to gather data representative of the site conditions.

3.1.4 The ground investigation was undertaken in accordance with the Scheme of Investigation produced by Jomas and reference in Table 1.1.

3.2 Scope of Ground Investigation

3.2.1 The ground investigation was undertaken on 18th, 19th and 23rd November 2020.

3.2.2 The work was undertaken in accordance with BS5930 'Code of Practice for Ground Investigations' and BS10175 'Investigation of Potentially Contaminated Sites'. All works were completed without incident.

3.2.3 The investigation focused on collecting data on the following:

- Quality of Made Ground/ natural ground within the site boundaries;
- Presence of groundwater beneath the site (if any), perched or otherwise;
- Determination of the presence or absence of hazardous ground gases;
- Obtaining geotechnical parameters to allow initial design to take place.

3.2.4 A summary of the fieldwork carried out at the site, with justifications for exploratory hole positions, are offered in Table 3.1 below.

Table 3.1: Scope of Intrusive Investigation

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
Window Sample Boreholes	5	WS1 – 5	Up to 4.45mbgl	Obtain shallow samples for laboratory contamination and geotechnical testing. To allow in-situ geotechnical testing. WS1 – located in close proximity to suspected tank location.

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
				WS2 – located within footprint of former garage/workshop. WS3 – within footprint of former garage structure. WS4 was non-targeted to provide site coverage.
Cable Percussion Boreholes	2	BH1	Up to 20.4mbgl	Obtain deeper samples for laboratory contamination and geotechnical testing. BH2 positioned in close proximity to suspected tank location. BH1 is non targeted. To allow in-situ geotechnical testing.
Monitoring Wells	5	WS1, WS2, WS3, BH1, BH2	Up to 6mbgl	Combined soil gas and groundwater monitoring wells. WS1 - response zone in alluvium and Taplow Gravel Member. WS2 - response zone in Alluvium/Taplow Gravel Member WS3 - response zone in Alluvium/Taplow Gravel Member BH1- response zone in Alluvium/Taplow Gravel Member BH2 - - response zone in Taplow Gravel Member
Hand dug Trial Pits	4	HTP1 - 4	Up to 1.28mbgl	Obtain shallow samples for contamination testing. To allow the inspection of the existing structure foundations.

3.2.5 The exploratory holes were completed to allow soil samples to be taken in the areas of interest identified in Table 3.1 above. In all cases, all holes were logged in accordance with BS5930:2015.

3.2.6 Exploratory hole positions were located approximately with reference to known features on site as shown in the exploratory hole location plan presented in Figure 2, Appendix 1. The exploratory hole records are included in Appendix 2.

3.2.7 Where monitoring well installations were not installed, the exploratory holes were backfilled with the arisings (in the reverse order in which they were drilled) and the ground surface was reinstated so that no depression was left.

3.3 In-situ Geotechnical Testing

3.3.1 In-situ geotechnical testing included Standard Penetration Tests. The determined 'N' values have been used to determine the relative density of granular materials and have been used with standard correlations to infer various other derived geotechnical parameters including the undrained shear strength of the cohesive strata. The results of the individual tests are on the appropriate exploratory hole logs in Appendix 2.

3.4 Sampling Rationale

3.4.1 Our soil sampling rationale for the site investigation was developed with reference to EA guidance 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination' (Technical Report P5-066/TR).

3.4.2 The exploratory holes were positioned by applying a combined non-targeted sampling strategy, as well as sample locations positioned with reference to sources identified from the desk study.

3.4.3 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs.

3.4.4 Jomas Associates Limited's engineers normally collect samples at appropriate depths based on field observations such as:

- appearance, colour and odour of the strata and other materials, and changes in these;
- the presence or otherwise of sub-surface features such as pipework, tanks, foundations and walls; and,
- areas of obvious damage, e.g. to the building fabric.

3.4.5 A number of the samples were taken from the top 0-1m to aid in the assessment of the pollutant linkages identified at the site. In addition, some deeper samples were taken to aid in the interpretation of fate and transport of any contamination identified.

3.4.6 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs (copies of which are provided in Appendix 2). The methodology used and type of samples taken were chosen to allow the Sampling category to be A or B according to EN ISO 22475-1. This in turn allows suitable geotechnical testing to be carried out.

3.4.7 During return groundwater monitoring visits, where groundwater samples are taken, this was undertaken using low flow methodologies to remove stagnant groundwater from the monitoring well prior to obtaining the sample for testing without removing significant quantities of solid deposits.

3.4.8 Groundwater strikes noted during drilling, are recorded within the exploratory hole records in Appendix 2.

3.4.9 Samples were stored in cool boxes (<4°C) and preserved in accordance with laboratory guidance.

3.5 Sampling Limitations

3.5.1 WS2, WS3 and WS5 were terminated at 2.45mbgl due to refusal of equipment on very dense granular deposits.

3.5.2 The remaining boreholes were drilled to the proposed depths.

3.6 Laboratory Analysis

3.6.1 A programme of laboratory testing, scheduled by Jomas Associates Limited, was carried out on selected samples of Made Ground and natural strata.

Chemical Testing

3.6.2 Soil samples were submitted to i2 Analytical (a UKAS and MCerts accredited laboratory), for analysis.

3.6.3 The samples were analysed for a wide range of contaminants as shown in Table 3.2 below:

Table 3.2: Chemical Tests Scheduled

	No. of tests	
Test Suite	**Made Ground / Topsoil**	**Natural**
Basic Suite 3	3	1
Basic Suite 5	4	2
Total Organic Carbon	3	0
Water Soluble Sulphate	7	8
TPHCWG (inc BTEX)	4	2
VOC	4	2
Asbestos Screen & ID	4	2

3.6.4 The determinands contained in the Basic Suite 3 are as detailed in Table 3.3 below. Basic Suite 5 contains the same determinands as Basic Suite 3, but without hydrocarbon compounds to avoid overlapping with the extended hydrocarbon suite testing.

Table 3.3: Basic Suite of Determinands

DETERMINAND	LIMIT OF DETECTION (mg/kg)	UKAS ACCREDITATION	TECHNIQUE
Arsenic	1	Y (MCERTS)	ICPMS
Cadmium	0.2	Y (MCERTS)	ICPMS
Chromium	1	Y (MCERTS)	ICPMS
Chromium (Hexavalent)	4	Y (MCERTS)	Colorimetry
Lead	1	Y (MCERTS)	ICPMS
Mercury	0.3	Y (MCERTS)	ICPMS
Nickel	1	Y (MCERTS)	ICPMS
Selenium	1	Y (MCERTS)	ICPMS
Copper	1	Y (MCERTS)	ICPMS
Zinc	1	Y (MCERTS)	ICPMS
Boron (Water Soluble)	0.2	Y (MCERTS)	ICPMS
pH Value	0.1 units	Y (MCERTS)	Electrometric
Sulphate (Water Soluble)	0.0125g/l	Y (MCERTS)	Ion Chromatography
Total Cyanide	1	Y (MCERTS)	Colorimetry
Speciated/Total PAH	0.05/0.80	Y (MCERTS)	GCFID
Phenols	1	Y (MCERTS)	HPLC
Total Petroleum Hydrocarbons (banded)	-	N Y (MCERTS)	Gas Chromatography

3.6.5 To support the selection of appropriate tier 1 screening values, 3No samples were analysed for total organic carbon.

3.6.6 Laboratory test results are summarised in Section 6, with raw laboratory data included in Appendix 3.

Geotechnical Laboratory Testing

3.6.7 In addition to the contamination assessment, soil samples were submitted to the UKAS Accredited laboratory of i2 Analytical Ltd. for a series of analyses.

3.6.8 This testing was specifically designed to:

- classify the samples; and
- obtain parameters (either directly or sufficient to allow relevant correlations to be used) relevant to the technical objectives of the investigation.

3.6.9 The following laboratory geotechnical testing (as summarised in Table 3.4) was carried out:

Table 3.4 Laboratory Geotechnical Analysis

BS 1377 (1990) Test Number	Test Description	Number of tests
Part 2		
3.2	Moisture Content Determination	6
9.2 and 9.3	Particle Size Distribution - Sieving	5

3.6.10 The water soluble sulphate and pH results obtained as part of the chemical analysis was used in combination with BRE Special Digest 1 to allow buried concrete to be classified.

3.6.11 The results of the geotechnical laboratory testing are presented as Appendix 4 and discussed in Section 9 of this report.

4 GROUND CONDITIONS

4.1 Soil

4.1.1 Ground conditions were logged in accordance with the requirements of BS5930:2015. Detailed exploratory hole logs are provided in Appendix 2. The ground conditions encountered are summarised in Table 4.1 below, based on the strata observed during the investigation.

4.1.2 Each location was measured using GPS equipment to establish the elevation at ground level. It was not possible to establish levels for WS2 and HP2 as they were located inside the existing building, and HP3 and HP4 were too close to the building to get sufficient GPS signal.

Table 4.1: Ground Conditions Encountered

Stratum and Description	Encountered from (mbgl)	Encountered from (m AOD)	Base of strata (mbgl)	Base of Strata (m AOD)	Thickness range (m)
Concrete over light brown/red brown to black gravelly sand with medium cobble content. Sand is fine to coarse. Gravel consist of fine to coarse sub-angular brick, concrete and flint. BH1 described as "ashy". (MADE GROUND)	GL	4.17-3.736	0.20-1.10	3.57-2.917	0.20-1.10
Brown to white sometimes clayey very sandy GRAVEL/gravelly SAND with wood fragments. Sand is fie to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded chalk and flint. (ALLUVIUM – granular)	0.20-0.90	3.57-2.917	1.00-1.40	2.97-0.407	0.50-1.00
Dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded flint. (WS1 only) (ALLUVIUM – cohesive)	1.00	2.736	1.50	2.236	0.50
Brown to beige gravelly SAND/sandy GRAVEL. Sand is fine to medium. Gravel consists of fine to coarse, sub-angular to sub-rounded flint. (TAPLOW GRAVEL MEMBER)	1.00-1.50	2.97-0.407	>2.45->20.4 (Base not proven)	<1.72-<16.39 (Base not proven)	>1.25->19.1 (Thickness not proven)

4.1.3 Given the likely ground strata profile identified in the Desk Study and the BGS descriptions of the materials given in Section 3 of the Desk Study it is considered that the encountered strata represent alluvial deposits (primarily granular with isolated cohesive patches) overlying superficial deposits of the Taplow Gravel Member. The base of this deposit was not proven. No deposits considered to represent the bedrock Chalk anticipated to underlie the site were reported.

4.2 Hydrogeology

4.2.1 Groundwater strikes and groundwater monitoring are summarised below.

Table 4.2: Groundwater Strikes During Drilling

Exploratory Hole ID	Depth Encountered (mbgl)	Depth After 20mins (mbgl)	Stratum
BH1	4.00	2.10	Taplow Gravel Member
BH2	4.10	-	Taplow Gravel Member
WS1	2.00	-	Taplow Gravel Member
WS2	No Strike	-	-
WS3	No Strike	-	-
WS4	2.00	-	Taplow Gravel Member
WS5	No strike	-	-

4.2.2 4No return groundwater monitoring visits were undertaken between 01/12/2020 and 21/12/2020. The results are summarised below.

Table 4.3: Groundwater Monitoring Records

Exploratory Hole ID	Depth Encountered (mbgl)	Depth to Base of Well (mbgl)	Strata targeted by response zone
BH1	1.72-2.50	6.2	Alluvium/Taplow Gravel Member
BH2	1.59-1.64	5.91	Taplow Gravel Member
WS1	1.47-1.61	1.64	Alluvium/Taplow Gravel Member
WS2	1.69-1.75	1.83	Alluvium/Taplow Gravel Member
WS3	1.86-1.91	1.98	Alluvium/Taplow Gravel Member

4.2.3 The groundwater levels recorded were fairly uniform across the site, with the water table present within the superficial alluvial and Taplow Gravel Member deposits which are assumed to be in hydraulic continuity with each other, and likely to be in continuity with groundwater within the underlying chalk (not encountered during this investigation).

4.3 Physical and Olfactory Evidence of Contamination

4.3.1 The Made Ground at BH1 was described as “ashy” and Made Ground in WS3 and WS4 was described as “black”.

4.3.2 Samples were screened with a hand-held photo-ionisation detector throughout the progression of the works; no response was recorded at any time.

5 RISK ASSESSMENT – ANALYTICAL FRAMEWORK

5.1 Context and Objectives

5.1.1 This section seeks to evaluate the level of risk pertaining to human health and the environment which may result from both the existing use and proposed future use of the site. It makes use of the site investigation findings, as described in the previous sections, to evaluate further the potential pollutant linkages identified in the desk study. A combination of qualitative and quantitative techniques is used, as described below.

5.1.2 The purpose of generic quantitative risk assessment is to compare concentrations of contaminants found on site against screening level generic assessment criteria (GAC) to establish whether there are actual or potential unacceptable risks. It also determines whether further detailed assessment is required. The approaches detailed all broadly fit within a tiered assessment structure in line with the framework set out in the Department of Environment, Food and Rural Affairs (DEFRA), EA and Institute for Environment and Health Publication, Guidelines for Environmental Risk Assessment and Management.

5.1.3 It should be noted that the statistical tests carried out in this report in accordance with CL:AIRE and CIEH (2008) recommendations, are for guidance purposes only and the conclusions of this report should be approved by the local authority prior to any redevelopment works being undertaken.

5.2 Analytical Framework – Soils

5.2.1 There is no single methodology that covers all the various aspects of the assessment of potentially contaminated land and groundwater. Therefore, the analytical framework adopted for this investigation is made up of a number of procedures, which are outlined below. All of these are based on a Risk Assessment methodology centred on the identification and analysis of Source – Pathway – Receptor linkages.

5.2.2 The CLEA model provides a methodology for quantitative assessment of the long term risks posed to human health by exposure to contaminated soils. Toxicological data have been used to calculate Soil Guideline Values (SGV) for individual contaminants, based on the proposed site use; these represent minimal risk concentrations and may be used as screening values.

5.2.3 In the absence of any published SGVs for certain substances, or where the assumptions made in generating the SGVs do not apply to the site, Jomas Associates Limited have obtained Tier 1 screening values for initial assessment of the soil, based on available current UK guidance including the LQM/CIEH S4ULs and DEFRA C4SL. Site-specific assessments are undertaken wherever possible and/or applicable. All assessments are carried out in accordance with the CLEA protocol.

5.2.4 CLEA requires a statistical treatment of the test results to take into account the normal variations in concentration of potential contaminants in the soil and allow comparisons to be made with published guidance.

5.2.5 The assessment criteria used for the screening of determinand within soils are identified within Table 5.1.

Table 5.1: Selected Assessment Criteria – Contaminants in Soils

Substance Group	Determinand(s)	Assessment Criteria Selected
Organic Substances		
Non-halogenated Hydrocarbons	Total Petroleum Hydrocarbons (TPHCWG banded)	S4UL
	Total Phenols	S4UL
Polycyclic Aromatic Hydrocarbons (PAH-16)	Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene	S4UL
Volatile Organic Compounds (VOCs/sVOCs).	Toluene, Ethylbenzene, Benzene, Xylenes	S4UL
Inorganic Substances		
Heavy Metals and Metalloids	Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel, Selenium, Copper, Zinc	S4UL
	Copper, Zinc, Nickel	BS: 3882 (2015).
Cyanides	Free Cyanide	CLEA v1.06
Sulphates	Water Soluble Sulphate	BRE Special Digest 1:2005

5.2.6 As the published reports only offer the option of selecting a SOM value of 1%, 2.5% or 6%, a SOM value of 1% has been used for the selection of generic assessment criteria, as 1.57% was the mean value obtained from laboratory analysis.

5.2.7 It is understood that the site is to be redeveloped to provide mixed commercial and residential units with no private or extensive soft landscaping proposed. As a result, the site has been assessed with regards to a "residential without plant uptake" end use scenario.

5.3 BRE

5.3.1 The BRE Special Digest 1:2005, 'Concrete in Aggressive Ground' is used with soluble sulphate and pH results to assess the aggressive chemical environment of future underground concrete structures at the site.

5.4 Analytical Framework – Groundwater and Leachate

5.4.1 The requirement to protect groundwater from pollution is outlined in Groundwater protection: Principles and practice (GP3, EA, August 2013, v1.1).

5.4.2 Where undertaken, the groundwater quality analysis comprises a Level 1 assessment in accordance with the EA Remedial Targets Methodology Document (EA, 2006).

5.4.3 The criteria used by Jomas' in the Level 1 assessment of groundwater and leachate quality are shown in Table 5.2.

Table 5.2: Selected Assessment Criteria – Contaminants in Water

Substance Group	Determinand(s)	Assessment Criteria Selected
Metals	Arsenic, Copper, Cyanide, Mercury, Nickel, Lead, Zinc, Chromium	EQS/DWS
	Selenium	DWS
PAHs	Sum of Four – benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, indeno(1,2,3-c,d)pyrene	DWS
PAHs	Benzo(a)pyrene,	DWS
PAHs	Remainder	LEC
Total Petroleum Hydrocarbons	Aliphatic C5-C6, Aliphatic >C6-C8, Aliphatic >C8-C10. Aliphatic >C10-C12, Aliphatic >C12-C16, Aliphatic >C16-C21, Aromatic C5-C7, Aromatic >C7-C8, Aromatic >C8-C10, Aromatic >C10-C12, Aromatic >C12-C16, Aromatic >C16-C21, Aromatic> C21-C35	DWS/WHO
Benzene	Benzene	DWS
Toluene	Toluene	EQS
Ethylbenzene	Ethylbenzene	EQS
Xylene	Xylene	EQS
Oxygen Demand	Chemical Oxygen Demand and Biological Oxygen Demand	Urban Waste Water Treatment (England and Wales) Regulations

Environmental Quality Standards EQS

Environmental Quality Standards (EQS) have been released by the EA for dangerous substances, as identified by the EC Dangerous Substances Directive. EQS can vary for each substance, for the hardness of the water and can be different for fresh, estuarine or coastal waters.

Lowest Effect Concentration (LEC)

These criteria relate to the concentration of PAHs in groundwater. They are taken from the EA R&D Technical Report P45 – Polycyclic Aromatic Hydrocarbons (PAH): Priorities for Environmental Quality Standard Development (2001).

WHO Health

These screening criteria have been taken from the World Health Organisation Guidelines for Drinking Water Quality (1984). The health value is a guideline value representing the concentration of a contaminant that does not result in any significant risk to the receptor over a lifetime of exposure.

Further criteria have been obtained from 'Petroleum Products in Drinking-water' - Background document for development of WHO Guidelines for Drinking-water Quality (2005).

UK Drinking Water Standards (DWS)
These comprise screening criteria provided by the Drinking Water Inspectorate (DWI) in the Water Supply (Water Quality) Regulations 2006,

Urban Waste Water Treatment (England and Wales) Regulations - UWWT Regs
The Urban Waste Water Treatment (England and Wales) Regulations SI/1994/2841 as amended by SI/2003/1788 sets down minimum standards for the discharge of treated effluent from waste water treatment works to inland surface waters, groundwater, estuaries or coastal waters. Standards of (125mg/L) COD and (25mg/L) BOD have been set.

6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Screening of Soil Chemical Analysis Results – Human Health Risk Assessment

6.1.1 Laboratory analysis for soils are summarised in Tables 6.1 to 6.4. Raw laboratory data is included in Appendix 3.

Table 6.1: Soil Laboratory Analysis Results – Metals, Metalloids, Phenol, Cyanide

Determinand	Unit	No. samples tested	Screening Criteria		Min	Max	No. Exceeding
Arsenic	mg/kg	9	S4UL	40	6.4	25	0
Cadmium	mg/kg	9	S4UL	85	<0.2	1.2	0
Chromium	mg/kg	9	S4UL	910	14	32	0
Lead	mg/kg	9	C4SL	310	29	480	2No (WS2@0.30mbgl, WS3@0.50mbgl)
Mercury	mg/kg	9	S4UL	56	<0.3	1.6	0
Nickel	mg/kg	9	S4UL	180	17	120	0
Copper	mg/kg	9	S4UL	7100	13	170	0
Zinc	mg/kg	9	S4UL	40000	55	890	0
Total Cyanide [A]	mg/kg	9	CLEA v 1.06	33	<1	1	0
Selenium	mg/kg	9	S4UL	430	<1	1.3	0
Boron Water Soluble	mg/kg	9	S4UL	11000	0.3	7.3	0
Phenols	mg/kg	9	S4UL	440	<1.0	<1.0	0

Notes: [A] Generic assessment criteria derived for free inorganic cyanide.

Table 6.2: Soil Laboratory Analysis Results – Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Naphthalene	mg/kg	9	S4UL	2.3	<0.05	0.89	0
Acenaphthylene	mg/kg	9	S4UL	2900	<0.05	0.34	0
Acenaphthene	mg/kg	9	S4UL	3000	<0.05	0.35	0
Fluorene	mg/kg	9	S4UL	2800	<0.05	0.52	0
Phenanthrene	mg/kg	9	S4UL	1300	<0.05	3.1	0
Anthracene	mg/kg	9	S4UL	2300	<0.05	0.92	0
Fluoranthene	mg/kg	9	S4UL	1500	<0.05	4.5	0
Pyrene	mg/kg	9	S4UL	3700	<0.05	4	0
Benzo(a)anthracene	mg/kg	9	S4UL	11	<0.05	5.1	0

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Chrysene	mg/kg	9	S4UL	30	<0.05	3.2	0
Benzo(b)fluoranthene	mg/kg	9	S4UL	3.9	<0.05	5.6	1No (WS2@0.30mbgl)
Benzo(k)fluoranthene	mg/kg	9	S4UL	110	<0.05	2.7	0
Benzo(a)pyrene	mg/kg	9	S4UL	3.2	<0.05	4.2	1No (WS2@0.30mbgl)
Indeno(123-cd)pyrene	mg/kg	9	S4UL	45	<0.05	2.6	0
Dibenzo(ah)anthracene	mg/kg	9	S4UL	0.31	<0.05	1.0	2No (WS2@0.30mbgl, BH2@1.00mbgl)
Benzo(ghi)perylene	mg/kg	9	S4UL	360	<0.05	2.7	0
Total PAH	mg/kg	9	-	-	<0.80	30.2	-

Table 6.3: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPH)

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
C_8-C_{10}	mg/kg	3	S4UL	27	<0.1	<0.1	0
>C_{10}-C_{12}	mg/kg	3	S4UL	130	<2.0	2.2	0
>C_{12}-C_{16}	mg/kg	3	S4UL	1100	<4.0	6.0	0
>C_{16}-C_{21}	mg/kg	3	S4UL	1900	<1.0	54	0
>C_{21}-C_{35}	mg/kg	3	S4UL	1900	<10	270	0
Total TPH	mg/kg	3	-	-	<17.1	330	0

Note: *The lower value of guidelines for Aromatic/Aliphatics has been selected

Table 6.4: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPHCWG)

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
>C_5-C_6 Aliphatic	mg/kg	6	S4UL	42	<0.001	<0.001	0
>C_6-C_8 Aliphatic	mg/kg	6	S4UL	100	<0.001	<0.001	0
>C_8-C_{10} Aliphatic	mg/kg	6	S4UL	27	<0.001	<0.001	0
>C_{10}-C_{12} Aliphatic	mg/kg	6	S4UL	130	<1.0	<1.0	0
>C_{12}-C_{16} Aliphatic	mg/kg	6	S4UL	1100	<2.0	<2.0	0
>C_{16}-C_{35} Aliphatic	mg/kg	6	S4UL	65000	<16.0	<16.0	0
>C_5-C_7 Aromatic	mg/kg	6	S4UL	65000	<0.001	<0.001	0
>C_7-C_8 Aromatic	mg/kg	6	S4UL	370	<0.001	<0.001	0

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
>C_8-C_{10} Aromatic	mg/kg	6	S4UL	860	<0.001	<0.001	0
>C_{10}-C_{12} Aromatic	mg/kg	6	S4UL	47	<1.0	<1.0	0
>C_{12}-C_{16} Aromatic	mg/kg	6	S4UL	250	<2.0	<2.0	0
>C_{16}-C_{21} Aromatic	mg/kg	6	S4UL	1800	<10	13	0
>C_{21}-C_{35} Aromatic	mg/kg	6	S4UL	1900	<10	29	0
Total TPH (Ali/Aro)	mg/kg	6	-	-	<20	42	-

6.2 Volatile Organic Compounds

6.2.1 In addition to the suites outlined previously, 6No samples were tested for the presence of volatile organic compounds including BTEX compounds (benzene, toluene, ethylbenzene, xylene).

6.2.2 No VOCs were reported above the laboratory detection limit within any tested sample.

6.3 Vapour Risk Assessment from a Soil Source

6.3.1 As outlined in Table 6.2, a number of polyaromatic hydrocarbons have been found in excess of their generic screening criteria for the protection of human health within a 'residential without plant uptake' end-use scenario. The generic screening criteria considers all possible pathways between the source and the receptor. In order to assess potential risks from inhalation of vapour, each organic compound that has been found in excess of its GAC will be assessed in terms of the contribution to total exposure from vapour inhalation inside a structure as reported within the LQM/CIEH S4UL document. Where a significant proportion of the total exposure is reported from vapour inhalation, there could be a potential risk from vapour inhalation.

Table 6.5: Soil Laboratory Analysis Results – Contribution to Total Exposure from Vapour Inhalation (Indoor)

Compound	Contribution of Vapour Inhalation to Total Exposure (%)	Screening Criteria (mg/kg)	Maximum recorded value (mg/kg)	Potential Vapour Risk?
Benzo(b)fluoranthene	<0.1	3.9	51	**X**
Benzo(a)pyrene	0.0	3.2	46	**X**
Dibenzo(ah)anthracene	<0.1	0.31	7.9	**X**

6.3.2 As shown in the table above, all of the PAHs detected in soils in excess of generic assessment criteria have a negligible contribution to total exposure via inhalation pathway (less or equal to 0.1%).

6.3.3 Therefore, it is considered that there is a negligible risk to end users of the proposed development associated with vapour risk inhalation from soils.

6.4 Statistical Analysis

6.4.1 Where samples tested exceeded the selected screening criteria, and the minimum numbers of samples were more than six in the impact horizon, statistical analyses of the dataset are undertaken.

6.4.2 The CL:AIRE/CIEH Guidance 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' (2008) describes the new approach to statistical analysis of datasets generated through the investigation of contaminated land. This includes differing statistical methodologies for the analysis of normally and non-normally distributed data. Different approaches to datasets being analysed under Part IIA and under the planning regime are also presented.

6.4.3 Chemical data from the laboratory testing has been assessed in accordance with the CL:AIRE/CIEH Guidance under a planning scenario. The purpose of the assessment is to determine if the land is suitable for the proposed development. Under the planning scenario, the key question is 'is there sufficient evidence that the true mean concentration of the contaminant within the data set (μ) is less than the critical concentration (Cc, in this instance the derived GAC). This is assessed by calculation of the upper confidence limit (UCL). The statistical test assesses the 95th percentile of contaminant populations across a site, and compares this value against the relevant GAC. Furthermore, the test determines statistically whether contaminants exceeding the soil guideline value could be regarded as outliers. Outliers are contaminant values which indicate a localised area of contamination or error in sampling, and may not be a member of the underlying population.

6.4.4 The statistical tests were run for:

- Lead
- Benzo(b)fluoranthene
- Benzo(a)pyrene
- Dibenzo(ah)anthracene

6.4.5 The results of statistical tests are presented in Appendix 5. Table 6.6 below provides the summary of statistical tests.

Table 6.6: Statistical Test Results

Determinand	95% UCL	Cc/GAC	GAC Exceeded	Outlier? (Y/N)
Lead	303	310	N	N
Benzo(b)fluoranthene	4.60	3.9	Y	N
Benzo(a)pyrene	3.43	4.2	N	N
Dibenzo(ah)anthracene	0.73	0.31	Y	N

6.4.6 As shown in the table above, the 95% upper confidence limits for dibenzo(ah)anthracene and benzo(b)fluoranthene exceed their respective generic assessment criteria.

6.4.7 No outliers have been identified, suggesting the exceedances are representative of the impact horizon as a whole and are unlikely to represent "hotspots" of contamination.

6.4.8 Therefore, the made ground is considered unsuitable for the proposed use, and a clean cover system will be required for areas of soft landscaping.

6.5 Asbestos in Soil

6.5.1 5No samples of the Made Ground were screened in the laboratory for the presence of asbestos.

6.5.2 No asbestos fibres were reported in samples analysed in the laboratory.

6.6 Screening of Groundwater Chemical Analysis Results

6.6.1 Samples of groundwater obtained from the borehole installations installed within exploratory locations BH1, BH2, WS1, WS2 and WS3 were submitted for chemical analysis. The samples from BH1 and BH2 were obtained by means of low flow methodology. Due to limited quantities of water and limited recharge within WS1, WS2 and WS3, these samples were obtained without stabilisation of the low-flow parameters.

6.6.2 The results of the laboratory testing are summarised in Tables 6.7 to 6.9 below, with the raw chemical testing data presented in Appendix 3.

Table 6.7: Groundwater Laboratory Analysis Results

Determinand	Unit	No. samples tested	Screening Criteria		Min	Max	No of Exceedances
Arsenic	µg/l	5	10	DWS	3.36	7.85	0
	µg/l		50	EQS	3.36	7.85	0
Cadmium	µg/l	5	5	DWS	0.03	0.12	0
Chromium	µg/l	5	50	DWS	3.2	5.6	0
Lead	µg/l	5	10	DWS	<0.2	0.4	0
	µg/l		1.2*	EQS	<0.2	0.4	0
Nickel	µg/l	5	20	DWS	4.9	33	1No (WS2)
	µg/l		4*	EQS	4.9	33	5No (BH1, BH2, WS1, WS2, WS3)
Copper	µg/l	5	12	EQS	16	21	5No (BH1, BH2, WS1, WS2, WS3)
			2000	DWS	16	21	0
Zinc	µg/l	5	5000	DWS	2.7	28	0
	µg/l		12.9**	EQS	2.7	28	1No (BH2)
Mercury	µg/l	5	1	DWS	<0.05	<0.05	0
Selenium	µg/l	5	10	DWS	3.9	18	3No (WS1, WS2, WS3)
Boron	µg/l	5	1000	DWS	93	750	0
	µg/l		2000	EQS	93	750	0
Cyanide (Total)	µg/l	5	50	DWS	<1.0	8.6	0
	µg/l		1	EQS	<1.0	8.6	1No (WS3)

Table 6.7: Groundwater Laboratory Analysis Results

Determinand	Unit	No. samples tested	Screening Criteria		Min	Max	No of Exceedances
Phenols (Total)	µg/l	5	7.7	EQS	<10	<10	0

* bioavailable concentration
**bioavailable concentration + ambient background concentration dissolved for Thames Groundwater (2 µg/L)

Table 6.8: Groundwater Analysis Results – Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. samples tested	Screening Criteria		Min.	Max.	No. of Exceedances
Naphthalene	µg/l	5	2.4	EQS	<0.01	34.4	2No (WS2, WS3)
Acenaphthylene	µg/l	5	-	-	<0.01	0.40	-
Acenaphthene	µg/l	5	-	-	<0.01	0.13	-
Fluorene	µg/l	5	-	-	<0.01	0.12	-
Phenanthrene	µg/l	5	-	-	<0.01	0.06	-
Anthracene	µg/l	5	0.1	EQS	<0.01	<0.01	0
Fluoranthene	µg/l	5	0.0063	EQS	<0.01	<0.01	0
Pyrene	µg/l	5	-	-	<0.01	<0.01	-
Benzo(a)anthracene	µg/l	5	-	-	<0.01	<0.01	-
Chrysene	µg/l	5	-	-	<0.01	<0.01	-
Sum of four Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(ghi)perylene Indeno(123-cd)pyrene	µg/l	5	0.1	DWS	<0.01	<0.01	0
Benzo(a)pyrene	µg/l	5	0.01	DWS	<0.01	<0.01	0
Dibenzo(ah)anthracene	µg/l	5	0.00017	EQS	<0.01	<0.01	0

Table 6.9: Groundwater Analysis Results (Round 2) – TPHCWG – Controlled Waters

Determinand	Unit	No. Samples tested	Screening Criteria		Min.	Max.	No. of Exceedances
>C5-C6 Aliphatic	µg/l	5	15000	WHO	<1.0	<1.0	0
>C6-C8 Aliphatic	µg/l	5	15000	WHO	<1.0	<1.0	0
>C8-C10 Aliphatic	µg/l	5	300	WHO	<1.0	<1.0	0
>C10-C12 Aliphatic	µg/l	5	300	WHO	<10	<10	0
>C12-C16 Aliphatic	µg/l	5	300	WHO	<10	<10	0
>C16-C21 Aliphatic	µg/l	5	-	-	<10	<10	0
>C21-C35 Aliphatic	µg/l	5	90	WHO	<10	<10	0
>C5-C7 Aromatic	µg/l	5	10	WHO	<1.0	<1.0	0

Determinand	Unit	No. Samples tested	Screening Criteria		Min.	Max.	No. of Exceedances
>C7-C8 Aromatic	µg/l	5	700	WHO	<1.0	<1.0	0
>C8-C10 Aromatic	µg/l	5	300	WHO	<1.0	<1.0	0
>C10-C12 Aromatic	µg/l	5	90	WHO	<10	34	0
>C12-C16 Aromatic	µg/l	5	90	WHO	<10	<10	0
>C16-C21 Aromatic	µg/l	5	90	WHO	<10	<10	0
>C21-C35 Aromatic	µg/l	5	90	WHO	<10	<10	0

6.6.3 In addition to the suite outlined above, the five water samples were also analysed for a suite of volatile organic compounds. The results are summarised below for determinands reported above laboratory detection limit.

Table 6.10: Groundwater Laboratory Analysis Results – Volatile Organic Compounds (VOCs)

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Tetrachloroethene	µg/l	5	WHO	40	<1.0	40.7	1No (BH2)

6.6.4 Exceedances of Environmental Quality Standards for naphthalene nickel, copper, zinc and cyanide have been reported. The nearest environmental receptor identified by the Desk Study is a pond 89m south-east. Review of mapping also indicates the location of the River Darent approximately 200m east of site.

6.6.5 Naphthalene was only detected in WS2 and WS3, in the west and south of the site respectively. No naphthalene was reported in WS1 or BH2, the nearest boreholes to the off-site receptors. This indicates that naphthalene is unlikely to pose a significant risk to these receptors. It is also possible that the naphthalene may be a result of sediment within the sample, as there was insufficient groundwater within the windowless sampler wells for full low-flow sampling to be undertaken.

6.6.6 Cyanide was only detected in a single soil sample (at the detection limit), and only detected in groundwater in WS3, the westernmost well on site suggesting a significant on site source is unlikely to be present. Given the distance to the receptors, the relatively minor exceedance of the EQS for cyanide is considered unlikely to pose a significant risk to surface waters.

6.6.7 Nickel, copper and zinc were reported in groundwater in excess of environmental quality standards, nickel and copper from wells across the site and zinc in a single sample only. The conceptual site model does not indicate any specific sources of these metals on site and results of soil analysis do not indicate any unusually high levels of these metals within Made Ground. It is considered that these contaminants are most likely elevated within groundwater across the wider vicinity (which is reported to have a long industrial heritage), and a specific site source is unlikely to be present. The proposed development plan shows a significant proportion of the site will be covered by hard-standing post development, limiting infiltration and limiting the potential for mobilisation of contaminants contained within the shallow strata.

6.6.8 Drinking water standard have been exceeded for nickel and selenium, and World Health Organisation criteria protective of human health have been exceeded for tetrachloroethene.

6.6.9 Although a single water sample reported tetrachloroethene at levels in excess of World Health Organisation screening criteria for drinking water, given the marginal nature of this exceedance and the non-detection in three of the other 4No samples, there is not considered to be a significant risk to the source protection zone or associated abstraction.

6.6.10 As with the metals exceeding EQS, there are no specific sources of nickel or selenium identified within the CSM, and no evidence of elevated concentrations within soils and therefore a specific on-site source of these contaminants is unlikely to be present, and hard-standing post-development is expected to limit infiltration and mobilisation of contaminants.

6.7 Vapour Risks from a Groundwater Source

6.7.1 There is potential for organic contaminants present within the groundwater to present a risk to end users from inhalation of contaminants in vapour phase. The organic contaminants reported above laboratory detection limits have been compared against criteria derived by the Society of Brownfield Risk Assessment (SoBRA) below. Criteria for a residential end use have been selected.

Table 6.11: Groundwater Laboratory Analysis Results – Vapour Risk from a Groundwater Source

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Naphthalene	µg/l	5	SoBRA	220	<0.01	34.4	0
Acenaphthylene	µg/l	5	SoBRA	220,000	<0.01	0.40	0
Acenaphthene	µg/l	5	SoBRA	170,000	<0.01	0.13	0
Fluorene	µg/l	5	SoBRA	210,000	<0.01	0.12	0
Phenanthrene	µg/l	5	SoBRA	Insufficiently Volatile	<0.01	0.06	0
C10-C12 Aromatic	µg/l	5	SoBRA	Insufficiently Volatile	<10	34	0
Tetrachloroethene	µg/l	5	SoBRA	34	<1.0	40.7	1No (BH2)

6.7.2 The marginal exceedance of the SoBRA criteria reported above suggest a potential risk to residential end users from vapour inhalation. However, it should be noted that given the commercial use at ground floor level, the application of SoBRA criteria for a "commercial" end use is considered conservative. The equivalent screening criteria for tetrachloroethene within a commercial end use scenario is 4,600µg/l which has not been exceeded by results obtained from groundwater samples from the site. Therefore it is considered that a significant risk to end users of the development (and adjacent site users) from contaminants in groundwater (via vapour inhalation pathways) is not present at the site.

6.8 Screening of Soil Chemical Analysis Results – Potential Risks to Plant Growth

6.8.1 Zinc, copper and nickel are phytotoxins and could therefore inhibit plant growth in soft landscaped areas. Concentrations measured in soil for these determinands have been compared with the pH dependent values given in BS: 3882 (2015).

6.8.2 Adopting a pH value of greater than 7, as indicated by the results of the laboratory analysis, the following is noted;

Table 6.12: Soil Laboratory Analysis Results – Phytotoxic Determinands

Determinand	Threshold level (mg/kg)	Min (mg/kg)	Max (mg/kg)	No. Exceeding
Nickel	110	17	120	1No (WS4@0.60mbgl)
Copper	200	13	170	0
Zinc	300	55	890	2No (WS3@0.50mbgl, HTP1@0.30mbgl)

6.9 Screening for Water Pipes

6.9.1 The results of the analysis have been assessed for potential impact upon water supply pipes. Table 6.13 below summarises the findings of the assessment:

Table 6.13: Screening Guide for Water Pipes

Determinand	No. of tests	Threshold adopted for PE (mg/kg)	Value for site data (mg/kg)		No of Exceedances
			Min	Max	
Total VOCs	6	0.5	<0.056	<0.056	0
BTEX	6	0.1	<0.04	<0.04	0
MTBE	6	0.1	<0.01	<0.01	0
EC5-EC10	6	1	<0.002	<0.1	0
EC10-EC16	6	10	<6.0	7.1	0
EC16-EC40	6	500	<11	208	0
Naphthalene	6	5	<0.05	0.89	0
Phenols	6	2	<1.0	<1.0	0

6.9.2 The above suggests that upgraded pipe work is unlikely to be required; however it should be noted that tetrachloroethene detected in the groundwater may impact on utility pipework selection.

6.9.3 The water supply pipe requirements for this site should be discussed at an early stage with the relevant utility provider.

6.10 Waste Disposal

6.10.1 The classification of materials for waste disposal purposes was outside the scope of this report. Should quantities of material require off-site disposal, Waste Acceptance Criteria testing will be required.

7 SOIL GAS RISK ASSESSMENT

7.1 Soil Gas Results

7.1.1 Four return monitoring visits have been undertaken from 1st December 2020 to 18th December 2020, to monitor wells installed within boreholes at the site for soil gas concentrations and groundwater levels.

7.1.2 During these visits pressure trends observed were static and falling.

7.1.3 The results of the monitoring undertaken are summarised in Table 7.1 below, with the monitoring records presented in Appendix 6.

Table 7.1: Summary of Gas Monitoring Data

Hole No.	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	VOCs (ppm)	Steady Flow Rate (l/hr)	Peak Flow Rate (l/hr)	Depth to water (mbgl)	Depth of installation (mbgl)
BH1	0.0	2.3-3.5	15.7-18.8	0	0.0-0.1	<0.1-+0.1	<0.1-+0.1	1.72-2.50	6.19
BH2	0.0	0.5-0.7	19.9-20.7	0	0.0-0.1	+0.1-+0.2	+0.1-+0.2	1.59-1.64	5.91
WS1	0.0	0.1-0.6	20.4-21.7	0	0.0-0.1	<0.1-+0.2	<0.1-+0.2	1.47-1.61	1.65
WS2	0.0	0.8-1.8	19.4-20.3	0	0.0-0.1	<0.1-+0.1	<0.1-+0.1	1.69-1.75	1.83
WS3	0.0	0.2-3.2	18.3-21.8	0	0.0-0.1	+0.1	+0.1	1.86-1.91	2.00

7.2 Screening of Results

7.2.1 As shown in Table 7.1, methane has not been detected. Carbon dioxide has been reported to a maximum concentration of 3.5% v/v. Screening of the monitoring well headspaces with a photo-ionisation detector (PID) has detected maximum Volatile Organic Compound (VOC) concentration to a maximum level of 0.1ppm. A maximum flow rate of +0.2l/hr has been reported.

7.2.2 In the assessment of risks posed by hazardous ground gases and selection of appropriate mitigation measures, BS8485 (2015) + A1 (2019) identifies four types of development, termed Type A to Type D.

Type B buildings are defined as:

"private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels."

7.2.3 Type B has been adopted as the relevant category for the proposed development.

7.2.4 The soil gas assessment method is based on that proposed by Wilson & Card (1999), which was a development of a method proposed in CIRIA publication R149 (CIRIA, 1995). The method uses both gas concentrations and borehole flow rates to define a characteristic situation based on the limiting borehole gas volume flow for methane and carbon dioxide. In both these methods, the limiting borehole gas volume flow is renamed as the Gas Screening Value (GSV).

7.2.5 The Gas Screening Value (litres of gas per hour) is calculated by using the following equation

GSV = (Concentration/100) X Flow rate

Where concentration is measured in percent (%)
and flow rate is measured in litres per hour (l/hr)

7.2.6 The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

7.2.7 To accord with C665, worst case conditions are used in the calculation of GSVs for the site.

7.2.8 A worst case flow rate of 0.2l/hr (maximum reported) will be used in the calculation of GSVs for the site. The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

7.2.9 To accord with C665, worst case conditions are used in the calculation of GSVs for the site. These have been summarised below in Table 7.2

Table 7.2: Summary of Gas Monitoring Data

Gas	Concentration (v/v %)	Peak Flow Rate (l/hr)	GSV (l/hr)	Characteristic Situation (after CIRIA C665)
CO_2	3.5	0.2	0.007	**1**
CH_4	<0.1	0.2	<0.0002	**1**

7.2.10 The methodology set out in BS 8485 (2015) has been used for determining the required gas protection measures. For a Type B development on a CS1 site, no formal gas protection measures are considered necessary.

7.2.11 PID screening of the monitoring well headspace has revealed maximum concentrations of VOCs of 0.1ppm. No evidence of a soil source of vapours has been identified, but a possible groundwater source of vapour inhalation was indicated. It is considered that the PID screening of monitoring well confirms the assessment that risks to human health receptors via vapour inhalation pathways are low.

8 SUMMARY OF RESULTS

8.1 Land Quality Impact Summary

8.1.1 Following the ground investigation, the following is noted:

- The proposed development is understood to comprise demolition of the existing structures to allow the construction of a 5-storey building comprising commercial use at ground floor level and eleven residential units with associated parking and limited landscaping.
- Following generic risk assessments and statistical analysis, elevated concentrations of lead, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene were detected in soils in excess of generic assessment criteria for the protection of human health within a "residential without plant uptake" end-use scenario.
- No asbestos fibres were detected in the samples analysed in the laboratory.
- The site proposal indicates that the majority of the site will remain covered by a combination of the proposed building footprint and hard surfacing. Where this is the case, no formal remedial measures are considered necessary in terms of human health, as the building and hard surfacing are expected to provide a barrier to potential receptors. In areas of soft landscaping, existing site soils should be encapsulated with a minimum 450mm of imported clean topsoil, placed on a membrane.
- A pollutant linkage to controlled waters is not considered to exist. However, in the event that previously undetected contamination is encountered during any tank decommissioning or groundworks at the site, it is recommended that remedial targets for soils are derived for high to medium mobility petroleum hydrocarbon compounds, and tetrachloroethene.
- Calculating the Gas Screening Value using worst case results indicates Characteristic Situation 1; meaning no formal gas protection measures are considered necessary. PID screening of the monitoring well headspace has revealed maximum concentrations of VOCs of 0.1ppm.
- A remedial strategy should be prepared, and submitted to the Local Authority for approval.
- As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.

8.1.2 The above conclusions are made subject to approval by the statutory regulatory bodies.

8.2 Review of Pollutant Linkages Following Site Investigation

8.2.1 The site CSM has been revised and updated from that suggested in the desk study in view of the ground investigation data, including soil laboratory analysis results. Table 8.1 highlights whether pollutant linkages identified in the original CSM are still relevant following the risk assessment, or whether pollutant linkages, not previously identified, exist.

Potential Source	Potential Receptor	Potential Contaminants	Potential Pathway	Complete Linkage Present?	Probability	Consequence	Viable S-P-R Linkage (pre-remediation)
Existing/historical garage workshops, including vehicle inspection pit within existing building	End Users	Petroleum Hydrocarbons, VOC Compounds and Land Gases	Dermal contact with soil and dust (indoor & outdoor)	Yes	High	Moderate	✓
			Ingestion of soil and indoor dust	Yes	High	Moderate	✓
			Consumption of home-grown produce and attached soil	No private gardens proposed			
			Inhalation of soil dust (indoor and outdoor)	Yes	High	Moderate	✓
			Inhalation of vapours	Yes	High	Moderate	**X**
			Inhalation of soil gases/Risk of explosion	Yes	Low	Moderate	**X**
	End Users (via Water Supply Pipework)	Petroleum Hydrocarbons and VOC Compounds	Contamination of incoming services	Yes	High	Moderate	**X**
	Groundwater	Petroleum Hydrocarbons and VOC Compounds	Migration to groundwater	Yes	Moderate	Severe	**X**
Underground fuel/waste oil storage tanks within eastern area of site	End Users	Petroleum Hydrocarbons, VOC Compounds and Land Gases	Dermal contact with soil and dust (indoor & outdoor)	Yes	High	Moderate	✓
			Ingestion of soil and indoor dust	Yes	High	Moderate	✓
			Consumption of home-grown produce and attached soil	No private gardens proposed			
			Inhalation of soil dust (indoor and outdoor)	Yes	High	Moderate	✓
			Inhalation of vapours	Yes	High	Moderate	**X**
			Inhalation of soil gases/Risk of explosion	Yes	Moderate	Moderate	**X**
	End Users (via Water Supply Pipework)	Petroleum Hydrocarbons and VOC Compounds	Contamination of incoming services	Yes	High	Moderate	**X**
	Groundwater	Petroleum Hydrocarbons and VOC Compounds	Migration to groundwater	Yes	Moderate	Severe	**X**
Made ground associated with historical site development/demolition of buildings	End Users	Dermal contact with soil and dust (indoor & outdoor)	Dermal contact with soil and dust (indoor & outdoor)	Yes	Moderate	Moderate	✓
		Ingestion of soil and indoor dust	Ingestion of soil and indoor dust	Yes	Moderate	Moderate	✓
		Consumption of home-grown produce and attached soil	Consumption of home-grown produce and attached soil	No private gardens proposed			
		Inhalation of soil dust	Inhalation of soil dust (indoor and outdoor)	Yes	Moderate	Moderate	✓

		(indoor and outdoor)					
		Inhalation of soil vapours	Inhalation of vapours	Identified contaminant(s) do not pose a risk via this pathway			
		Inhalation of soil gases/ Risk of explosion	Inhalation of soil gases/Risk of explosion	Identified contaminant(s) do not pose a risk via this pathway			
	End Users (via Water Supply Pipework)	Contamination of incoming services	Contamination of incoming services	Identified contaminant(s) do not pose a risk via this pathway			
	Groundwater	Migration to groundwater	Migration to groundwater	Yes	Very Low	Minor	X
Off-site industrial land use	End Users	Petroleum Hydrocarbons and VOC Compounds	Dermal contact with soil and dust (indoor & outdoor)	Yes	Low	Moderate	✓
			Ingestion of soil and indoor dust	Yes	Low	Moderate	✓
			Consumption of home-grown produce and attached soil	No private gardens proposed			
			Inhalation of soil dust (indoor and outdoor)	Yes	Low	Moderate	✓
			Inhalation of vapours	Yes	Low	Moderate	✓
			Inhalation of soil gases/Risk of explosion	No potential gas source identified			
	End Users (via Water Supply Pipework)	Petroleum Hydrocarbons and VOC Compounds	Contamination of incoming services	Yes	Very Low	Moderate	**X**
	Groundwater	Petroleum Hydrocarbons and VOC Compounds	Migration to groundwater	Yes	Very Low	Severe	**X**

9 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

9.1 Introduction

9.1.1 It is understood that the proposed development comprises demolition of the existing structures and construction of a mixed residential and commercial development up to 5-storeys in height.

9.1.2 No detailed structural engineering design information, with respect to the type of construction and associated structural loadings, was provided at the time of preparing this report. Consequently, a detailed discussion of all the problems that may arise during the proposed redevelopment scheme is beyond the scope of this report.

9.1.3 Practical solutions to the difficulties encountered, both prior to, and during construction, are frequently decided by structural constraints or economic factors. For these reasons, this discussion is predominantly confined to remarks of a general nature, which are based on site conditions encountered during the intrusive investigations.

9.2 Geotechnical Classification

9.2.1 At the Desk Study stage this development was not given a Geotechnical Classification in accordance with BS EN: 1997. However, at the start of this phase of works it was considered that the development should be classed as a GC2 development in accordance with BS EN: 1997.

9.2.2 The findings of the investigation undertaken and discussed previously does not change this assessment.

9.3 Data Summary

9.3.1 The results of the ground investigation revealed a ground profile comprising a variable thickness of Made Ground (up to 1.10mbgl depth), overlying predominantly granular alluvial deposits to a maximum depth of 1.40mbgl, overlying gravelly sand and sandy gravel of the Taplow Gravel Member to the base of the deepest borehole at a maximum proven depth of 20.4mbgl

9.3.2 Groundwater was reported between 2.00mbgl and 4.00mbgl during drilling, and between 1.47-2.50mbgl during return monitoring visits.

9.3.3 A summary of ground conditions obtained from the ground investigation and the derived geotechnical parameters, is provided in Table 9.1 below.

Table 9.1: Ground Conditions and Derived Geotechnical Parameters

Strata	Depth Encountered (from-to) (mbgl)	Depth Encountered (from-to) (mAOD)	SPT 'N' Value	Inferred Shear Strength (kPa)	Measured Shear Strength (kPa)	Moisture content (%)	Particle Size Distribution				NHBC Volume Change Classification
							Fines (<0.063mm)	Sand	Gravel	Very Coarse	
Concrete over light brown/red brown to black gravelly sand with medium cobble content. Sand is fine to coarse. Gravel consist of fine to coarse sub-angular brick, concrete and flint. BH1 described as "ashy". (MADE GROUND)	GL To 0.20-1.10	4.17-3.736 To 3.57-2.917	-	-	-	15-26	13.00	26.30	60.70	0.00	Non-plastic
Brown to white sometimes clayey very sandy GRAVEL/gravelly SAND with wood fragments. Sand is fie to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded chalk and flint. (ALLUVIUM – granular)	0.20-0.90 To 1.00-1.10	3.57-2.917 To 2.97-0.407	11	-	-	3.9-14	0.70-19.40	11.10-28.90	51.70-78.70	0.00	Non-plastic
Dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded flint. (WS1 only) (ALLUVIUM – cohesive)	1.00 To 1.50	2.736 To 2.236	10	45	-	-	-	-	-	-	-
Brown to beige gravelly SAND/sandy GRAVEL. Sand is fine to medium. Gravel consists of fine to coarse, sub-angular to sub-rounded flint. (TAPLOW GRAVEL MEMBER)	1.00-1.50 To 2.97-0.407	2.97-0.407 To <1.72-<16.39	13-81*	-	-	4.1	1.00	31.10	67.90	0.00	Non-plastic

*N-equi calculated following refusal of SPT.

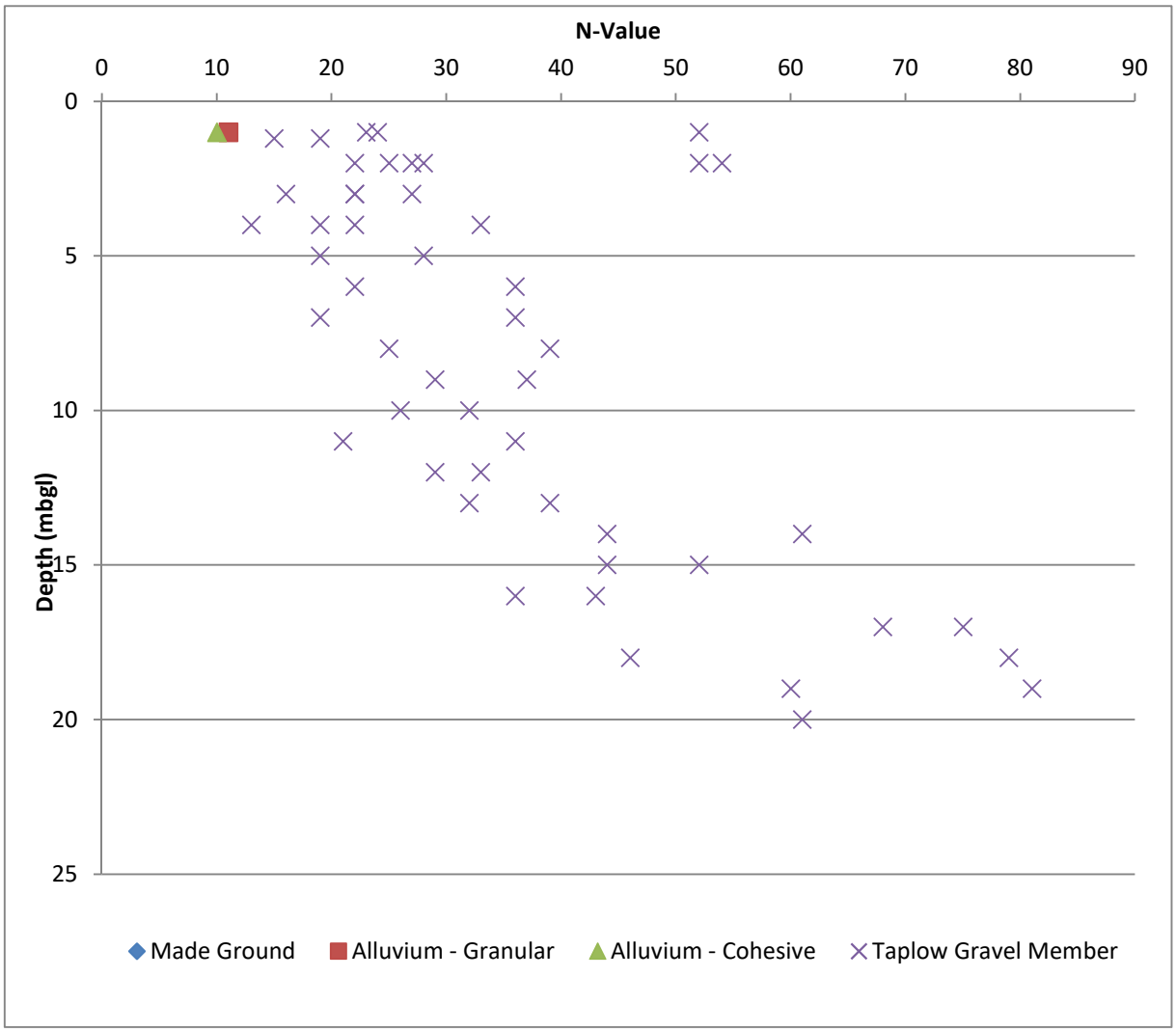
9.4 Standard Penetration Tests

9.4.1 Standard Penetration Tests were undertaken at regular intervals throughout the window sampler holes and cable percussive boreholes. The results of the SPTs are plotted against depth in Figure 9.1 below.

9.4.2 The strata have been grouped into "Made Ground", "Alluvium - Cohesive", "Alluvium – Granular" and "Taplow Gravel Member".

9.4.3 N_{equi} results have been calculated where the full 300mm of penetration could not be achieved for 50 or more blows.

Figure 9.1: SPT 'N' Value v Depth



9.4.4 As shown above, the N-values within the Taplow Gravel Member generally increase with depth, as would be expected. There are insufficient results from the alluvial deposits to draw definitive conclusions on the strength properties of these uppermost superficial materials.

9.5 Building Near Trees

9.5.1 The underlying soil conditions have been shown to be non-plastic and therefore have no volume change potential. The only cohesive deposits identified is a localised patch of alluvium; due to the potential for differential settlement foundations should not be formed within alluvial deposits regardless of whether they are predominantly cohesive or granular.

9.5.2 Using the geotechnical testing obtained (summarised in Table 9.1) and with reference to NHBC Standards Chapter 4.2 it can be seen that a minimum founding depth of 0.75m will be required.

9.6 Foundations (Existing)

9.6.1 4No hand excavated trial pits were undertaken along the existing site boundary walls to investigate the existing foundations.

9.6.2 When assessing the foundations, the following is assumed:

- Walls were constructed symmetrically and centrally on the strip footing to prevent overturning and eccentric loading.
- Where the width of the wall is not known, it is assumed to be 0.30m wide to take into account the walls and any cavity.

9.6.3 The findings and assessment of the foundation as exposed by the inspection pit are summarised in Table 9.2.

Table 9.2: Foundation Inspection Pit Summary

Hole	Location	Total Step Out (m)	Assumed Width (m)	Proven Depth (mbgl)	Founding Strata
HTP1	Southern site boundary in west of site.	0.02	0.34	0.50	Made Ground
HTP2	Southern boundary inside structure	None	0.30	0.15	Made Ground
HTP3a	Against existing structure in south of site	0.15	0.60	1.28	Alluvium
HTP3b	Southern boundary wall	None	0.30	1.28	Alluvium
HTP4	Western boundary wall	None	0.30	0.20	Made Ground

9.7 Foundations

General

9.7.1 Foundations should not be formed in either the Made Ground, topsoil or alluvial deposits due to the unacceptable risk of total and differential settlement.

9.7.2 It should be noted that the demolition and removal of existing structures, foundations and services may increase the depth of Made Ground on the site.

9.7.3 The comments below are indicative only based on limited ground investigation data. Foundations should be designed by a suitably qualified Engineer. Once structural loads have been fully determined a full design check in accordance with BS EN 1997 should be undertaken to confirm suitability of foundation choice.

Traditional Shallow Foundations

9.7.4 Traditional shallow foundations may be appropriate to support the proposed structure.

9.7.5 Based on the findings of this investigation, it is considered that traditional strip or pad footings up to 1.2m wide may be formed at a minimum depth of 0.75m within the underlying Taplow Gravel Member for an allowable bearing capacity of 125kPa. Total and differential settlements should be contained within tolerable limits.

9.7.6 Foundations must be deepened beneath any Made Ground, which was encountered up to 1.1m bgl, and Alluvium, which was encountered up to 1.5m bgl.

9.7.7 Where foundations need to change levels, the foundations should be stepped. These steps should be no deeper than half of the width of the foundation and each step should not exceed 0.5m. For practical purposes, steps are unlikely to be less than 0.15m deep. The steps should be suitably reinforced for an adequate distance either side of the step.

9.7.8 It is recommended that formations are inspected by a geotechnical engineer prior to the pouring of concrete to confirm the bearing capacity.

9.7.9 It is recommended that excavations to form the foundations should be undertaken using a toothless bucket to reduce the potential for disturbance of the underlying granular strata.

9.7.10 Foundations should not be formed in the granular materials until the granular materials have been proof compacted. Given the depth and likely size of these foundations it is considered that this could be undertaken using a hydraulic “elephants foot”.

Piled Foundations

9.7.11 If a greater bearing capacity is required, a piled foundation solution could be considered.

9.7.12 The piled foundations will carry their working load in a combination of skin friction along the sides of the pile and end bearing at the base of the pile. The piles should be designed by a suitably qualified and experienced piling specialist using a suitable factor of safety with the settlement at working load specified to meet any structural requirements. Table 9.4 provides some indicative capacities for a single pile for the diameter and depths shown.

9.7.13 In order to calculate the provided indicative allowable pile capacities, the following ground model and characteristic ground parameters, summarised in Table 9.3, were used.

Table 9.3: Characteristic Parameters Used to Calculate Allowable Indicative Pile Carry Capacities

Strata	Depth (m bgl)	Bulk Density (kN/m³)	Design c_u or N
Made Ground	GL to 1.5	16	-
Taplow Gravel Member	1.5	18.63	N = (z + 4.0625) / 0.4375
Groundwater	1.5	9.81	

9.7.14 The depth of Made Ground has been extended to include the alluvial deposits as alluvium is not considered a suitable bearing strata and therefore should not be assumed to give any bearing capacity to the pile. The bulk density for the Taplow Gravel Member has been taken as the lowest value suggested by Carter and Bentley (1991).

9.7.15 The groundwater table has been taken as 1.5mbgl, the shallowest it was reported during return monitoring visits.

Table 9.4: Indicative Piles Capacities (kN)

Pile toe depth (m bgl)	Pile diameter (m)				
	0.3	0.45	0.6	0.75	0.9
	Indicative Allowable Pile Capacity (kN)				
9	130	270	465	705	1000
10	160	330	555	845	1190
11	190	385	650	985	1385
12	230	460	775	1165	1640
13	265	535	890	1340	1875
14	310	615	1020	1525	2135
15	360	715	1185	1765	2465

9.7.16 To comply with BS EN 1997 and the guidance given by the Federation of Piling Specialists the ground must be proven to a minimum of 5m below the proposed toe of the piles. Consequently, the above table is limited to 15mbgl.

9.7.17 It should be noted that the above assumes a bored piling system. Other methods of piling and equipment may provide different results.

9.7.18 Should greater carrying capacity be required then groups of piles could be considered. However, if such an option is used then a pile efficiency or grouping factor will need to be applied. This factor will depend on a number of contributing issues that include (but are not limited to), the number of piles; the distance between the piles and the geometry of the pile group.

9.7.19 Should any loading be placed directly on the ground which cause the ground to settle relative to the piles then additional negative skin friction loads could be imposed on the piles.

9.7.20 The use of a piling foundation solution will require the emplacement of an engineered granular piling mat to support the piling rig and prevent overturning. This should be designed and constructed in accordance with BRE 470.

9.7.21 As a piled foundation will be emplaced into the underlying chalk (Principal Aquifer) an EA piling risk assessment may be required as part of the planning process.

9.8 Concrete in the Ground

9.8.1 Sulphate attack on building foundations occurs where sulphate solutions react with the various products of hydration in Ordinary Portland Cement (OPC) or converted High-Alumina Cement (HAC). The reaction is expansive, and therefore disruptive, not only due to the formation of minute cracks, but also due to loss of cohesion in the matrix.

9.8.2 In accordance with BRE Special Digest 1, the characteristic values of sulphate used to determine the concrete classification are determined using the methodology summarised in the table below.

Table 9.5: Concrete in the Ground Characteristic Value Determination

No. Samples in the dataset	Method for determining the sulphate characteristic value
1 - 4	Highest value
5-9	Mean of the top 2no. highest results
10 or greater	Mean of the top 20% highest results

9.8.3 Table 9.6 summarises the analysis of the aggressive nature of the ground for each of the strata encountered within the ground investigation.

Table 9.6: Concrete in the Ground Classes

Stratum	No. Samples	pH range	Characteristic WS Sulphate (mg/l)	Design Sulphate Class	ACEC Class
Made Ground	7	8.2-9.3	803	DS-2	AC-2
Alluvium	2	9.2-10.0	101	DS-1	AC-1
Taplow Gravel Member	5	8.5-9.1	32.75	DS-1	AC-1

9.8.4 The concrete structures, including foundations, will need to be designed in accordance with BS EN 1992-1-1:2004+A1:2014.

9.9 Ground Floor Slabs

9.9.1 As Made Ground in excess of 600mm thickness has been reported, suspended floor slabs are recommended. If a piled foundation is adopted, a suspended floor slab will be required.

9.9.2 Under suspended in-situ concrete ground floor a minimum void of 50mm is required; under suspended precast concrete and timber floors a minimum of 200mm is required.

9.9.3 The loadings from the suspended floor slab will need to be carried by the foundations, which will need to be designed to not only carry the structural loadings but the additional floor loadings.

9.9.4 Alternatively, a ground bearing floor slab could be used if emplaced on a blanket of suitable granular materials. The granular blanket should be at least 50% of the foundation depth and no more than 1.25m deep (measured from ground level). Assuming that there the proposed and current trees do not increase the required depth for shallow foundations this would mean a blanket of granular material between 1.0m and 1.25m thick.

9.9.5 The granular blanket should extend beyond the edge of the foundation by a distance equal to its natural angle of repose, plus 0.5m. The angle of repose will depend on the material used.

9.9.6 It is possible that following simple sorting and processing that demolition waste could be used for this purpose.

9.10 Excavations

9.10.1 It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These are anticipated to remain stable for the short term only.

9.10.2 The stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter should be assessed and battered back to a safe angle.

9.10.3 Any vertically sided excavations require support to provide safe man access and to support the sides of the excavation. Supports should be installed as excavation proceeds. For service excavations, overlapping trench sheets could be used as close support in the Made Ground deposits to minimise ground loss. Alternatively, consideration could be given to the use of trench boxes provided excavations take place within the boxes.

9.11 Groundwater Control

9.11.1 During the investigation groundwater was reported within cable percussive boreholes BH1 And BH2 between 43.00-4.10mbgl, rising to 2.10mbgl in BH1 after 20 minutes' monitoring. Groundwater was reported within WS1 and WS4 at 2.00mbgl, with no strikes reported in WS2, WS3 or WS5.

9.11.2 During return monitoring groundwater was reported at depths of between 1.47m and 2.50mbgl.

9.11.3 Subject to seasonal variations, any groundwater encountered during site works could be readily dealt with by conventional pumping from a sump used to collate waters.

9.11.4 Surface water or rainfall ingress is likely to freely drain through the granular materials. If this does not occur, then they too could be dealt with by traditional sump and pump.

10 REFERENCES

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BRE Special Digest 1: Concrete in Aggressive Ground, 2005

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LQM/CIEH S4ULs. LQM, 2014

Ministry of Housing, Communities & Local Government: *National Planning Policy Framework*. February 2019.

M Zohrabi and PL Scott (2003) TRL Report TRL587 *The Correlation between the CBR Value and Penetrability of Pavement Construction Materials;* Transport Research Laboratory

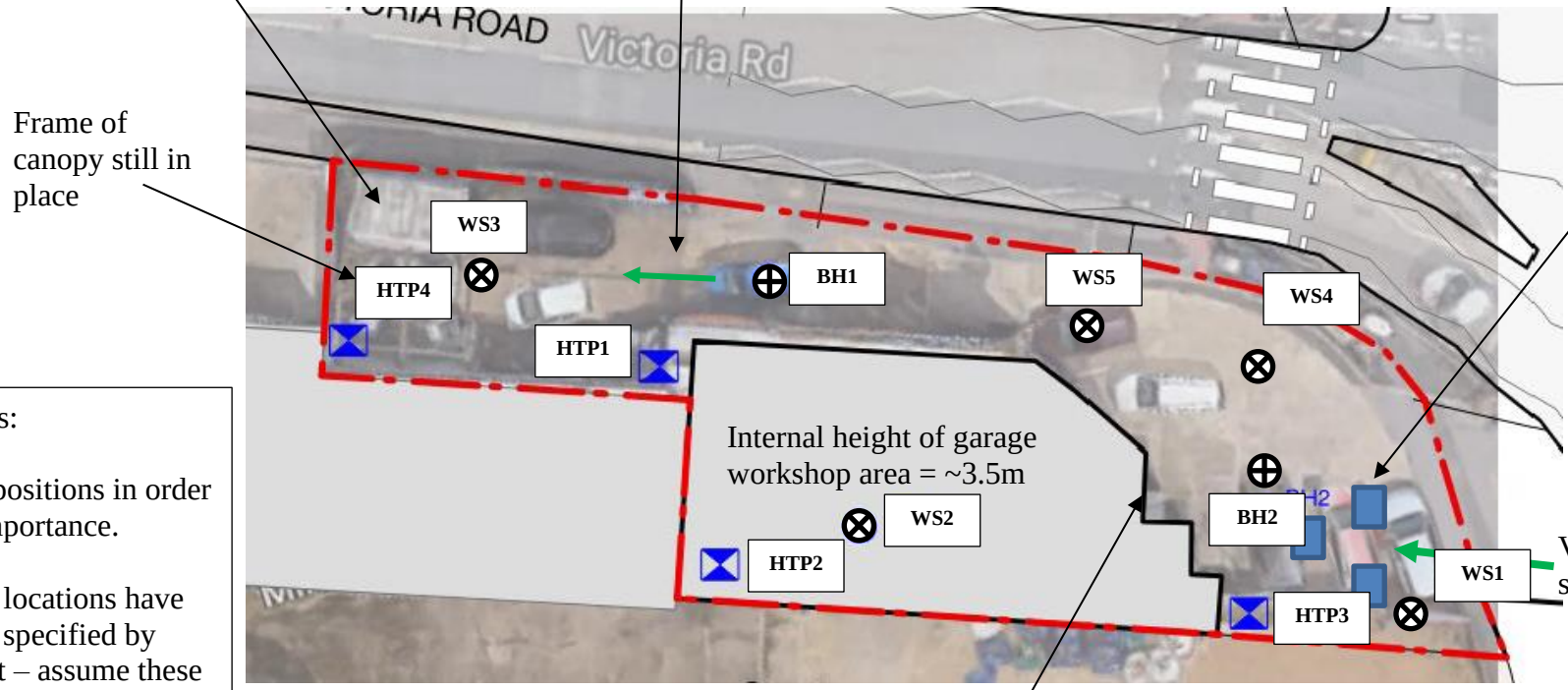
NHBC Standards 2020. NHBC, Milton Keynes

APPENDICES

APPENDIX 1 – FIGURES

PROJECT NAME	Hythe Street	**CLIENT**	Crown Coast Property Group
TITLE	Site Location Plan	**PROJECT NO.**	P2883J2099
DATE	October 2020	**FIGURE NO.**	1

PROJECT NAME	Hythe Street	**CLIENT**	Crown Coast Property Group
TITLE	Completed Exploratory Hole Plan	**PROJECT NO.**	P2883J2099
DATE	November 2020	**FIGURE NO.**	2

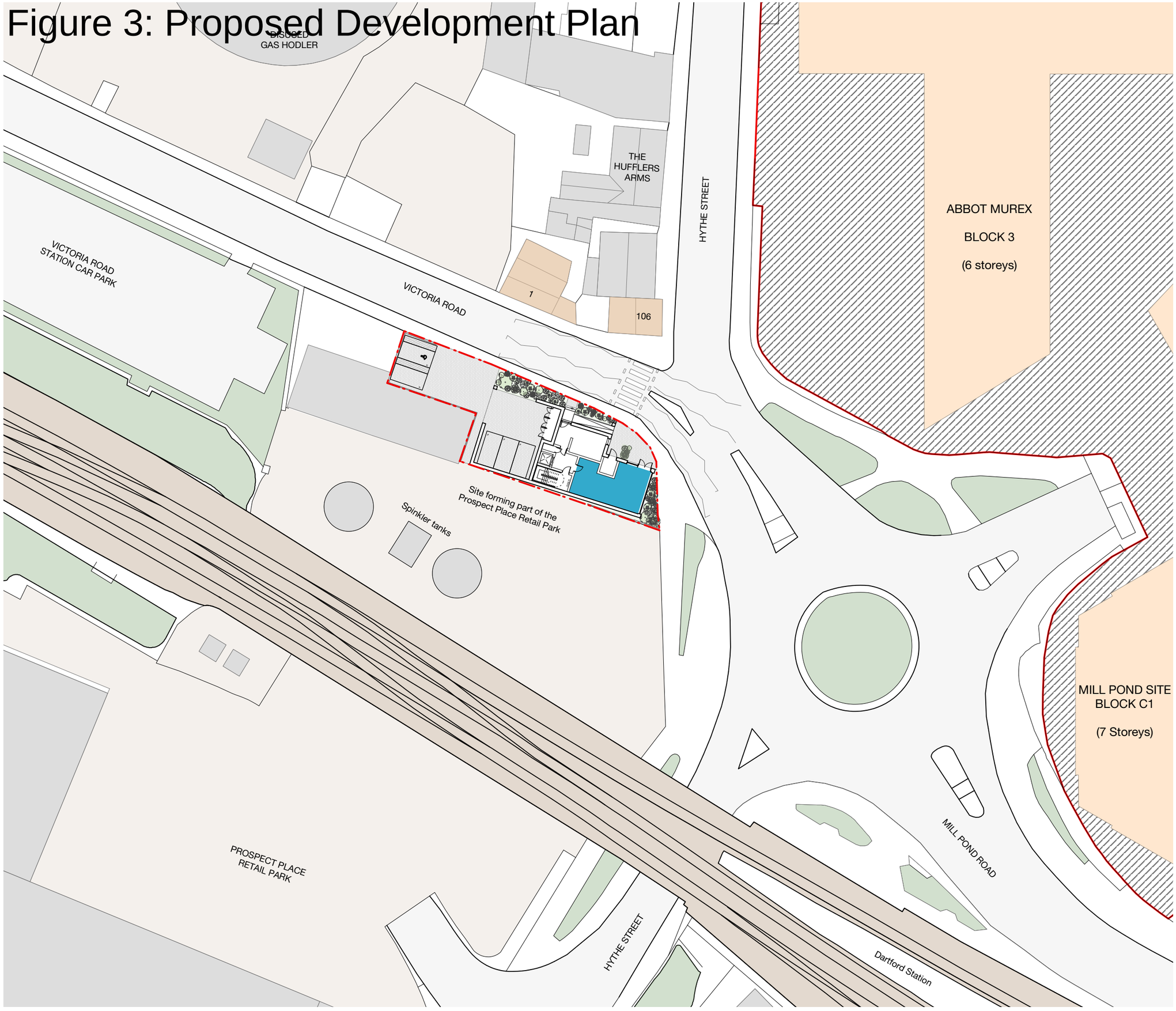


Notes:

WS positions in order of importance.

HTP locations have been specified by client – assume these are in the corners of locations shown to expose both foundations.

Figure 3: Proposed Development Plan



General Notes

These proposals are subject to the approval of all Statutory Building Control requirements and the requirements of all Statutory Authorities and Service Providers.

The site boundaries and surroundings are based on the following:

- OS Map

The site boundaries are those described by the client.

These drawings are to be read in conjunction with all other relevant documentation produced by Stephen Davy Peter Smith Architects and other consultants employed by the client.

Specific Notes

- SITE BOUNDARY
- 1 BED / 2 PERSON
- 2 BED / 3 PERSON
- 2 BED / 4 PERSON
- OFFICE

Key

N

Rev	Drawn	Notes	Date
P6	CM	PLANNING ISSUE	14/05/20
P5	NBR	Issued for information	08/04/20
P4	NBR	Issued for information	06/04/20

Rev	Checked	Date	Approved	Date
P4	PS	08/04/20		

REVISIONS

Client

Crown Coast Property Group

	A - APPROVED
	B - APPROVED WITH COMMENTS
	C - DO NOT USE

CLIENT APPROVAL

stephen davy peter smith architects
Fanshaw House, Fanshaw Street, London N1 6HX
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Project

Hythe Street
Dartford

Drawing Ref.	Job No.
HYT - DS - 00 - 00 - DR - A - P003	1843
Purpose of Issue	**Scale**
PLANNING	1:500 @ A3

Drawing Title

Proposed Site Plan

Project Ref - Drawing No - Status - Revision

H Y T - P 0 0 3 - S 2 - P 6

APPENDIX 2 – EXPLORATORY HOLE RECORDS

CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH1		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	4.007
Logged By:	SK	Date Commenced:	18/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	1 Of 5

Water levels recorded during boring, m

Date:	18/11/2020					
Hole depth:	20.40					
Casing depth:						
Level water on strike:	4.00					
Water Level after 20mins:	2.10					

Remarks

1: Water reported at 4.00mbgl which rose to 2.10mbgl after 20 minutes.

2: *Field description

3:

4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00					
											0.20		Concrete. (MADE GROUND)	
ES	0.30												Dark brown ashy gravelly clay. Gravel consists of brick. (MADE GROUND)	
ES	0.50								0.50		0.50		Brown to white clayey sandy GRAVEL with wood fragments. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded chalk and flint. (ALLUVIUM)	
ES	1.00								1.00					
SPT B	1.20	3	5	6	5	4	4	19			1.30			
									1.50				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
SPT-C B	2.00	4	6	7	7	8	6	28	2.00					
									2.50					
SPT-C B	3.00	3	4	6	7	6	8	27	3.00					
									3.50					
SPT-C B	4.00	4	4	5	6	5	6	22	4.00					
									4.50					
SPT-C B	5.00	3	3	4	5	5	5	19	5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH1		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	4.007
Logged By:	SK	Date Commenced:	18/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	2 Of 5

Water levels recorded during boring, m

Date:	18/11/2020					
Hole depth:	20.40					
Casing depth:						
Level water on strike:	4.00					
Water Level after 20mins:	2.10					

Remarks

1: Water reported at 4.00mbgl which rose to 2.10mbgl after 20 minutes.
2: *Field description
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT-C B	5.00	3	3	4	5	5	5	19	5.00				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
									5.50					
SPT B	6.00	3	4	5	5	6	6	22	6.00					
									6.50					
SPT B	7.00	4	5	4	5	5	5	19	7.00					
									7.50					
SPT B	8.00	4	4	5	6	7	7	25	8.00					
									8.50					
SPT B	9.00	5	6	8	9	10	10	37	9.00					
									9.50					
SPT B	10.00	4	5	6	6	7	7	26	10.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH1		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	4.007
Logged By:	SK	Date Commenced:	18/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	3 Of 5

Water levels recorded during boring, m

Date:	18/11/2020					
Hole depth:	20.40					
Casing depth:						
Level water on strike:	4.00					
Water Level after 20mins:	2.10					

Remarks

1: Water reported at 4.00mbgl which rose to 2.10mbgl after 20 minutes.

2: *Field description

3:

4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT B	10.00	4	5	6	6	7	7	26	10.00				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
									10.50					
SPT B	11.00	3	4	4	5	6	6	21	11.00					
									11.50					
SPT B	12.00	3	5	7	8	8	10	33	12.00					
									12.50					
SPT B	13.00	4	7	8	10	9	12	39	13.00					
									13.50					
SPT B	14.00	6	8	9	10	12	13	44	14.00					
									14.50					
SPT	15.00	8	9	11	13	15	11	50	15.00					
	50 blows for 285mm total penetration.													

B

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH1		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	4.007
Logged By:	SK	Date Commenced:	18/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	4 Of 5

Water levels recorded during boring, m

Date:	18/11/2020					
Hole depth:	20.40					
Casing depth:						
Level water on strike:	4.00					
Water Level after 20mins:	2.10					

Remarks

1: Water reported at 4.00mbgl which rose to 2.10mbgl after 20 minutes.
2: *Field description
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT	15.00	8	9	11	13	15	11	50	15.00				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
	50 blows for 285mm total penetration.													
B									15.50					
SPT	16.00	6	8	10	9	11	13	43	16.00					
B														
									16.50					
SPT	17.00	8	12	15	18	17		50	17.00					
	50 blows for 200mm total penetration.													
B									17.50					
SPT	18.00	10	14	17	21	12		50	18.00					
	50 blows for 190mm total penetration.													
B									18.50					
SPT	19.00	11	13	15	26	9		50	19.00					
	50 blows for 185mm total penetration.													
B									19.50					
SPT	20.00	10	11	13	14	18	5	50	20.00					
	50 blows for 245mm total penetration.													

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH1		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	4.007
Logged By:	SK	Date Commenced:	18/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	5 Of 5

Water levels recorded during boring, m

Date:	18/11/2020					
Hole depth:	20.40					
Casing depth:						
Level water on strike:	4.00					
Water Level after 20mins:	2.10					

Remarks

1: Water reported at 4.00mbgl which rose to 2.10mbgl after 20 minutes.

2: *Field description

3:

4:

Sample or Tests									Strata				
Type	Depth (mbgl)	Result							Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N					
SPT	20.00	10	11	13	14	18	5	50				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
	50 blows for 245mm total penetration.									20.40			

20.00
20.50
21.00
21.50
22.00
22.50
23.00
23.50
24.00
24.50
25.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH2		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	3.888
Logged By:	SK	Date Commenced:	23/11/2020
Checked By:	JF	Date Completed:	23/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	1 Of 4

Water levels recorded during boring, m

Date:	23/11/2020					
Hole depth:	20.00					
Casing depth:						
Level water on strike:	4.10					
Water Level after 20mins:						

Remarks

1: Water reported at 4.10mbgl.
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N	0.00					
											0.20		Concrete. (MADE GROUND)	
ES	0.20												Brown red sandy gravelly clay. Gravel consists of brick. (MADE GROUND)	
ES	0.50								0.50					
ES	1.00								1.00		1.10			
SPT-C B	1.20	3	3	3	3	5	4	15					Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
									1.50					
SPT-C B	2.00	4	6	5	6	6	5	22	2.00					
									2.50					
SPT-C B	3.00	3	5	4	5	6	7	22	3.00					
									3.50					
SPT-C B	4.00	4	4	6	8	9	10	33	4.00					
									4.50					
SPT-C B	5.00	3	5	6	7	7	8	28	5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH2		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	3.888
Logged By:	SK	Date Commenced:	23/11/2020
Checked By:	JF	Date Completed:	23/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	2 Of 4

Water levels recorded during boring, m

Date:	23/11/2020					
Hole depth:	20.00					
Casing depth:						
Level water on strike:	4.10					
Water Level after 20mins:						

Remarks

1: Water reported at 4.10mbgl.

2:

3:

4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT-C B	5.00	3	5	6	7	7	8	28	5.00				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
									5.50					
SPT-C B	6.00	5	6	6	8	10	12	36	6.00					
									6.50					
SPT-C B	7.00	7	8	9	9	9	9	36	7.00					
									7.50					
SPT-C B	8.00	5	7	8	10	11	10	39	8.00					
									8.50					
SPT-C B	9.00	6	6	7	7	7	8	29	9.00					
									9.50					
SPT-C B	10.00	7	7	7	8	8	9	32	10.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH2		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	3.888
Logged By:	SK	Date Commenced:	23/11/2020
Checked By:	JF	Date Completed:	23/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	3 Of 4

Water levels recorded during boring, m

Date:	23/11/2020					
Hole depth:	20.00					
Casing depth:						
Level water on strike:	4.10					
Water Level after 20mins:						

Remarks

1: Water reported at 4.10mbgl.

2:

3:

4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT-C B	10.00	7	7	7	8	8	9	32	10.00				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
									10.50					
SPT-C B	11.00	7	8	8	9	9	10	36	11.00					
									11.50					
SPT-C B	12.00	5	5	6	7	8	8	29	12.00					
									12.50					
SPT-C B	13.00	6	7	7	7	8	10	32	13.00					
									13.50					
SPT-C	14.00	9	10	12	15	16	7	50	14.00					
	50 blows for 245mm total penetration.													
B									14.50					
SPT-C B	15.00	7	9	11	10	10	13	44	15.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH2		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	3.888
Logged By:	SK	Date Commenced:	23/11/2020
Checked By:	JF	Date Completed:	23/11/2020
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	4 Of 4

Water levels recorded during boring, m

Date:	23/11/2020					
Hole depth:	20.00					
Casing depth:						
Level water on strike:	4.10					
Water Level after 20mins:						

Remarks

1: Water reported at 4.10mbgl.

2:

3:

4:

Sample or Tests									Strata				
Type	Depth (mbgl)	Result							Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N					
SPT-C	15.00	7	9	11	10	10	13	44				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
B													
SPT-C	16.00	4	5	8	9	8	11	36					
B													
SPT-C	17.00	7	10	12	14	24		50					
	50 blows for 220mm total penetration.												
B													
SPT-C	18.00	8	8	10	11	11	14	46					
B													
SPT-C	19.00	9	12	12	13	16	9	50					
	50 blows for 250mm total penetration.												
B													
										20.00			

15.00 15.50 16.00 16.50 17.00 17.50 18.00 18.50 19.00 19.50 20.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD

Exploratory Hole No:	WS1		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	3.736
Logged By:	JPB	Date Commenced:	19/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Windowless Sampler Rig	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	19/11/2020					
Hole depth:	4.45					
Casing depth:						
Level water on strike:	2.00					
Water Level after 20mins:						

Remarks

1: *Field description.
2: Water reported at 2.00mbgl.
3: Borehole collapsed to 1.70mbgl after equipment was removed.
4:

Sample or Tests									Strata				
Type	Depth (mbgl)	Result							Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N					
										0.00			
										0.20		Concrete. (MADE GROUND)	
ES	0.25											Light brown gravelly sand with medium cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular concrete, brick and flint. Cobbles consist of brick. (MADE GROUND)	
										0.30			
ES	0.60											Brown to white clayey very sandy GRAVEL with wood fragments. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded chalk and flint. (ALLUVIUM)	
SPT	1.00	2	0	3	2	3	2	10		1.00			
ES	1.10											Soft consistency* dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded flint. (ALLUVIUM)	
										1.50			
												Medium dense brown to beige gravelly SAND. Sand is fine to medium. Gravel consists of fine to coarse, sub-angular to sub-rounded flint. (TAPLOW GRAVEL MEMBER)	
D	2.00												
SPT		4	4	6	7	6	6	25					
										2.50			
												Medium dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded flint. (TAPLOW GRAVEL MEMBER)	
D	3.00												
SPT		8	7	5	4	3	4	16					
D	4.00												
SPT		5	4	3	5	4	7	19					
										4.45			

0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD

Exploratory Hole No:	WS2		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	
Logged By:	JPB	Date Commenced:	19/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Windowless Sampler Rig	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.

2: No water reported.

3: Borehole terminated at 2.45mbgl due to equipment refusal in very dense gravel.

4: Location could not be GPS levelled due to lack of signal inside structure

Sample or Tests									Strata				
Type	Depth (mbgl)	Result							Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N					
										0.00			
										0.20		Concrete. (MADE GROUND)	
ES	0.30											Brown gravelly SAND. Sand is coarse. Gravel consists of fine to medium, sub-angular to rounded flint. (ALLUVIUM)	
										0.50			
										0.80			
ES	0.90											Brown to white clayey sandy GRAVEL with wood fragments. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded chalk and flint. (ALLUVIUM)	
SPT	1.00	2	1	4	5	8	7	24		1.00			
										1.20			
												Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
ES	1.50									1.50			
SPT	2.00	11	10	12	13	12	17	54		2.00			
										2.45			
										2.50			
										3.00			
										3.50			
										4.00			
										4.50			
										5.00			

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD

Exploratory Hole No:	WS3		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	4.17
Logged By:	JPB	Date Commenced:	19/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Windowless Sampler Rig	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.

2: No water reported.

3: Borehole terminated at 2.45mbgl due to equipment refusal in very dense gravel.

4:

Sample or Tests									Strata				
Type	Depth (mbgl)	Result							Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N					
										0.00			
										0.20		Concrete. (MADE GROUND)	
ES	0.30									0.40		Black gravelly SAND. Sand is fine. Gravel consists of fine, rounded flint and sub-angular concrete. (MADE GROUND)	
ES	0.50									0.60		Red brown gravelly SAND. Sand is fine to coarse. Gravel consists of fine to coarse brick. (MADE GROUND)	
ES	1.00									1.00		Brown to white clayey sandy GRAVEL with wood fragments. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded chalk and flint. (ALLUVIUM)	
SPT		1	3	5	4	7	7	23		1.20			
										1.50		Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
D	2.00									2.00			
SPT		10	10	12	13	13	14	52		2.45			
										2.50			
										3.00			
										3.50			
										4.00			
										4.50			
										5.00			

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD

Exploratory Hole No:	WS4		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	3.817
Logged By:	JPB	Date Commenced:	19/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Windowless Sampler Rig	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	19/11/2020					
Hole depth:	4.45					
Casing depth:						
Level water on strike:	2.00					
Water Level after 20mins:						

Remarks

1: *Field description.
2: Water reported at 2.00mbgl.
3: No recovery between 3.00mbgl and 4.00mbgl.
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N	0.00					
											0.20		Reinforced concrete. (MADE GROUND)	
ES	0.30												Black gravelly sand. Sand is fine to medium. Gravel consists of sub-angular to sub-rounded brick, concrete and flint. (MADE GROUND)	
ES	0.60								0.50					
											0.90			
SPT	1.00	1	1	2	2	3	4	11	1.00				Brown to white clayey sandy GRAVEL with wood fragments. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to sub-rounded chalk and flint. (ALLUVIUM)	
ES	1.10										1.40			
									1.50				Medium dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. (TAPLOW GRAVEL MEMBER)	
D	2.00								2.00					
SPT		7	8	8	7	5	7	27						
									2.50					
D	3.00								3.00					
SPT		4	4	5	5	7	5	22						
									3.50					
SPT	4.00	4	6	5	3	3	2	13	4.00					
											4.45			
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
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WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD

Exploratory Hole No:	WS5		
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Project No:	P2883J2099
Client:	Crown Coast Property Group	Ground Level:	
Logged By:	JPB	Date Commenced:	19/11/2020
Checked By:	JF	Date Completed:	19/11/2020
Type and diameter of equipment:	Windowless Sampler Rig	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.

2: No water reported.

3: Borehole terminated at 2.45mbgl due to equipment refusal in very dense gravel.

4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00				Concrete. (MADE GROUND)	
											0.20			
ES	0.30												Brown clayey sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded flint, concrete, brick and porcelain. (MADE GROUND)	
									0.50					
ES	0.60													
											1.00			
SPT	1.00	4	8	5	5	7	7	24	1.00				Medium dense becoming very dense brown to beige sandy GRAVEL. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint. Band of sand noted at 1.50mbgl. (TAPLOW GRAVEL MEMBER)	
ES	1.20													
									1.50					
SPT	2.00	8	7	10	12	14	16	52	2.00					
											2.45			
									2.50					
									3.00					
									3.50					
									4.00					
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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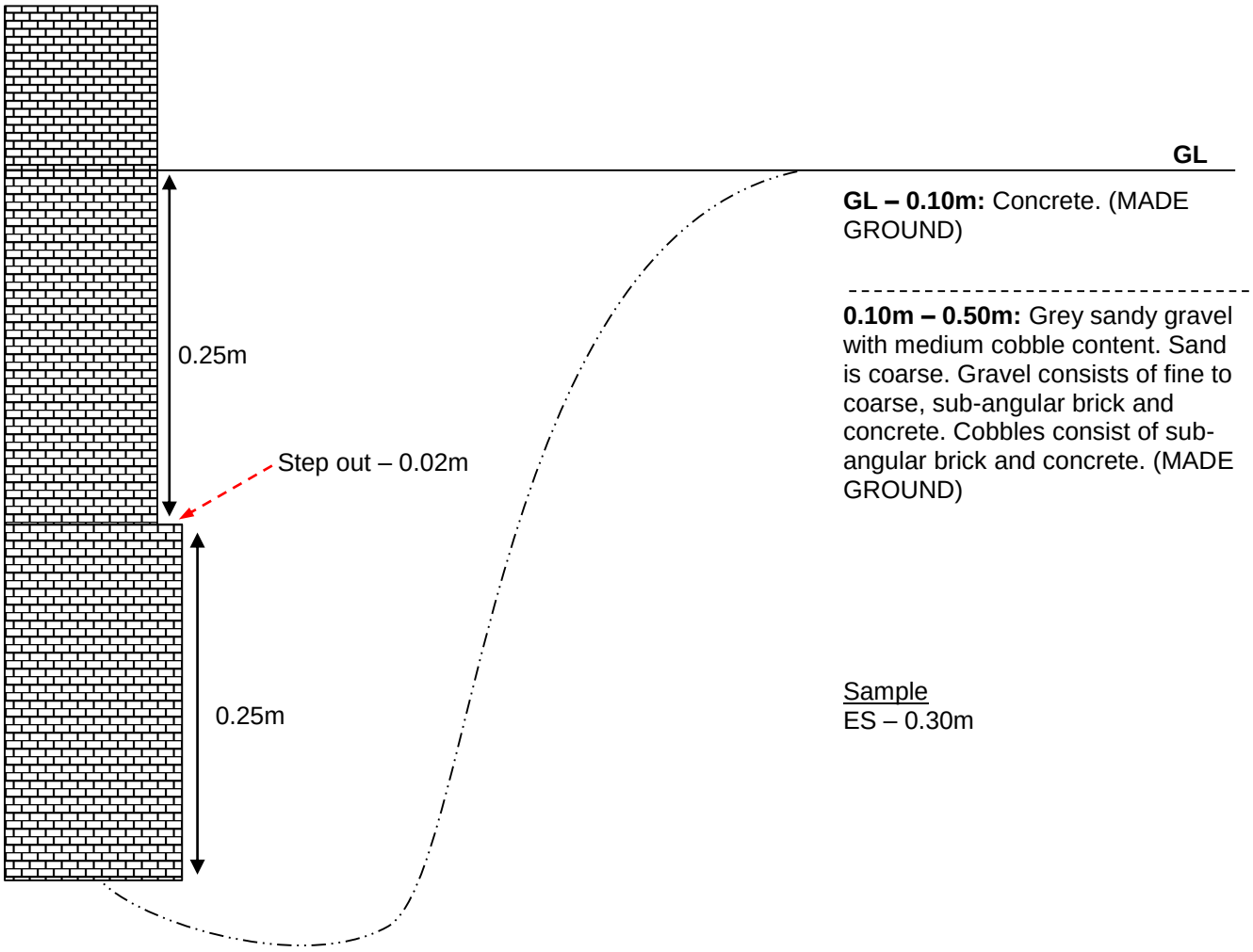
T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

Job No.	P2883J2099	**Issue Date**	November 2020
Project	104 Hythe Street, Dartford	**Reference**	P2883J2099/TE
Subject	Foundation Inspection Pit Sketches	**Prepared by**	JLW

HTP1

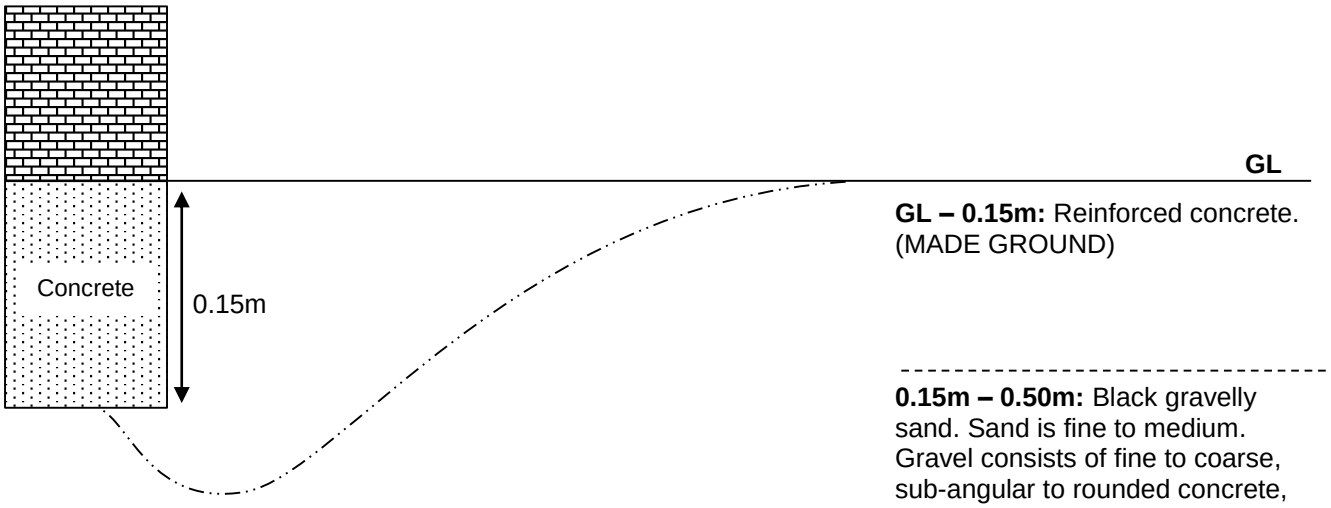


Not to scale

Depth beneath footing proven at 0.50mbgl.

Job No.	P2883J2099	**Issue Date**	November 2020
Project	104 Hythe Street, Dartford	**Reference**	P2883J2099/TE
Subject	Foundation Inspection Pit Sketches	**Prepared by**	JLW

HTP2

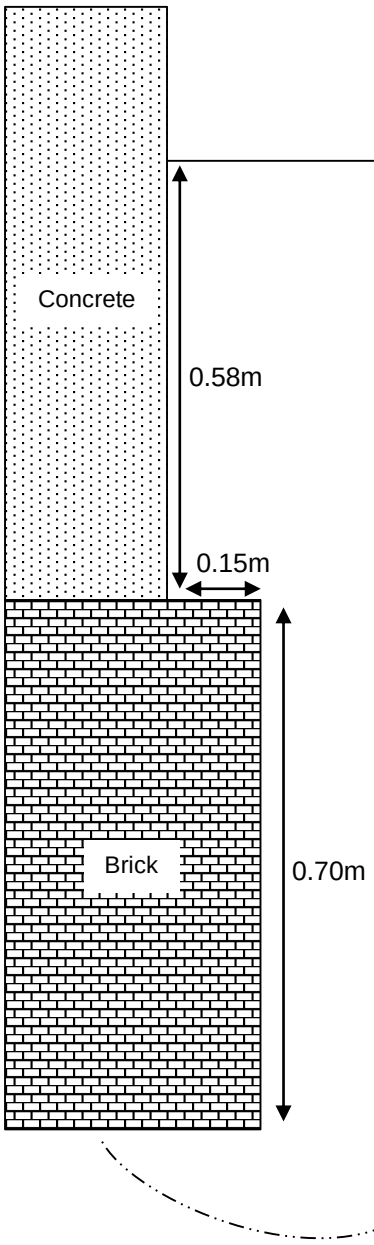


Not to scale

Depth beneath concrete slab proven at 0.15mbgl. No footings observed.

Job No.	P2883J2099	**Issue Date**	November 2020
Project	104 Hythe Street, Dartford	**Reference**	P2883J2099/TE
Subject	Foundation Inspection Pit Sketches	**Prepared by**	JLW

HTP3A



GL – 0.20m: Reinforced concrete. (MADE GROUND)

0.20m – 0.40m: Brown to beige gravelly sand with medium cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular concrete and brick. Cobbles consist of sub-angular concrete and brick. (MADE GROUND)

0.40m – 1.20m: Soft consistency* black to brown sandy gravelly CLAY. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to rounded flint, with chalk reported at the base of the pit. (ALLUVIUM)

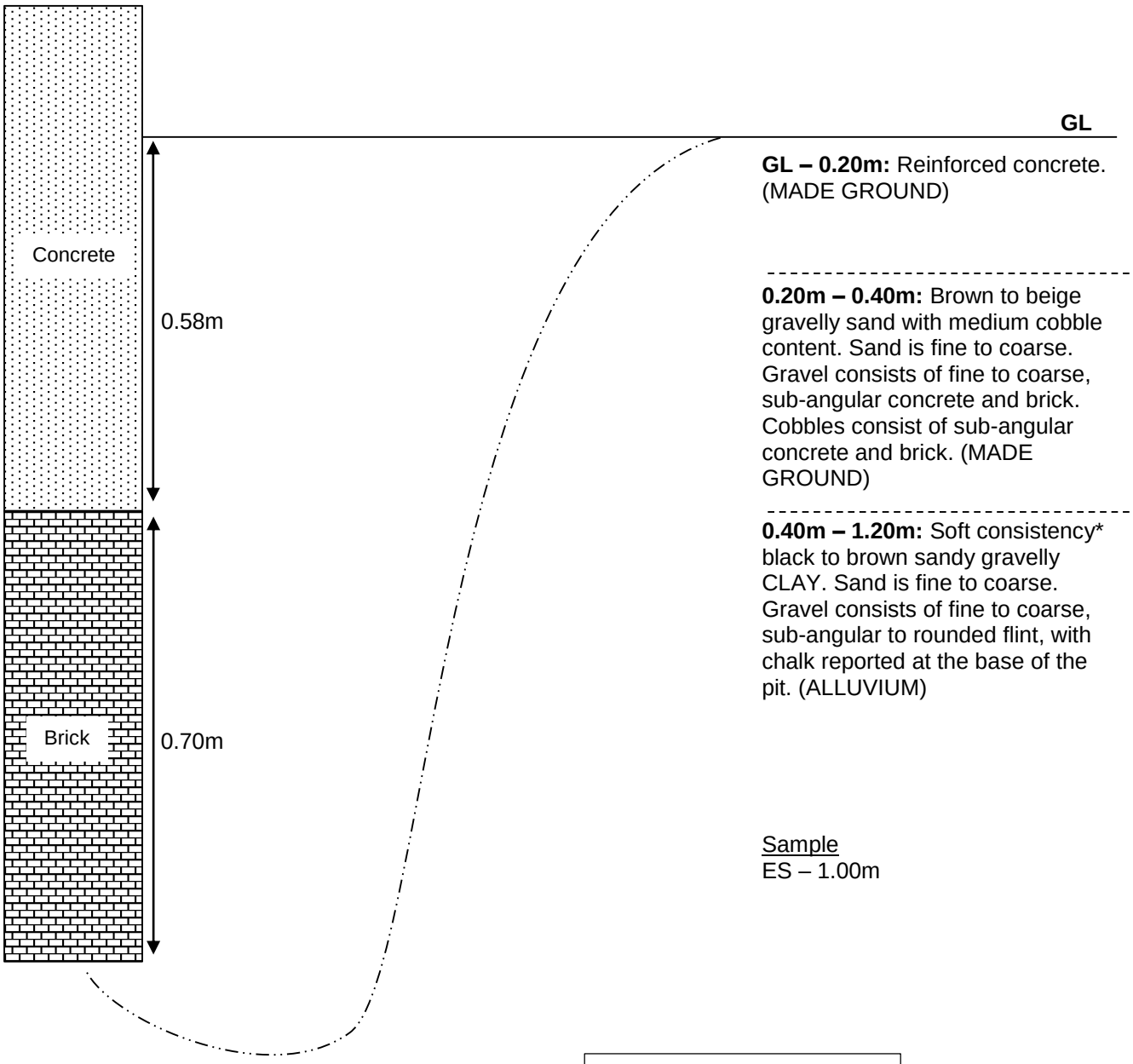
Sample
ES – 1.00m

Depth beneath footing proven at 1.28mbgl.

Not to scale

Job No.	P2883J2099	**Issue Date**	November 2020
Project	104 Hythe Street, Dartford	**Reference**	P2883J2099/TE
Subject	Foundation Inspection Pit Sketches	**Prepared by**	JLW

HTP3B



GL – 0.20m: Reinforced concrete. (MADE GROUND)

0.20m – 0.40m: Brown to beige gravelly sand with medium cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular concrete and brick. Cobbles consist of sub-angular concrete and brick. (MADE GROUND)

0.40m – 1.20m: Soft consistency* black to brown sandy gravelly CLAY. Sand is fine to coarse. Gravel consists of fine to coarse, sub-angular to rounded flint, with chalk reported at the base of the pit. (ALLUVIUM)

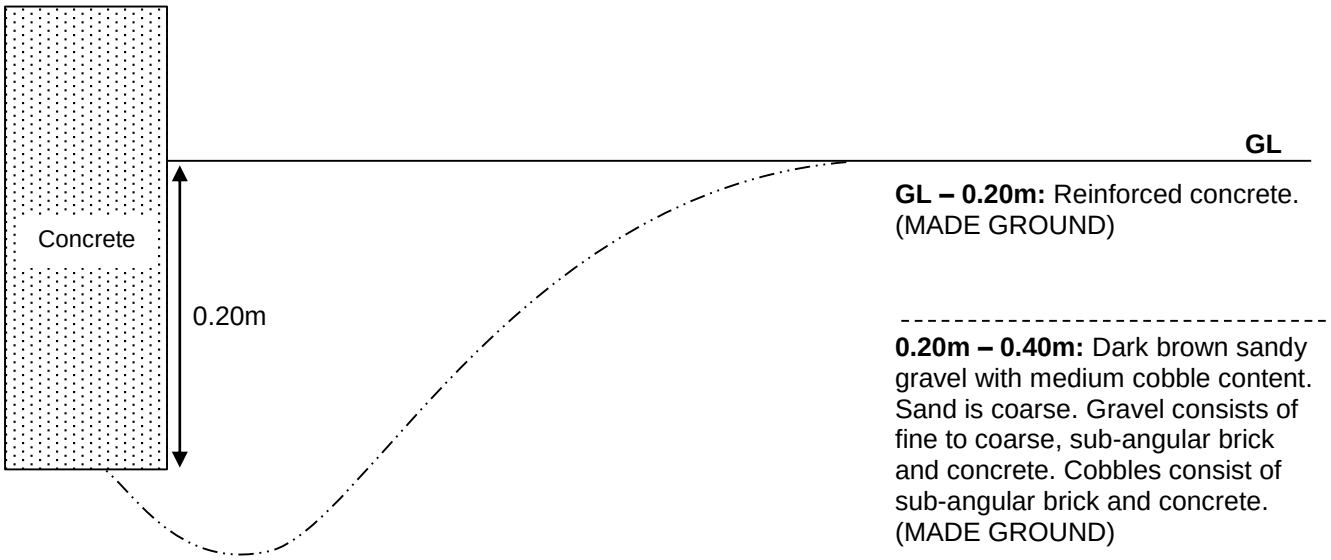
Sample
ES – 1.00m

Depth beneath footing proven at 1.28mbgl.

Not to scale

Job No.	P2883J2099	**Issue Date**	November 2020
Project	104 Hythe Street, Dartford	**Reference**	P2883J2099/TE
Subject	Foundation Inspection Pit Sketches	**Prepared by**	JLW

HTP4



GL – 0.20m: Reinforced concrete. (MADE GROUND)

0.20m – 0.40m: Dark brown sandy gravel with medium cobble content. Sand is coarse. Gravel consists of fine to coarse, sub-angular brick and concrete. Cobbles consist of sub-angular brick and concrete. (MADE GROUND)

Not to scale

Sample
ES – 0.30m

Depth beneath footing proven at 0.20mbgl.

APPENDIX 3 – CHEMICAL LABORATORY TEST RESULTS

Accounts
Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

e: Jomas Associates -

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 : 20-43802

Project / Site name:	104 Hythe Street, Dartford, DA1 1BW	**Samples received on:**	26/11/2020
Your job number:	JJ2099	**Samples instructed on/ Analysis started on:**	26/11/2020
Your order number:	P2883JJ2099.6	**Analysis completed by:**	03/12/2020
Report Issue Number:	1	**Report issued on:**	03/12/2020
Samples Analysed:	3 soil samples		

Signed:

Rachel Bradley
Deputy Quality Manager
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

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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.

Analytical Report Number: 20-43802
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.6

Lab Sample Number				1698033	1698034	1698045
Sample Reference				BH2	BH2	BH2
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.50
Date Sampled				24/11/2020	24/11/2020	24/11/2020
Time Taken				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
Moisture Content	%	0.01	NONE	12	15	17
Total mass of sample received	kg	0.001	NONE	0.5	0.4	0.4
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-
General Inorganics						
pH - Automated	pH Units	N/A	MCERTS	-	8.6	9.3
Total Cyanide	mg/kg	1	MCERTS	-	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	-	2300	3400
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.46	0.75
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	464	750
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.2	-	-
Total Phenols						
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	-	0.89	0.32
Acenaphthylene	mg/kg	0.05	MCERTS	-	0.34	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	0.35	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	0.52	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	3.1	0.47
Anthracene	mg/kg	0.05	MCERTS	-	0.92	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	4.5	0.9
Pyrene	mg/kg	0.05	MCERTS	-	4	0.84
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	2.9	0.65
Chrysene	mg/kg	0.05	MCERTS	-	2.2	0.47
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	3.6	0.88
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	1.2	0.27
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	2.7	0.55
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	1.3	0.34
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	0.38	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	1.5	0.4
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	30.2	6.09

Analytical Report Number: 20-43802
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.6

Lab Sample Number				1698033	1698034	1698045
Sample Reference				BH2	BH2	BH2
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.50
Date Sampled				24/11/2020	24/11/2020	24/11/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	16	13
Boron (water soluble)	mg/kg	0.2	MCERTS	-	1.4	1.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	0.8	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	32	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	54	170
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	94	170
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	0.8
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	30	30
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	150	130
Monoaromatics & Oxygenates						
Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Petroleum Hydrocarbons						
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	13	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	29	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	42	< 10

Analytical Report Number: 20-43802
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.6

Lab Sample Number				1698033	1698034	1698045
Sample Reference				BH2	BH2	BH2
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.50
Date Sampled				24/11/2020	24/11/2020	24/11/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
VOCs						
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	-	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	-	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0

Analytical Report Number: 20-43802
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.6

Lab Sample Number				1698033	1698034	1698045
Sample Reference				BH2	BH2	BH2
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.50
Date Sampled				24/11/2020	24/11/2020	24/11/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	< 1.0

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-43802
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

* 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 *
1698033	BH2	None Supplied	0.2	Brown loam and clay with gravel.
1698034	BH2	None Supplied	1	Brown loam and clay with gravel and brick.
1698045	BH2	None Supplied	0.5	Brown loam and clay with gravel.

Analytical Report Number : 20-43802
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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
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
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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	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
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
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
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
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
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
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	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
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

Analytical Report Number : 20-43802
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil	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

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.

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Analytical Report Number : 20-43393

Project / Site name:	104 Hythe Street, Dartford, DA1 1BW	**Samples received on:**	20/11/2020
Your job number:	JJ2099	**Samples instructed on/ Analysis started on:**	24/11/2020
Your order number:	P2883JJ2099.5	**Analysis completed by:**	01/12/2020
Report Issue Number:	1	**Report issued on:**	01/12/2020
Samples Analysed:	9 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
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

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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.

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695395	1695396	1695397	1695398
Sample Reference				WS1	WS1	WS2	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	1.10	0.30	0.30
Date Sampled				19/11/2020	19/11/2020	19/11/2020	19/11/2020
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	-
Moisture Content	%	0.01	NONE	9.1	9	4.6	-
Total mass of sample received	kg	0.001	NONE	1.5	2	0.5	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	Not-detected
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	8.8	10	9.2	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	1	-
Total Sulphate as SO4	mg/kg	50	MCERTS	3700	760	1400	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.077	0.057	0.1	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	76.6	56.6	101	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.27	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.33	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.2	-
Phenanthrene	mg/kg	0.05	MCERTS	0.36	< 0.05	1.5	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.58	-
Fluoranthene	mg/kg	0.05	MCERTS	1	< 0.05	3.9	-
Pyrene	mg/kg	0.05	MCERTS	1	< 0.05	3.9	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.67	< 0.05	5.1	-
Chrysene	mg/kg	0.05	MCERTS	0.45	< 0.05	3.2	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.86	< 0.05	5.6	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.21	< 0.05	2.7	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.53	< 0.05	4.2	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.4	< 0.05	2.6	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.46	< 0.05	2.7	-
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.96	< 0.80	37.8	-
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	6.4	25	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.8	0.6	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	17	19	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	57	13	60	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	130	29	360	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	1.6	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	54	17	19	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1	< 1.0	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	200	55	130	-

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695395	1695396	1695397	1695398
Sample Reference				WS1	WS1	WS2	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	1.10	0.30	0.30
Date Sampled				19/11/2020	19/11/2020	19/11/2020	19/11/2020
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	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Petroleum Hydrocarbons							
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-	< 0.1	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	12	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	28	< 10	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	40	< 10	-	-
TPH (C10 - C12)	mg/kg	2	MCERTS	-	-	< 2.0	-
TPH (C12 - C16)	mg/kg	4	MCERTS	-	-	6	-
TPH (C16 - C21)	mg/kg	1	MCERTS	-	-	54	-
TPH (C21 - C40)	mg/kg	10	MCERTS	-	-	270	-
VOCs							
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695395	1695396	1695397	1695398
Sample Reference				WS1	WS1	WS2	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	1.10	0.30	0.30
Date Sampled				19/11/2020	19/11/2020	19/11/2020	19/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695399	1695400	1695401	1695402
Sample Reference				WS3	WS4	WS4	WS5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.30	0.60	0.60
Date Sampled				19/11/2020	19/11/2020	19/11/2020	19/11/2020
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	%	0.01	NONE	17	12	11	10
Total mass of sample received	kg	0.001	NONE	0.7	0.7	2	0.5
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	8.2	-	9	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	1800	-	2900	420
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.075	-	0.86	0.023
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	74.8	-	856	23.2
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	2.7	-	0.8
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0
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	0.37	-	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.37	-	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.24	-	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.24	-	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.28	-	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.14	-	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.2	-	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 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	-	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1.84	-	< 0.80	< 0.80
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	-	22	8.4
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	-	7.3	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6	-	0.8	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	-	27	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	64	-	120	59
Lead (aqua regia extractable)	mg/kg	1	MCERTS	480	-	86	110
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	0.7
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	-	120	19
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	1.3	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	330	-	250	110

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695399	1695400	1695401	1695402
Sample Reference				WS3	WS4	WS4	WS5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.30	0.60	0.60
Date Sampled				19/11/2020	19/11/2020	19/11/2020	19/11/2020
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	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Petroleum Hydrocarbons							
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-	-	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	-
TPH (C10 - C12)	mg/kg	2	MCERTS	-	-	-	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	-	-	-	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	-	-	-	< 1.0
TPH (C21 - C40)	mg/kg	10	MCERTS	-	-	-	< 10
VOCs							
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695399	1695400	1695401	1695402
Sample Reference				WS3	WS4	WS4	WS5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.30	0.60	0.60
Date Sampled				19/11/2020	19/11/2020	19/11/2020	19/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695403
Sample Reference				HTP1
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				19/11/2020
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	18
Total mass of sample received	kg	0.001	NONE	0.5
Asbestos in Soil	Type	N/A	ISO 17025	-
General Inorganics				
pH - Automated	pH Units	N/A	MCERTS	10.5
Total Cyanide	mg/kg	1	MCERTS	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	1000
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.067
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	67.3
Total Organic Carbon (TOC)	%	0.1	MCERTS	-
Total Phenols				
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
Speciated PAHs				
Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.5
Pyrene	mg/kg	0.05	MCERTS	0.52
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.29
Chrysene	mg/kg	0.05	MCERTS	0.33
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.52
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.12
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.25
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.29
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.45
Total PAH				
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.27
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	46
Lead (aqua regia extractable)	mg/kg	1	MCERTS	230
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	890

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695403
Sample Reference				HTP1
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				19/11/2020
Time Taken				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				
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1
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	-
TPH (C10 - C12)	mg/kg	2	MCERTS	2.2
TPH (C12 - C16)	mg/kg	4	MCERTS	4.9
TPH (C16 - C21)	mg/kg	1	MCERTS	28
TPH (C21 - C40)	mg/kg	10	MCERTS	180
VOCs				
Chloromethane	µg/kg	1	ISO 17025	-
Chloroethane	µg/kg	1	NONE	-
Bromomethane	µg/kg	1	ISO 17025	-
Vinyl Chloride	µg/kg	1	NONE	-
Trichlorofluoromethane	µg/kg	1	NONE	-
1,1-Dichloroethene	µg/kg	1	NONE	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-
Trichloromethane	µg/kg	1	MCERTS	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-

Analytical Report Number: 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW
Your Order No: P2883JJ2099.5

Lab Sample Number				1695403
Sample Reference				HTP1
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				19/11/2020
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
1,1-Dichloropropene	µg/kg	1	MCERTS	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-
Benzene	µg/kg	1	MCERTS	-
Tetrachloromethane	µg/kg	1	MCERTS	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-
Trichloroethene	µg/kg	1	MCERTS	-
Dibromomethane	µg/kg	1	MCERTS	-
Bromodichloromethane	µg/kg	1	MCERTS	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-
Toluene	µg/kg	1	MCERTS	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-
Dibromochloromethane	µg/kg	1	ISO 17025	-
Tetrachloroethene	µg/kg	1	NONE	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-
Chlorobenzene	µg/kg	1	MCERTS	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-
Ethylbenzene	µg/kg	1	MCERTS	-
p & m-Xylene	µg/kg	1	MCERTS	-
Styrene	µg/kg	1	MCERTS	-
Tribromomethane	µg/kg	1	NONE	-
o-Xylene	µg/kg	1	MCERTS	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-
Isopropylbenzene	µg/kg	1	MCERTS	-
Bromobenzene	µg/kg	1	MCERTS	-
n-Propylbenzene	µg/kg	1	ISO 17025	-
2-Chlorotoluene	µg/kg	1	MCERTS	-
4-Chlorotoluene	µg/kg	1	MCERTS	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-
tert-Butylbenzene	µg/kg	1	MCERTS	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-
sec-Butylbenzene	µg/kg	1	MCERTS	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-
Butylbenzene	µg/kg	1	MCERTS	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

* 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 *
1695395	WS1	None Supplied	0.25	Brown loam and clay with gravel and vegetation.
1695396	WS1	None Supplied	1.1	Brown clay and loam with gravel and vegetation.
1695397	WS2	None Supplied	0.3	Brown loam and sand with gravel and vegetation.
1695399	WS3	None Supplied	0.5	Brown loam and sand with gravel and vegetation.
1695400	WS4	None Supplied	0.3	Brown loam and sand with gravel and vegetation.
1695401	WS4	None Supplied	0.6	Brown loam and sand with gravel and vegetation.
1695402	WS5	None Supplied	0.6	Brown clay and loam with gravel and vegetation.
1695403	HTP1	None Supplied	0.3	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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
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
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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	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
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
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	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
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
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
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
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	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

Analytical Report Number : 20-43393
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Sulphate, water soluble, in soil	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

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.

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Analytical Report Number : 20-46299

Project / Site name:	104 Hythe Street, Dartford, DA1 1BW	**Samples received on:**	09/12/2020
Your job number:	JJ2099	**Samples instructed on/ Analysis started on:**	09/12/2020
Your order number:	P2883JJ2099.9	**Analysis completed by:**	16/12/2020
Report Issue Number:	1	**Report issued on:**	16/12/2020
Samples Analysed:	5 water samples		

Signed:

Rachel Bradley
Deputy Quality Manager
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

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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.

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711191	1711192	1711193	1711194
Sample Reference				BH1	BH2	WS1	WS2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				08/12/2020	08/12/2020	08/12/2020	08/12/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
General Inorganics							
pH	pH Units	N/A	ISO 17025	7.2	7.3	7.8	7.7
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	850	970	1800	1300
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate as SO4	µg/l	45	ISO 17025	75100	71700	242000	170000
Ammonium as NH4	µg/l	15	ISO 17025	< 15	< 15	< 15	500
Hardness - Total	mgCaCO3/l	1	ISO 17025	424	405	422	481
Total Phenols							
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Speciated PAHs							
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	34.4
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.4
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.13
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.12
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	0.06
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH							
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	35.1
Heavy Metals / Metalloids							
Boron (dissolved)	µg/l	10	ISO 17025	140	93	750	570
Calcium (dissolved)	mg/l	0.012	ISO 17025	160	150	130	170
Magnesium (dissolved)	mg/l	0.005	ISO 17025	5.4	5.4	25	15
Arsenic (dissolved)	µg/l	0.15	ISO 17025	3.36	3.5	7.85	6.38
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03	0.03	0.12	0.12
Chromium (dissolved)	µg/l	0.2	ISO 17025	4.1	4	3.2	4.5
Copper (dissolved)	µg/l	0.5	ISO 17025	16	17	21	19
Lead (dissolved)	µg/l	0.2	ISO 17025	0.4	< 0.2	< 0.2	0.3
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	6.3	4.9	6.1	33
Selenium (dissolved)	µg/l	0.6	ISO 17025	4.3	3.9	17	18
Zinc (dissolved)	µg/l	0.5	ISO 17025	5.7	28	11	2.7

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711191	1711192	1711193	1711194
Sample Reference				BH1	BH2	WS1	WS2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				08/12/2020	08/12/2020	08/12/2020	08/12/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Monoaromatics & Oxygenates							
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	34
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	34

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711191	1711192	1711193	1711194
Sample Reference				BH1	BH2	WS1	WS2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				08/12/2020	08/12/2020	08/12/2020	08/12/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
VOCs							
Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	32.5	40.7	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711191	1711192	1711193	1711194
Sample Reference				BH1	BH2	WS1	WS2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				08/12/2020	08/12/2020	08/12/2020	08/12/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711195
Sample Reference				WS3
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				08/12/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	8
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	1000
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	8.6
Sulphate as SO4	µg/l	45	ISO 17025	124000
Ammonium as NH4	µg/l	15	ISO 17025	60
Hardness - Total	mgCaCO3/l	1	ISO 17025	516
Total Phenols				
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	17.9
Acenaphthylene	µg/l	0.01	ISO 17025	0.21
Acenaphthene	µg/l	0.01	ISO 17025	0.09
Fluorene	µg/l	0.01	ISO 17025	0.07
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	18.3
Heavy Metals / Metalloids				
Boron (dissolved)	µg/l	10	ISO 17025	590
Calcium (dissolved)	mg/l	0.012	ISO 17025	180
Magnesium (dissolved)	mg/l	0.005	ISO 17025	14
Arsenic (dissolved)	µg/l	0.15	ISO 17025	6.63
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.1
Chromium (dissolved)	µg/l	0.2	ISO 17025	5.6
Copper (dissolved)	µg/l	0.5	ISO 17025	19
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	15
Selenium (dissolved)	µg/l	0.6	ISO 17025	17
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.1

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711195
Sample Reference				WS3
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				08/12/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
Petroleum Hydrocarbons				
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	18
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	18

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711195
Sample Reference				WS3
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				08/12/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
VOCs				
Chloromethane	µg/l	1	ISO 17025	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0

Analytical Report Number: 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

Your Order No: P2883JJ2099.9

Lab Sample Number				1711195
Sample Reference				WS3
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				08/12/2020
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-46299
Project / Site name: 104 Hythe Street, Dartford, DA1 1BW

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

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.

APPENDIX 4 – GEOTECHNICAL LABORATORY TEST RESULTS

SUMMARY REPORT

Summary of Moisture Content Test Results

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

UKAS TESTING 4041

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

Client: Jomas Associates Ltd

Client Address: Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD

Contact: Tom Elbourne

Site Address: 104 Hythe Street, Dartford, DA1 1BW

Client Reference: JJ2099
Job Number: 20-44661
Date Sampled: 23/11/2020
Date Received: 20/11/2020
Date Tested: 03/12 - 05/12/2020
Sampled By: Not Given

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											
		Reference	Depth Top m	Depth Base m	Type			%											
1702231	BH1	Not Given	1.20	Not Given	B	Brown sandy GRAVEL		3.9											
1702232	BH2	Not Given	0.50	Not Given	ES	Dark brown gravelly sandy CLAY		26											
1702233	BH2	Not Given	1.20	Not Given	B	Brown sandy GRAVEL		4.1											

Comments:

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.

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 08/12/2020

GF 099.15

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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

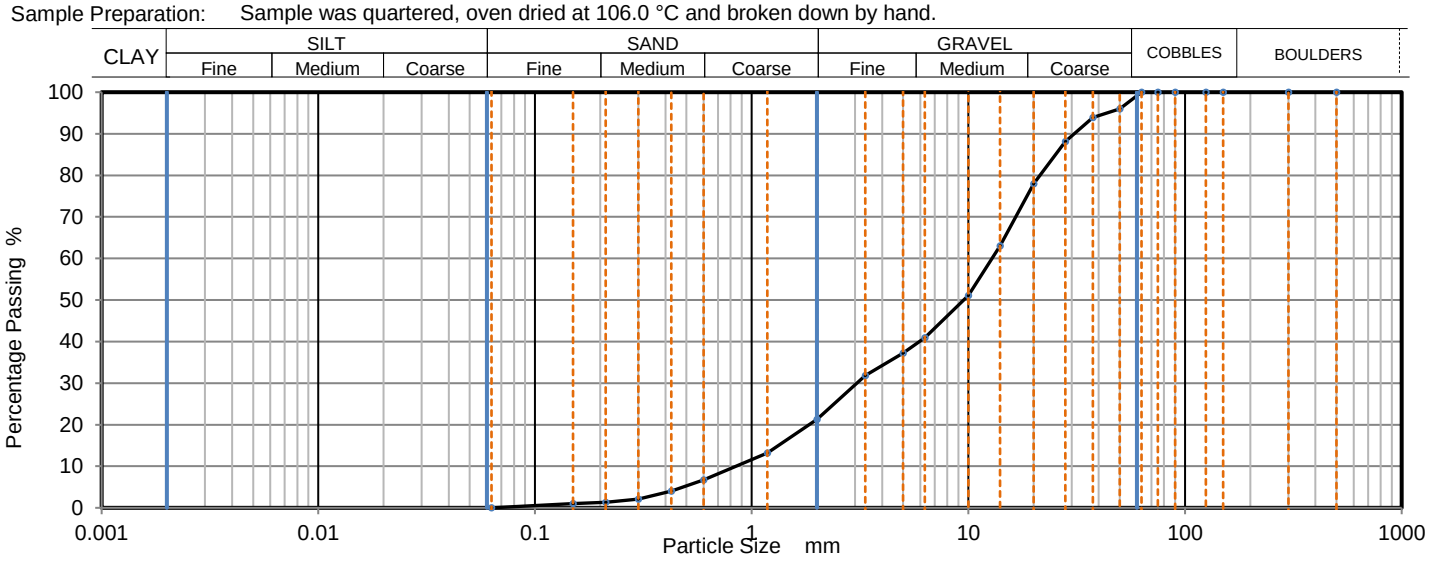
4041

Client:	Jomas Associates Ltd	Client Reference:	JJ2099
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	20-44661
		Date Sampled:	23/11/2020
		Date Received:	20/11/2020
Contact:	Tom Elbourne	Date Tested:	05/12/2020
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	1702231	Depth Top [m]:	1.20
Hole No.:	BH1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown sandy GRAVEL		
Sample Preparation:	Sample was quartered, oven dried at 106.0 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	96		
37.5	94		
28	88		
20	78		
14	63		
10	51		
6.3	41		
5	37		
3.35	32		
2	21		
1.18	13		
0.6	7		
0.425	4		
0.3	2		
0.212	1		
0.15	1		
0.063	1		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	78.70
Sand	20.60
Fines <0.063mm	0.70

Grading Analysis		
D100	mm	63
D60	mm	12.9
D30	mm	3.07
D10	mm	0.845
Uniformity Coefficient		15
Curvature Coefficient		0.87

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 08/12/2020

GF 100.19

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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

4041

Client: Jomas Associates Ltd

Client Address: Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD

Contact: Tom Elbourne

Site Address: 104 Hythe Street, Dartford, DA1 1BW

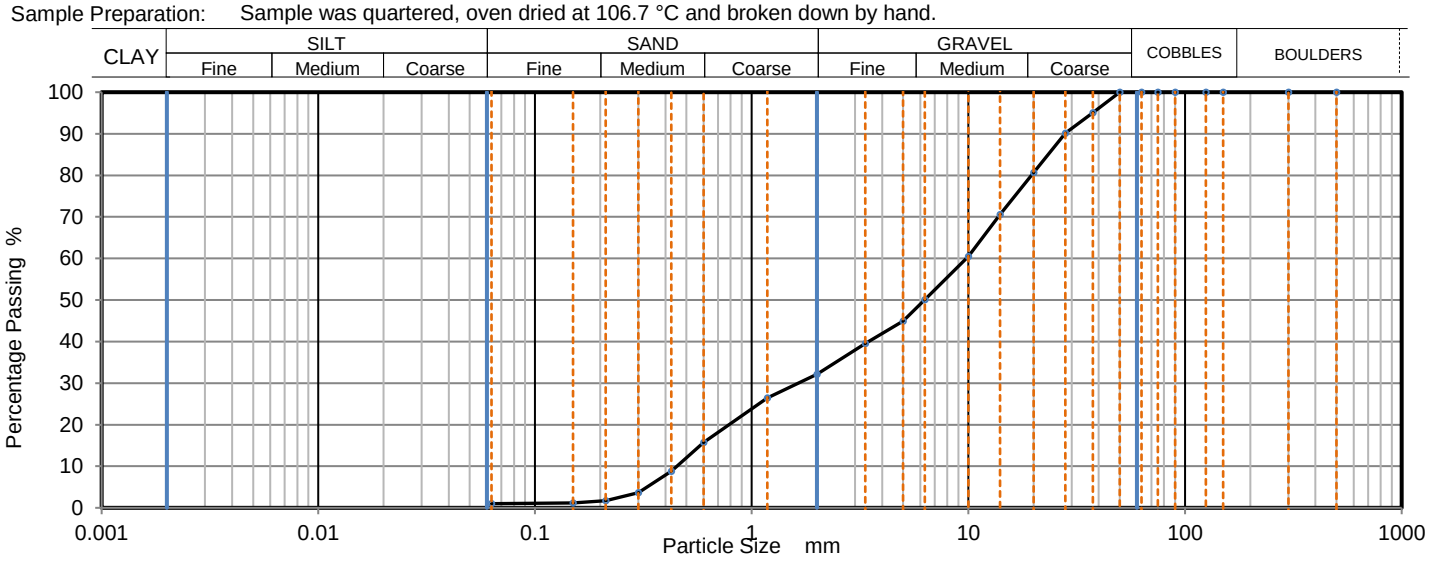
Client Reference: JJ2099
Job Number: 20-44661
Date Sampled: 23/11/2020
Date Received: 20/11/2020
Date Tested: 05/12/2020
Sampled By: Not Given

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

Test Results:

Laboratory Reference: 1702233
Hole No.: BH2
Sample Reference: Not Given
Sample Description: Brown sandy GRAVEL
Sample Preparation: Sample was quartered, oven dried at 106.7 °C and broken down by hand.

Depth Top [m]: 1.20
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	95		
28	90		
20	81		
14	71		
10	61		
6.3	50		
5	45		
3.35	40		
2	32		
1.18	26		
0.6	16		
0.425	9		
0.3	4		
0.212	2		
0.15	1		
0.063	1		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	67.90
Sand	31.10
Fines <0.063mm	1.00

Grading Analysis		
D100	mm	50
D60	mm	9.76
D30	mm	1.65
D10	mm	0.452
Uniformity Coefficient		22
Curvature Coefficient		0.61

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 08/12/2020

GF 100.19

SUMMARY REPORT

Summary of Moisture Content Test Results

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

UKAS TESTING 4041

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

Client: Jomas Associates Ltd

Client Address: Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD

Contact: Tom Elbourne

Site Address: 104 Hythe Street, Dartford, DA1 1BW

Client Reference: JJ2099
Job Number: 20-44661
Date Sampled: 23/11/2020
Date Received: 20/11/2020
Date Tested: 03/12 - 05/12/2020
Sampled By: Not Given

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											
		Reference	Depth Top m	Depth Base m	Type			%											
1702231	BH1	Not Given	1.20	Not Given	B	Brown sandy GRAVEL		3.9											
1702232	BH2	Not Given	0.50	Not Given	ES	Dark brown gravelly sandy CLAY		26											
1702233	BH2	Not Given	1.20	Not Given	B	Brown sandy GRAVEL		4.1											

Comments:

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.

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 08/12/2020

GF 099.15

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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

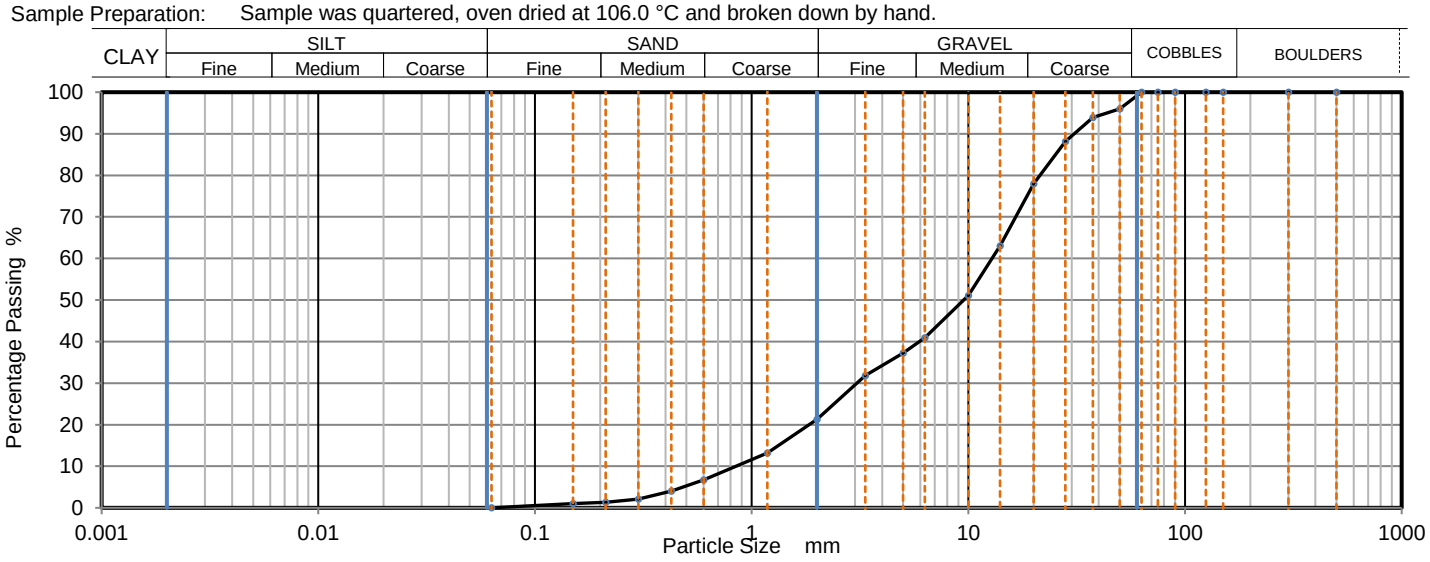
4041

Client:	Jomas Associates Ltd	Client Reference:	JJ2099
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	20-44661
		Date Sampled:	23/11/2020
		Date Received:	20/11/2020
Contact:	Tom Elbourne	Date Tested:	05/12/2020
Site Address:	104 Hythe Street, Dartford, DA1 1BW	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	1702231	Depth Top [m]:	1.20
Hole No.:	BH1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown sandy GRAVEL		
Sample Preparation:	Sample was quartered, oven dried at 106.0 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	96		
37.5	94		
28	88		
20	78		
14	63		
10	51		
6.3	41		
5	37		
3.35	32		
2	21		
1.18	13		
0.6	7		
0.425	4		
0.3	2		
0.212	1		
0.15	1		
0.063	1		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	78.70
Sand	20.60
Fines <0.063mm	0.70

Grading Analysis		
D100	mm	63
D60	mm	12.9
D30	mm	3.07
D10	mm	0.845
Uniformity Coefficient		15
Curvature Coefficient		0.87

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 08/12/2020

GF 100.19

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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

4041

Client: Jomas Associates Ltd

Client Address: Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD

Contact: Tom Elbourne

Site Address: 104 Hythe Street, Dartford, DA1 1BW

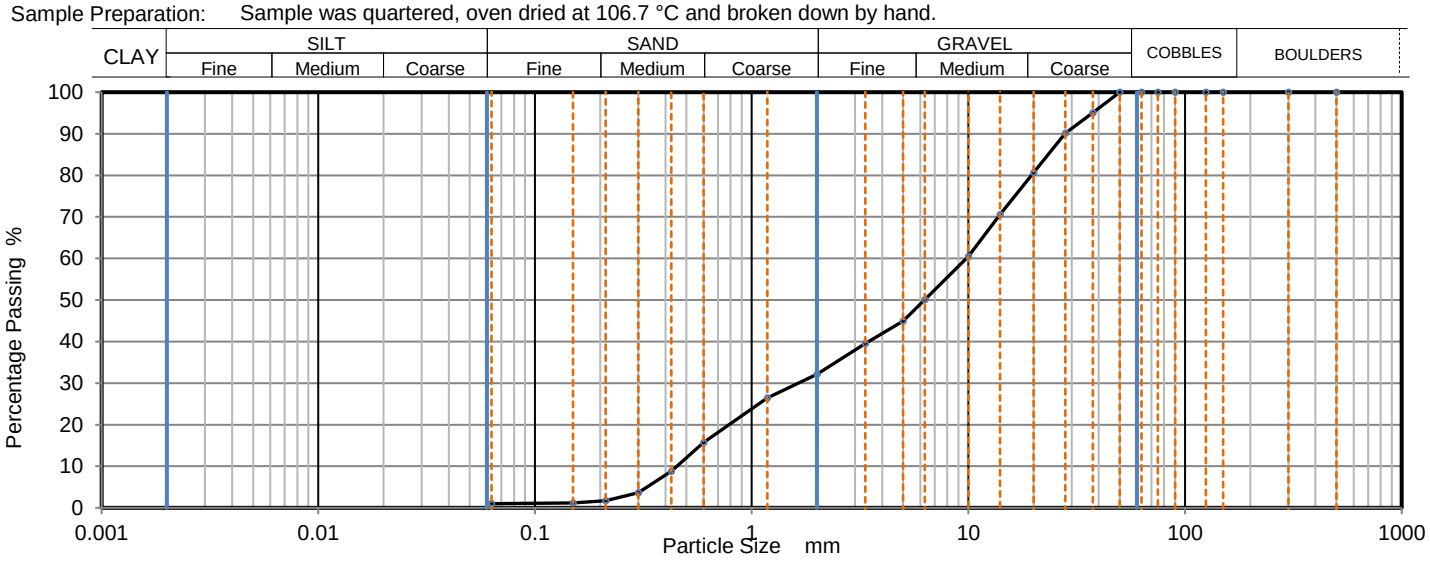
Client Reference: JJ2099
Job Number: 20-44661
Date Sampled: 23/11/2020
Date Received: 20/11/2020
Date Tested: 05/12/2020
Sampled By: Not Given

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

Test Results:

Laboratory Reference: 1702233
Hole No.: BH2
Sample Reference: Not Given
Sample Description: Brown sandy GRAVEL
Sample Preparation: Sample was quartered, oven dried at 106.7 °C and broken down by hand.

Depth Top [m]: 1.20
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	95		
28	90		
20	81		
14	71		
10	61		
6.3	50		
5	45		
3.35	40		
2	32		
1.18	26		
0.6	16		
0.425	9		
0.3	4		
0.212	2		
0.15	1		
0.063	1		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	67.90
Sand	31.10
Fines <0.063mm	1.00

Grading Analysis		
D100	mm	50
D60	mm	9.76
D30	mm	1.65
D10	mm	0.452
Uniformity Coefficient		22
Curvature Coefficient		0.61

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

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

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 08/12/2020

GF 100.19

APPENDIX 5 – STATISTICAL ANALYTICAL RESULTS

Client/client ref	
Project ref	P2883J2099
Site ref	104 Lower Hythe Street
Data description	
Contaminant(s)	
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	17 December 2020
User details	TE

Statistics calculator (version 1)

Input data

Go to summary

Data sheet

Project details

Easting	Northing	Sample ID	Lead	Benzo(b)Fluoranthene	Benzo(a)pyrene	Dibenzo(ah)anthracene								
		WS1-0.25	130	0.86	0.53	<0.05								
		WS2-0.30	360	5.6	4.2	1								
		WS3-0.50	480	0.28	0.2	<0.05								
		WS4-0.60	86	<0.05	<0.05	<0.05								
		WS5-0.60	110	<0.05	<0.05	<0.05								
		HTP1-0.30	230	0.52	0.25	<0.05								
		BH2-1.00	94	3.6	2.7	0.38								
		BH2-0.50	170	0.88	0.55	<0.05								

Client/client ref:
Project ref: P2883J2099
Site ref: 104 Lower Hythe Street
Data description:
Contaminant(s):
Test scenario: Planning
Date: 17 December 2020
User details: TE

	Lead	Benzo(b)Fluoranthene	Benzo(a)pyrene	Dibenzo(ah)anthracene								
Critical concentration, C_c	**310**	**3.9**	**4.2**	**0.31**								
Notes												
Sample size, n	8	8	8	8	0	0	0	0	0	0	0	0
Sample mean, $\overline{X}$	207.5	1.48	1.06625	0.21	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s	142.719505	2.02359652	1.53649822	0.33945334								
Number of non-detects	0	**2**	**2**	**6**								
Set non-detect values to:	Detection limit	Detection limit	Detection limit	Detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	No	No	No	No								
Distribution	Normal	Non-normal	Non-normal	Non-normal								
Statistical approach	Auto: One-sample t	Chebychev	Auto: Chebychev	Auto: Chebychev	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Log-Normal distribution to test for outliers				
t statistic, t_0 (or k_0)	-2.031353598	-3.38248934	-5.768691025	-0.833230013								
Upper confidence limit (on true mean concentration, μ)	303.098475	4.59857167	3.43415279	0.73313273								
Evidence level	**96%**	**92%**	**97%**	**41%**								
Base decision on:	evidence level	evidence level	evidence level	evidence level								
Result	**μ < Cc**	**μ ≈≥ Cc**	**μ < Cc**	**μ ≥ Cc**								
Select dataset	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

APPENDIX 6 – SOIL GAS AND GROUNDWATER MONITORING TEST RESULTS

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Hythe street	**Operative(s):** IKL	**Date:** 01/12/20	**Time:** 9:30	**Round:** 1	**Page:**

MONITORING EQUIPMENT

Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	09/03/2020
PID	Phocheck tiger	T-106448	11/03/2020
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Sunny	**Ground Conditions:** Dry	**Temperature:** 8 °C
Barometric Pressure (mbar): 1027	**Barometric Pressure Trend (24hr):** Falling	**Ambient Concentration:** 0.0%CH_4, 0.1%CO_2, 21.0%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	+0.1	+0.1	1027	0.0	/	3.5	15.7	/	/	0	0	/	1.75	6.19
BH2	+0.1	+0.1	1027	0.0	/	0.7	20.2	/	/	0	0	/	1.64	5.91
WS1	0.0	0.0	1027	0.0	/	0.1	21.0	/	/	0	0	/	1.61	1.65
WS2	+0.1	+0.1	1027	0.0	/	1.1	20.3	/	/	0	0	/	1.75	1.83
WS3	+0.1	+0.1	1027	0.0	/	3.2	18.3	/	/	0	3	/	1.91	2.00

*All monitoring wells very silty at the base

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Hythe street	**Operative(s):** IKL	**Date:** 08/12/20	**Time:** 9:30	**Round:** 2	**Page:**

MONITORING EQUIPMENT

Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	09/03/2020
PID	Phocheck tiger	T-106448	11/03/2020
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Overcast	**Ground Conditions:** Wet	**Temperature:** 3 °C
Barometric Pressure (mbar): 1005	**Barometric Pressure Trend (24hr):** Falling	**Ambient Concentration:** 0.0%CH_4, 0.1%CO_2, 21.3%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	+0.1	+0.1	1005	0.0	/	2.3	18.8	/	/	0	0	/	1.73	6.20
BH2	+0.1	+0.1	1005	0.0	/	0.5	20.7	/	/	0	0	/	1.60	5.91
WS1	+0.1	+0.1	1005	0.0	/	0.2	21.7	/	/	0	0	/	1.47	1.64
WS2	0.0	0.0	1005	0.0	/	1.8	19.9	/	/	0	0	/	1.70	1.83
WS3	+0.1	+0.1	1005	0.0	/	0.2	21.8	/	/	0	0	/	1.87	1.98

*All monitoring wells very silty at the base

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Hythe street	**Operative(s):** JPB	**Date:** 14/12/20	**Time:** 14:00	**Round:** 3	**Page: 1**

MONITORING EQUIPMENT

Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	09/03/2020
PID	Phocheck tiger	T-106448	11/03/2020
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Overcast	**Ground Conditions:** Dry	**Temperature:** 11 °C
Barometric Pressure (mbar): 1002	**Barometric Pressure Trend (24hr):** Steady	**Ambient Concentration:** 0.1%CH_4, 0.1%CO_2, 20.7%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	0.0	0.0	1002	0.0	/	2.7	16.9	0.1	0.1	0	0	/	1.72	6.20
BH2	+0.2	+0.2	1002	0.0	/	0.6	19.9	0.1	0.1	0	0	/	1.59	5.91
WS1	+0.1	+0.1	1002	0.0	/	0.5	20.4	0.1	0.1	0	0	/	1.55	1.64
WS2	0.0	0.0	1002	0.0	/	0.8	19.8	0.1	0.1	0	0	/	1.69	1.83
WS3	+0.1	+0.1	1002	0.0	/	1.9	18.6	0.1	0.1	0	0	/	1.86	1.98

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Hythe street	**Operative(s):** IKL	**Date:** 21/12/20	**Time:** 15:00	**Round:** 4	**Page: 1**

MONITORING EQUIPMENT

Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Analox	GA5000	G501805	09/03/2020
PID	Phocheck tiger	T-106448	11/03/2020
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Raining	**Ground Conditions:** Wet	**Temperature:** 9°C
Barometric Pressure (mbar): 1011	**Barometric Pressure Trend (24hr):** Falling	**Ambient Concentration:** 0.0% CH_4, 0.1% CO_2, 21.5% O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	steady					
BH1	+0.1	+0.1	1011	0.0	-	2.5	18.3	0	0	0	0	-	2.50	6.20
BH2	+0.1	+0.1	1012	0.0	-	0.7	20.5	0	0	0	0	-	1.60	5.91
WS1	+0.2	+0.2	1011	0.0	-	0.6	21.2	0	0	0	0	-	1.50	1.64
WS2	0.0	0.0	1012	0.0	-	1.7	19.4	0	0	0	0	-	NR	1.83
WS3	+0.1	+0.1	1012	0.0	-	2.7	18.6	0	0	0	0	-	NR	1.98

NR – no reading due to equipment failure.

LOW FLOW GROUNDWATER MONITORING BOREHOLE RECORD SHEET					
Site: Hythe street	**Operative(s):** IKL	**Date:** 08/12/20	**Time:** 10:00	**Round:** 2	**Page:** 1 of

MONITORING EQUIPMENT			
Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
SmarTROLL MP	In-Situ	448904	26/06/2019
Dip Meter	In-Situ		

MONITORING CONDITIONS		
Weather Conditions: Overcast	**Ground Conditions: Wet**	**Temperature:** 3 °C

Hole ID	Temperature (°C)	Specific Conductivity (µS/cm)	pH	(ORP) Oxidation-Reduction Potential (mV)	(RDO) Rugged Dissolved Oxygen Concentration (mg/L)	Depth to product – NB do not sample if present	Water Level (Start of testing)	Water Level (End of testing)	Hole Depth	Comments
BH1	12.95	485.92	6.99	149.1	2.41	/	1.73	1.73	6.20	Low turbidity w/ some sediments. At 30 min spec. conduct. Did not stabilise.
BH2	12.67	1160.1	7.06	155.6	3.36	/	1.60	1.61	5.91	Low turbidity. Spec conduct. And RDO did not stabilise at 30 min.
WS1	Insufficient water and recharge – “grab” sample obtained without stabilising parameters.									
WS2	Insufficient water and recharge – “grab” sample obtained without stabilising parameters.									
WS3	Insufficient water and recharge – “grab” sample obtained without stabilising parameters.									

Specific Conductivity (µS/cm)

This is a measure of the capability of a solution such as water in a stream to pass an electric current. This is an indicator of the concentration of dissolved electrolyte ions in the water. It doesn't identify the specific ions in the water. However, significant increases in conductivity may be an indicator that polluting discharges have entered the water.

Every creek will have a baseline conductivity depending on the local geology and soils. Higher conductivity will result from the presence of various ions including nitrate, phosphate, and sodium.

The basic unit of measurement for conductivity is micromhos per centimetre (µmhos/cm) or micro Siemens per centimetre (µS/cm). Either can be used, they are the same. It is a measure of the inverse of the amount of resistance an electric charge meets in traveling through the water. Distilled water has a conductivity ranging from 0.5 to 3 µS/cm, while most streams range between 50 to 1500 µS/cm. Freshwater streams ideally should have a conductivity between 150 to 500 µS/cm to support diverse aquatic life.

pH

A measure of a solution's acidity. In water, small numbers of water molecules (H_2O) will break apart or disassociate into hydrogen ions (H^+) and hydroxide ions (OH^-). Other compounds entering the water may react with these, leaving an imbalance in the numbers of hydrogen and hydroxide ions. When more hydrogen ions react, more hydroxide ions are left in solution and the water is basic; when more hydroxide ions react, more hydrogen ions are left and the water is acidic. pH is a measure of the number of hydrogen ions and thus a measure of acidity.

pH is measured on a logarithmic scale between 1 and 14 with 1 being extremely acid, 7 neutral, and 14 extremely basic. Because it is a logarithmic scale there is a tenfold increase in acidity for a change of one unit of pH, e.g. 5 is 100 times more acid than 7 on the pH scale. The largest variety of freshwater aquatic organisms prefer a pH range between 6.5 to 8.0.

(RDO) Rugged Dissolved Oxygen Concentration (mg/L)

Dissolved oxygen is oxygen gas molecules (O_2) present in the water. Plants and animals cannot directly use the oxygen that is part of the water molecule (H_2O), instead depending on dissolved oxygen for respiration. Oxygen enters streams from the surrounding air and as a product of photosynthesis from aquatic plants. Consistently high levels of dissolved oxygen are best for a healthy ecosystem.

Levels of dissolved oxygen vary depending on factors including water temperature, time of day, season, depth, altitude, and rate of flow. Water at higher temperatures and altitudes will have less dissolved oxygen. Dissolved oxygen reaches its peak during the day. At night, it decreases as photosynthesis has stopped while oxygen consuming processes such as respiration, oxidation, and respiration continue, until shortly before dawn.

Human factors that affect dissolved oxygen in streams include addition of oxygen consuming organic wastes such as sewage, addition of nutrients, changing the flow of water, raising the water temperature, and the addition of chemicals.

Dissolved oxygen is measured in mg/L.

0-2 mg/L: not enough oxygen to support life.
2-4 mg/L: only a few fish and aquatic insects can survive.
4-7 mg/L: good for many aquatic animals, low for cold water fish
7-11 mg/L: very good for most stream fish

(ORP) Oxidation- Reduction Potential (mV)

ORP is a measure of the cleanliness of the water & its ability to break down contaminants". It has a range of –2,000 to + 2,000 and units are in "mV" (millivolts).

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