Reading Borough Council

NORTH STREET, READING

Phase 2 Geo-Environmental Risk Assessment



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CONTENTS

1	**INTRODUCTION**	**1**
1.1	INTRODUCTION	1
1.2	PROPOSED DEVELOPMENT	1
1.3	AIMS AND OBJECTIVES	1
1.4	PROJECT SCOPE	1
1.5	LEGISLATIVE CONTEXT AND GUIDANCE	2
1.6	SOURCES OF INFORMATION	2
1.7	CONFIDENTIALITY AND LIMITATIONS	3
2	**SITE SETTING**	**4**
2.1	SITE DESCRIPTION AND CURRENT USE	4
2.2	SITE HISTORY AND ENVIRONMENTAL SETTING	4
3	**PRELIMINARY CONCEPTUAL SITE MODEL**	**6**
3.1	INTRODUCTION	6
4	**SITE INVESTIGATION – METHODOLOGY**	**8**
4.1	RATIONALE AND SCOPE OF WORKS	8
4.2	DEVIATIONS FROM SCOPE	9
4.3	IN-SITU AND FIELD TESTING	10
4.4	GROUNDWATER AND GROUND GAS MONITORING INSTALLATIONS	10
4.5	GROUNDWATER / SURFACE WATER SAMPLING AND MONITORING	11
4.6	GAS MONITORING	11
4.7	LABORATORY ANALYSIS	11
4.8	DYNAMIC CONE PENETROMETERS	12
4.9	DOWNHOLE PERMEABILITY TESTS	12
4.10	GEOTECHNICAL LABORATORY TESTING	12

5 ENCOUNTERED GROUND AND GROUNDWATER CONDITIONS 14

5.1 ENCOUNTERED GROUND CONDITIONS 14
5.2 VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION 15
5.3 GROUNDWATER 15

6 QUANTITATIVE RISK ASSESSMENT 17

6.1 INTRODUCTION 17
6.2 GENERIC HUMAN HEALTH RISK ASSESSMENT 17
6.3 GENERIC CONTROLLED WATERS ASSESSMENT 19
6.4 GROUNDWATER ASSESSMENT 19
6.5 GENERIC GROUND GAS RISK ASSESSMENT 20
6.6 BURIED STRUCTURES AND SERVICES 22

7 REVISED CONCEPTUAL SITE MODEL 23

7.1 INTRODUCTION 23
7.2 POTENTIAL SOURCES OF CONTAMINATION 23
7.3 POTENTIAL RECEPTORS 23
7.4 REFINED CONTAMINATION LINKAGES 23

8 GEOTECHNICAL TEST RESULTS AND MATERIAL PROPERTIES 27

8.1 GENERAL ASSUMPTIONS 27
8.2 COHESIVE MADE GROUND 28
8.3 COHESIVE ALLUVIUM 28
8.4 GRANULAR ALLUVIUM 30
8.5 TAPLOW GRAVELS 30
8.6 STRUCTURELESS CHALK 31
8.7 SUMMARY OF GEOTECHNICAL TEST RESULTS 31
8.8 SUMMARY OF DERIVED GEOTECHNICAL PARAMETERS 34
8.9 AGGRESSIVE BURIED CONCRETE DESIGN 34

9 PRELIMINARY GEOTECHNICAL ASSESSMENT 35

9.1 FOUNDATIONS 35
9.2 FLOOR SLABS 36
9.3 PAVEMENT DESIGN 36
9.4 BURIED CONCRETE DESIGN 36
10 RISK REGISTER 37
10.1 GEOTECHNICAL RISK REGISTER 37
11 CONCLUSION AND RECOMMENDATIONS 39
11.1 SUMMARY OF SITE INVESTIGATION 39
11.2 GEO-ENVIRONMENTAL CONCLUSIONS 39
11.3 GEOTECHNICAL CONCLUSIONS 40

TABLES

Table 1-1 – Sources of Information 2
Table 2-1 – Summary of Environmental Setting 4
Table 3-1 – Potential Contaminant Pathways 7
Table 4-1 – Summary of Rationale 9
Table 4-2 – Summary of Monitoring Installations 10
Table 4-3 – Schedule of Geotechnical Testing 13
Table 5-1 – Summary of Encountered Ground Conditions 14
Table 5-2 – Summary of Groundwater Elevations Recorded 16
Table 6-1 – Details of Soil Assessment Criteria Exceedances for Residential with No Home Grown Vegetables 18
Table 6-2 – Summary of Groundwater Exceedances 20
Table 6-3 – Summary of Gas Monitoring Results 21
Table 6-4 – Gas Screening Values 21
Table 6-5 – Typical Protection Measures Required for Characteristic Situation 2 22
Table 7-1 – Revised Conceptual Site Model 24
Table 8-1 – Summary of derived geotechnical parameters 34
Table 8-2 – BRE testing results 34

Table 10-1 – Likelihood classification and risk evaluation **37**

Table 10-2 – Geotechnical Risk Register **37**

APPENDICES

APPENDIX A

FIGURES AND DRAWINGS

APPENDIX B

LIMITATIONS

APPENDIX C

EXPLORATORY HOLE LOGS

APPENDIX D

DYNAMIC CONE PENOTROMETER RESULTS

APPENDIX E

DOWNHOLE PERMEABILITY RESULTS

APPENDIX F

CHEMICAL RESULTS - SOILS

APPENDIX G

CHEMICAL RESULTS - WATER

APPENDIX H

WATER AND SOILS SCREENING METHODOLOGY

APPENDIX I

WATER AND SOILS SCREENING

APPENDIX J

FIELD MONITORING

APPENDIX K

GEOTECHNICAL LABORATORY RESULTS

APPENDIX L

GROUNDWATER PARAMETERS

1 INTRODUCTION

1.1 INTRODUCTION

WSP UK Ltd was instructed by Saunders Architects on behalf of Reading Borough Council (the 'Client') to undertake a combined Phase 1 and 2 Geo-Environmental Risk Assessment in accordance with our proposal dated 19 November 2019 (ref: 70012984).

The assessment is associated with land located at the junction of North Street and Weldale Street Reading, RG1 7DA (the Site). It is proposed to redevelop the Site for a residential purpose and this report is required in order to identify potential constraints to the redevelopment relating to the ground conditions, including a risk-based environmental assessment and recommendations for remediation works, foundations, road pavements design and general construction advice in the context of the development proposals.

This report presents the information obtained from a desk study and a ground investigation. A risk-based assessment of potential contamination is presented in Section 7 of the report. This assessment makes reference to the desk study, ground investigation and a Conceptual Site Model. Section 8 of the report provides a Ground Investigation Report (GIR) as defined in BS EN 1997-1:2004 and BS EN 1997-2:2007.

The site location plan and site layout plan are presented on Figures 1 and 2 in **Appendix A**.

1.2 PROPOSED DEVELOPMENT

The proposed development includes construction of 41 affordable dwellings configured within a 4 storey building with small car park and communal garden space/landscaping areas.

Specific information on proposed site levels and proposals for re-use of materials were not known at the time of writing this report.

The proposed development layout is presented on Figure 3 in **Appendix A**.

1.3 AIMS AND OBJECTIVES

The key aims and objectives of this investigation were as follows:

- Confirm the current ground conditions;
- Investigate previously identified potential pollutant linkages;
- Undertake risk assessments to identify potential contaminant linkages & determine site suitability for a residential end use; and
- Recommend geotechnical design parameters to provide an indication of likely foundation solutions required.

1.4 PROJECT SCOPE

The following scope of work has been completed:

- Review desk-based information;
- Design and complete ground investigation comprising formation of boreholes and installation of groundwater and ground gas monitoring wells;
- Logging, screening and sampling of soil arisings;

- Laboratory analysis of soil samples;
- Presentation of encountered contamination, ground and groundwater conditions;
- Human health generic quantitative risk assessment;
- Ground gas risk assessment;
- Controlled waters generic quantitative risk assessment;
- Risk appraisal & refine conceptual site model; and
- Preliminary geotechnical appraisal.

This preliminary report excludes an assessment of waste.

1.5 LEGISLATIVE CONTEXT AND GUIDANCE

The assessment was undertaken in the legislative context of:

- Part 2A of The Environmental Protection Act (1990); and
- The National Planning Policy Framework (2019).

The following good practice and statutory guidance was considered and the assessment was undertaken in general accordance with:

- Environment Agency 'Contaminated Land: Risk Management' (2019);
- NHBC 'Guidance for the Safe Development of Housing on Land Affected by Contamination', R&D66 (2008);
- CIRIA 'Assessing Risks Posed by Hazardous Ground Gases to Buildings', C665 (2007);
- NHBC 'Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present' Report Edition No. 4 (2007);
- British Standard 'Investigation of Potentially Contaminated Sites – Code of Practice', BS EN 10175:2011+A2:2017;
- Defra 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance', PB13735 (2012);
- British Standard 'Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (VOCs)' BS 8576:2013;
- British Standard 'Code of Practice for Ground Investigations', BS 5930:2015;
- CIRIA C552 Contaminated Land Risk Assessment – A Guide to Good Practice;
- UK Water Industry Research (UKWIR) (2010). Guidance for the selection of water supply pipe to be used in brownfield sites. Report Ref. No. 10/WM/03/21;
- CIRIA C574 (2003) Engineering in Chalk;
- BRE Special Digest 1 (2005) Concrete in Aggressive Ground Conditions; and
- BS8002-2015 - Code of Practice for Earth Retaining Structures.

1.6 SOURCES OF INFORMATION

The following relevant sources of information were used in the production of this report:

Table 1-1 – Sources of Information

Source	Report
WSP Reports	WSP 'North Street, Reading, Phase 1 Contaminated Land Assessment' (September 2017), Report Reference: 70012984-006 Issue 2 (this report references all associated

Source	Report
	sources of information including third party information and public information where used), herein referred to as Phase 1 Report.
Public Information	BGS, 2000. 1:50,000 Series Geological Map Sheet 268 'Reading' (Solid & Drift ed.); BGS 'Geology of Britain' online viewer accessed on 02 February 2020; and Wundermap.com accessed on 26 February 2020.

1.7 CONFIDENTIALITY AND LIMITATIONS

This report is addressed to and may be relied upon by Reading Borough Council. It may not be relied upon or transferred to any other parties without the express written agreement of WSP. The report should be read and used in full. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party. WSP cannot be held liable for third party information. Full details of the limitations and uncertainties are provided as **Appendix B**.

2 SITE SETTING

2.1 SITE DESCRIPTION AND CURRENT USE

A Site walkover was undertaken on 7 September 2017 and a detailed description of the current land use is provided in the Phase 1 Report (Ref: 70012984-006). In summary, the Site, which is 0.23 ha and roughly rectangular in shape, is unoccupied by structures and comprises a relatively flat, hard-surfaced area. A gentle bank is present in the south and this rises by approximately 1m to meet the level of Weldale Street.

The surfacing consists of asphalt (along the eastern boundaries and across the western area), the floor slab of a former building and vegetation along the southern boundary.

A significant quantity of rubbish and an abandoned caravan was present at the Site at the time of the walkover and during the investigation.

Surrounding land use comprises an ambulance station to the north, residential properties to the south and west and an industrial estate to the east.

2.2 SITE HISTORY AND ENVIRONMENTAL SETTING

A full description of the Site history and environmental setting is provided in the Phase 1 Report. A summary of the pertinent information is provided in **Table 2-1.**

Table 2-1 – Summary of Environmental Setting

Feature	Detail
Site History	On-site: The Site was historically associated with residential land use, comprising of residential terrace housing until 1961. Circa to 1979, a day nursery/school was constructed. Off-site: Historically, residential properties directly adjacent to the Site, with the ambulance station constructed circa to 1986. To the south and west of the Site, the area has remained residential properties while to the north and east the area was redeveloped as an industrial estate.
Geology	Published data indicates the Site to be underlain by superficial deposits of Alluvium (clay, silt, sand and gravel) and by Taplow Gravel (sand and gravel) and the solid geology of Seaford Chalk and Newhaven Chalk Formation (undifferentiated). Mining Hazards One small scale underground chalk mine is recorded 36m to the south of Site. However, it is unknown whether this is an open pit mine or if it includes tunnels. Natural Cavities Data provided by Peter Brett Associates natural cavities database indicates three solution pipes located approximately 300m south east of the Site. Three solution widening joint or fissure solution features are located 450m south of Site. A total of 39 solution features are located within 1km of the Site boundary.

Feature	Detail
Hydrogeology	The alluvium is designated by the Environment Agency as a Secondary A Aquifer strata and the chalk is designated as a Principal Aquifer. The Site does not lie within a groundwater Source Protection Zone. However, there are two groundwater abstraction licenses noted within 500m of the Site, one is present approximately 300m southeast and one approximately 420m north.
Hydrology	There are no surface water abstraction licenses recorded within 500m of the Site. There are a number of tertiary rivers and culverts present 250-300m north of Site running in an east –west orientation, roughly parallel to the train line.
Significant Regulatory Information	Three recorded pollution incidents were within 500m of the Site: ▪ One 250m NW of 'Unidentified Oils' in 2007. Significant land impact and minor water impact (ID 516354); ▪ One 390m SE of contaminated water from fire-fighting run off in 2001. Designated 'No Impact' (ID 50702); ▪ One 480m E of 'Gas and Fuel Oils' in 2002. Minor land impact (ID 74851). Four discharge consents with 500m of the Site: ▪ Two consents for site drainage associated with the bus depot 220m N; ▪ Two historic consents for sewage discharges (treated effluent – non-water company) 390m NW associated with an accommodation block. Three registered Part A(2) and Part B Activities: ▪ One permit 430m N for respraying of road vehicles; ▪ One permit 445m N for respraying of road vehicles; ▪ One permit 450m SW for unloading of petrol to storage. Three waste treatment transfer or disposal Sites: ▪ One site 80m NW identified as a surface car park/waste station; ▪ One site 160m N identified as a refuse yard; ▪ One site 480m W identified as a metals recycling site. One recorded landfill site within 1km ▪ One site 610m north west for inert waste.
Contaminated Land	One site historically determined as contaminated was recorded 325m west of Site: Identified 325m W of the Site at George Street Allotments. Benzo(a)Pyrene identified in Made Ground and compost. Identified in 2008 and considered remediated in February 2011.

3 PRELIMINARY CONCEPTUAL SITE MODEL

3.1 INTRODUCTION

The preliminary Conceptual Site Model (CSM) is presented within the Phase 1 Report. A summary of the identified sources, pathways and receptors taken from the preliminary model are provided below, for information.

3.1.1 POTENTIAL SOURCES

On-Site

- Made Ground associated with past development; and
- Historical coal-fire ash disposal.

Off-Site

- Industrial land to north and east.

3.1.2 POTENTIAL RECEPTORS

Human Health

- Current and future site users (future residents and visitors, existing users of the car park);
- Off-site workers and adjacent site users (commercial and residential).

Controlled Waters

- Groundwater (and associated abstractions) within superficial deposits (Secondary A aquifer) and the chalk bedrock strata (Principal aquifer);
- Potable abstractions (closest 300m southeast;
- Off-site surface water network (located further north).

Other

- Foundations and services associated with the new residential buildings.

3.1.3 POTENTIAL PATHWAY(S)

Table 3-1 summarises the preliminary conceptual site model from the Phase 1 Report associated with the proposed development.

Table 3-1 – Potential Contaminant Pathways

Sources	Pathways	Receptors
On Site - Made Ground Various substances including hydrocarbons, PAHs, asbestos, sulphates, sulphides, nitrates, iron, possible volatile organic compounds	Direct Contact, direct ingestion / inhalation	Future site users
	Inhalation of hazardous ground gases	Future site users
	Leaching of contaminants through the unsaturated zone and into groundwater	Groundwater resource (Secondary A Aquifer and Principal Aquifer)
	Subsequent migration into surface water course via baseflow	Local surface water receptors
On Site - Historical coal-fire ash disposal*:* Potential for elevated concentrations of metals and PAHs including BaP	Direct Contact, direct ingestion / inhalation	Future site users
	Leaching of contaminants through the unsaturated zone and into groundwater	Groundwater resource
	Subsequent migration into surface water courses via baseflow	Local surface water receptors
Off-Site – Adjacent Industrial Land	Leaching of contaminants through the unsaturated zone and into groundwater beneath the Site.	Groundwater

4 SITE INVESTIGATION – METHODOLOGY

4.1 RATIONALE AND SCOPE OF WORKS

4.1.1 INTRODUCTION

Exploratory holes were positioned to consider the preliminary Conceptual Site Model (CSM), the layout of the proposed redevelopment, location of existing utilities and to provide general coverage of the Site. The vertical extent of the ground investigation was designed such that the investigation would determine depth to competent strata whilst providing information on the shallower soil properties.

The ground investigation was designed and supervised by a qualified and experienced geo-environmental specialist from WSP.

4.1.2 GENERAL SCOPE OF WORKS

The main drilling phase of the ground investigation works was carried out between 13 to 21 January 2020. Monitoring was undertaken throughout January and February 2020. The scope of the intrusive assessment work was as follows:

- Clearance of all proposed exploratory hole locations by a specialist service tracing company using ground penetrating radar (GPR) and a CAT and Genny to locate all services on the Site;
- Advancing 6 No. hand-dug pits to 1.5m bgl for service inspection;
- Advancing 3 No. rotary boreholes up to 17m bgl. Groundwater monitoring wells to be installed within the chalk;
- Advancing up to 3 No. window sample boreholes up to 4m bgl. Installed as gas monitoring wells;
- Two downhole permeability tests to determine permeability of underlying strata;
- Three dynamic cone penetrometer (DCP) tests to determine underlying strata strength to aid with pavement design (two locations required concrete coring);
- Surveying co-ordinates and levelling in all window sample and borehole investigation locations (X,Y,Z);
- One return visit to purge all groundwater monitoring installations;
- One return visit to undertake groundwater monitoring;
- Six return visits to undertake ground gas monitoring;
- Laboratory analysis of recovered soil and groundwater samples.

The ground investigation was undertaken in accordance with techniques outlined in BS5930:2015 and BS1377:2016, as appropriate. An exploratory hole location plan, is presented as Figure 4 in **Appendix A**.

A summary of the rationale for each specific exploratory hole location is provided in **Table 4-1**.

Table 4-1 – Summary of Rationale

Reference	Location / Rationale	Completed Works
BH101	Undertaken towards the north west corner. Located under the footprint of the proposed building.	Terminated at 15.50m bgl
BH102	Undertaken centrally within the southern half of the Site. Located under the footprint of the proposed building.	Terminated at 17.00m bgl
BH103	Undertaken towards the north east corner. Located under the footprint of the proposed building.	Terminated at 15.50m bgl
WS101	Undertaken towards the south west corner. Located under the proposed footprint of the building and to provide site coverage.	Terminated at 3m bgl. Downhole permeability test completed post drilling and pre installation.
WS102	Undertaken centrally within the northern half of Site. Located to provide site coverage.	Terminated at 4m bgl
WS103	Undertaken towards the south east corner for general site coverage.	Terminated at 3m bgl Downhole permeability test completed within installed well
DCP 1 to 3	Three DCP probes completed under the area proposed for car parking.	-

4.2 DEVIATIONS FROM SCOPE

- Due to the limited thickness of Made Ground encountered across the Site it was only possible to install one suitable gas monitoring well (WS102) within the Made Ground.

4.3 IN-SITU AND FIELD TESTING

A hand-held Photo-Ionisation Detector (PID) fitted with a 10.6eV lamp and calibrated against 100 ppm isobutylene standard gas was used in the field to provide a semi-quantitative indication of the presence of volatile organic compounds within soil samples. The readings are taken through headspace measurements and are used to assist with sample selection for chemical analysis and type of analysis.

Standard Penetration Tests (SPT) were carried out at regular intervals in all locations to provide data on the in-situ density/strength of the strata.

A hand shear vane was used if the recovered material was deemed appropriate, to aid with the determination of strength of material.

The results of the PID testing, the SPT 'N values' and the hand shear vane are presented on the exploratory hole records (**Appendix C**).

4.4 GROUNDWATER AND GROUND GAS MONITORING INSTALLATIONS

Following completion of drilling, six monitoring locations (boreholes and window sample locations) were installed with combined groundwater and gas monitoring installations. All wells were constructed using 50mm diameter perforated HDPE piping with a pea gravel and bentonite surround and were fitted with appropriate valves and flush covers to allow either gas or groundwater monitoring within the borehole. Specific details of each installation are summarised in **Table 4-2** and presented on the exploratory hole records in **Appendix C**.

Table 4-2 – Summary of Monitoring Installations

Exploratory Hole	Ground Level (m AOD)	Standpipe / Piezometer Diameter	Screen Top and Base Depth (m bgl)	Screen Top and Base Elevation (m AOD)	Strata Targeted
BH101	39.412	50	5.00 to 10.00	34.41 to 29.41	Seaford Chalk Formation
BH102	39.524	50	4.00 to 14.00	35.52 to 25.52	Seaford Chalk Formation
BH103	39.549	50	6.00 to 8.00	33.55 to 31.55	Seaford Chalk Formation
WS101	39.931	50	1.00 to 2.00	39.93 to 38.93	Alluvium
WS102	39.539	50	1.00 to 2.00	38.54 to 37.54	Made Ground Cohesive

Exploratory Hole	Ground Level (m AOD)	Standpipe / Piezometer Diameter	Screen Top and Base Depth (m bgl)	Screen Top and Base Elevation (m AOD)	Strata Targeted
WS103	39.725	50	2.00 to 3.00	37.73 to 36.73	Alluvium

4.5 GROUNDWATER / SURFACE WATER SAMPLING AND MONITORING

Groundwater sampling and monitoring was undertaken at the Site on 29 January 2020. Groundwater samples were obtained from BH101, BH102 and BH103. Groundwater levels were recorded using an oil water interface probe to confirm the absence of light non-aqueous phase liquid (LNAPL) or 'free product'.

Prior to sampling, in-situ measurements of groundwater and surface water quality indicators (dissolved oxygen, electrical conductivity, redox potential and temperature) were taken using a multi-parameter probe. The groundwater samples were then taken from each monitoring well using low flow sampling techniques. Groundwater parameters during groundwater sampling are presented in **Appendix L**.

The groundwater samples were decanted into appropriate containers and transported to the testing laboratory (under an appropriate chain of custody) within a cooler box with ice packs to maintain a cool temperature, on the same day as the sampling took place.

4.6 GAS MONITORING

Six rounds of ground gas monitoring were undertaken between 21 January to 25 February 2020. Ground gas monitoring was undertaken on all installed monitoring wells.

Initial and steady state concentrations of methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide were measured using a GFM435 gas analyser, along with the gas flow rate and atmospheric pressures at each monitoring location. Groundwater levels were also recorded from all boreholes during these rounds using a water level dip meter. A hand-held PID was also used to provide a semi-quantitative indication of the presence of VOCs.

The monitoring records for all completed rounds are presented in **Appendix J**.

4.7 LABORATORY ANALYSIS

All samples were collected in accordance with current industry best practice and on-site sampling procedures were designed to minimise the potential for cross-contamination. Samples were collected in labelled containers and sent directly to ALS Environmental under a digital chain of custody. The samples were suitably preserved and all testing was completed under relevant UKAS and MCERTS accreditations.

The chemical testing strategy was underpinned by the preliminary conceptual site model and by on-site observations. Selected soil samples were analysed for:

- Asbestos identification and quantification;
- Metals and metalloids including hexavalent chromium;
- Inorganics;
- Ammoniacal nitrogen;
- Cyanide;
- Phenols;
- Polyaromatic hydrocarbons (PAHs);
- Total petroleum hydrocarbons (TPHs); and
- PCBs.

Selected groundwater samples for analysed for:

- Metals and metalloids including hexavalent chromium;
- Inorganics;
- Ammoniacal nitrogen;
- Cyanide;
- pH;
- Phenols;
- Polyaromatic hydrocarbons (PAHs);
- Total petroleum hydrocarbons (TPHs); and
- Volatile organic compounds (VOCs) and semi-organic volatile compounds (SVOCs).

4.8 DYNAMIC CONE PENETROMETERS

A total of three dynamic cone penetrometer tests (DCP) were undertaken in accordance with BS1377:Part 4. Each DCP location was dug by hand to natural prior to the test being completed. Results are presented in **Appendix D**.

4.9 DOWNHOLE PERMEABILITY TESTS

During drilling, a downhole permeability tests was completed in the unsaturated zone on WS101. Post drilling, a downhole permeability test was completed in WS103, this was due to the instability of the ground conditions. Water was added to the borehole and the rate of water level fall recorded. In situ readings are presented in **Appendix E**.

4.10 GEOTECHNICAL LABORATORY TESTING

The following geotechnical laboratory testing was undertaken on 44 No. soil and rock samples collected throughout the fieldworks period in order to provide an overview of the engineering parameters of the in-situ soils. The geotechnical samples were couriered to Geotechnical Engineering Ltd (GEL) for geotechnical testing. Geotechnical samples were tested for the parameters summarised in **Table 4-3**.

The results of geotechnical laboratory testing are presented in **Appendix K**.

Table 4-3 – Schedule of Geotechnical Testing

Determinand(s) / Test	No. Samples Scheduled
Moisture Content	24
Plasticity Index 4 points	10
Particle Size Distribution	6
Bulk/Dry Density	4
BRE SD1 Extended Suite	6
CBR remoulded 2.5kg	1

5 ENCOUNTERED GROUND AND GROUNDWATER CONDITIONS

5.1 ENCOUNTERED GROUND CONDITIONS

Ground conditions encountered during the investigation are summarised in **Table 5-1**. The exploratory hole logs and photographic logs are presented in **Appendix C**.

Table 5-1 – Summary of Encountered Ground Conditions

Stratum	Depth to Base of Stratum (m bgl)	Elevation of Base of Stratum (m AOD)	Thickness (m)	Typical description
Hardstanding	0.05 to 0.35	39.54 to 39.06	0.05 to 0.35	Concrete, asphalt or concrete paving slab.
Made Ground	0.50 to 2.00	39.43 to 37.54	0.25 to 1.81	Very dark grey sandy gravelly CLAY with brick, concrete, tile and glass fragments. Or Red and brown sandy GRAVEL of flint with brick sized cobbles.
Alluvium	1.60 to 5.90	37.92 to 33.65	1.10 to 4.50	Soft yellowish brown sandy CLAY Or Pale brown clayey sandy fine to coarse GRAVEL of flint and chalk. Or Pale brown slightly clayey gravelly SAND.
Taplow Gravels	2.65	36.87	1.05	Slightly clayey sandy GRAVEL of flint.
Seaford Chalk Formation and Newhaven Chalk Formation	Not proven (17)*	Not proven (22.52)*	Not proven (14.35)*	Structureless chalk, composed of cream / pale brown gravelly clay to structureless chalk comprised of cream clayey gravel.

*Brackets indicate maximum unproven depth and thickness and the minimum elevations

5.1.1 GROUND COVER

A concrete slab associated with the former development is present within the central area of Site, three positions (BH103, WS102 and WS103) were located upon the slab which had a maximum thickness 0.2m. WS103 had a layer of asphalt overlaying the slab. Two locations (BH101 and WS103) had asphalt at the surface, BH101 associated with the former playground and WS103 from the newly installed carpark on the eastern side of Site. BH102 was positioned on concrete paving and WS101 was positioned on soft standing.

5.1.2 MADE GROUND

Made Ground was encountered within all positions across the Site varying in depth to the base of strata from 0.50m bgl in WS101 near the western boundary to 2.0m bgl in WS102 in the centre of the Site. The typical thickness of the Made Ground was 0.5m to 0.6m within the southern area and north western corner (WS101, WS103, BH101 and BH102) and varied from 1.4m to 2.0m in the eastern and northern locations (WS102 and BH103). Typically, the Made Ground consisted of brown to black sandy gravelly CLAY with brick and tile fragment and rare glass or red and brown GRAVEL and COBBLES of brick and concrete potentially part of a former structure occupying the Site.

5.1.3 ALLUVIUM (SUPERFICIAL DEPOSITS)

Superficial alluvial deposits were encountered across the Site, underlying the deposits of Made Ground. Generally, the upper layers of the alluvium consisted of brown sandy slightly gravelly CLAY gravel of flint. Underlying this cohesive layer was cream and pale brown clayey GRAVEL or SAND gravel of flint and chalk typical of a transitional layer between the underlying chalk. The maximum depth of alluvium encountered was 5.90m bgl within BH103 towards north eastern corner of Site.

5.1.4 TAPLOW GRAVELS (SUPERFICIAL DEPOSITS)

Taplow gravels were encountered at one location (BH102), underlying the alluvium at 1.6m bgl to a depth of 2.65m bgl. These are present as pale yellowish brown slightly clayey sandy GRAVEL of flint.

5.1.5 SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) (BEDROCK)

Seaford Chalk Formation strata was recorded across the Site and outcropped between 2.65m bgl in the centre of the Site to 5.9m bgl in the north eastern corner. The chalk was recovered as granular or cohesive structureless chalk. The granular chalk formation typically consisted of clayey gravel overlaid the cohesive chalk formation which typically consisted of gravelly clay. Numerous flint nodules were encountered through the chalk formation within all locations.

5.2 VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

No olfactory evidence and minimal visual evidence of contamination was observed during the ground investigation. Visual evidence generally consisted of brick and concrete within the Made Ground other notable evidence consisted of isolated coal fragments within WS102 between 1.30m to 1.50m bgl.

No PID readings were recorded above 0.1ppm across the Site.

5.3 GROUNDWATER

The granular nature of the underlying stratum meant that water flush had to be utilised in order to progress the drilling to the depths required. The addition of water during drilling can mask underground water strikes. One strike was recorded during drilling at 3.20m bgl in BH103 which rose to 2.90m bgl after 20 minutes. However, subsequent monitoring rounds will determine depth of groundwater. WS101 and WS103 were progressed to 3m bgl and WS102 was progressed to 4m bgl without the use of water. WS101 and WS103 were both recorded as dry, however, WS102 had standing water at 2.70m bgl at the end of hole suggesting a groundwater strike between 3m to 4m bgl.

Groundwater levels have been recorded during the six monitoring rounds between 21 January and 25 February 2020. A summary of groundwater levels is present in **Table 5-2**.

Table 5-2 – Summary of Groundwater Elevations Recorded

Exploratory Hole	Elevation of Screen Top and Base (m AOD)	Strata Encountered	Product Recorded	Groundwater Elevation (m AOD)		
				Min	Mean	Max
BH101	34.41 to 29.41	Chalk Formation	None	36.43	36.55	36.71
BH102	35.52 to 25.52	Chalk Formation	None	36.54	36.65	36.78
BH103	33.55 to 31.55	Chalk Formation	None	36.50	36.62	36.82
WS101	38.93 to 37.93	Alluvium	None	38.83	38.86	38.91
WS102	38.54 to 37.54	Made Ground	None	37.46	37.46	37.46
WS103	37.73 to 36.73	Alluvium	None	36.78	36.79	36.80

Groundwater within the chalk was detected between 36.43m and 36.82m AOD. No true groundwater was detected within the shallow boreholes (WS101 to WS103), groundwater recorded is likely residual drilling water at the base of the wells or seepage from surface.

The resting level of the groundwater within BH101 to BH103 all installed within the underlying chalk strata is similar during each monitoring round. Within BH101 and BH103 the groundwater is resting within the alluvium while BH102 groundwater is resting in the chalk suggesting a degree of hydraulic conductivity between the alluvium and chalk.

Due to the size of the Site and similarity between the groundwater levels across the boreholes it was not possible to determine the groundwater flow direction. However, BGS hydrological maps suggest the regional groundwater flow within the chalk is to the south east.

5.3.1 SOIL INFILTRATION RESULTS

Two downhole permeability were completed on site both within the granular alluvium material. However, within WS101, the hole collapsed during the test due to being unsupported. The permeability of the material varied from 4.83^{-05}m/s (WS101) to 1.99^{-05}m/s (WS103). However, ground conditions across the Site are varied and these results might not represent the Site as a whole. Results are presented in **Appendix D**.

6 QUANTITATIVE RISK ASSESSMENT

6.1 INTRODUCTION

Following a tiered risk assessment approach provided in CLR11 (The Model Procedures for the Management of Land Contamination), this section of the report provides a Generic Quantitative Risk Assessment (GQRA) of those contaminant linkages that were determined to plausible in the CSM.

Assessment of potential contamination has been undertaken using a risk assessment-based approach, as recommended within the Environmental Protection Act (1990), CLR 11 (2004) CLEA Model (2004-2009), BS 10175 (2011), CIRIA C552 (2001) and guidance provided by the NHBC.

6.2 GENERIC HUMAN HEALTH RISK ASSESSMENT

6.2.1 RATIONALE

In the United Kingdom the presence of contamination on site is generally only of concern if an actual or potentially unacceptable risk exists. Legislation and guidance on the assessment of contaminated sites, consistent with European Union best practice, acknowledges the need for a tiered risk based approach. This human health risk assessment represents a GQRA and involves comparison of site contaminant levels against generic standards and compliance criteria including an assessment of risk using the source-pathway-receptor model.

WSP has derived a set of Generic Assessment Criteria (GAC) for the generic land use scenarios following the CLEA methodology and using the CLEA V1.07 computer modelling tool. Where appropriate, exceedances of GACs are compared against recently published Category 4 Screening Levels (C4SLs). Further details on the assumptions and methodologies adopted by WSP are provided **Appendix H**. The following describe a number of critical aspects in GAC selection:

- Soil chemical data has been screened against GAC derived for a residential scenario (with no homegrown vegetables);
- GACs for hydrocarbon compounds are typically sensitive to the degree of soil organic matter (SOM) present in the environment. The GACs have been selected assuming a representative SOM of 2.5%. SOM was not tested during the ground investigation. However, total organic carbon was tested, using a conversion factor of 1.72% the SOM can be calculated. The SOM ranged from 0.45% to 8.32% with an average of 3.9%; and
- The groundwater vapour assessment was screened against GAC derived for a residential underlain by loam scenario.

6.2.2 GENERIC QUANTITATIVE RISK ASSESSMENT OF SOIL

The generic risk assessment shows that there are exceedances of the screening criteria for residential land use without homegrown vegetables for beryllium and lead. All exceedances of the screening criteria were recorded within the Made Ground.

There were no recorded exceedances of human health criteria for vapours derived from groundwater.

The soil screening results of the human health exceedances are presented in **Appendix I** and summarised in **Table 6-1**.

Table 6-1 – Details of Soil Assessment Criteria Exceedances for Residential with No Home Grown Vegetables

Analyte	Exploratory Hole	Depth (m BGL)	Result	Assessment Criteria	Stratum
Beryllium	WS102	0.35 – 0.45	2.64	1.70	Made Ground
	WS102	1.40 – 1.50	2.78		Made Ground
Lead	BH101	0.40 – 0.60	312	188	Made Ground
	BH103	0.40 – 0.50	312		Made Ground
	WS101	0.20 – 0.40	206		Made Ground
	WS102	0.35 – 0.45	530		Made Ground
	WS102	1.40 – 1.50	284		Made Ground

Using the C4SL residential (with no homegrown vegetables) screening value for lead (310mg/kg) WS101 at 0.20 - 0.40m bgl and WS102 at 1.40 – 1.50m bgl are no longer recorded as exceedances. However, WS102 at 0.35 - 0.45m, BH101 at 0.40 – 0.60m and BH103 at 0.40 – 0.50m still exceed the criteria.

6.2.3 ASBESTOS OBSERVATIONS

No visual suspected asbestos containing material was observed during the ground investigation. However, one of the seven samples from the Made Ground sent of laboratory analysis identified asbestos. This was within BH103 at 0.40 - 0.50m bgl and was recorded as trace chrysotile asbestos. The sample was quantified with the result being below the level of detect, <0.001.

6.2.4 DISCUSSION

All poly-cyclic aromatic hydrocarbons, total petroleum hydrocarbons, total petroleum hydrocarbons hazard index, inorganics (including cyanide), phenols, polychlorinated biphenyls, volatile organic compounds and semi-volatile organic compounds are below their relevant GAC.

With the exception of lead and beryllium, concentrations of heavy metals have not been recorded in the soils above the relevant assessment criteria. The concentrations of lead and beryllium are considered to be associated with the clinker/ash in the soil samples.

Asbestos fibres were encountered within BH103 at shallow depth (0.4 – 0.5m) and may be present within soils not subject to analysis. The potential for encountering asbestos fibres will need to b considered during any future below ground works and an appropriate Asbestos Management Plan implemented for the Site. The form of development is such that, upon completion, the floor slab and hardstanding will provide a barrier between the shallow soils and end users. In order to provide a suitable growing medium and provide a barrier between end users and the shallow soils in areas of proposed landscaping, it is recommended that a suitable thickness of topsoil/soil-forming material is imported to Site. Following installation of these measures, there will be no direct exposure pathway between future site users and the substances present in the shallow soils.

6.3 GENERIC CONTROLLED WATERS ASSESSMENT

6.3.1 RATIONALE

The controlled waters risk assessment is conducted in accordance with the principles detailed in 'Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination' (EA 2006) and the 'prevent and limit' approach of the Water Framework Directive (2000/60.EC). The methodology is detailed further in **Appendix H**.

The CSM identified the following potential controlled waters receptors for the Site:

- Groundwater from the secondary A aquifer (Alluvium deposits);
- Groundwater from the Principal aquifer (Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated));
- Potable abstractions (closest 300m southeast); and
- Off-site surface water features 250-300m to the north of Site.

Environment Agency (EA) publications for the assessment of groundwater (RTM, CLR11) provides guidance on the appropriate compliance criteria to be used as generic assessment criteria (GAC). This standard should be relevant to the current or intended use of the identified aquifer/surface water receptor.

Based on the identified receptors the following sources of GAC have been utilised:

- Freshwater Environmental Quality Standards (EQS) 2015, for surface water receptors;
- UK Drinking Water Standards (UK DWS), for groundwater receptors; and
- World Health Organization Standards (i.e. for MTBE and Xylene), in the absence of UK based criteria for groundwater receptors.

Groundwater quality data has therefore been screened against two sets of water standards: protective of the groundwater as a resource (DWS) and the surface waters (EQS). Some EQS are hardness related. In the absence of hardness data for the surface water body, the most conservative hardness banding (0 – 50mg/l CaCO3) was selected.

6.4 GROUNDWATER ASSESSMENT

Groundwater concentrations were generally in the same order of magnitude or below the LOD within all three boreholes. Groundwater screening results are presented in **Appendix I** and a summary of exceedances are presented in **Table 6-2**.

Table 6-2 – Summary of Groundwater Exceedances

Analyte	Location	Concentration (µg/l)	Assessment Criteria (µg/l)	Assessment Criteria Source
Ammoniacal Nitrogen	BH101	1,110	500	UK DWS
	BH103	1,260	500	UK DWS
	BH101	1,110	771	EQS 2015
	BH103	1,260	771	EQS 2015
Nickel	BH103	7.13	4	EQS 2015

One location exceeded the EQS assessment criteria for nickel. The nickel EQS is bioavailability dependent, however due to the lack of data quality from the surface water receptor, the bioavailability of nickel could not be calculated. Therefore, the EQS used for nickel is very conservative as it assumes 100% bioavailability. For this reason, and the distance to the nearest surface water receptor and groundwater flow being to the south east, the exceedances are not considered significant.

Within BH101 and BH103 ammoniacal nitrogen exceeded both the EQS and DWS assessment criteria. However, the leachable concentrations of ammoniacal nitrogen from the samples from across the Site were all low and potentially the groundwater is impacted from an off-site source.

6.5 GENERIC GROUND GAS RISK ASSESSMENT

6.5.1 GAS MONITORING DATA

A total of three shallow window sample locations (WS101 to WS103) were installed as soil gas monitoring locations. Following the completion of the intrusive investigation, six rounds of gas monitoring were undertaken. Monitoring works were completed during January and February 2020, to enable a preliminary assessment of the soil gas regime at the Site. This level of monitoring is consistent with the typical/idealised period and frequency specified in C665 for a residential development on a site with low gas potential.

One of the monitoring rounds (Round 6) was undertaken in periods of falling atmospheric pressure which is therefore considered that worst-case conditions have been monitored at the site. The results of the gas monitoring are presented in **Appendix J**.

Ground gas monitoring was undertaken using a multi-gas analyser (GFM435 and GA2000) for methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, flow rate and atmospheric pressure.

A summary of the highest (and lowest in the case of oxygen) recorded gas monitoring results is summarised in **Table 6-3**.

Table 6-3 – Summary of Gas Monitoring Results

Exploratory Hole	Response Zone (m bgl)	Response Strata	Max Flow Rate (l/hr)	Atmospheric Pressure Range	Max Methane (%)	Max Carbon Dioxide (%)	Min Oxygen (%)	Peak Hydrogen Sulphide (ppm)	Peak Carbon Monoxide (ppm)
WS101	**1.00 to 2.00**	Alluvium	0.20	997-1,036	0.0	5.30	14.60	0.0	0.0
WS102	**1.00 to 2.00**	Made Ground	1.80	997-1,036	0.0	4.50	14.50	0.0	0.0
WS103	**2.00 to 3.00**	Alluvium	0.90	997-1,036	0.0	3.20	16.40	0.0	0.0

Flooding of the well installations was not recorded during the period of monitoring. Methane concentrations were negligible at all locations on all monitoring rounds. Elevated concentrations (3.2% to 5.3%) of carbon dioxide above atmospheric conditions and depleted oxygen levels were recorded at all locations. Carbon monoxide and hydrogen sulphide were not recorded within any locations. The highest flow rate recorded was 1.80 l/hr however, this was not sustained and quickly diminished to 0.2l/hr. Therefore, for the ground gas risk assessment, a value of 0.2l/hr was used which was the maximum steady flow reading.

6.5.2 GROUND GAS RISK ASSESSMENT

Potential risks posed by hazardous ground gases at the Site have been assessed following the guidance contained within CIRIA C665 Report and NHBC Report. Both methods require the use of both gas concentrations (carbon dioxide and methane) and standpipe flow rates to calculate a gas screening value (GSV). The GSV is calculated by multiplying the maximum flow rate by the maximum methane or carbon dioxide concentration, whichever is the highest.

The GSVs recorded during the ground gas monitoring programme at the Site are summarised in **Table 6-4**.

Table 6-4 – Gas Screening Values

		Methane		Carbon Dioxide	
	Maximum Flow Rate (l/hr)	Maximum Concentrations (%)	Gas Screening Value (l/hr)	Maximum Concentrations (%)	Gas Screening Value (l/hr)
Measured Concentration	0.2	0	0	5.30	0.011

The gas risk assessment for the Site is driven by the concentrations of carbon dioxide. The GSV of 0.011 l/hr would classify the Site as a characteristic situation 1 and/or Green using the NHBC traffic

light system and however, CO_2 recordings >5% would characterise the Site as a CIRIA Characteristic Situation 2 and 'Amber 1' using the NHBC traffic light system. A Classification of CIRIA Characteristic Situation 2 would require gas protection measures to be installed within all new developments. This characterisation is been based upon recent gas monitoring data collected by WSP on six occasions in January and February 2020.

It is noted that the barometric pressure was showing a decreasing trend during only one monitoring round on 25 February.

Typical protection measures required for a Characteristic Situation 2 are present in **Table 6-5**.

Table 6-5 – Typical Protection Measures Required for Characteristic Situation 2

Situation A:	**Characteristic Situation 2 (low risk).** **2 levels of protection are required for a residential building. Typical scope of protective measures:** **a) Reinforced concrete cast in-situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM2 and underfloor venting.** **b) Beam and block or pre-cast concrete slab and minimum 2000 g DPM/reinforced gas membrane.** **All joints and penetrations sealed.**

6.6 BURIED STRUCTURES AND SERVICES

With reference to Water UK "Contaminated Land Assessment Guidance" dated January 2014, the Site is classified as 'brownfield' as it constitutes previously developed land.

Although there is no evidence of substances that would be deleterious to buried construction materials (including normal plastics) in the area of the Site where the potable water supply pipes are likely to be located, additional testing should be undertaken along the exact route of the proposed pipe line at the depth at which potable water supply pipes are to be laid.

7 REVISED CONCEPTUAL SITE MODEL

7.1 INTRODUCTION

The identification of potential “pollutant linkages” is a key aspect of the evaluation of potentially contaminated land. An approach based on the UK CIRIA report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001) has been adopted within this report.

7.2 POTENTIAL SOURCES OF CONTAMINATION

The revised sources of contamination are:

- Metals (beryllium and lead identified within Made Ground);
- Soil vapours and ground gases;
- Ammoniacal nitrogen and nickel identified within groundwater exceeding the surface water screening value; and
- Ammoniacal nitrogen identified within groundwater exceeding the drinking water screening value.

7.3 POTENTIAL RECEPTORS

In the context of the proposed land use, the following receptors of soil and/or impact were identified:

Human Health

- Future residents and visitors; and
- Neighbouring off-site residents, workers and users of adjacent commercial and residential properties.

Controlled Waters

- Underlying Principal and Secondary A Aquifer; and
- Surface water features to the north.

Other

- Below ground building structures, services and pipework; and
- Proposed structures and properties on-site.

7.4 REFINED CONTAMINATION LINKAGES

A risk matrix is presented in **Table 7-1** based on the CSM and outcome of the GQRA.

For each of the identified pollutant linkages, an estimate is made on:

- The potential severity of the risk; and
- The likelihood of the risk occurring.

Groundworkers during redevelopment have been discounted from further assessment because there are legal requirements to ensure that suitable health and safety controls should be in place during works.

Table 7-1 – Revised Conceptual Site Model

Source	Pathway	Receptor	Severity	Likelihood	Risk	Comments
Made Ground (Primary Source): Asbestos Metals (Beryllium and Lead within Made Ground) Soil vapours and ground gases	Inhalation of asbestos fibres	Human Health: Future residents	Severe	Unlikely	Low/Moderate Risk	Asbestos containing materials have been identified at one location within the Made Ground. Mitigation measures will therefore need to be implemented during construction works. The risk to future on-site human health receptors will be negligible to low following construction. An appropriate thickness of clean cover will be required in landscaped areas. A geo-textile membrane and hard to dig layer may also be requested to form a marker layer to residual Made Ground deposits. Risks to off-site human health receptors have been classified as negligible due to the low likelihood of inhaling asbestos fibres from source on site. A low risk will only be present during the construction phase and appropriate control measures will be required during construction to mitigate the potential for the generation of wind-blown dusts.
		Off-Site human health receptors	Medium	Unlikely	Negligible	

Source	Pathway	Receptor	Severity	Likelihood	Risk	Comments
						An Asbestos Management Plan will be required for the Site in accordance with the Control of Asbestos Regulations 2012.
	Direct Contact, direct ingestion / inhalation	Human Health: Future residents	Medium	Low Likelihood	Moderate to Low Risk	Risks to future residents have been classified as Moderate to Low due to exceedances of lead and beryllium. The risks can be mitigated by the placement of impacted materials under areas of hard-standing / building or the placement of a suitable thickness of clean cover in soft-landscaped areas; or the excavation and removal of impacted materials off-site.
	Leaching of contaminants through the unsaturated zone and into groundwater	Groundwater resource (Secondary A Aquifer and Principal Aquifer)	Severe	Unlikely	Low Risk	The Site is located above Secondary & Principal aquifers, however limited contamination has been identified within the soils underlying the Site and limited exceedances identified within the groundwater. Upon completion of the development, the Site will be covered in hard standing which

Source	Pathway	Receptor	Severity	Likelihood	Risk	Comments
						will reduce the infiltration of rainwater and in turn the likelihood of contaminants leaching into the underlying strata.
Secondary Source: Ammoniacal nitrogen and nickel within groundwater	Lateral and vertical migration of groundwater	Groundwater resource (Secondary A Aquifer and Principal Aquifer)	Medium	Unlikely	Low Risk	Only identified exceedances of groundwater screening criteria for ammoniacal nitrogen. However, no on site soil sources have been identified and the contamination source is considered to potentially be located off-site.
	Lateral migration contaminants in groundwater to surface waters	Surface water features to the north of Site	Low	Unlikely	Very Low Risk	Due to the distance and direction of surface water features, and limited contaminants within the groundwater impact to surface water features is considered minimal.
Made Ground: Ground Gases	Migration through soils and into building	Human health	Medium	Low Likelihood	Low / Moderate Risk	Carbon dioxide recorded above 5%. The Ground gas risk assessment has characterised the Site as 'Characteristic Situation 2' / NHBC Amber 1 where basic gas protection measures will be required

8 GEOTECHNICAL TEST RESULTS AND MATERIAL PROPERTIES

8.1 GENERAL ASSUMPTIONS

This section provides an interpretation of the geotechnical data of the material encountered during the ground investigation (GI). Where appropriate, in-situ testing, laboratory test results, ground description, published data and engineering judgement have been used to derive geotechnical parameters.

The geotechnical parameters were derived from the ground investigation data summarised in Section 5. Exploratory hole logs are presented in **Appendix C** and Geotechnical laboratory test results are presented in **Appendix K**. To ease the understanding of how geotechnical properties of the ground vary with depth a compilation of charts providing site and laboratory test results is provided in Section 8.7.

The methods used to derive geotechnical parameters are provided below.

8.1.1 UNIT WEIGHT

Direct measurement of unit weight from geotechnical laboratory testing has been used. When not available, wet and dry unit weight for each stratum were derived based on recommendations provided in Figure 1 and 2 from BS 8002 (BS8002-2015 Code of Practice for Earth Retaining Structures), respectively.

8.1.2 UNDRAINED SHEAR STRENGTH

In the absence of direct measurement from hand shear vanes or triaxial tests, the undrained shear strength of cohesive materials has been estimated from correlation with SPT N values where:

$c_u = 4.5 \times N$ (MPa)	Eq. 1

This is after the relationship proposed by Stroud [4].

8.1.3 ANGLE OF SHEARING RESISTANCE

The method used to derive the angle of shearing resistance, f', is indicated below:

Cohesive materials

Derived using Equation 7, constant volume effective angle of shearing resistance, f'cv from BS 8002 (BS8002-2015 Code of Practice for Earth Retaining Structures).

Granular materials

Derived using Equation 3 in Section 4.3.1.$_3$5 of BS 8002 (British Standards, 2015), effective angle of shearing resistance, f'cv.

8.1.4 UNDRAINED YOUNG'S MODULUS

Undrained Young's modulus for cohesive materials was calculated using Eq. 2 which uses Stroud and Butler (Stroud M A (1974): The standard penetration test in insensitive clays and soft rocks. Proc. Eurp. Symp. on Penetration Testing, Stockholm.) relationship between Eu and Cu.

$E_u = 200 \times c_u$ (MPa)	Eq. 2

8.1.5 COMPRESSIBILITY

Cohesive materials

The coefficient of compressibility (m_v) of the cohesive Alluvium has been derived using Table 11.8 in the Handbook of Geotechnical Investigation and Design Tables, Burt Look (Look, 2007).

8.1.6 DRAINED YOUNG'S MODULUS

Cohesive materials

Drained Young's Modulus for cohesive Alluvium has been calculated using the following relationship presented within Section 5.1.3 of Correlation of Soil Properties (Bentley, 1991):

$\mathrm{E}' = \frac{1}{m_v}$ (MPa)	Eq. 3

Where m_v is the coefficient of volume compressibility.

Granular materials

The drained Young's modulus (E') has been derived using the equation specified in Section 8.1.2 of CIRIA 143 for granular soils (Construction Industry Research Information Association, 1995).

$E' = N_{60}$ (MPa)	Eq. 4

N_{60} indicates the result of a SPT test corrected for 60% of the hammer blow energy. N_{60} values were calculated in accordance with Annex A of BS EN ISO 22476-3 (British Standards, 2012).

8.2 COHESIVE MADE GROUND

A description of the Made Ground characteristics is provided in Section 5.1.2.

8.2.1 MOISTURE CONTENT

Three moisture content tests were carried out in the cohesive Made Ground. Values varied between 14 and 25%. Moisture content results are provided in Figure 8.2.

8.2.2 STANDARD PENETRATION TEST (SPT)

One standard penetration test was carried out within the cohesive Made Ground from which a corrected SPT N value of 20 was obtained. SPT N plot against depth below ground level is provided in **Figure 8-3**.

8.2.3 DYNAMIC CONE PENETROMETER (DCP)

Three DCP tests were undertaken near the surface where hardstanding area is proposed. CBR values were calculated using the formula given in IAN 73/06 (IAN 73/06 (Revision 1), Design guidance for road pavement Foundations, 2009.). The results of DCP testing are provided as **Appendix D**.

Calculated CBR values between 0.4 and 1.0 m bgl ranged from 5 to 40%. These do not consider the results from DCP2 which was undertaken at 1.0 m bgl (minimum CBR of 44%).

8.3 COHESIVE ALLUVIUM

A description of the cohesive Alluvium characteristics is provided in Section 5.1.3.

8.3.1 BULK AND DRY DENSITY TEST

Two bulk and dry density tests were undertaken in the cohesive Alluvium. The bulk density ranged from 20.4 to 20.9 kN/m3 and dry density ranged from 17.1 to 18.4 kN/m3.

8.3.2 PARTICLE SIZE DISTRIBUTION (PSD)

Three samples identified as cohesive Alluvium were tested for PSD. The grading curves are presented as Figure 8-4.

Based on the PSD results, strata identified in the field as cohesive and granular Alluvium are found to consist of clayey silty gravelly Sand or clayey gravelly very silty Sand.

8.3.3 ATTERBERG LIMITS AND MOISTURE CONTENT

Six moisture content tests were carried out on cohesive Alluvium samples. The results ranged between 11 and 19%.

Atterberg's testing indicate that the plastic limit of the cohesive Alluvium varied between 14% and 18%, liquid limit varies between 22 and 34% and plasticity indices varied between 8% and 16%. Results shown in Figure 8-1, indicate that the cohesive Alluvium can be classified as a low plasticity Clay (CL). A plasticity chart for cohesive Alluvium is presented in Figure 8.1.

8.3.4 SPT N VALUE

Figure 8-3 shows corrected SPT N values and results ranged between 6 and 18 for the cohesive Alluvium.

8.3.5 UNDRAINED SHEAR STRENGTH

Using Eq. 1 from Section 8.1.2, the undrained shear strength of the cohesive Alluvium ranged from 29 to 82 kN/m2. A derived value of 40kN/m2 is considered appropriate for preliminary design.

8.3.6 ANGLE OF SHEARING RESISTANCE

Based on the material description and using Equation 7 of BS 8002 (BS8002-2015 Code of Practice for Earth Retaining Structures), the derived constant volume angle of shearing resistance varied between 26 and 30° for the cohesive Alluvium.

8.3.7 UNDRAINED YOUNG'S MODULUS

The derived undrained Young's Modulus, Eu, varied between 5.8 and 16.5 MPa for the cohesive Alluvium using Eq. 3 in Section 8.1.4.

8.3.8 COEFFICIENT OF COMPRESSIBILITY

The coefficient of compressibility, m_v, varied between 0.1 and 0.3 m2/MN. Valued were obtained for the cohesive Alluvium (as per Section 8.1.5) which correspond with normally consolidated alluvial clays of firm strength and medium compressibility.

8.3.9 DRAINED YOUNG'S MODULUS

Drained Young's Modulus (E') ranging between 3.3 and 10.0 MPa for cohesive Alluvium has been calculated using Eq. 3.

8.3.10 CALIFORNIA BEARING RATIO (CBR)

One laboratory CBR test was undertaken on an unsoaked sample of the cohesive Alluvium. The result shows a CBR value of 2%.

8.4 GRANULAR ALLUVIUM

A description of the characteristics of the Granular Alluvium are provided in Section 5.1.3.

8.4.1 PARTICLE SIZE DISTRIBUTION

Two PSD tests were carried out on granular Alluvium samples. Grading curves of the results shown in Figure 8.4 confirm that the material consists of clayey silty gravelly Sand or slightly silty clayey sandy Gravel.

8.4.2 MOISTURE CONTENT

Two samples of the granular Alluvium were tested for natural moisture content, resulting in 15% for both samples. Moisture content results are summarised in **Figure 8-2**.

8.4.3 STANDARD PENETRATION TEST

Eight standard penetration tests were undertaken within the granular Alluvium. Corrected SPT N values ranged from 6 to 35.

The corrected SPT N values correspond to, loose to medium dense material. A plot of the corrected results is shown in Figure 8.3.

8.4.4 ANGLE OF SHEARING RESISTANCE

Using Equation 3 of BS 8002 (BS8002-2015 Code of Practice for Earth Retaining Structures) the angle of shearing resistance of 34° was derived for the granular Alluvium.

8.4.5 DRAINED YOUNG'S MODULUS

The derived Young's modulus, E', for the granular Alluvium ranged from 6 to 36 MPa, using Eq. 5 as stated in Section 8.1.5.

8.5 TAPLOW GRAVELS

A description of the Taplow Gravels characteristics is provided in Section 5.1.4.

8.5.1 PARTICLE SIZE DISTRIBUTION

One PSD test was carried out on Taplow Gravels sample. Grading curve of the result as shown in Figure 8-4 confirms the Taplow Gravels consist of slightly silty slightly clayey very sandy Gravel.

8.5.2 STANDARD PENETRATION TEST

Two standard penetration tests were carried out in the Taplow Gravels. Corrected SPT N values were 34 and 40. The uncorrected SPT N values correspond to medium dense to dense granular material. A plot of the corrected results is shown in Figure 8.3.

8.5.3 ANGLE OF SHEARING RESISTANCE

Using Equation 3 of BS 8002 (BS8002-2015 Code of Practice for Earth Retaining Structures), a constant volume angle of shearing resistance of 34° was derived for the Taplow Gravels.

8.5.4 DRAINED YOUNG'S MODULUS

The drained Young's modulus, E', varying between 34 and 40 MPa was derived for the Taplow Gravels using Eq. 5, using the method provided in Section 8.1.5.

8.6 STRUCTURELESS CHALK

The characteristics of the Chalk encountered is provided in Section 5.1.5. Saturated Moisture Content, Natural Moisture and Dry/Bulk Density

Three saturated moisture content tests were undertaken on coarse gravel size clasts of chalk which corresponds to strata identified as the Structureless Chalk. Moisture content results range from 23 to 24%. The Bulk density results were consistent between both tests being approximately 20.0 kN/m3, and dry density results ranged from 16.2 to 16.5 kN/m3.

17 natural moisture content tests undertaken on Structureless Chalk samples ranged from 11 to 29%. A chart summarising the moisture content test results is provided as Figure 8.2.

8.6.1 STANDARD PENETRATION TEST (SPT)

Twenty-six standard penetration tests were undertaken within material recovered as Structureless Chalk, as shown in Figure 8.3. Corrected SPT N results ranged from 10 to 108 (values above 50 were obtained by extrapolating SPT N over 300 mm penetration). Corrected SPT N values show a linear increase with depth.

Based on experience within similar materials and CIRIA C574 (CIRIA) it is likely that the high corrected SPT N values are due to the presence of clasts and flints within the chalk matrix.

8.7 SUMMARY OF GEOTECHNICAL TEST RESULTS

A summary of geotechnical site and laboratory testing results is provided in this section showing a variation of the derived geotechnical parameters with depth.

Plasticity chart for cohesive Alluvium is presented in **Figure 8-1**.

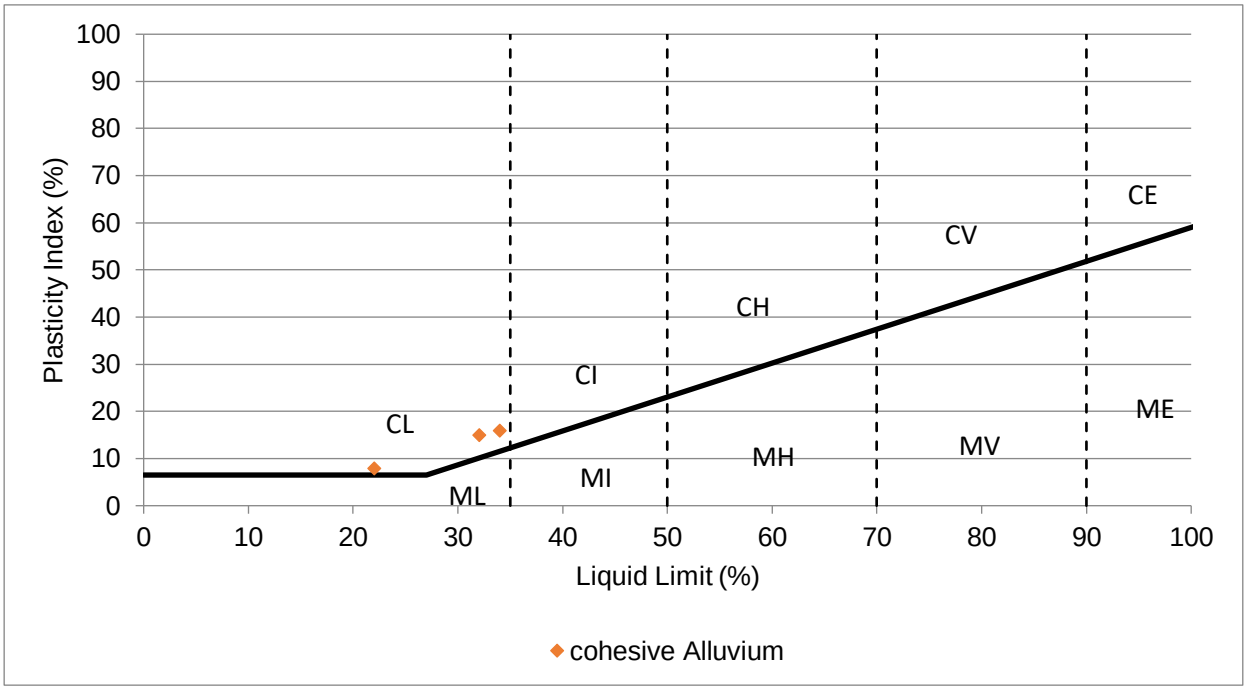


Figure 8-1 - Plasticity chart for cohesive Alluvium

Moisture content results are provided in **Figure 8-2**.

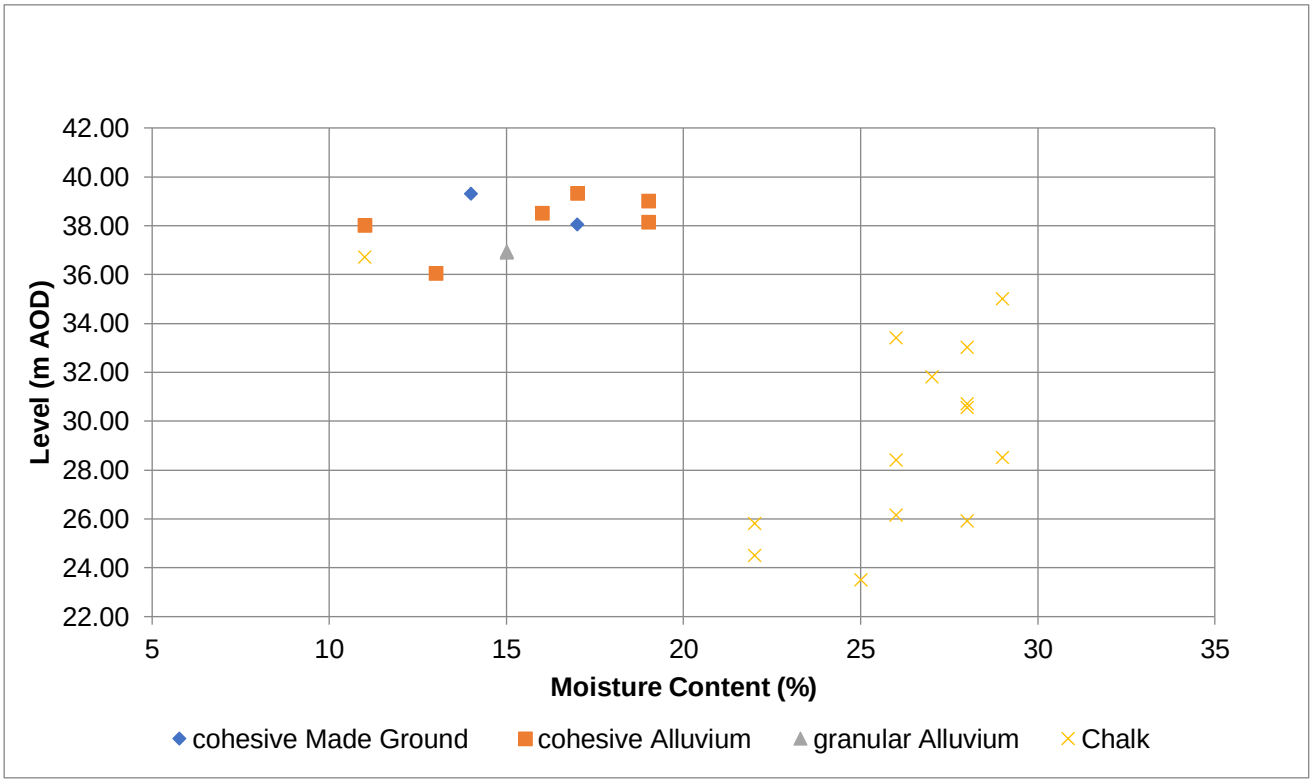


Figure 8-2 - Moisture content plot for all strata

Corrected SPT N values are provided in Figure 8-3.

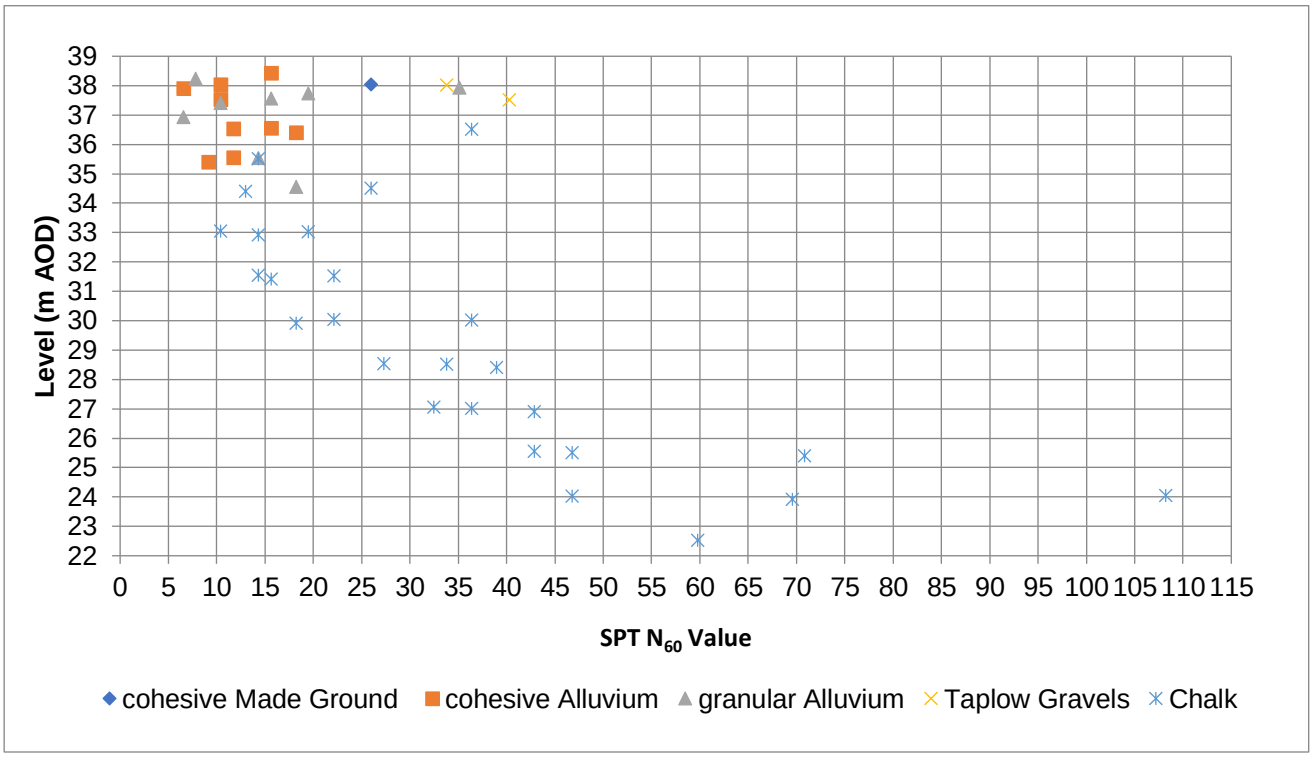


Figure 8-3 - SPT N value plot for all strata

PSD for Alluvium and Taplow Gravels are provided in Figure 8-4.

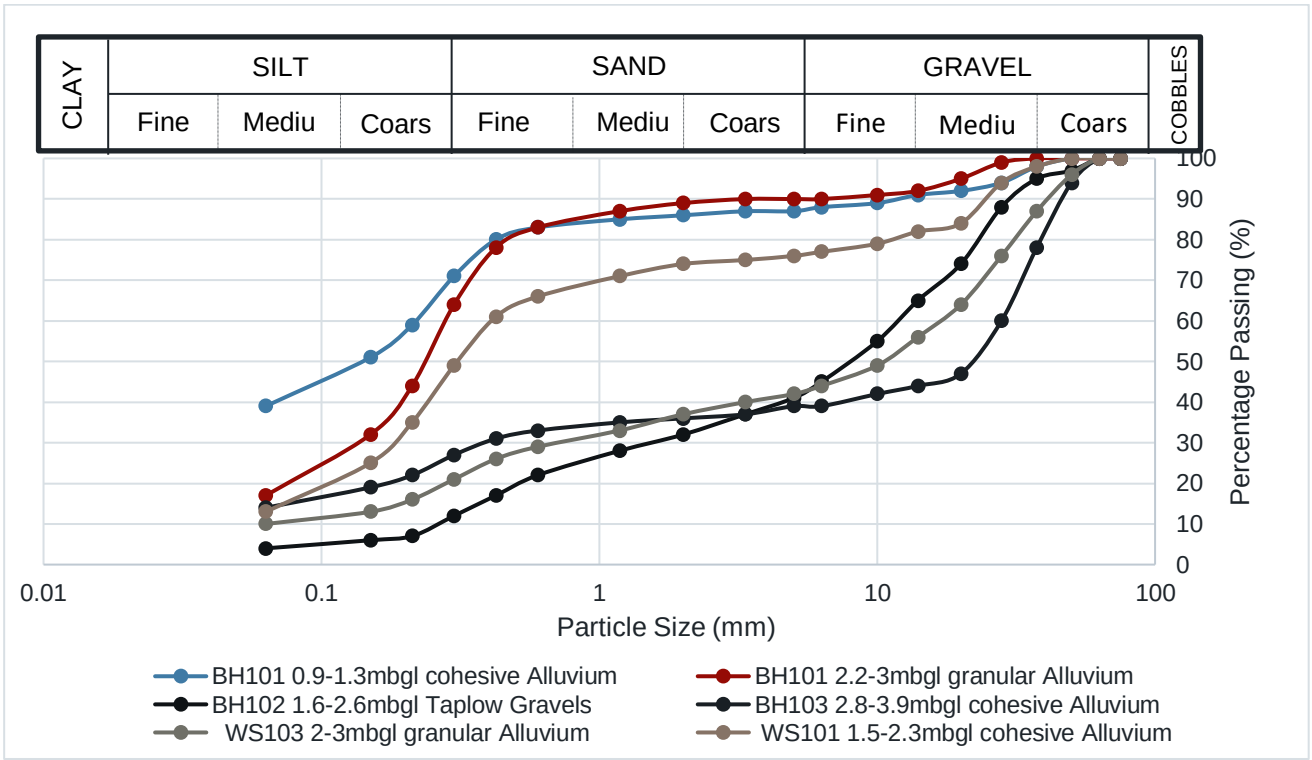


Figure 8-4 - PSD for Alluvium and Taplow Gravels

8.8 SUMMARY OF DERIVED GEOTECHNICAL PARAMETERS

A summary of the derived geotechnical parameters is provided in Table 8-1.

Table 8-1 – Summary of derived geotechnical parameters

Strata	γ_{dry} (kN/m^3)	γ_{wet} (kN/m^3)	C_u (kN/m^2)	φ' (°)	E_u (MPa)	E' (MPa)	m_v (m^2/MN)
Cohesive Made Ground	-	18.0	-(1)	-(1)	-(1)	-(1)	-(1)
Cohesive Alluvium	17.1 to 18.4	20.0	50	26 to 30	10	7.5	0.1 to 0.3
Granular Alluvium	-	20.0	-	34	-	6 to 36	-
Taplow Gravels	-	20.0	-	34	-	34 to 40	-
Chalk	16.0	20.0	-	-	-	-	-

γ_{dry} – Dry unit weight; γ_{wet} – Dry unit weight; C_u – Undrained shear strength; φ' – Angle of shearing resistance: E_u – Undrained Young's modulus; E' – Drained Young's modulus; m_v - Coefficient of compressibility.

1 – Derived resistance and stiffens parameters for Made Ground are not provided in this table, it is not recommended to base foundations on this stratum.

8.9 AGGRESSIVE BURIED CONCRETE DESIGN

Five testing for buried concrete undertaken on various soil samples on site, according to BRE Special Digest 1 **(BRE, 2005)** and, as shown in Table 8-2. The results are discussed in Section 9.4.

Table 8-2 – BRE testing results

Exploratory ID	Top Sample depth (mbgl)	Geology	Sulphur, Total (%)	pH	Sulphate, acid soluble (total) (mg/l)	Soluble Sulphate 2:1 extract as SO4 BRE (mg/l)	Chloride 2:1 water/soil extract BRE (mg/l)	Nitrate as NO3, 2:1 water soluble (BRE) (mg/l)	Ammoniacal N as NH4 in 2:1 extract BRE (mg/l)	Magnesium (BRE) (mg/l)	Design Sulfate Class	ACEC Class
BH101	0.9	Cohesive Alluvium	0.02	8.19	52.6	23.4	3.0	45.4	1.22	8	DS-1	AC-1
BH102	0.1	Cohesive Alluvium	0.02	8.22	20.0	17.9	5.4	1.6	0.86	8	DS-1	AC-1
BH103	1.7	Cohesive Alluvium	0.02	8.31	20.0	11.6	3.6	4.0	1.28	8	DS-1	AC-1
BH103	4.5	Cohesive Alluvium	0.02	8.90	41.3	21.0	4.3	5.0	2.13	8	DS-1	AC-1
WS102	1.5	Cohesive Made Ground	0.07	7.63	102.0	253.0	6.8	239.0	2.08	8	DS-1	AC-1

9 PRELIMINARY GEOTECHNICAL ASSESSMENT

The Client intends to redevelop the land for residential purposes likely to be 4 storey flats with areas of public open space. At the time of writing this report information pertaining to proposed structural loads, foundation levels, settlement tolerances and final formation levels were yet to be established.

This section of the report provides a high level, preliminary geotechnical engineering assessment in relation to the proposed works.

9.1 FOUNDATIONS

At present, information pertaining to proposed structural loads, foundation levels and settlement tolerances are yet to be provided. Based on the proposed works, likely foundation loads and results of the ground investigation, it is recommended that foundations are not founded in Made Ground or soft Alluvial deposits due to their low strength, the potential for settlement (including differential settlement) and the presence of high groundwater.

It is considered that piles into the Chalk are likely to be required and continuous flight auger (CFA) piles are considered an appropriate construction technique. Nevertheless, the Designer and the Contractor shall identify an appropriate construction method applicable to the geotechnical conditions and site characteristics.

Ground improvement such as vibro stone columns may provide an alternative to piles but would likely require further ground investigation. The vibro stone column technique comprises a vibrating 'poker' penetrating the ground and displacing the soils to produce a cavity to a design depth through loose or weak ground onto a competent bearing stratum. The poker is then withdrawn and at the same time the cavity filled with hard inert graded stone. The stone is introduced in successive layers compacted by the vibrating poker at each layer forming a column of stone that is tightly interlocked with the surrounding ground.

The reinforcing action of the stone columns serves to significantly improve the load bearing characteristics of the ground. A specialist contractor normally undertakes the design of the stone columns. It is likely that a bearing pressure of typically around 125kN/m^2 will be achieved using this technique, although higher values can be achieved if desired.

The foundations could then be constructed at a shallow depth in the improved ground using conventional pad or strip foundations constructed off the improved soil. The settlement of pad foundations constructed off the vibro improved soil will be dependent on the layout of the columns beneath the footings.

A review of the groundwater data presented in Table 5-2 indicates that over the period monitored, the maximum groundwater level equated to a depth of 2.7m below existing ground level.

Excavations in made ground, alluvium and granular strata may experience sudden and unexpected collapse, stability is likely to be further reduced if groundwater seepage or inflows occur. It is likely that any excavations on the site will be unstable in the short term and will require shoring.

9.2 FLOOR SLABS

Building floor slabs will need to be suspended and supported on the piles. Should a ground improvement solution such as vibro stone columns be considered, ground bearing floor slabs may be possible should they extend across the building footprint.

9.3 PAVEMENT DESIGN

The in-situ CBR tests carried out gave a minimum value of 5% however, based on the lab CBR value obtained in the cohesive Made Ground a CBR value of 2% is recommended for pavement design.

9.4 BURIED CONCRETE DESIGN

Sulphate content and pH values of soil samples indicated design sulphate class for concrete DS-1. An aggressive chemical environment for concrete of ACEC class AC-1 in accordance with BRE Special Digest 1 (BRE, 2005).

The Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC) have been determined as DS-1 and AC1 based upon results presented in Section 8.9.

The concrete design class is based upon the following assumptions:

- Classification for Brownfield locations (according to BRE Special Digest 1 (BRE, 2005));
- Mobile groundwater conditions; and
- Pyrite is not present within the site extents.

10 RISK REGISTER

10.1 GEOTECHNICAL RISK REGISTER

A geotechnical risk register has been prepared, as shown below. A geotechnical risk register is considered a live document, and as such it must be updated as the project progresses. It should continue to be updated and guidance should be sought from all parties involved in the design and implementation of the works.

The scoring system used in this register can be seen in below:

Table 10-1 – Likelihood classification and risk evaluation

Probability (P)		Impact/Consequence (I)		Risk PxI=R		Impact/Consequence				
						1	2	3	4	5
Very Likely	5	Very High	5	Probability	1	1	2	3	4	5
Probable	4	High	4		2	2	4	6	8	10
Likely	3	Medium	3		3	3	6	9	12	15
Unlikely	2	Low	2		4	4	8	12	16	20
Negligible	1	Very Low	1		5	5	10	15	20	25

Table 10-2 – Geotechnical Risk Register

HAZARD	BEFORE CONTROL			RISK CONTROL MEASURE (RCM)	AFTER CONTROL		
	P	I	R		P	I	R
Variable or compressible strata at formation/foundation level.	3	3	9	Ground Investigation has been carried out to assess founding strata. Assessment of soil properties has been made based on GI findings and lab results. Adopt piled foundations or ground improvement, Recommendations for a Geotechnical Engineer to assess the ground conditions during the construction have been provided.	2	2	4
Frost Susceptible Soils	3	3	9	Chalk materials are recorded following the Ground Investigation therefore should be considered as frost susceptible materials. A minimum 450 mm road construction is	1	3	3

HAZARD	BEFORE CONTROL			RISK CONTROL MEASURE (RCM)	AFTER CONTROL		
	P	I	R		P	I	R
				recommended, this should be achievable given the coverage of the Chalk by the Alluvium.			
Chemical attack on buried concrete.	3	3	9	Geochemical testing on material encountered has been carried out as part this GI. Design Class (DC) and Aggressive Chemical Environment Classification have been determined based on GI data according to BRE SD1.	1	3	3
Encountering Groundwater	2	3	6	Standpipes were installed to facilitate groundwater monitoring. Excavations should be monitored for water in-flow rates which could make sides of excavation unstable. It is considered likely that shallow flow can be controlled by conventional sumps and pumping should groundwater be encountered.	1	3	3

11 CONCLUSION AND RECOMMENDATIONS

11.1 SUMMARY OF SITE INVESTIGATION

WSP was instructed to carry out a combined geo-environmental and geotechnical ground investigation and assessment of the land at the corner of North Street and Wendale Street, Reading. The Site is proposed to be redeveloped as 4 storey flats with areas of public open space. Final formation levels of the proposed development are yet to be confirmed.

The Site is currently a vacant plot of land occupied by the floor slab of the former school building. Previous development at the Site has included a school and terraced housing.

A ground investigation comprising the drilling of three deep boreholes and three shallow boreholes was required to obtain information on the ground and groundwater conditions. This information was used to assess the potential risk to human health and controlled waters from potential sources of contamination. Geotechnical data was also required to inform the preliminary design for the proposed development.

Ground conditions at the Site comprised Made Ground of between 0.50m to 2.00m in thickness (the greatest thickness in the centre of the Site) overlying alluvial deposits. Superficial Taplow Gravels were encountered in one location in the southern half of the Site. Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) was encountered at depth across the Site and extended to the base of all exploratory holes.

Resting groundwater at the Site is between 36.43m to 36.82m AOD. Regional groundwater flow considered to be to the south east.

11.2 GEO-ENVIRONMENTAL CONCLUSIONS

Generally, no visual or olfactory evidence of contamination was identified during the investigation. The Made Ground typically comprises reworked soils containing brick and concrete fragments; isolated fragments of coal were identified in WS102 (between 1.3m and 1.5m) depth.

Exceedances of the relevant generic assessment criteria have been identified for lead and beryllium across the Site within the Made Ground. However, the exceedances are considered to represent a moderate to low risk to future site users and risks can be mitigated during construction. One positive identification of asbestos was recorded with BH103.

The exceedances of lead and beryllium and the presence of asbestos within soil will require the implementation of control measures during construction including the placement of materials beneath areas of hard-standing / buildings and / or a suitable thickness of clean cover. Appropriate control measures will be required during any future below groundworks to mitigate the potential for the generation of dust and mobilisation of asbestos fibres.

The Site has been characterised as a CIRIA Characteristic Situation 2 and ‘Amber 1’ under the NHBC traffic light scheme. Therefore, basic gas protection measures will be required for the new buildings. Additional testing of the organic matter within the alluvium could reduce the classification of the Site.

The overall risk to human receptors is consider **Moderate to Low** due to the identification of limited contaminants localised to one location and due to the Sites gas regime. While the risk to controlled waters is considered **Low** due to limited exceedances within the groundwater.

Recommended Remedial Works

- It is recommended that the risk to human health is mitigated through placement of imported material over the Made Ground in areas of soft landscaping.
- It should be noted that contaminants such as asbestos can be present in soil in discrete pockets and any sampling frequency cannot guarantee the absence of contaminants of this nature in areas between sample locations. The Client should ensure that suitable precautions, controls and monitoring are in place during earthworks activities and suspicious materials should be managed through procedures defined by the Client within an Asbestos Management Plan in accordance with the Control of Asbestos Regulations 2012.
- Basic gas protection measures required which will include both reinforced concrete cast in-situ floor slab (suspended, non-suspended or raft) with at least 1,200 g DPM2 and underfloor venting and beam and block or pre-cast concrete slab and minimum 2,000 g DPM/reinforced gas membrane. All joints and penetrations should be sealed.
- As piling is required as a foundation solution a piling risk assessment will be required to ensure the underlying principal aquifer is not contaminated.

Waste and Materials

From an environmental perspective, there is no requirement to remove materials from site to permit development and all materials should be retained and re-used on site, where possible.

11.3 GEOTECHNICAL CONCLUSIONS

The geotechnical risks have been addressed in the Geotechnical Risk Register provided in Section 10.

Piled foundations and suspended floor slabs are considered the most appropriate foundation solution based on the available ground investigation information. CFA piles are considered an appropriate piling technique.

Ground improvement using vibro stone columns may provide alternative to using piles and may enable the use of ground bearing floor slabs. This would be subject to confirmation of structural loads and possible further ground investigation.

Appendix A

FIGURES AND DRAWINGS

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Date Modified: 28/01/2020

Drawn By: EJ

File: \\uk.wspgroup.com\central data\Projects\70012xxx\70012984 - RBC Housing Sites, Reading\03 WIP\GRR\North Street Reading\Information\GIS\Draft bore hole plan.mxd

Legend

Site Boundary

Contains Ordnance Survey data © Crown copyright and database right 2020.

0 0.050.1 0.2 0.3 0.4 Kilometres

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community, Esri, and the GIS user community

wsp

TITLE:

70012894-020
North Street, Reading

FIGURE No:

Figure 1
Site Location

Date Modified: 28/01/2020

Drawn By: EJ

File: \\uk.wspgroup.com\central data\Projects\70012xxx\70012984 - RBC Housing Sites, Reading\03 WIP\GRR\North Street Reading\Information\GIS\Draft bore hole plan.mxd

Legend

Site Boundary

0 0.00375 0.075 0.015 0.0225 0.03 Kilometres

Contains Ordnance Survey data © Crown copyright and database right 2020.

Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

wsp

TITLE:

70012894-020
North Street, Reading

FIGURE No:

Figure 2
Site Layout

1B2P - Type B	1	2	51.9	51.9		
1B2P - Type	6	12	52.5	315		
1B2P -	1	2	56.7	56.7		
1B2P	1	2	57.4	57.4		
2B3P	2	6	64.4	128.8		
2B4P -	1	4	70.0	70		
2B4P -Type B	4	16	70.4	281.6		
2B4P -Type C	3	12	70.6	211.8		
2B4P -Type D	3	12	77.6	232.8		
2B4P -Type E	1	4	77.2	77.2		
2B4P -Type F	1	4	76.6	76.6		
2B4P -Type G	2	8	81.6	163.2		
2B4P -Type H	3	12	81.7	245.1		
2B4P -Type J	1	4	76.4	76.4		
3B5P	1	5	89.7	89.7		
Totals	41	125		2642.2	9	

Site Area (ha)	0.23
Density (dph)	178



Legend

Exploratory Hole Plan

Hole Type

- Rotary Cored
- Window Sampler
- Dynamic Cone Penetrometer

Project
Reading Affordable Housing Sites

North Street
Reading

Title
Proposed Ground Floor Plan

wsp

TITLE:
70012894-020
North Street, Reading

FIGURE No:
Figure 3
Proposed Development Plan

Contains Ordnance Survey data © Crown copyright and database right 2020.

0 0.0025 0.005 0.0075 0.01
Kilometres

Esri, HERE, Garmin, (c) OpenStreet

Date Modified: 14/02/2020
Drawn By: EJ
File: \\uk.wspgroup.com\central data\Projects\70012xxx\70012984 - RBC Housing Sites, Reading\03 WIP\GRR\North Street Reading\In

Legend

Exploratory Hole Plan

Hole Type

- Rotary Cored
- Window Sampler
- Dynamic Cone Penetrometer

BH101
BH102
BH103
WS101
WS102
WS103
DCP1
DCP2
DCP3
STN01 H=39.50
STN02 H=39.51
STN04 H=41.36
Old building base
Old drainage channel UTS Blocked
Paved area
Area of Non reinforced concrete
UTS Spoil heap
UTT No valve visible
ASPHALT
CONCRETE
GRASS
TREE RADIUS:2M BOLE:0.2M
TREE RADIUS:5M BOLE:0.6M
TREE RADIUS:3.5M BOLE:0.3M
TREE RADIUS:6M BOLE:0.6M
TREE RADIUS:6M BOLE:0.65M
TREE RADIUS:2M BOLE:0.25M
TREE RADIUS:2M BOLE:0.5M
TREE RADIUS:5M BOLE:0.35M
TREE RADIUS:7M BOLE:0.7M
TREE RADIUS:2M BOLE:0.3M
TREE BOLE:0.8M
TREE BOLE:0.4M
GPR 0.6d
GPR 0.5d
IR 2.00m
IR 1.00m
EOT
RS
TP
MH
IC
GU
SV
LP
OHT
UTS
UTT

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0 0.00125 0.0025 0.005 0.0075 0.01 Kilometres

Esri, HERE, Garmin, (c) OpenStreet

wsp

TITLE:

70012894-020
North Street, Reading

FIGURE No:

Figure 4
Exploratory Hole Plan

File: \\uk.wspgroup.com\central data\Projects\70012xxx\70012984 - RBC Housing Sites, Reading\03 WIP\GRR\North Street Reading\Information\GIS\Exploratory hole plan2.mxd
Drawn By: EJ
Date Modified: 14/02/2020

Appendix B

LIMITATIONS

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REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated

with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

28. The data is presented and will be compared with assessment criteria.

Appendix C

EXPLORATORY HOLE LOGS

Confidential

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	**BOREHOLE LOG**	Hole No. **BH101**
	Project North Street	Sheet 1 of 2
Job No 70012984	Client Reading Borough Council	Date 15-01-20 16-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470887.95 N 173667.95	39.41

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
							39.34	0.07	ASPHALT.		TARMAC	
0.20-0.40	ES						39.16	0.25			GMG	
0.40-0.60	ES		0				39.06	0.35	Red brown black slightly clayey gravelly COBBLES of brick and concrete. Gravel is fine to coarse angular to subangular of flint, brick and concrete. (MADE GROUND)		TARMAC	
			0				38.81	0.60			CMG	
									ASPHALT. Extremely weak.			
0.90-1.30	B								Black sandy CLAY with fine to coarse gravel sized tiles, glass and metals. (MADE GROUND)			
1.30-1.50	ES		0					(1.50)	Firm brown slightly gravelly sandy CLAY. Gravel is fine to coarse subangular to angular of flint. (ALLUVIUM)		ALV	
1.50-1.95	SPT	1,1,1 1,2,1 N=5 (S)										
			0				37.31	2.10	1.90 - 2.10 Pale brown gravelly sand. Gravel is fine to medium, subangular of chalk			
1.70-1.80	D											
2.00-2.45	SPT	1,1,2 2,2,2 N=8 (S)						(0.90)	Loose brown gravelly SAND. Gravel is fine and medium subangular of flint and chalk. (ALLUVIUM)		ALV	
2.20-3.00	B						36.41	3.00				
2.50-2.60	D											
3.00	SPT	2,2,3 3,4,4 N=14 (S)							Firm locally stiff pale brown occasionally cream sandy gravelly CLAY. Gravel is fine to coarse angular to subangular of flint and chalk. (ALLUVIUM) 3.50 - 3.60 Slightly clayey sandy GRAVEL 3.60 Gravel chalk fine to coarse subrounded to subangular			
3.00-4.00	B							(1.70)			ALV	
3.70-3.80	D											
4.00	SPT	1,2,2 2,2,1 N=7 (S)										
							34.71	4.70				
							34.56	4.85	Cream and black clayey fine to coarse subangular to angular GRAVEL of flint. (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated))		SECK	
5.00	SPT	2,2,3 3,2,2 N=10 (S)							CHALK recovered as clayey matrix with fine to coarse angular to subangular chalk clasts. Clasts are extremely weak to very weak medium-density cream with rare black specks matrix is cream occasional orangish staining on clast surfaces. Flint gravels at 5.0m to 5.3m bgl, singular coarse flint gravel at 6.0m bgl, angular flint gravel from 9.50m to 10.2m potentially broken up cobbles. (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)) 4.85 - 4.95 Flint cobble 5.00 - 5.50 Orangish staining			
6.00-6.10	D											
6.50-6.95	SPT	1,2,2 3,3,3 N=11 (S)						(5.35)			SECK	
7.60-7.70	D											
8.00-8.45	SPT	1,2,2 3,3,4 N=12 (S)										
9.30-9.40	D											

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt
15-01-20	12.40				
15-01-20	16.40	9.50	9.50		8
16-01-20	07.15	9.50	9.50		5
16-01-20	15.00				

Chiselling				Water Added	
From	To	Hours	Tool	From	To

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 15.5m bgl
Handpit terminated at 1.50m bgl

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

17 WSP BH LOG 70012984 - NORTH STREET, READING.GPJ WSPETEMPLATE7.00.GDT 3/3/20

WSP
1 Queens Street
Bristol BS2 0HQ
Telephone: 0117 930 6200

BOREHOLE LOG

Hole No. **BH101**

Project: North Street

Sheet: 2 of 2

Job No: 70012984

Client: Reading Borough Council

Date: 15-01-20 16-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470887.95 N 173667.95	39.41

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
9.50	SPT	2,3,3 4,3,4 N=14 (S)					29.21	10.20			SECK	
10.50-10.60	D								CHALK recovered as chalk gravel sized clasts and clayey matrix. Gravel is extremely weak to very weak medium-density cream matrix cream and sub-angular. Flint gravel at 11.5m and 12.1m, 12.5m to 13.15m and 15.5m. (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated))			
11.00-11.45	SPT	5,5,6 8,8,8 N=30 (S)										
11.70-11.80	D								11.50 - 11.70 Orange staining			
12.50-12.95	SPT	2,2,9 7,8,9 N=33 (S)						(5.30)			SECK	
13.50-13.60	D											
14.00	SPT	7,7,11 9,15,15 N=50/ 275mm (S)										
14.90-15.00	D											
15.50-15.78	SPT	8,12,13 13,12,12 N=50/ 280mm (S)					23.91	15.50	Borehole terminated at 15.5m bgl		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt
				125	

Chiselling

From	To	Hours	Tool

Water Added

From	To

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

General Remarks

Hole terminated at 15.5m bgl
Handpit terminated at 1.50m bgl

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

17 WSP BH LOG 70012984 - NORTH STREET, READING.GPJ WSPETEMPLATE7.00.GDT 3/3/20

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	**BOREHOLE LOG**	Hole No. **BH102**
	Project: North Street	Sheet: 1 of 2
Job No: 70012984	Client: Reading Borough Council	Date: 13-01-20 13-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470907.27 N 173657.24	39.52

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
0.00-0.50	B						39.47	0.05	CONCRETE. Paving slab.		CONC	
0.20	D		0				39.02	0.50	Brown sandy gravelly CLAY with occasional rootlets and rare metal fragments. Gravel is fine to coarse of flint, chalk and brick. (MADE GROUND)		CMG	
0.20-0.40	ES											
0.50-1.00	B		0									
0.50	D											
0.60-0.70	ES								Soft yellowish brown sandy CLAY. (ALLUVIUM)			
			0					(1.10)			ALV	
1.50	SPT	2,4,7 7,6,6 N=26 (S)					37.92	1.60	Medium dense to dense pale yellowish brown slightly clayey sandy fine to coarse subangular to rounded GRAVEL of flint. (TAPLOW GRAVELS)			
1.60-2.60	B							(1.05)			TG	
2.00	SPT	5,6,8 8,7,8 N=31 (S)	0				36.87	2.65	2.40 - 2.50 Dark orangish brown			
2.80-2.90	D								CHALK recovered as yellowish cream coloured clayey matrix with fine to coarse subangular to subrounded gravel sized clasts. Clasts are very weak medium-density cream with occasional dark orangish brown staining on fracture surface. Matrix is cream with rare orange staining. Rinded nodular flint cobble at 3.40m bgl. (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated))			
3.00-3.45	SPT	2,5,8 7,7,6 N=28 (S)						(1.35)			SECK	
3.50-3.60	D						35.52	4.00				
4.00-4.50	SPT	1,2,3 3,2,3 N=11 (S)	0						CHALK recovered clay matrix with fine to coarse subangular gravel sized clasts. Clasts are very weak to weak medium-density cream. Matrix is cream. Nodular rinded flint gravel 4.0m to 4.5m potential cobble broken up.(Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated))			
4.50-4.60	D							(1.00)			SECK	
							34.52	5.00				
5.00-5.45	SPT	2,2,4 5,5,6 N=20 (S)							CHALK recovered as clay matrix with fine to coarse subangular gravel sized clasts. Clasts are weak none medium and high density cream with rare black specks. Matrix is cream rare orangish brown staining. Rinded nodular flint cobble 7.3m to 7.4m. (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated))			
6.00-6.10	D											
6.50-6.95	SPT	1,2,3 3,3,6 N=15 (S)						(4.00)			SECK	
									7.30 - 7.50 Orangish brown staining			
7.50-7.60	D											
8.00-8.45	SPT	2,3,4 4,3,6 N=17 (S)										
8.80-8.90	D						30.52	9.00				
									CHALK recovered as clay matrix with fine to coarse subangular gravel sized clasts. Gravel is very weak to weak medium-density cream with rare black specks and sub-angular. Rinded nodular flint at 9.50m, 10.2m and 12.0m (cobble). (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated))		SECK	

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt
13-01-20	06.00				
13-01-20	16.05	2.00	1.50		Dry
14-01-20	07.15	2.00	1.50		Dry
15-01-20	12.35				

Chiselling				Water Added	
From	To	Hours	Tool	From	To

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 17.0m bgl
Handpit to 1.50m bgl

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	**BOREHOLE LOG**	Hole No. **BH102**
	Project: North Street	Sheet: 2 of 2
Job No: 70012984	Client: Reading Borough Council	Date: 13-01-20 13-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470907.27 N 173657.24	39.52

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
9.50-9.95	SPT	4,6,7 7,7,7 N=28 (S)							CHALK recovered as clay matrix with fine to coarse subangular gravel sized clasts. Gravel is very weak to weak medium-density cream with rare black specks and sub-angular. Rinded nodular flint at 9.50m, 10.2m and 12.0m (cobble). (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)) *(continued)*			
10.50-10.60	D							(3.80)				
11.00-11.45	SPT	3,5,5 7,8,6 N=26 (S)									SECK	
12.20-12.30	D											
12.50-12.95	SPT	4,6,7 7,7,7 N=28 (S)					26.72	12.80				
									CHALK recovered as clay matrix with fine to coarse angular gravel sized clasts. Clasts are very weak to weak medium and high density cream. Matrix is cream rare pale orange staining. Rinded flint at 13.60m bgl. (Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated))			
13.70-13.80	D							(1.20)			SECK	
14.00-14.45	SPT	4,6,7 9,11,9 N=36 (S)					25.52	14.00				
14.60-14.70	D								CHALK recovered as clay matri with gravel sized clasts. Gravel is extremely weak to very weak medium-density cream and sub-angular. Flint at 14.00m bgl, 15.10m bgl, 16.40m bgl and 16.90m bgl. Matrix is cream with rare orange staining.(Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)) 14.70 - 14.90 Rare orange / brown staining			
15.50-15.95	SPT	5,6,7 8,9,12 N=36 (S)						(3.00)			SECK	
16.00-16.10	D								16.60 - 16.70 Weak high density chalk			
17.00-17.50	SPT	8,8,9 8,17,12 N=46 (S)					22.52	17.00				
									Borehole terminated at 17.0m bgl		END	

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt
14-01-20	17.00	14.00	9.00	125	8.5
15-01-20	07.15	14.00	9.00		6

Chiselling				Water Added	
From	To	Hours	Tool	From	To

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 17.0m bgl
Handpit to 1.50m bgl

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

17 WSP BH LOG 70012984 - NORTH STREET, READING.GPJ WSPETEMPLATE7.00.GDT 3/3/20

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	**BOREHOLE LOG**	Hole No. **BH103**
	Project: North Street	Sheet: 1 of 2
Job No: 70012984	Client: Reading Borough Council	Date: 20-01-20 20-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470916.42 N 173671.27	39.55

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
							39.35	0.20	Reinforced CONCRETE.		CONC	
							39.20	0.35	Red and brown sandy fine to coarse subangular to subrounded GRAVEL of flint. With concrete and cobble size bricks. (MADE GROUND)		GMG	
0.40-0.50	ES		0									
0.50-1.00	B							(0.75)	Very dark grey gravelly CLAY with numerous brick and tile fragments. Gravel is fine to coarse angular to subrounded of flint. (MADE GROUND)		CMG	
							38.45	1.10				
1.10-1.40	D		0				38.15	1.40	Dark brown sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded of flint. Reworked natural. (MADE GROUND)		CMG	
1.40-1.90	B		0									
1.50-1.60	ES							(0.50)	Soft brown gravelly slightly sandy CLAY. Gravel is medium and coarse angular to subangular of flint. (ALLUVIUM)		ALV	
1.50-1.95	SPT	1,2,1 2,2,3 N=8 (S)					37.65	1.90				
1.70-1.80	D							(0.90)	Medium density yellowish cream clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular of flint and sub angular to sub rounded of chalk. (ALLUVIUM)		ALV	
2.00	SPT	2,2,3 3,3,3 N=12 (S)	0			1	36.75	2.80				
2.60-2.70	D					1			Stiff locally firm cream and yellowish brown gravelly slightly sandy CLAY. Gravel is fine to coarse subangular to subrounded of chalk and rare angular to sub angular of flint. Chalk clasts high density very weak, matrix cream with rare black speckles. (ALLUVIUM)		ALV	
2.80-3.90	B							(1.10)				
3.00-3.45	SPT	3,3,3 3,3,3 N=12 (S)	0				35.65	3.90				
3.50-3.60	D								Firm pale brown gravelly sandy CLAY. Gravel is fine and medium angular to subrounded of flint and chalk. (ALLUVIUM)		ALV	
4.00-4.45	SPT	1,1,2 2,3,2 N=9 (S)						(1.20)				
4.50-4.60	D						34.45	5.10				
5.00	SPT	2,2,3 4,4,3 N=14 (S)						(0.80)	Medium dense pale brown clayey sandy fine to coarse angular to subangular GRAVEL of flint with rare fine chalk. (ALLUVIUM)		ALV	
5.10-5.90	B						33.65	5.90				
6.10-6.20	D								CHALK recovered as clay matrix with fine to coarse subangular gravel sized clasts. Clasts are very weak none low and medium density cream with rare black specks. Matrix is cream. Rinded flint cobble at 6.30 bgl.(Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)) 6.50 - 8.00 No recovery flint and chalk gravel in liner		SECK	
6.50	SPT	2,3,3 2,2,1 N=8 (S)						(2.10)				
							31.55	8.00				
8.00-8.45	SPT	3,2,3 3,2,3 N=11 (S)						(1.30)	CHALK recovered as clay matrix with fine to coarse subangular gravel sized clasts. Clasts are very weak medium-density cream with occasional black specks. Matrix is cream. Rinded flint cobble at 8.30m bgl. flint gravel at 8.70m bgl. rinded nodular flint cobble at 9.30m bgl. Occasional orange staining.(Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)) 8.00 - 8.30 No recovery		SECK	
9.00-9.10	D						30.25	9.30				
											SECK	

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt
20-01-20 21-01-20	06.10 16.35				

Chiselling				Water Added	
From	To	Hours	Tool	From	To

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing
20-01-20		3.20	20	2.95	

General Remarks
Hole terminated at 15.50m bgl
Handpit terminated at 1.50m bgl

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

17 WSP BH LOG 70012984 - NORTH STREET, READING.GPJ WSPETEMPLATE7.00.GDT 3/3/20

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	**BOREHOLE LOG**	Hole No. **BH103**
	Project North Street	Sheet 2 of 2
Job No 70012984	Client Reading Borough Council	Date 20-01-20 20-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470916.42 N 173671.27	39.55

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
9.50-9.95	SPT	3,4,4 5,4,4 N=17 (S)							CHALK recovered as clay matrix with gravel sized clasts. Gravel is very weak none low and medium density cream and sub-angular. Broken rinded flint cobble at 14.70m and 11.40m, angular flint gravel at 15.50m, rare flint. 9.90m rinded nodular flint and at 13.20, at 10.70m. Matrix cream.(Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)) *(continued)*			
10.50-10.60	D											
11.00-11.45	SPT	4,4,5 5,6,5 N=21 (S)							11.00 - 11.20 No recovery			
11.90-12.00	D											
12.50-12.95	SPT	5,6,6 6,6,7 N=25 (S)						(6.20)			SECK	
13.40-13.50	D											
14.00-14.45	SPT	5,6,7 8,7,11 N=33 (S)							14.00 - 14.70 No recovery			
15.20-15.30	D						24.05	15.50				
15.50	SPT	17,8,23 17,10 N=50/ 180mm (S)							Borehole terminated at 15.5m bgl		END	

Boring Progress						Water Strikes					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt	Date	Time	Strike	Minutes	Standing	Casing
20-01-20	17.00	14.00	14.00	125	7						
21-01-20	07.15	14.00	14.00		7						

Chiselling				Water Added	
From	To	Hours	Tool	From	To

General Remarks
Hole terminated at 15.50m bgl
Handpit terminated at 1.50m bgl

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

WINDOW SAMPLE LOG

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	Project: North Street	Hole No.: WS101 Sheet: 1 of 1
Job No: 70012984	Client: Reading Borough Council	Date: 16-01-20 17-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470883.71 N 173656.00	39.93

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
0.20-0.40	ES	.	0				39.43	(0.50) 0.50	Soft very dark brown slightly sandy slightly gravelly CLAY with numerous rootlets occasional brick fragments. Gravel is fine to coarse subangular to subrounded of flint. (MADE GROUND)		CMG	
0.50-1.00	B	.	0						Soft to firm brown sandy CLAY with occasional rootlets. (ALLUVIUM)			
0.60	D	.	0									
1.50-2.30	B (S)	2,2,1 4,4,3 N=12.	0					(1.80)			ALV	
2.00	(S)	2,7,6 6,7,8 N=27.					37.63	2.30				
2.30-3.00	B	.	0						Cream and pale brown slightly clayey slightly sandy GRAVEL. Gravel fine to coarse subrounded to subangular flint and chalk. (ALLUVIUM)			
								(0.70)			ALV	
3.00	(S)	3,2,2 1,1,1 N=5.					36.93	3.00				
									Borehole terminated at 3m bgl to complete downhole permeability test		END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
3.00	102	102									

General Remarks
Hole terminated at 3.0m bgl to complete downhole permeability test
Handpit terminated at 1.50m bgl
At start of shift water at 2.70m bgl

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

17 WSP WINDOW SAMPLE LOG 70012984 - NORTH STREET, READING.GPJ WSPETEMPLATE7.00.GDT 13/2/20

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	**WINDOW SAMPLE LOG**	Hole No. **WS102**
	Project North Street	Sheet 1 of 1
Job No 70012984	Client Reading Borough Council	Date 17-01-20 17-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470905.51 N 173666.17	39.54

SAMPLES & TESTS							STRATA						
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill	Dia. mm
							39.50	0.04	CONCRETE		CONC		
							39.35	0.19	CONCRETE		CONC		
							39.29	0.25			GMG		
0.25-0.75	B	.							Brown fine subangular GRAVEL of flint. (MADE GROUND)				
0.35-0.45	ES	.							Very soft very dark grey very gravelly CLAY with occasional fine and medium gravel sized brick fragments. Gravel fine to medium subangular of flint. (MADE GROUND)				
0.40		.	0						0.25 Red brick (cobble sized)				
0.50	D	.						(1.75)			CMG		
1.30		.	0						1.30 - 1.50 Coal fragments				
1.40-1.50	ES	.											
1.50	D (S)	1,1,4 5,5,6 N=20.	0										
1.50-1.95	SPT (S)	1,1,4 5,5,6 N=20.	0				37.54	2.00	1.80 Bone fragment				
2.00	(S)	1,1,2 2,2,2 N=8.	0					(1.60)	Firm brown gravelly sandy CLAY. Gravel fine and medium subangular of flint. (ALLUVIUM)		ALV		
3.00	(S)	1,1,2 2,2,3 N=9.	0				35.94	3.60					
3.80-4.00	D	.					35.54	(0.40) 4.00	Pale brown slightly clayey gravelly SAND. Gravel fine to coarse subrounded to angular of flint. (ALLUVIUM)		ALV		
4.00-4.45	SPT (S)	1,4,3 3,2,3 N=11.							Borehole terminated at 4.0m bgl due to collapse of borehole		END		

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
4.00	102	102									

General Remarks
Hole terminated at 4.0m bgl due to collapse
Handpit terminated at 1.50m bgl
At end of borehole water standing at 2.70m bgl

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

17 WSP WINDOW SAMPLE LOG 70012984 - NORTH STREET, READING.GPJ WSPETEMPLATE7.00.GDT 13/2/20

WINDOW SAMPLE LOG

WSP 1 Queens Street Bristol BS2 0HQ Telephone: 0117 930 6200	Project: North Street	Hole No.: WS103 Sheet: 1 of 1
Job No: 70012984	Client: Reading Borough Council	Date: 17-01-20 17-01-20

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (470955 173682)	Ground Level (m)
ADP Group Limited	Comacchio 305	EJ	E 470920.92 N 173659.65	39.73

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (m)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
							39.54	0.19	ASPHALT.		TARMAC	
							39.48	0.25	CONCRETE.		CONC	
0.30-0.40	ES	.	0				39.43	0.30	0.19 Re bar		CMG	
0.50	D	.					39.13	(0.30) 0.60	Stiff brown gravelly CLAY with rare cobble size bricks. Gravel is fine to coarse angular to subangular of flint concrete and brick. (MADE GROUND)		CMG	
0.70-1.20	B	.						(0.70)	Brown and cream gravelly CLAY with rare brick fragments. Gravel is fine and medium angular to subangular of flint and chalk. (MADE GROUND) Soft brown sandy slightly gravelly CLAY. Gravel is fine and medium subangular of flint. (ALLUVIUM)		ALV	
1.20-1.30	ES	.	0				38.43	1.30				
1.50	(S)	1,1,1 1,2,2 N=6.					38.13	(0.30) 1.60	Brown very gravelly CLAY. Gravel is fine to coarse angular to subangular of flint. (ALLUVIUM)		ALV	
1.70-1.80	D	.					37.83	(0.30) 1.90	Loose brown slightly clayey sandy fine to coarse angular to subrounded GRAVEL of flint. (ALLUVIUM)		ALV	
2.00-3.00	B (S)	2,4,3 4,5,3 N=15.						(1.10)	Medium density pale brown slightly clayey sandy fine to coarse angular to subrounded GRAVEL of flint and rare chalk. (ALLUVIUM) 2.45 - 2.55 Chalk gravel very clayey and cream		ALV	
							36.73	3.00	2.90 - 3.00 Very clayey and cream			
									Borehole terminated at 3.0m bgl		END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
3.00	102	102									

General Remarks
Hole terminated at 3.00m bgl to ensure a monitoring well could be installed within the gravels
Hole dry

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

17 WSP WINDOW SAMPLE LOG 70012984 - NORTH STREET, READING.GPJ WSPETEMPLATE7.00.GDT 13/2/20



1. BH101: Handpit to 1.5m bgl



2. BH101: 1.50m to 2.00m bgl



3. BH101: 2.0m to 3.00m bgl



4. BH101: 4.0m to 5.00m bgl



5. BH101: 6.50m to 5.00m bgl



6. BH101: 6.50m to 8.00m bgl



7. BH101: 9.50m to 11.00m bgl



8. BH101: 11.0m to 12.50m bgl



9. BH101: 12.50m to 14.00m bgl



10. BH101: 14.00m to 15.50m bgl



11. BH102: : Handpit - 0m to 1.50m bgl



12. BH101: 1.50m to 2.00m bgl



13. BH102: 2.00m to 3.00m bgl



14. BH101: 3.00m to 4.00m bgl



15. BH102: 5.00m to 6.50m bgl



16. BH101: 6.50m to 9.50m bgl



17. BH102: 9.50m to 11.00m bgl



18. BH101: 11.00m to 12.50m bgl



19. BH102: 12.50m to 14.00m bgl

20.



21. BH101: 14.00m to 15.50m bgl

22.



23. BH103: : Handpit - 0.00m to 1.50m bgl

24.



25. BH103: 1.50m to 3.00m bgl

26.



27. BH103: 3.00m to 5.00m bgl

28.



29. BH103: 5.00m to 8.00m bgl

30.



31. BH103: 8.00m to 11.00m bgl

32.



33. BH103: 11.00m to 14.00m bgl

34.



35. BH103: 14.00m to 15.50m bgl

36.



37. WS101: : Handpit - 0.00m to 1.50m bgl

38.



39. WS101: 1.50m to 2.00m bgl

40.



41. WS101: 2.00m to 3.00m bgl

42.



43. WS102: Handpit - 0.00m to 1.50m bgl

44.



45. WS102: 1.50m to 3.00m bgl

46.



47. WS103: : Handpit - 0.00m to 1.50m bgl

48.



49. WS103 1.50 to 3.00m bgl

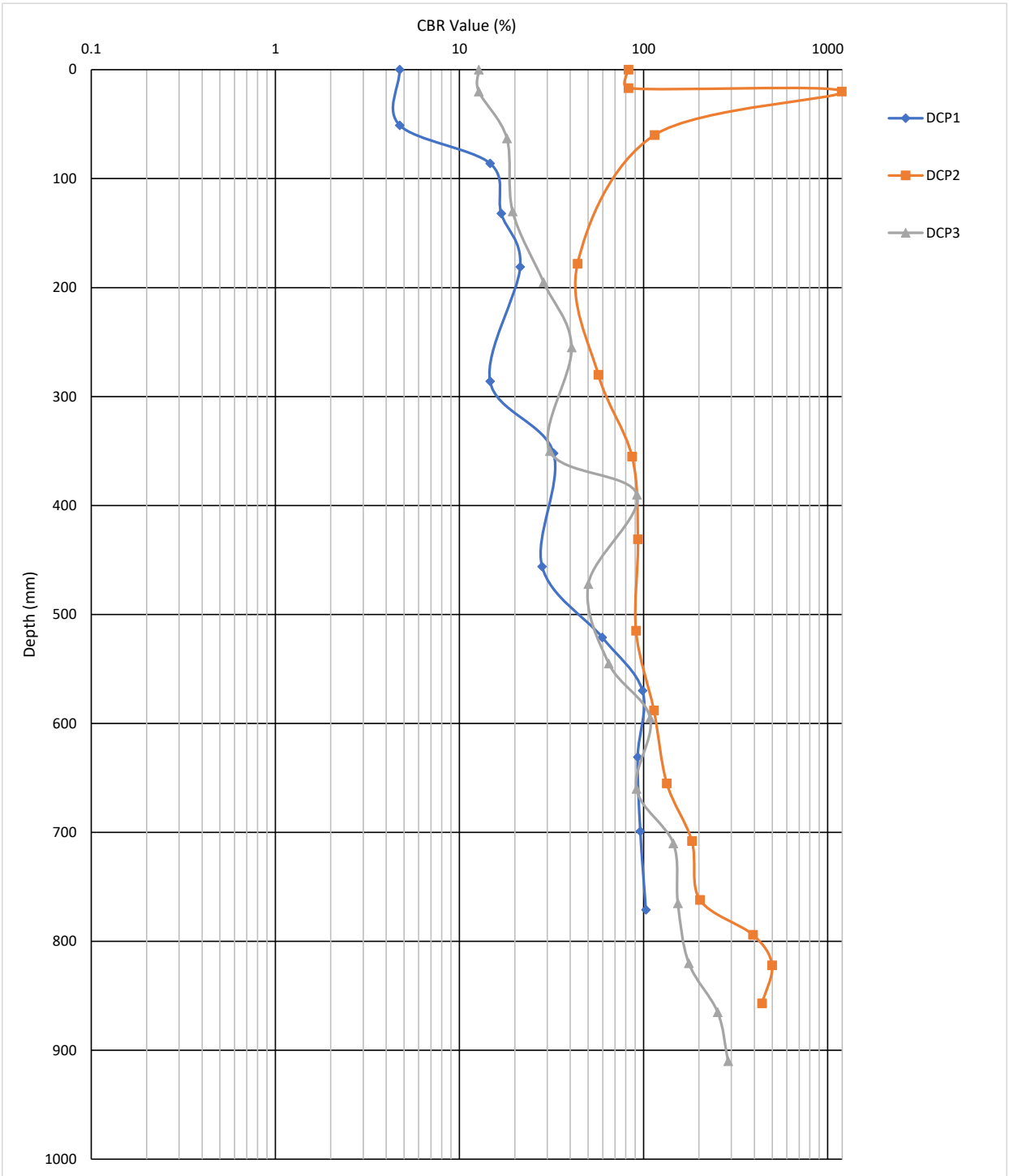
Appendix D

DYNAMIC CONE PENOTROMETER RESULTS

Confidential

Graphical Summary of TRL DCP Results

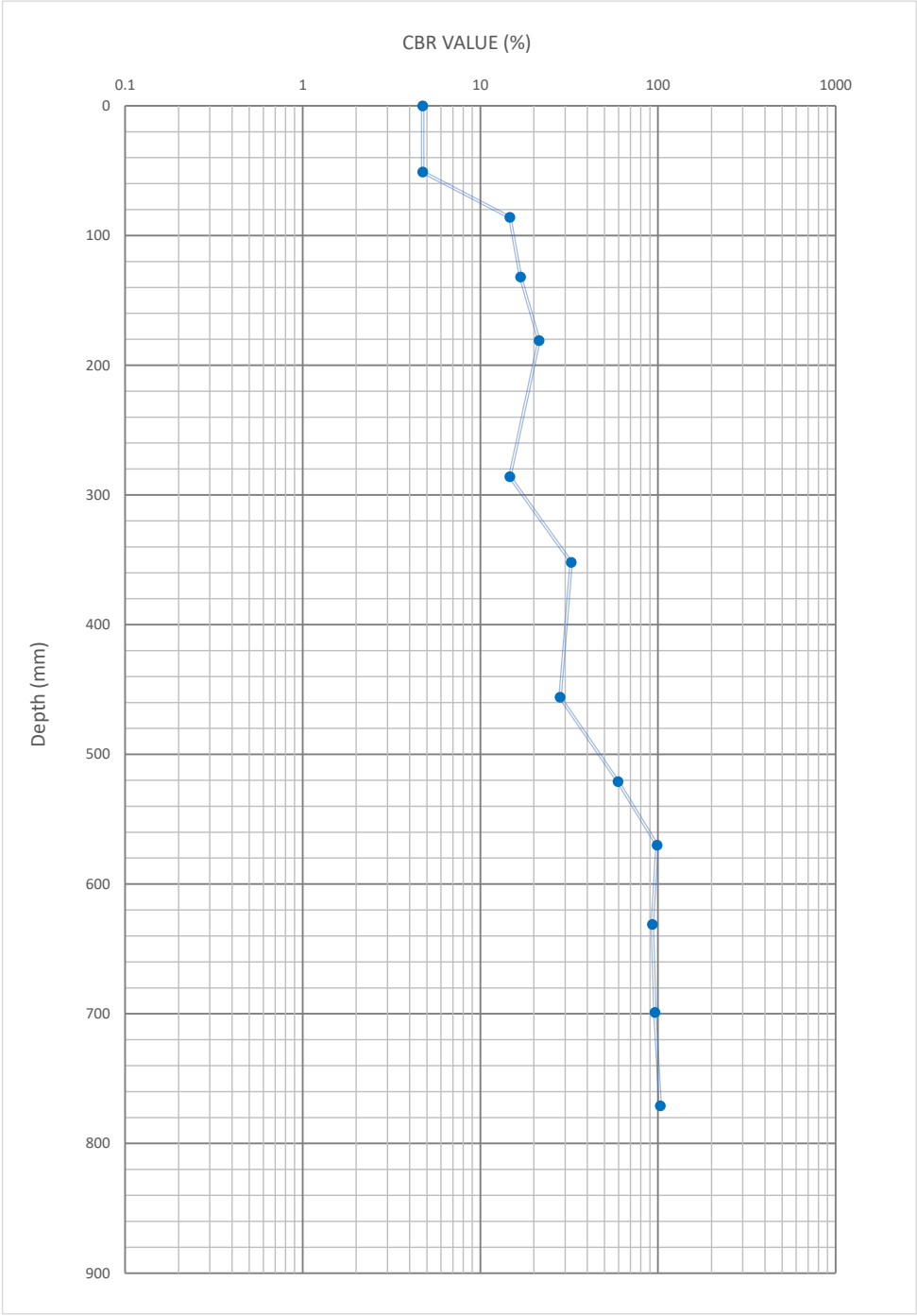
Project No.	Project Name
	North Street Reading
Client Job No.	
-	



KL020R TRL DCP Graphical Summary		

	Determination of the In-Situ CBR of Soil using TRL Dynamic Cone Penetrometer Method - Design Manual for Roads/Pavement Foundations Draft HD 25 (2009)	Project No.	
		TRL DCP No.	DCP1
Project Name	North Street Reading	Top Depth (m)	0.8
Soil Description	Subbase - 6F2	Easting	-
Client Job No.	-	Northing	-
Client Name	Reading Borough Council	Date of Test	16/01/20
Test Location	North east corner	Weather	Wet

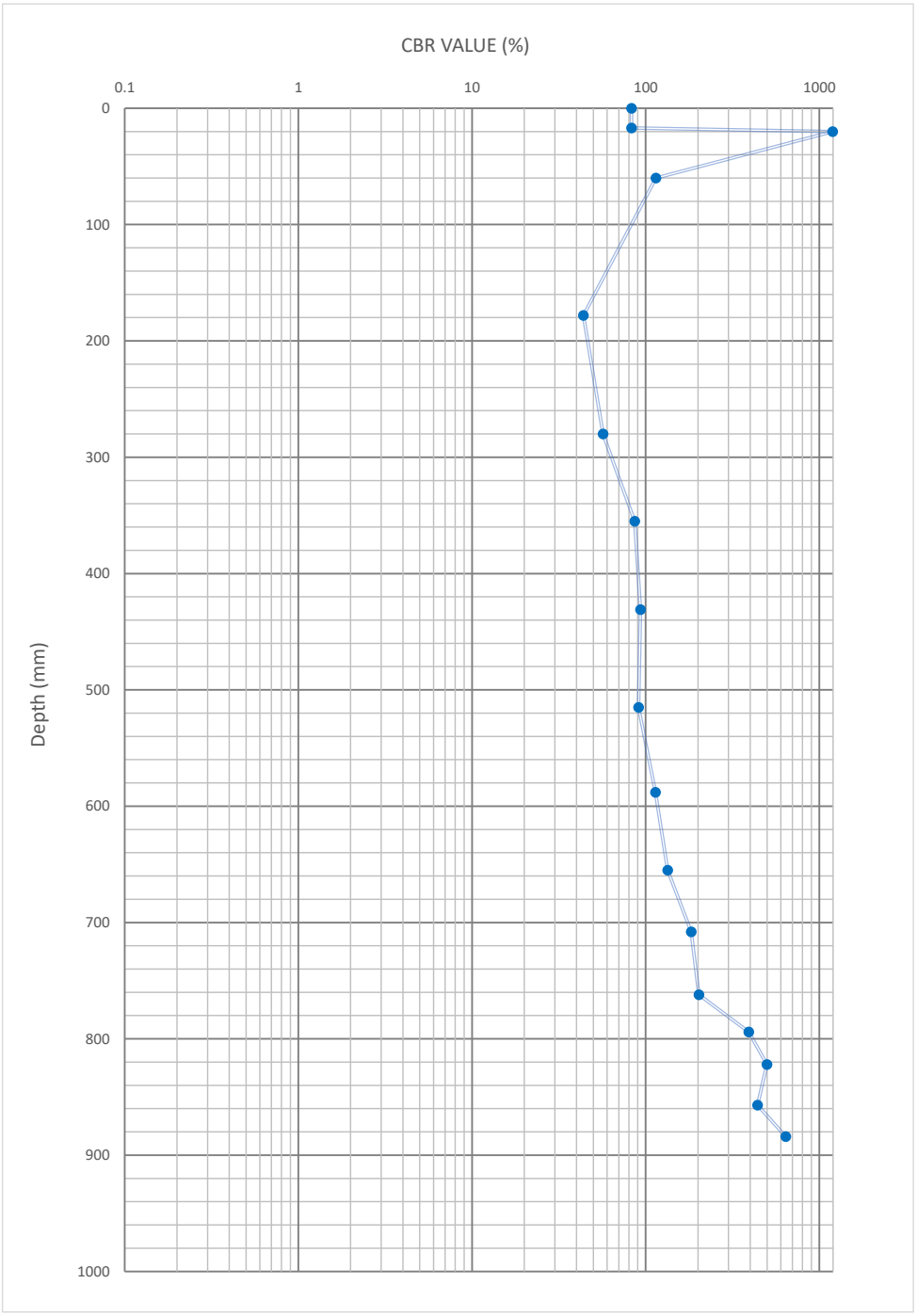
Depth (mm)	CBR (%)
51	5
86	15
46	17
181	21
286	15
352	32
456	28
521	60
570	99
631	93
699	96
771	103



KL020R TRL DCP		Date		Remarks
Page No.	2	27/01/20		

	Determination of the In-Situ CBR of Soil using TRL Dynamic Cone Penetrometer Method - Design Manual for Roads/Pavement Foundations Draft HD 25 (2009)	Project No.	
		TRL DCP No.	DCP2
Project Name	North Street Reading	Top Depth (m)	1
Soil Description	Made Ground	Easting	-
Client Job No.	-	Northing	-
Client Name	Reading Borough Council	Date of Test	16/01/20
Test Location	South east corner	Weather	Wet

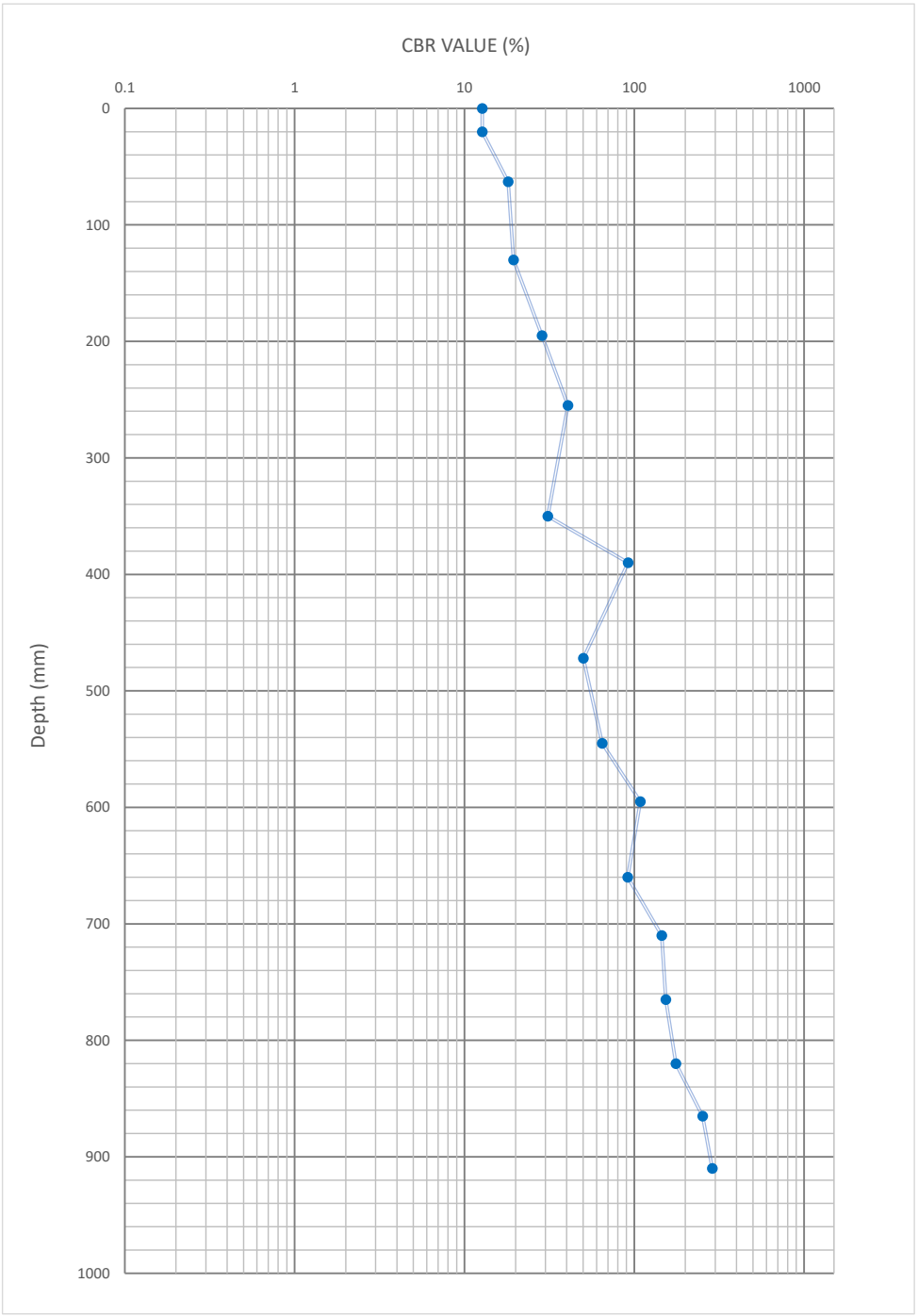
Depth (mm)	CBR (%)
17	83
20	1192
60	115
118	44
280	57
355	87
431	93
515	91
73	114
655	134
708	183
762	203
794	392
822	499
857	440
884	641



KL020R TRL DCP		Date		Remarks
Page No.	3	27/01/20		

	Determination of the In-Situ CBR of Soil using TRL Dynamic Cone Penetrometer Method - Design Manual for Roads/Pavement Foundations Draft HD 25 (2009)	Project No.	
		TRL DCP No.	DCP3
Project Name	North Street Reading	Top Depth (m)	0.4
Soil Description	Subbase - 6F2	Easting	-
Client Job No.	-	Northing	-
Client Name	Reading Borough Council	Date of Test	16/01/20
Test Location	Centre east	Weather	Wet

Depth (mm)	CBR (%)
20	13
63	18
130	19
195	29
255	41
350	31
390	92
472	50
545	65
595	109
660	91
710	145
765	154
820	176
865	253
910	288



KL020R TRL DCP		Date		Remarks
Page No.	4	27/01/20		

Appendix E

DOWNHOLE PERMEABILITY RESULTS

Confidential

Project: North Street
Code: 70012984
Client:

Downhole permeability TEST

TEST DATA

Pit reference		**WS101**
Pit depth (m)		2.18
Hand Pit Diameter(m)		0.34
Borehole Diameter (m)		0.10
Area of hand pit (m2)		0.09
Area of borehole (m2)		0.08
Depth to standing water (m)		0.81

Test 1

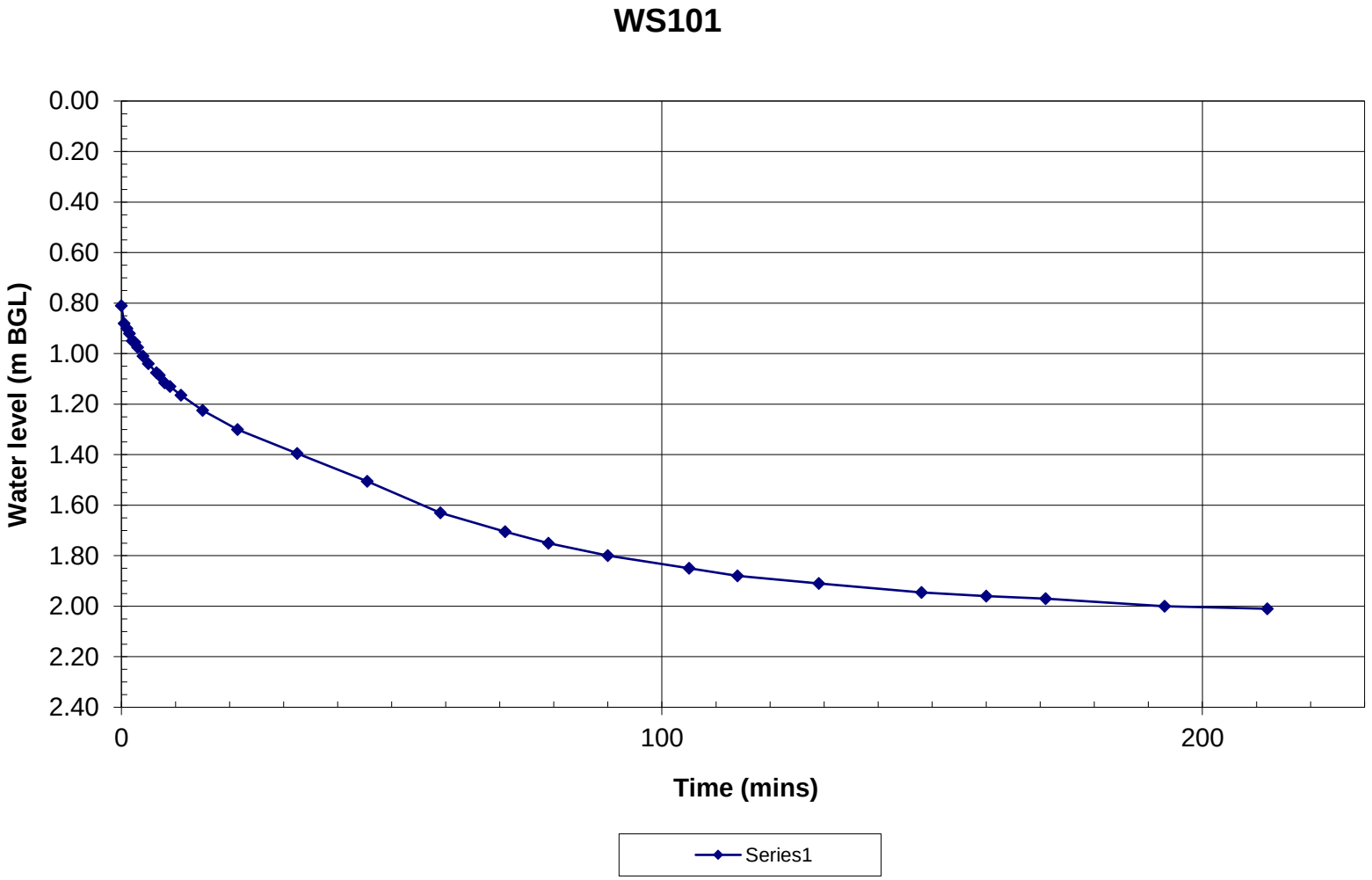
Time (min)	**Depth (m)**
0.0	0.81
0.5	0.88
1.0	0.90
1.5	0.92
2.0	0.95
2.5	0.96
3.0	0.98
4.0	1.01
5.0	1.04
6.5	1.08
7.0	1.09
8.0	1.12
9.0	1.13
11.0	1.17
15.0	1.23
21.5	1.30
32.5	1.40
45.5	1.51
59.0	1.63
71.0	1.71
79.0	1.75
90.0	1.80
105.0	1.85
114.0	1.88
129.0	1.91
148.0	1.95
160.0	1.96
171.0	1.97
193.0	2.00
212.0	2.01

Max. depth (m)	2.18
Effective depth (m)	0.81
Effective drop (m)	1.37
75% effective depth (m)	1.84
50% effective depth (m)	1.50
25% effective depth (m)	1.15
t75 (min)	103.00
t50 (min)	45.00
t25 (min)	10.00
Vp 75-25	0.06
ap 50	0.2179009
tp 75-25	93.00

Soil infiltration rate (m/s)	**4.83E-05**			
Soil infiltration rate (mm/hr	**1.74E+02**			

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0 sec


WS101
Water level (m BGL)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
2.20
2.40
0
100
200
Time (mins)
Series1

Project: North Street
Code: 70012984

Downhole Permeabiltiy TEST

TEST DATA

Pit reference		**WS103**
Pit depth (m)		3.00
Borehole diameter (m)		0.05
Pit area m3		0.001963495
Pit perimeter m2		0.157079633
Depth to standing water (m)		0.98

Test 1

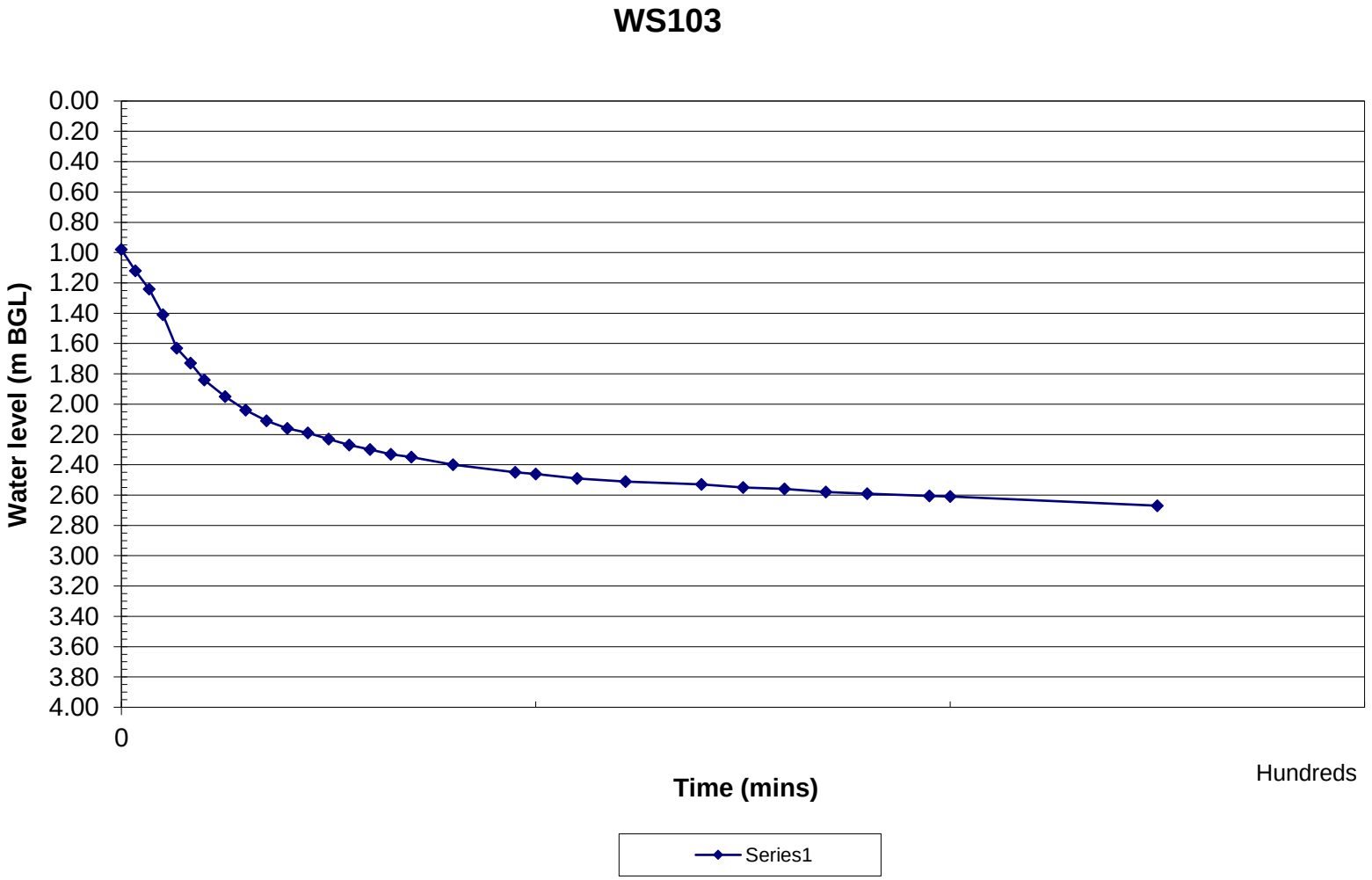
Time (min)	**Depth (m)**
0.0	0.98
0.3	1.12
0.7	1.24
1.0	1.41
1.3	1.63
1.7	1.73
2.0	1.84
2.5	1.95
3.0	2.04
3.5	2.11
4.0	2.16
4.5	2.19
5.0	2.23
5.5	2.27
6.0	2.30
6.5	2.33
7.0	2.35
8.0	2.40
9.5	2.45
10.0	2.46
11.0	2.49
12.2	2.51
14.0	2.53
15.0	2.55
16.0	2.56
17.0	2.58
18.0	2.59
19.5	2.61
20.0	2.61
25.0	2.67
29.0	2.71
36.0	2.74
49.0	2.77
61.0	2.79

Max. depth (m)	3.00
Effective depth (m)	0.98
Effective drop (m)	2.02
75% effective depth (m)	2.50
50% effective depth (m)	1.99
25% effective depth (m)	1.49
t75 (min)	11.60
t50 (min)	2.75
t25 (min)	1.15
Vp 75-25	0.001983
ap 50	0.158650429
tp 75-25	10.45

Soil infiltration rate (m/s)	**1.99E-05**		
Soil infiltration rate (mm/hr)	**7.18E+01**		

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0 sec


WS103
Water level (m BGL)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
2.20
2.40
2.60
2.80
3.00
3.20
3.40
3.60
3.80
4.00
0
Hundreds
Time (mins)
Series1

Appendix F

CHEMICAL RESULTS - SOILS

Confidential

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

WSP PB BBC
3rd Floor, Kings Orchard,
1 Queen Street
Bristol
Gloucestershire
BS2 0HQ

Attention: Edward Jollands

CERTIFICATE OF ANALYSIS

Date of report Generation:	06 February 2020
Customer:	WSP PB BBC
Sample Delivery Group (SDG):	200116-79
Your Reference:	70012984
Location:	North Street, Reading
Report No:	539971

This report has been revised and directly supersedes 538621 in its entirety.

We received 2 samples on Thursday January 16, 2020 and 2 of these samples were scheduled for analysis which was completed on Thursday February 06, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

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CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21497637	BH102	ES	0.20 - 0.40	13/01/2020
21497645	BH102	ES	0.60 - 0.70	13/01/2020

Maximum Sample/Coolbox Temperature (°C) : **7.8**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21497637				21497645		
Customer Sample Reference			BH102				BH102		
AGS Reference			ES				ES		
Depth (m)			0.20 - 0.40				0.60 - 0.70		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)		
Sample Type			S	S	S	S	S		
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 2		X		X			
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	X						
Boron Water Soluble	All	NDPs: 0 Tests: 2		X		X			
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2		X		X			
Easily Liberated Sulphide	All	NDPs: 0 Tests: 2		X		X			
EPH CWG GC (S)	All	NDPs: 0 Tests: 2		X		X			
Flashpoint	All	NDPs: 0 Tests: 2		X		X			
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2			X		X		
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2		X		X			
Loss on Ignition in soils	All	NDPs: 0 Tests: 2		X		X			
Metals in solid samples by OES	All	NDPs: 0 Tests: 2		X		X			
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 2		X		X			
PAH by GCMS	All	NDPs: 0 Tests: 2		X		X			
PCBs by GCMS	All	NDPs: 0 Tests: 1		X					
pH	All	NDPs: 0 Tests: 2		X		X			

Validated

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21497637				21497645	
Customer Sample Reference			BH102				BH102	
AGS Reference			ES				ES	
Depth (m)			0.20 - 0.40				0.60 - 0.70	
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)	
Sample Type			S	S	S	S	S	
Phenols by HPLC (S)	All	NDPs: 0 Tests: 2		X		X		
Sample description	All	NDPs: 0 Tests: 2		X		X		
Total Organic Carbon	All	NDPs: 0 Tests: 2		X		X		
Total Sulphate	All	NDPs: 0 Tests: 2		X		X		
TPH CWG GC (S)	All	NDPs: 0 Tests: 2		X		X		
VOC MS (S)	All	NDPs: 0 Tests: 2			X		X	

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Sample Descriptions

Grain Sizes

very fine	<0.063mm	**fine**	0.063mm - 0.1mm	**medium**	0.1mm - 2mm	**coarse**	2mm - 10mm	**very coarse**	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21497637	BH102	0.20 - 0.40	Dark Brown	Sandy Loam	Stones	Brick
21497645	BH102	0.60 - 0.70	Light Brown	Silty Clay Loam	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102				
			Depth (m)	0.20 - 0.40	0.60 - 0.70				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	13/01/2020	13/01/2020				
			Sampled Time	.	.				
			Date Received	16/01/2020	16/01/2020				
			SDG Ref	200116-79	200116-79				
			Lab Sample No.(s)	21497637	21497645				
			AGS Reference	ES	ES				
Moisture Content Ratio (% of as received sample)	%	PM024		9.1	14				
Loss on ignition	<0.7 %	TM018		4.23 M	2.78 M				
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M				
Cresols	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M				
Xylenols	<0.015 mg/kg	TM062 (S)		<0.015 M	<0.015 M				
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)		<0.035 M	<0.035 M				
Organic Carbon, Total	<0.2 %	TM132		1.27 M	0.272 M				
pH	1 pH Units	TM133		8.53 M	8.22 M				
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #				
Cyanide, Total	<1 mg/kg	TM153		<1 M	<1 M				
Cyanide, Free	<1 mg/kg	TM153		<1 M	<1 M				
Cyanide, Complex	<1 mg/kg	TM153		<1	<1				
PCB congener 28	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 52	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 101	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 118	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 138	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 153	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 180	<0.003 mg/kg	TM168		<0.003 M					
Sum of detected PCB 7 Congeners	<0.021 mg/kg	TM168		<0.021					
Sulphide, Easily liberated	<15 mg/kg	TM180		<15 @ M	<15 @ M				
Arsenic	<0.6 mg/kg	TM181		23.5 M	17 M				
Barium	<0.6 mg/kg	TM181		96.7 #	233 #				
Beryllium	<0.01 mg/kg	TM181		0.779 M	0.803 M				
Cadmium	<0.02 mg/kg	TM181		0.0711 M	<0.02 M				
Chromium	<0.9 mg/kg	TM181		10.6 M	18.6 M				
Copper	<1.4 mg/kg	TM181		30.5 M	11.6 M				
Lead	<0.7 mg/kg	TM181		142 M	21.3 M				
Mercury	<0.14 mg/kg	TM181		0.185 M	<0.14 M				
Nickel	<0.2 mg/kg	TM181		17.4 M	22.7 M				
Selenium	<1 mg/kg	TM181		<1 #	<1 #				
Vanadium	<0.2 mg/kg	TM181		32.6 #	42.2 #				

Validated

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102				
			Depth (m)	0.20 - 0.40	0.60 - 0.70				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	13/01/2020	13/01/2020				
			Sampled Time	-	-				
			Date Received	16/01/2020	16/01/2020				
			SDG Ref	200116-79	200116-79				
			Lab Sample No.(s)	21497637	21497645				
			AGS Reference	ES	ES				
Zinc	<1.9 mg/kg	TM181		172 M	52 M				
Sulphate, Total	<48 mg/kg	TM221		11100 M	253 M				
Boron, water soluble	<1 mg/kg	TM222		<1 M	1.52 M				
Flashpoint	°C	TM225		>70	>70				
Nitrite as NO2, 2:1 water soluble	<0.1 mg/kg	TM243		0.13	0.24				
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248		0.00157	0.00175				

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102				
			Depth (m)	0.20 - 0.40	0.60 - 0.70				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	13/01/2020	13/01/2020				
			Sampled Time	.	.				
			Date Received	16/01/2020	16/01/2020				
			SDG Ref	200116-79	200116-79				
			Lab Sample No.(s)	21497637	21497645				
			AGS Reference	ES	ES				
Naphthalene-d8 % recovery**	%	TM218		81.7	83.8				
Acenaphthene-d10 % recovery**	%	TM218		84.9	86.4				
Phenanthrene-d10 % recovery**	%	TM218		82.7	86.4				
Chrysene-d12 % recovery**	%	TM218		80.6	86				
Perylene-d12 % recovery**	%	TM218		78.1	84.6				
Naphthalene	<0.009 mg/kg	TM218		<0.009 M	<0.009 M				
Acenaphthylene	<0.012 mg/kg	TM218		0.0391 M	<0.012 M				
Acenaphthene	<0.008 mg/kg	TM218		<0.008 M	<0.008 M				
Fluorene	<0.01 mg/kg	TM218		<0.01 M	<0.01 M				
Phenanthrene	<0.015 mg/kg	TM218		0.142 M	<0.015 M				
Anthracene	<0.016 mg/kg	TM218		0.0462 M	<0.016 M				
Fluoranthene	<0.017 mg/kg	TM218		0.415 M	<0.017 M				
Pyrene	<0.015 mg/kg	TM218		0.367 M	<0.015 M				
Benz(a)anthracene	<0.014 mg/kg	TM218		0.209 M	<0.014 M				
Chrysene	<0.01 mg/kg	TM218		0.199 M	<0.01 M				
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		0.227 M	<0.015 M				
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		0.112 M	<0.014 M				
Benzo(a)pyrene	<0.015 mg/kg	TM218		0.229 M	<0.015 M				
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		0.192 M	<0.018 M				
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		0.0496 M	<0.023 M				
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		0.228 M	<0.024 M				
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		2.45	<0.118				

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

TPH CWG (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102				
			Depth (m)	0.20 - 0.40	0.60 - 0.70				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	13/01/2020	13/01/2020				
			Sampled Time	.	.				
			Date Received	16/01/2020	16/01/2020				
			SDG Ref	200116-79	200116-79				
			Lab Sample No.(s)	21497637	21497645				
			AGS Reference	ES	ES				
GRO Surrogate % recovery**	%	TM089		96.9	110				
Aliphatics >C5-C6	<0.01 mg/kg	TM089		<0.01	<0.01				
Aliphatics >C6-C8	<0.01 mg/kg	TM089		<0.01	<0.01				
Aliphatics >C8-C10	<0.01 mg/kg	TM089		<0.01	<0.01				
Aliphatics >C10-C12	<1 mg/kg	TM414		<1	<1				
Aliphatics >C12-C16	<1 mg/kg	TM414		<1	<1				
Aliphatics >C16-C35	<1 mg/kg	TM414		1.21	<1				
Aliphatics >C35-C44	<1 mg/kg	TM414		<1	<1				
Total Aliphatics >C10-C44	<5 mg/kg	TM414		<5	<5				
Total Aliphatics & Aromatics >C10-C44	<10 mg/kg	TM414		<10	<10				
Aromatics >EC5-EC7	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics >EC7-EC8	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics >EC8-EC10	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics > EC10-EC12	<1 mg/kg	TM414		<1	<1				
Aromatics > EC12-EC16	<1 mg/kg	TM414		<1	<1				
Aromatics > EC16-EC21	<1 mg/kg	TM414		<1	<1				
Aromatics > EC16-EC35	<1 mg/kg	TM414		6.01	2.01				
Aromatics > EC21-EC35	<1 mg/kg	TM414		5.36	1.84				
Aromatics >EC35-EC44	<1 mg/kg	TM414		<1	<1				
Aromatics > EC40-EC44	<1 mg/kg	TM414		<1	<1				
Total Aromatics > EC10-EC44	<5 mg/kg	TM414		7.07	<5				
Total Aliphatics & Aromatics >C5-C44	<10 mg/kg	TM414		<10	<10				
Total Aliphatics >C5-C10	<0.05 mg/kg	TM089		<0.05	<0.05				
Total Aromatics >EC5-EC10	<0.05 mg/kg	TM089		<0.05	<0.05				
GRO >C5-C10	<0.02 mg/kg	TM089		<0.02	<0.02				

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102				
			Depth (m)	0.20 - 0.40	0.60 - 0.70				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	13/01/2020	13/01/2020				
			Sampled Time	.	.				
			Date Received	16/01/2020	16/01/2020				
			SDG Ref	200116-79	200116-79				
			Lab Sample No.(s)	21497637	21497645				
			AGS Reference	ES	ES				
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116		<0.1 M	<0.1 M				
Benzene	<0.009 mg/kg	TM116		<0.09 M	<0.09 M				
Toluene	<0.007 mg/kg	TM116		<0.07 M	<0.07 M				
Ethylbenzene	<0.004 mg/kg	TM116		<0.04 M	<0.04 M				
p/m-Xylene	<0.01 mg/kg	TM116		<0.1 #	<0.1 #				
o-Xylene	<0.01 mg/kg	TM116		<0.1 M	<0.1 M				
Tert-amyl methyl ether	<0.01 mg/kg	TM116		<0.1 #	<0.1 #				

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref.	BH102ES	17/01/2020	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	0.20 - 0.40										
Sample Type	SOLID										
Date Sampled	13/01/2020 00:00:00										
Date Receieved	16/01/2020 12:58:00										
SDG	200116-79										
Original Sample	21497637										
Method Number	TM048										

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM180	Sulphide in waters and waste waters 1991 ISBN 01 175 7186 SCA rec. 2007 (unpublished)'	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM225	Standard Methods for Analysis and Testing of Petroleum and Related Products 1989 Volume 1	Determination of Closed Cup Flash Point for Contamination in Solids
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Test Completion Dates

Lab Sample No(s)	21497637	21497645
Customer Sample Ref.	BH102	BH102
AGS Ref.	ES	ES
Depth	0.20 - 0.40	0.60 - 0.70
Type	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal N as NH4 in 2:1 extract	22-Jan-2020	22-Jan-2020
Asbestos ID in Solid Samples	17-Jan-2020	
Boron Water Soluble	22-Jan-2020	22-Jan-2020
Cyanide Comp/Free/Total/Thiocyanate	20-Jan-2020	20-Jan-2020
Easily Liberated Sulphide	20-Jan-2020	20-Jan-2020
EPH CWG GC (S)	20-Jan-2020	20-Jan-2020
Flashpoint	22-Jan-2020	22-Jan-2020
GRO by GC-FID (S)	20-Jan-2020	20-Jan-2020
Hexavalent Chromium (s)	23-Jan-2020	23-Jan-2020
Loss on Ignition in soils	21-Jan-2020	21-Jan-2020
Metals in solid samples by OES	28-Jan-2020	28-Jan-2020
NO3, NO2 and TON by KONE (s)	21-Jan-2020	21-Jan-2020
PAH by GCMS	17-Jan-2020	17-Jan-2020
PCBs by GCMS	06-Feb-2020	
pH	20-Jan-2020	17-Jan-2020
Phenols by HPLC (S)	20-Jan-2020	21-Jan-2020
Sample description	16-Jan-2020	16-Jan-2020
Total Organic Carbon	20-Jan-2020	20-Jan-2020
Total Sulphate	22-Jan-2020	22-Jan-2020
TPH CWG GC (S)	20-Jan-2020	20-Jan-2020
VOC MS (S)	17-Jan-2020	17-Jan-2020

CERTIFICATE OF ANALYSIS

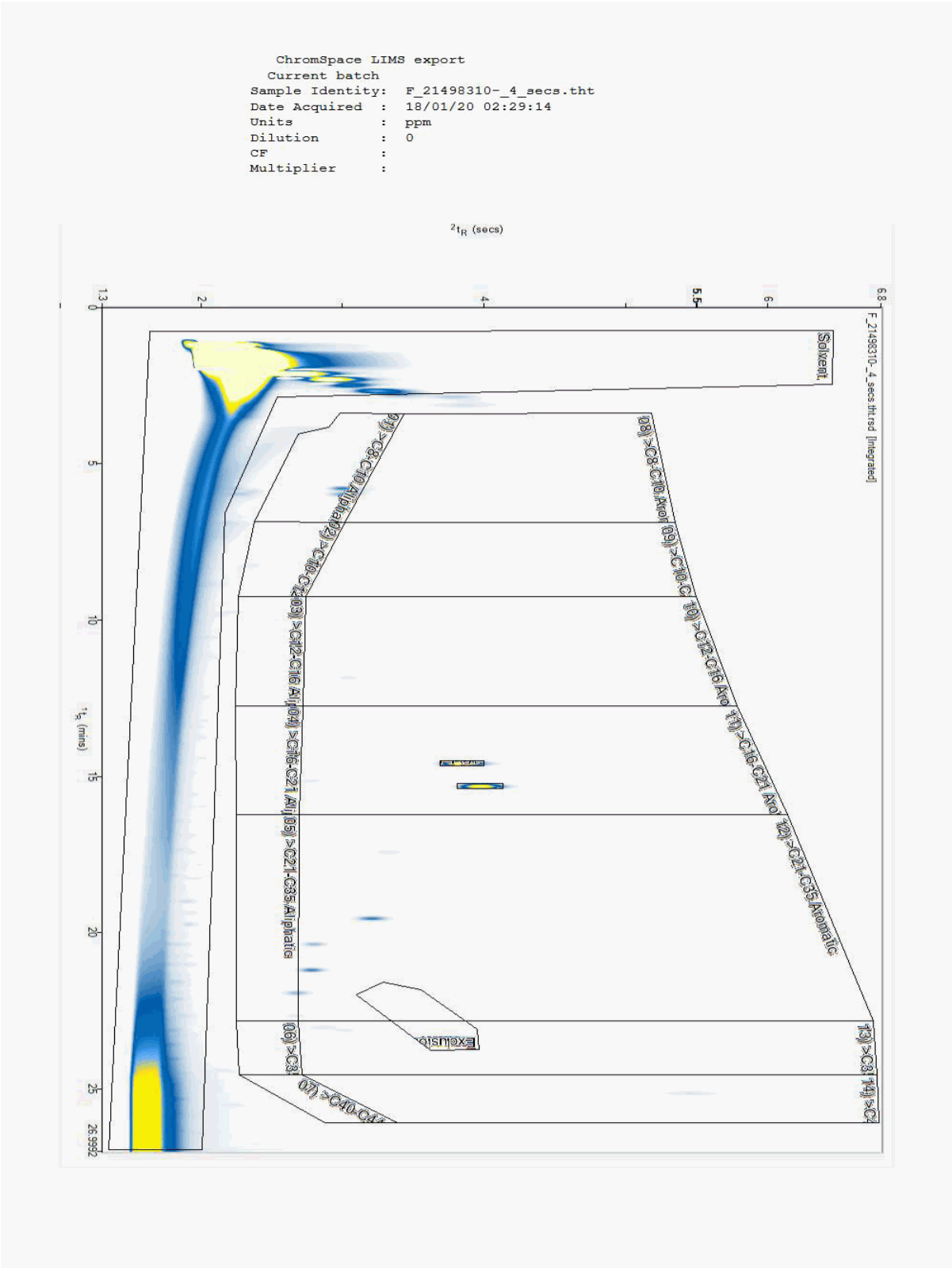
SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Chromatogram

Analysis: EPH CWG GC (S)

Sample No : 21498310
Sample ID : BH102

Depth : 0.60 - 0.70



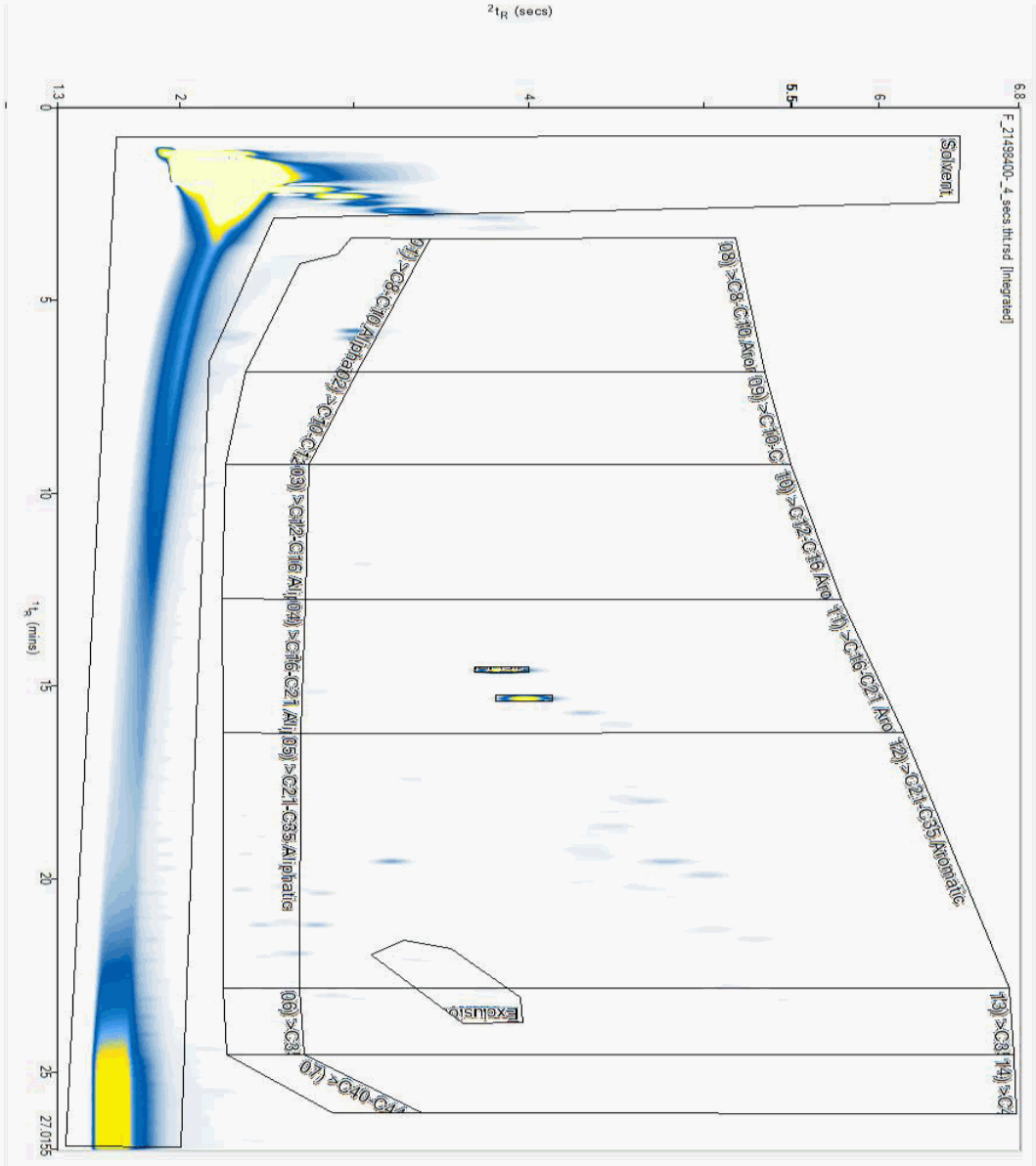
CERTIFICATE OF ANALYSIS

SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21498400 **Depth :** 0.20 - 0.40
Sample ID : BH102

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  F_21498400-_4_secs.tht
Date Acquired  :  18/01/20 05:04:57
Units          :  ppm
Dilution       :  0
CF             :
Multiplier     :
```



CERTIFICATE OF ANALYSIS

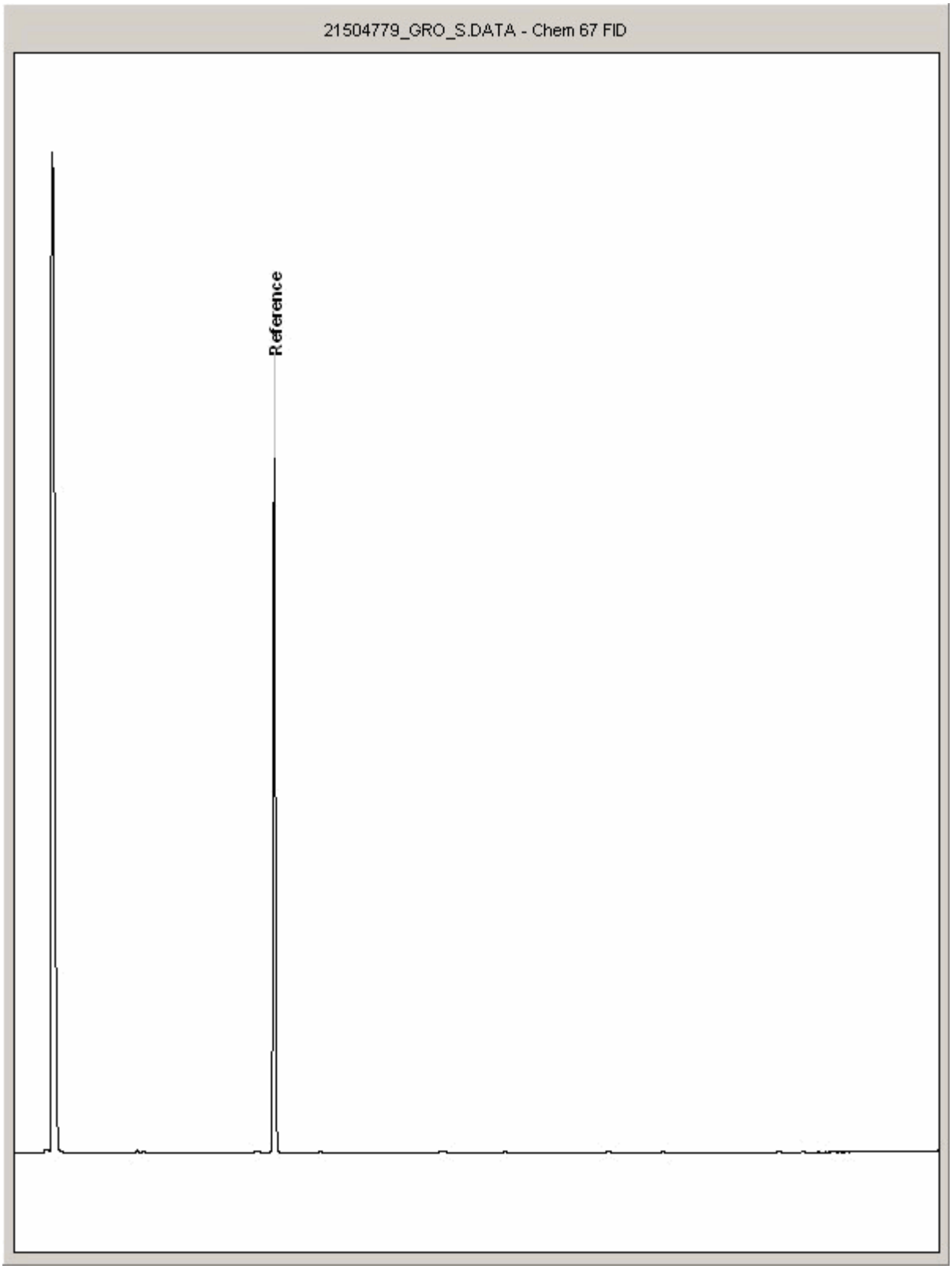
SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21504779
Sample ID : BH102

Depth : 0.60 - 0.70



CERTIFICATE OF ANALYSIS

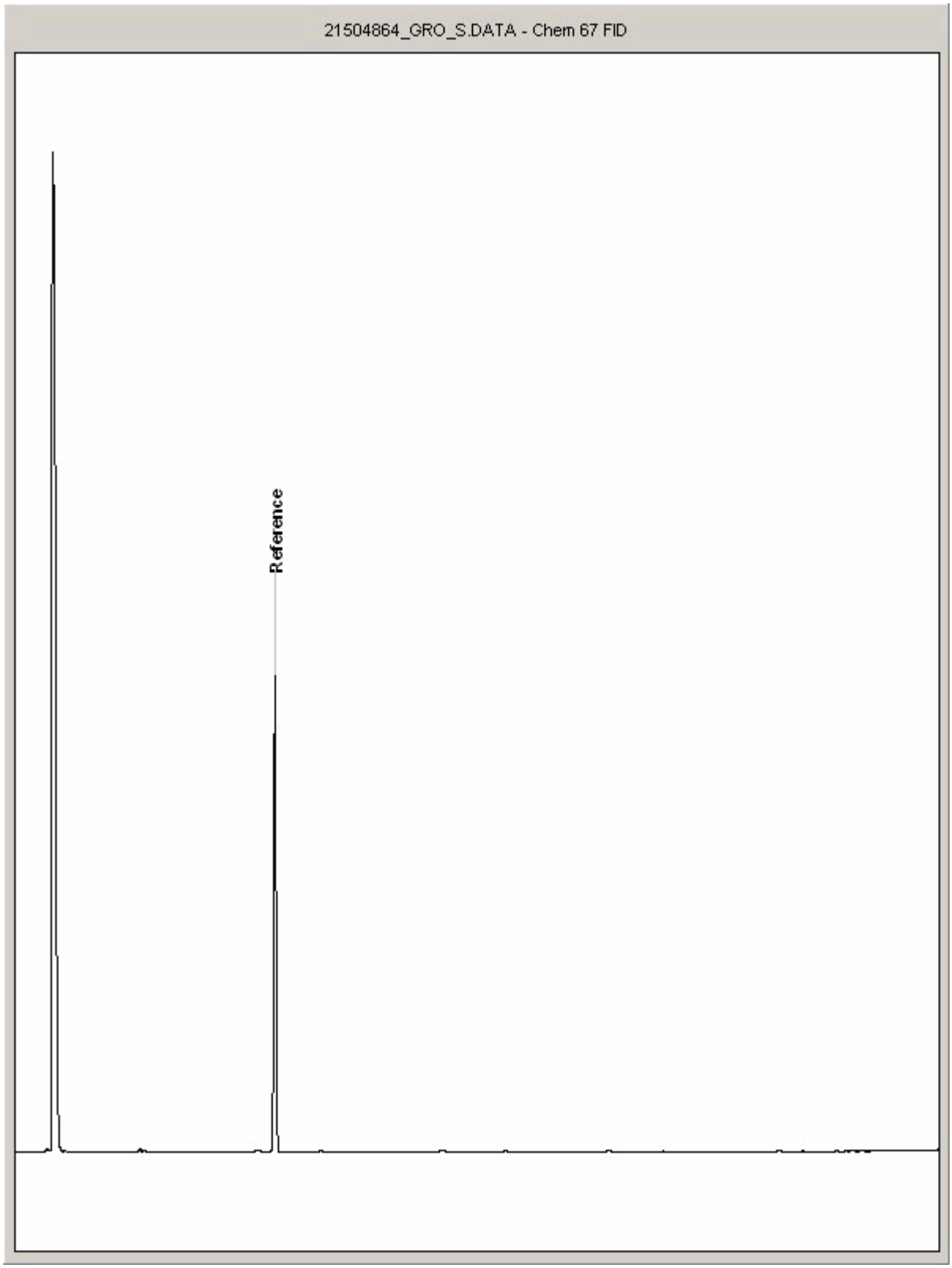
SDG:	200116-79	**Client Reference:**	70012984	**Report Number:**	539971
Location:	North Street, Reading	**Order Number:**	70012984-019	**Superseded Report:**	538621

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21504864
Sample ID : BH102

Depth : 0.20 - 0.40



Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
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WSP PB BBC
3rd Floor, Kings Orchard,
1 Queen Street
Bristol
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BS2 0HQ

Attention: Edward Jollands

CERTIFICATE OF ANALYSIS

Date of report Generation:	30 January 2020
Customer:	WSP PB BBC
Sample Delivery Group (SDG):	200117-14
Your Reference:	70012984
Location:	North Street, Reading
Report No:	539018

We received 2 samples on Friday January 17, 2020 and 2 of these samples were scheduled for analysis which was completed on Thursday January 30, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21501807	BH101	ES	0.40 - 0.60	15/01/2020
21501813	BH101	ES	1.30 - 1.50	15/01/2020

Maximum Sample/Coolbox Temperature (°C) : **8.0**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21501807				21501813	
Customer Sample Reference			BH101				BH101	
AGS Reference			ES				ES	
Depth (m)			0.40 - 0.60				1.30 - 1.50	
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)	
Sample Type			S	S	S	S	S	
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 2		X		X		
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	X					
Boron Water Soluble	All	NDPs: 0 Tests: 2		X		X		
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2		X		X		
Easily Liberated Sulphide	All	NDPs: 0 Tests: 2		X		X		
EPH CWG GC (S)	All	NDPs: 0 Tests: 2		X		X		
Flashpoint	All	NDPs: 0 Tests: 1		X				
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2			X		X	
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2		X		X		
Loss on Ignition in soils	All	NDPs: 0 Tests: 1		X				
Metals in solid samples by OES	All	NDPs: 0 Tests: 2		X		X		
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 2		X		X		
PAH by GCMS	All	NDPs: 0 Tests: 2		X		X		
pH	All	NDPs: 0 Tests: 2		X		X		
Phenols by HPLC (S)	All	NDPs: 0 Tests: 2		X		X		

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21501807					21501813
Customer Sample Reference			BH101					BH101
AGS Reference			ES					ES
Depth (m)			0.40 - 0.60					1.30 - 1.50
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S
Sample description	All	NDPs: 0 Tests: 2		X		X	
Total Organic Carbon	All	NDPs: 0 Tests: 2		X		X	
Total Sulphate	All	NDPs: 0 Tests: 2		X		X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 2		X		X	
VOC MS (S)	All	NDPs: 0 Tests: 2			X		X

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	**fine**	0.063mm - 0.1mm	**medium**	0.1mm - 2mm	**coarse**	2mm - 10mm	**very coarse**	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21501807	BH101	0.40 - 0.60	Dark Brown	Loamy Sand	Brick	Stones
21501813	BH101	1.30 - 1.50	Dark Brown	Loamy Sand	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH101
			Depth (m)	0.40 - 0.60	1.30 - 1.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	15/01/2020	15/01/2020
			Sampled Time	.	.
			Date Received	17/01/2020	17/01/2020
			SDG Ref	200117-14	200117-14
			Lab Sample No.(s)	21501807	21501813
			AGS Reference	ES	ES
Moisture Content Ratio (% of as received sample)	%	PM024		16	13
Loss on ignition	<0.7 %	TM018		9.75 M	
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M
Cresols	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M
Xylenols	<0.015 mg/kg	TM062 (S)		<0.015 M	<0.015 M
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)		<0.035 M	<0.035 M
Organic Carbon, Total	<0.2 %	TM132		4.26 M	0.441 M
pH	1 pH Units	TM133		7.79 M	8.25 M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #
Cyanide, Total	<1 mg/kg	TM153		<1 M	<1 M
Cyanide, Free	<1 mg/kg	TM153		<1 M	<1 M
Cyanide, Complex	<1 mg/kg	TM153		<1	<1
Sulphide, Easily liberated	<15 mg/kg	TM180		77.8 M	<15 M
Arsenic	<0.6 mg/kg	TM181		24.1 M	15 M
Barium	<0.6 mg/kg	TM181		200 #	69.6 #
Beryllium	<0.01 mg/kg	TM181		1.5 M	0.761 M
Cadmium	<0.02 mg/kg	TM181		1.57 M	<0.02 M
Chromium	<0.9 mg/kg	TM181		12.1 M	10.6 M
Copper	<1.4 mg/kg	TM181		74.4 M	17.6 M
Lead	<0.7 mg/kg	TM181		312 M	51.6 M
Mercury	<0.14 mg/kg	TM181		0.785 M	<0.14 M
Nickel	<0.2 mg/kg	TM181		29.4 M	16.4 M
Selenium	<1 mg/kg	TM181		<1 #	<1 #
Vanadium	<0.2 mg/kg	TM181		28.9 #	34.2 #
Zinc	<1.9 mg/kg	TM181		2170 M	132 M
Sulphate, Total	<48 mg/kg	TM221		878 M	84.5 M
Boron, water soluble	<1 mg/kg	TM222		3.35 M	<1 M
Flashpoint	°C	TM225		>70	
Nitrite as NO2, 2:1 water soluble	<0.1 mg/kg	TM243		0.17	0.22
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248		0.00435	0.00192

Validated

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH101				
			Depth (m)	0.40 - 0.60	1.30 - 1.50				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	15/01/2020	15/01/2020				
			Sampled Time	.	.				
			Date Received	17/01/2020	17/01/2020				
			SDG Ref	200117-14	200117-14				
			Lab Sample No.(s)	21501807	21501813				
			AGS Reference	ES	ES				
Naphthalene-d8 % recovery**	%	TM218		85.3	93.1				
Acenaphthene-d10 % recovery**	%	TM218		92.3	94.2				
Phenanthrene-d10 % recovery**	%	TM218		103	91.1				
Chrysene-d12 % recovery**	%	TM218		90.7	85.4				
Perylene-d12 % recovery**	%	TM218		92	86.9				
Naphthalene	<0.009 mg/kg	TM218		0.019 M	<0.009 M				
Acenaphthylene	<0.012 mg/kg	TM218		0.0769 M	<0.012 M				
Acenaphthene	<0.008 mg/kg	TM218		<0.008 M	<0.008 M				
Fluorene	<0.01 mg/kg	TM218		0.0226 M	<0.01 M				
Phenanthrene	<0.015 mg/kg	TM218		0.526 M	0.113 M				
Anthracene	<0.016 mg/kg	TM218		0.13 M	0.029 M				
Fluoranthene	<0.017 mg/kg	TM218		1.51 M	0.237 M				
Pyrene	<0.015 mg/kg	TM218		1.31 M	0.202 M				
Benz(a)anthracene	<0.014 mg/kg	TM218		0.626 M	0.11 M				
Chrysene	<0.01 mg/kg	TM218		0.573 M	0.11 M				
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		0.702 M	0.137 M				
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		0.281 M	0.0455 M				
Benzo(a)pyrene	<0.015 mg/kg	TM218		0.596 M	0.0927 M				
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		0.43 M	0.0574 M				
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		0.0958 M	<0.023 M				
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		0.456 M	0.0566 M				
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		7.35	1.19				

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

TPH CWG (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH101				
			Depth (m)	0.40 - 0.60	1.30 - 1.50				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	15/01/2020	15/01/2020				
			Sampled Time	.	.				
			Date Received	17/01/2020	17/01/2020				
			SDG Ref	200117-14	200117-14				
			Lab Sample No.(s)	21501807	21501813				
			AGS Reference	ES	ES				
GRO Surrogate % recovery**	%	TM089		73.6	97.9				
Aliphatics >C5-C6	<0.01 mg/kg	TM089		0.0143	<0.01				
Aliphatics >C6-C8	<0.01 mg/kg	TM089		0.0333	<0.01				
Aliphatics >C8-C10	<0.01 mg/kg	TM089		0.0607	<0.01				
Aliphatics >C10-C12	<1 mg/kg	TM414		<1	<1				
Aliphatics >C12-C16	<1 mg/kg	TM414		<1	<1				
Aliphatics >C16-C35	<1 mg/kg	TM414		12.5	<1				
Aliphatics >C35-C44	<1 mg/kg	TM414		1.61	<1				
Total Aliphatics >C10-C44	<5 mg/kg	TM414		14.5	<5				
Total Aliphatics & Aromatics >C10-C44	<10 mg/kg	TM414		67.8	<10				
Aromatics >EC5-EC7	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics >EC7-EC8	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics >EC8-EC10	<0.01 mg/kg	TM089		0.0405	<0.01				
Aromatics > EC10-EC12	<1 mg/kg	TM414		<1	<1				
Aromatics > EC12-EC16	<1 mg/kg	TM414		<1	<1				
Aromatics > EC16-EC21	<1 mg/kg	TM414		9.8	<1				
Aromatics > EC16-EC35	<1 mg/kg	TM414		48.5	<1				
Aromatics > EC21-EC35	<1 mg/kg	TM414		38.7	<1				
Aromatics >EC35-EC44	<1 mg/kg	TM414		4.32	<1				
Aromatics > EC40-EC44	<1 mg/kg	TM414		<1	<1				
Total Aromatics > EC10-EC44	<5 mg/kg	TM414		53.3	<5				
Total Aliphatics & Aromatics >C5-C44	<10 mg/kg	TM414		67.9	<10				
Total Aliphatics >C5-C10	<0.05 mg/kg	TM089		0.108	<0.05				
Total Aromatics >EC5-EC10	<0.05 mg/kg	TM089		<0.05	<0.05				
GRO >C5-C10	<0.02 mg/kg	TM089		0.108	<0.02				

Validated

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH101				
			Depth (m)	0.40 - 0.60	1.30 - 1.50				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	15/01/2020	15/01/2020				
			Sampled Time	.	.				
			Date Received	17/01/2020	17/01/2020				
			SDG Ref	200117-14	200117-14				
			Lab Sample No.(s)	21501807	21501813				
			AGS Reference	ES	ES				
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116		<0.1 M	<0.1 M				
Benzene	<0.009 mg/kg	TM116		<0.09 M	<0.09 M				
Toluene	<0.007 mg/kg	TM116		<0.07 M	<0.07 M				
Ethylbenzene	<0.004 mg/kg	TM116		<0.04 M	<0.04 M				
p/m-Xylene	<0.01 mg/kg	TM116		<0.1 #	<0.1 #				
o-Xylene	<0.01 mg/kg	TM116		<0.1 M	<0.1 M				
Tert-amyl methyl ether	<0.01 mg/kg	TM116		<0.1 #	<0.1 #				

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref.	BH101ES	20/01/2020	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	0.40 - 0.60										
Sample Type	SOLID										
Date Sampled	15/01/2020 00:00:00										
Date Receieved	17/01/2020 07:31:00										
SDG	200117-14										
Original Sample	21501807										
Method Number	TM048										

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM180	Sulphide in waters and waste waters 1991 ISBN 01 175 7186 SCA rec. 2007 (unpublished)'	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM225	Standard Methods for Analysis and Testing of Petroleum and Related Products 1989 Volume 1	Determination of Closed Cup Flash Point for Contamination in Solids
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	21501807	21501813
Customer Sample Ref.	BH101	BH101
AGS Ref.	ES	ES
Depth	0.40 - 0.60	1.30 - 1.50
Type	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal N as NH4 in 2:1 extract	22-Jan-2020	22-Jan-2020
Asbestos ID in Solid Samples	20-Jan-2020	
Boron Water Soluble	22-Jan-2020	22-Jan-2020
Cyanide Comp/Free/Total/Thiocyanate	21-Jan-2020	21-Jan-2020
Easily Liberated Sulphide	20-Jan-2020	20-Jan-2020
EPH CWG GC (S)	21-Jan-2020	21-Jan-2020
Flashpoint	22-Jan-2020	
GRO by GC-FID (S)	21-Jan-2020	21-Jan-2020
Hexavalent Chromium (s)	23-Jan-2020	23-Jan-2020
Loss on Ignition in soils	21-Jan-2020	
Metals in solid samples by OES	30-Jan-2020	29-Jan-2020
NO3, NO2 and TON by KONE (s)	21-Jan-2020	21-Jan-2020
PAH by GCMS	23-Jan-2020	22-Jan-2020
pH	21-Jan-2020	20-Jan-2020
Phenols by HPLC (S)	21-Jan-2020	21-Jan-2020
Sample description	17-Jan-2020	17-Jan-2020
Total Organic Carbon	21-Jan-2020	22-Jan-2020
Total Sulphate	22-Jan-2020	22-Jan-2020
TPH CWG GC (S)	21-Jan-2020	21-Jan-2020
VOC MS (S)	21-Jan-2020	21-Jan-2020

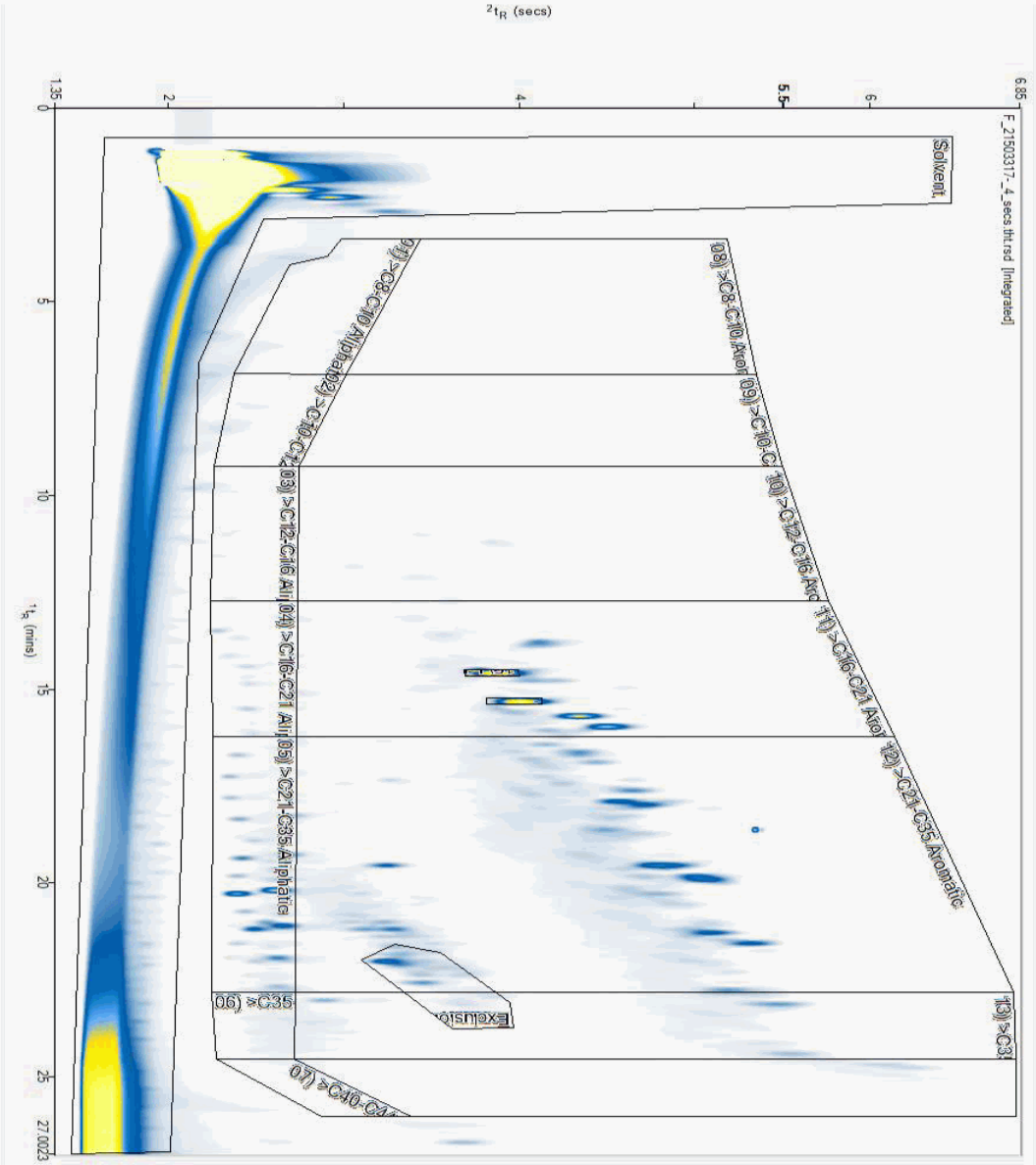
CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21503317 **Depth :** 0.40 - 0.60
Sample ID : BH101

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  F_21503317-_4_secs.tht
Date Acquired   :  21/01/20 07:25:08
Units           :  ppm
Dilution        :  0
CF              :
Multiplier      :
```



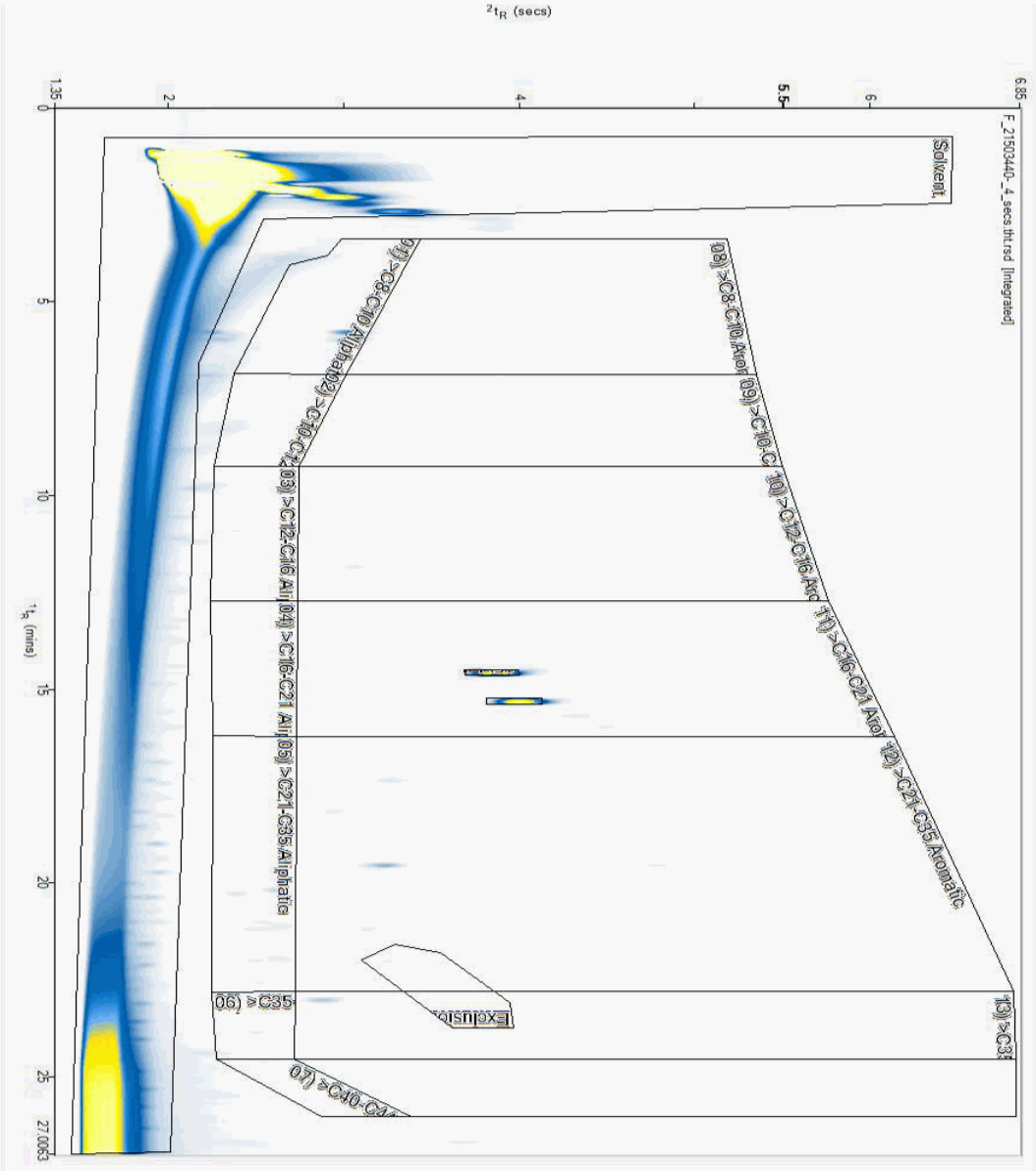
CERTIFICATE OF ANALYSIS

SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21503440 **Depth :** 1.30 - 1.50
Sample ID : BH101

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  F_21503440-_4_secs.tht
Date Acquired   :  21/01/20 01:47:41
Units           :  ppm
Dilution        :  0
CF              :
Multiplier      :
```



CERTIFICATE OF ANALYSIS

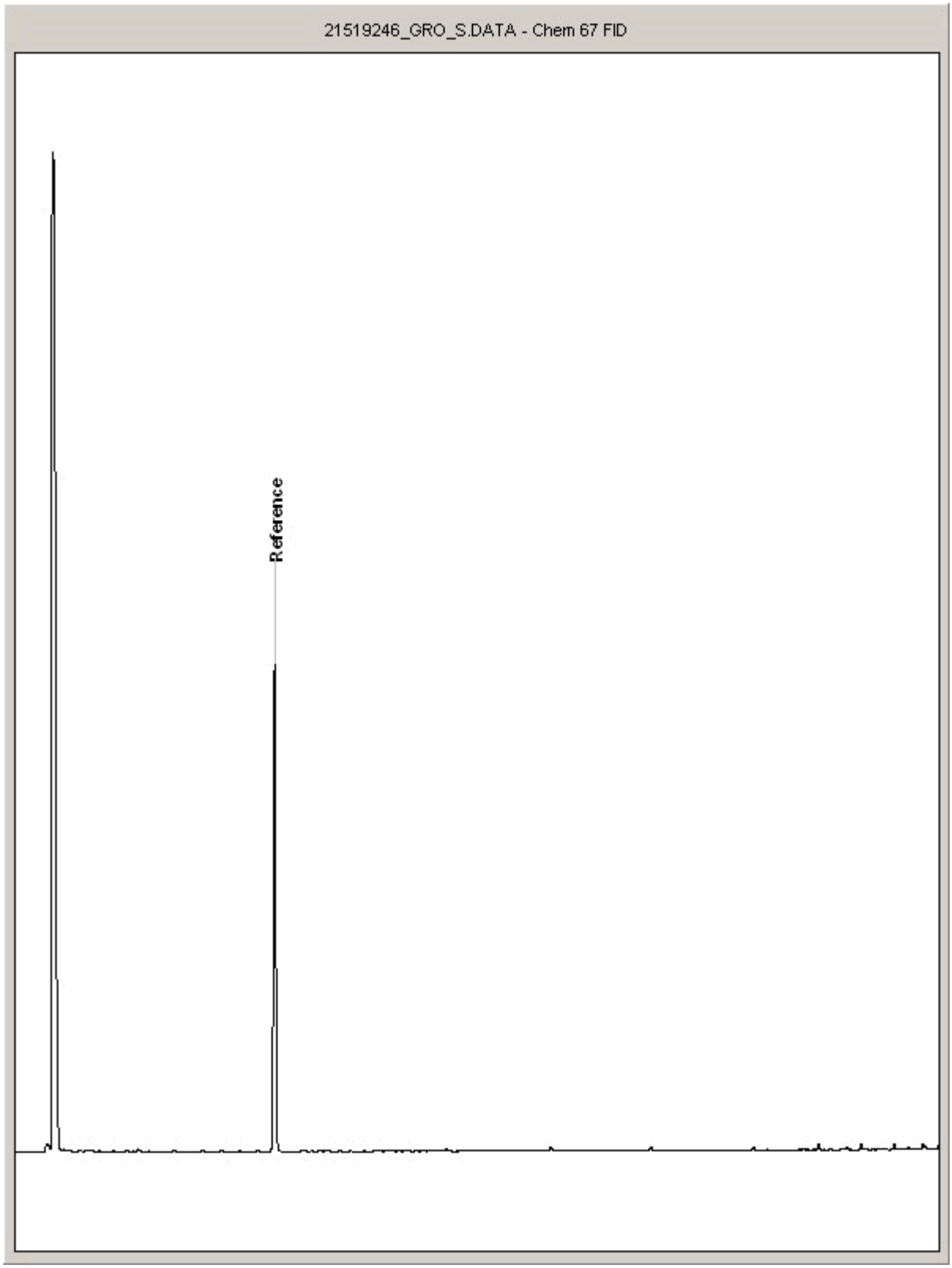
SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21519246
Sample ID : BH101

Depth : 0.40 - 0.60



CERTIFICATE OF ANALYSIS

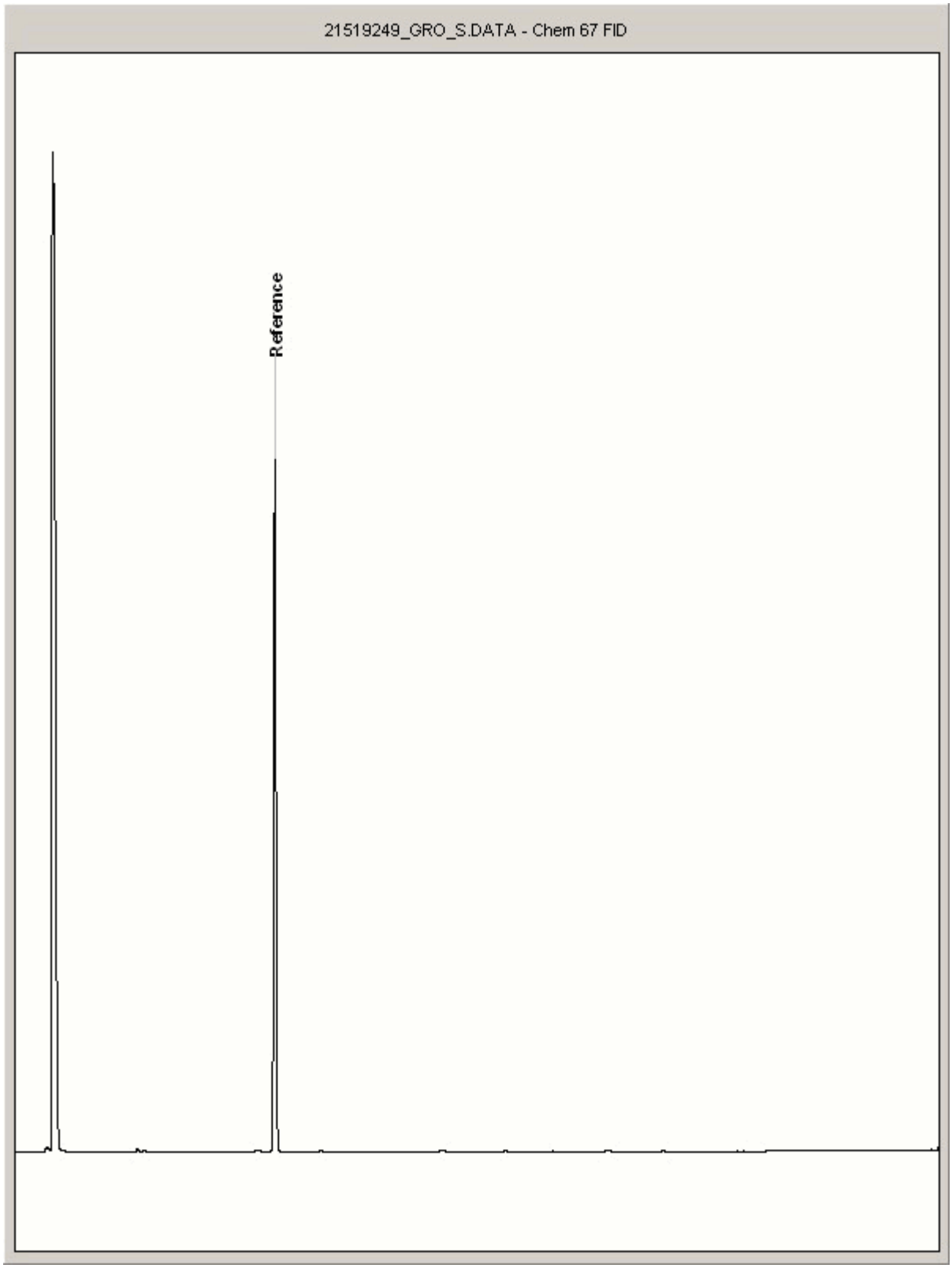
SDG:	200117-14	**Client Reference:**	70012984	**Report Number:**	539018
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21519249
Sample ID : BH101

Depth : 1.30 - 1.50



Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Website: www.alsenvironmental.co.uk

WSP PB BBC
3rd Floor, Kings Orchard,
1 Queen Street
Bristol
Gloucestershire
BS2 0HQ

Attention: Edward Jollands

CERTIFICATE OF ANALYSIS

Date of report Generation:	06 February 2020
Customer:	WSP PB BBC
Sample Delivery Group (SDG):	200121-50
Your Reference:	70012984
Location:	North Street, Reading
Report No:	539972

This report has been revised and directly supersedes 539294 in its entirety.

We received 4 samples on Tuesday January 21, 2020 and 4 of these samples were scheduled for analysis which was completed on Thursday February 06, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



Sonia McWhan

Operations Manager

ALS Life Sciences Limited. ALS Life Sciences Limited registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21522786	WS102	ES	0.35 - 0.45	17/01/2020
21522791	WS102	ES	1.40 - 1.50	17/01/2020
21522798	WS103	ES	0.30 - 0.40	17/01/2020
21522803	WS103	ES	1.20 - 1.30	17/01/2020

Maximum Sample/Coolbox Temperature (°C) : **7.6**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21522786				21522791				21522798				21522803								
Customer Sample Reference			WS102				WS102				WS103				WS103								
AGS Reference			ES				ES				ES				ES								
Depth (m)			0.35 - 0.45				1.40 - 1.50				0.30 - 0.40				1.20 - 1.30								
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)		1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)		1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)		250g Amber Jar (ALE210)	60g VOC (ALE215)							
Sample Type			S	S	S		S	S	S		S	S	S		S	S							
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 4		X				X				X			X								
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 3	X				X				X												
Boron Water Soluble	All	NDPs: 0 Tests: 4		X				X				X			X								
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 4		X				X				X			X								
Easily Liberated Sulphide	All	NDPs: 0 Tests: 4		X				X				X			X								
EPH CWG GC (S)	All	NDPs: 0 Tests: 4		X				X				X			X								
Flashpoint	All	NDPs: 0 Tests: 1		X																			
GRO by GC-FID (S)	All	NDPs: 0 Tests: 4			X				X				X			X							
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 4		X				X				X			X								
Loss on Ignition in soils	All	NDPs: 0 Tests: 1		X																			
Metals in solid samples by OES	All	NDPs: 0 Tests: 4		X				X				X			X								
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 4		X				X				X			X								
PAH by GCMS	All	NDPs: 0 Tests: 4		X				X				X			X								
PCBs by GCMS	All	NDPs: 0 Tests: 1		X																			
pH	All	NDPs: 0 Tests: 4		X				X				X			X								

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21522786			21522791			21522798			21522803	
Customer Sample Reference			WS102			WS102			WS103			WS103	
AGS Reference			ES			ES			ES			ES	
Depth (m)			0.35 - 0.45			1.40 - 1.50			0.30 - 0.40			1.20 - 1.30	
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S
Phenols by HPLC (S)	All	NDPs: 0 Tests: 4		X			X			X		X	
Sample description	All	NDPs: 0 Tests: 4		X			X			X		X	
Total Organic Carbon	All	NDPs: 0 Tests: 2		X								X	
Total Sulphate	All	NDPs: 0 Tests: 4		X			X			X		X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 4		X			X			X		X	
VOC MS (S)	All	NDPs: 0 Tests: 4			X			X			X		X

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Sample Descriptions

Grain Sizes

very fine	<0.063mm	**fine**	0.063mm - 0.1mm	**medium**	0.1mm - 2mm	**coarse**	2mm - 10mm	**very coarse**	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21522786	WS102	0.35 - 0.45	Dark Brown	Silt Loam	Crushed Brick	Stones
21522791	WS102	1.40 - 1.50	Dark Brown	Silt Loam	Crushed Brick	Stones
21522798	WS103	0.30 - 0.40	Dark Brown	Silty Clay Loam	Crushed Brick	Stones
21522803	WS103	1.20 - 1.30	Dark Brown	Loamy Sand	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS102	WS102	WS103	WS103		
			Depth (m)	0.35 - 0.45	1.40 - 1.50	0.30 - 0.40	1.20 - 1.30		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	17/01/2020	17/01/2020	17/01/2020	17/01/2020		
			Sampled Time	.	.	.	.		
			Date Received	21/01/2020	21/01/2020	21/01/2020	21/01/2020		
			SDG Ref	200121-50	200121-50	200121-50	200121-50		
			Lab Sample No.(s)	21522786	21522791	21522798	21522803		
			AGS Reference	ES	ES	ES	ES		
Moisture Content Ratio (% of as received sample)	%	PM024		19	21	12	11		
Loss on ignition	<0.7 %	TM018		24.4 M					
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M	<0.01 M	<0.01 M		
Cresols	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M	<0.01 M	<0.01 M		
Xylenols	<0.015 mg/kg	TM062 (S)		<0.015 M	<0.015 M	<0.015 M	<0.015 M		
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)		<0.035 M	<0.035 M	<0.035 M	<0.035 M		
Organic Carbon, Total	<0.2 %	TM132		4.84 M			0.26 M		
pH	1 pH Units	TM133		7.57 M	7.12 M	8.29 M	8.48 M		
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #		
Cyanide, Total	<1 mg/kg	TM153		<1 M	<1 M	<1 M	<1 M		
Cyanide, Free	<1 mg/kg	TM153		<1 M	<1 M	<1 M	<1 M		
Cyanide, Complex	<1 mg/kg	TM153		<1	<1	<1	<1		
PCB congener 28	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 52	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 101	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 118	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 138	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 153	<0.003 mg/kg	TM168		<0.003 M					
PCB congener 180	<0.003 mg/kg	TM168		<0.003 M					
Sum of detected PCB 7 Congeners	<0.021 mg/kg	TM168		<0.021					
Sulphide, Easily liberated	<15 mg/kg	TM180		<15 @ M	<15 @ M	<15 @ M	<15 @ M		
Arsenic	<0.6 mg/kg	TM181		28.2 M	27 M	34.2 M	20.4 M		
Barium	<0.6 mg/kg	TM181		345 #	150 #	82.2 #	56.9 #		
Beryllium	<0.01 mg/kg	TM181		2.64 M	2.78 M	0.847 M	0.819 M		
Cadmium	<0.02 mg/kg	TM181		0.845 M	0.494 M	<0.02 M	<0.02 M		
Chromium	<0.9 mg/kg	TM181		14.8 M	14.8 M	14.3 M	13.4 M		
Copper	<1.4 mg/kg	TM181		92.5 M	106 M	43.5 M	13.9 M		
Lead	<0.7 mg/kg	TM181		530 M	284 M	122 M	21.7 M		
Mercury	<0.14 mg/kg	TM181		0.847 M	0.88 M	0.41 M	<0.14 M		
Nickel	<0.2 mg/kg	TM181		35.4 M	32.5 M	20 M	26.3 M		
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #		
Vanadium	<0.2 mg/kg	TM181		39.4 #	37.9 #	31.4 #	43.1 #		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS102	WS102	WS103	WS103		
			Depth (m)	0.35 - 0.45	1.40 - 1.50	0.30 - 0.40	1.20 - 1.30		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	17/01/2020	17/01/2020	17/01/2020	17/01/2020		
			Sampled Time	-	-	-	-		
			Date Received	21/01/2020	21/01/2020	21/01/2020	21/01/2020		
			SDG Ref	200121-50	200121-50	200121-50	200121-50		
			Lab Sample No.(s)	21522786	21522791	21522798	21522803		
			AGS Reference	ES	ES	ES	ES		
Zinc	<1.9 mg/kg	TM181		579 M	246 M	87.4 M	50.6 M		
Sulphate, Total	<48 mg/kg	TM221		646 M	644 M	253 M	354 M		
Boron, water soluble	<1 mg/kg	TM222		2.99 M	2.81 M	1.59 M	<1 M		
Flashpoint	°C	TM225		>70					
Nitrite as NO2, 2:1 water soluble	<0.1 mg/kg	TM243		1	0.44	0.31	0.19		
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248		0.00444	0.00508	0.00546	0.00148		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS102	WS102	WS103	WS103		
			Depth (m)	0.35 - 0.45	1.40 - 1.50	0.30 - 0.40	1.20 - 1.30		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	17/01/2020	17/01/2020	17/01/2020	17/01/2020		
			Sampled Time	.	.	.	.		
			Date Received	21/01/2020	21/01/2020	21/01/2020	21/01/2020		
			SDG Ref	200121-50	200121-50	200121-50	200121-50		
			Lab Sample No.(s)	21522786	21522791	21522798	21522803		
			AGS Reference	ES	ES	ES	ES		
Naphthalene-d8 % recovery**	%	TM218		90.3	85.6	92	111		
Acenaphthene-d10 % recovery**	%	TM218		91	87.3	93.5	112		
Phenanthrene-d10 % recovery**	%	TM218		90.3	86.9	94.2	111		
Chrysene-d12 % recovery**	%	TM218		78.9	74.3	78.8	101		
Perylene-d12 % recovery**	%	TM218		80.8	78.2	83	107		
Naphthalene	<0.009 mg/kg	TM218		<0.009 M	<0.009 M	<0.009 M	<0.009 M		
Acenaphthylene	<0.012 mg/kg	TM218		0.0621 M	<0.012 M	<0.012 M	<0.012 M		
Acenaphthene	<0.008 mg/kg	TM218		<0.008 M	<0.008 M	<0.008 M	<0.008 M		
Fluorene	<0.01 mg/kg	TM218		0.0294 M	<0.01 M	<0.01 M	<0.01 M		
Phenanthrene	<0.015 mg/kg	TM218		0.432 M	0.0539 M	0.0531 M	<0.015 M		
Anthracene	<0.016 mg/kg	TM218		0.0789 M	<0.016 M	<0.016 M	<0.016 M		
Fluoranthene	<0.017 mg/kg	TM218		0.971 M	0.162 M	0.149 M	0.0221 M		
Pyrene	<0.015 mg/kg	TM218		0.825 M	0.14 M	0.134 M	0.0195 M		
Benz(a)anthracene	<0.014 mg/kg	TM218		0.415 M	0.0746 M	0.0816 M	<0.014 M		
Chrysene	<0.01 mg/kg	TM218		0.374 M	0.0721 M	0.0719 M	<0.01 M		
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		0.467 M	0.0862 M	0.0861 M	0.0173 M		
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		0.184 M	0.0269 M	0.034 M	<0.014 M		
Benzo(a)pyrene	<0.015 mg/kg	TM218		0.408 M	0.068 M	0.0735 M	<0.015 M		
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		0.304 M	0.0465 M	0.0528 M	<0.018 M		
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		0.0657 M	<0.023 M	<0.023 M	<0.023 M		
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		0.314 M	0.0541 M	0.0592 M	<0.024 M		
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		4.93	0.785	0.795	<0.118		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

TPH CWG (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS102	WS102	WS103	WS103		
			Depth (m)	0.35 - 0.45	1.40 - 1.50	0.30 - 0.40	1.20 - 1.30		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	17/01/2020	17/01/2020	17/01/2020	17/01/2020		
			Sampled Time	.	.	.	.		
			Date Received	21/01/2020	21/01/2020	21/01/2020	21/01/2020		
			SDG Ref	200121-50	200121-50	200121-50	200121-50		
			Lab Sample No.(s)	21522786	21522791	21522798	21522803		
			AGS Reference	ES	ES	ES	ES		
GRO Surrogate % recovery**	%	TM089		123	87	107	113		
Aliphatics >C5-C6	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aliphatics >C6-C8	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aliphatics >C8-C10	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aliphatics >C10-C12	<1 mg/kg	TM414		<1	<1	<1	<1		
Aliphatics >C12-C16	<1 mg/kg	TM414		<1	<1	<1	<1		
Aliphatics >C16-C35	<1 mg/kg	TM414		3.64	2.64	<1	<1		
Aliphatics >C35-C44	<1 mg/kg	TM414		<1	<1	<1	<1		
Total Aliphatics >C10-C44	<5 mg/kg	TM414		<5	<5	<5	<5		
Total Aliphatics & Aromatics >C10-C44	<10 mg/kg	TM414		49.5	<10	<10	<10		
Aromatics >EC5-EC7	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC7-EC8	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC8-EC10	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics > EC10-EC12	<1 mg/kg	TM414		<1	<1	<1	<1		
Aromatics > EC12-EC16	<1 mg/kg	TM414		<1	<1	<1	<1		
Aromatics > EC16-EC21	<1 mg/kg	TM414		7.95	<1	<1	<1		
Aromatics > EC16-EC35	<1 mg/kg	TM414		40.7	5.56	1.7	<1		
Aromatics > EC21-EC35	<1 mg/kg	TM414		32.8	4.59	1.41	<1		
Aromatics >EC35-EC44	<1 mg/kg	TM414		4.35	<1	<1	<1		
Aromatics > EC40-EC44	<1 mg/kg	TM414		<1	<1	<1	<1		
Total Aromatics > EC10-EC44	<5 mg/kg	TM414		45.7	6.61	<5	<5		
Total Aliphatics & Aromatics >C5-C44	<10 mg/kg	TM414		45.7	<10	<10	<10		
Total Aliphatics >C5-C10	<0.05 mg/kg	TM089		<0.05	<0.05	<0.05	<0.05		
Total Aromatics >EC5-EC10	<0.05 mg/kg	TM089		<0.05	<0.05	<0.05	<0.05		
GRO >C5-C10	<0.02 mg/kg	TM089		<0.02	<0.02	<0.02	<0.02		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS102	WS102	WS103	WS103		
			Depth (m)	0.35 - 0.45	1.40 - 1.50	0.30 - 0.40	1.20 - 1.30		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	17/01/2020	17/01/2020	17/01/2020	17/01/2020		
			Sampled Time	.	.	.	.		
			Date Received	21/01/2020	21/01/2020	21/01/2020	21/01/2020		
			SDG Ref	200121-50	200121-50	200121-50	200121-50		
			Lab Sample No.(s)	21522786	21522791	21522798	21522803		
			AGS Reference	ES	ES	ES	ES		
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116		<0.1 M	<0.1 M	<0.1 M	<0.1 M		
Benzene	<0.009 mg/kg	TM116		<0.09 M	<0.09 M	<0.09 M	<0.09 M		
Toluene	<0.007 mg/kg	TM116		<0.07 M	<0.07 M	<0.07 M	<0.07 M		
Ethylbenzene	<0.004 mg/kg	TM116		<0.04 M	<0.04 M	<0.04 M	<0.04 M		
p/m-Xylene	<0.01 mg/kg	TM116		<0.1 #	<0.1 #	<0.1 #	<0.1 #		
o-Xylene	<0.01 mg/kg	TM116		<0.1 M	<0.1 M	<0.1 M	<0.1 M		
Tert-amyl methyl ether	<0.01 mg/kg	TM116		<0.1 #	<0.1 #	<0.1 #	<0.1 #		

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&♦§@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS102ES 0.35 - 0.45 SOLID 17/01/2020 00:00:00 21/01/2020 13:13:00 200121-50 21522786 TM048	23/01/2020	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS102ES 1.40 - 1.50 SOLID 17/01/2020 00:00:00 21/01/2020 13:13:00 200121-50 21522791 TM048	23/01/20	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS103ES 0.30 - 0.40 SOLID 17/01/2020 00:00:00 21/01/2020 13:13:00 200121-50 21522798 TM048	23/01/20	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM180	Sulphide in waters and waste waters 1991 ISBN 01 175 7186 SCA rec. 2007 (unpublished)'	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM225	Standard Methods for Analysis and Testing of Petroleum and Related Products 1989 Volume 1	Determination of Closed Cup Flash Point for Contamination in Solids
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Test Completion Dates

Lab Sample No(s)	21522786	21522791	21522798	21522803
Customer Sample Ref.	WS102	WS102	WS103	WS103
AGS Ref.	ES	ES	ES	ES
Depth	0.35 - 0.45	1.40 - 1.50	0.30 - 0.40	1.20 - 1.30
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal N as NH4 in 2:1 extract	23-Jan-2020	23-Jan-2020	23-Jan-2020	22-Jan-2020
Asbestos ID in Solid Samples	23-Jan-2020	23-Jan-2020	23-Jan-2020	
Boron Water Soluble	27-Jan-2020	27-Jan-2020	27-Jan-2020	24-Jan-2020
Cyanide Comp/Free/Total/Thiocyanate	27-Jan-2020	27-Jan-2020	27-Jan-2020	23-Jan-2020
Easily Liberated Sulphide	28-Jan-2020	28-Jan-2020	28-Jan-2020	28-Jan-2020
EPH CWG GC (S)	26-Jan-2020	26-Jan-2020	26-Jan-2020	23-Jan-2020
Flashpoint	28-Jan-2020			
GRO by GC-FID (S)	24-Jan-2020	24-Jan-2020	24-Jan-2020	24-Jan-2020
Hexavalent Chromium (s)	24-Jan-2020	24-Jan-2020	24-Jan-2020	24-Jan-2020
Loss on Ignition in soils	29-Jan-2020			
Metals in solid samples by OES	31-Jan-2020	30-Jan-2020	30-Jan-2020	30-Jan-2020
NO3, NO2 and TON by KONE (s)	31-Jan-2020	31-Jan-2020	31-Jan-2020	28-Jan-2020
PAH by GCMS	27-Jan-2020	27-Jan-2020	27-Jan-2020	23-Jan-2020
PCBs by GCMS	06-Feb-2020			
pH	27-Jan-2020	27-Jan-2020	24-Jan-2020	22-Jan-2020
Phenols by HPLC (S)	27-Jan-2020	27-Jan-2020	27-Jan-2020	23-Jan-2020
Sample description	22-Jan-2020	22-Jan-2020	22-Jan-2020	21-Jan-2020
Total Organic Carbon	27-Jan-2020			24-Jan-2020
Total Sulphate	27-Jan-2020	27-Jan-2020	27-Jan-2020	27-Jan-2020
TPH CWG GC (S)	26-Jan-2020	26-Jan-2020	26-Jan-2020	24-Jan-2020
VOC MS (S)	24-Jan-2020	24-Jan-2020	24-Jan-2020	24-Jan-2020

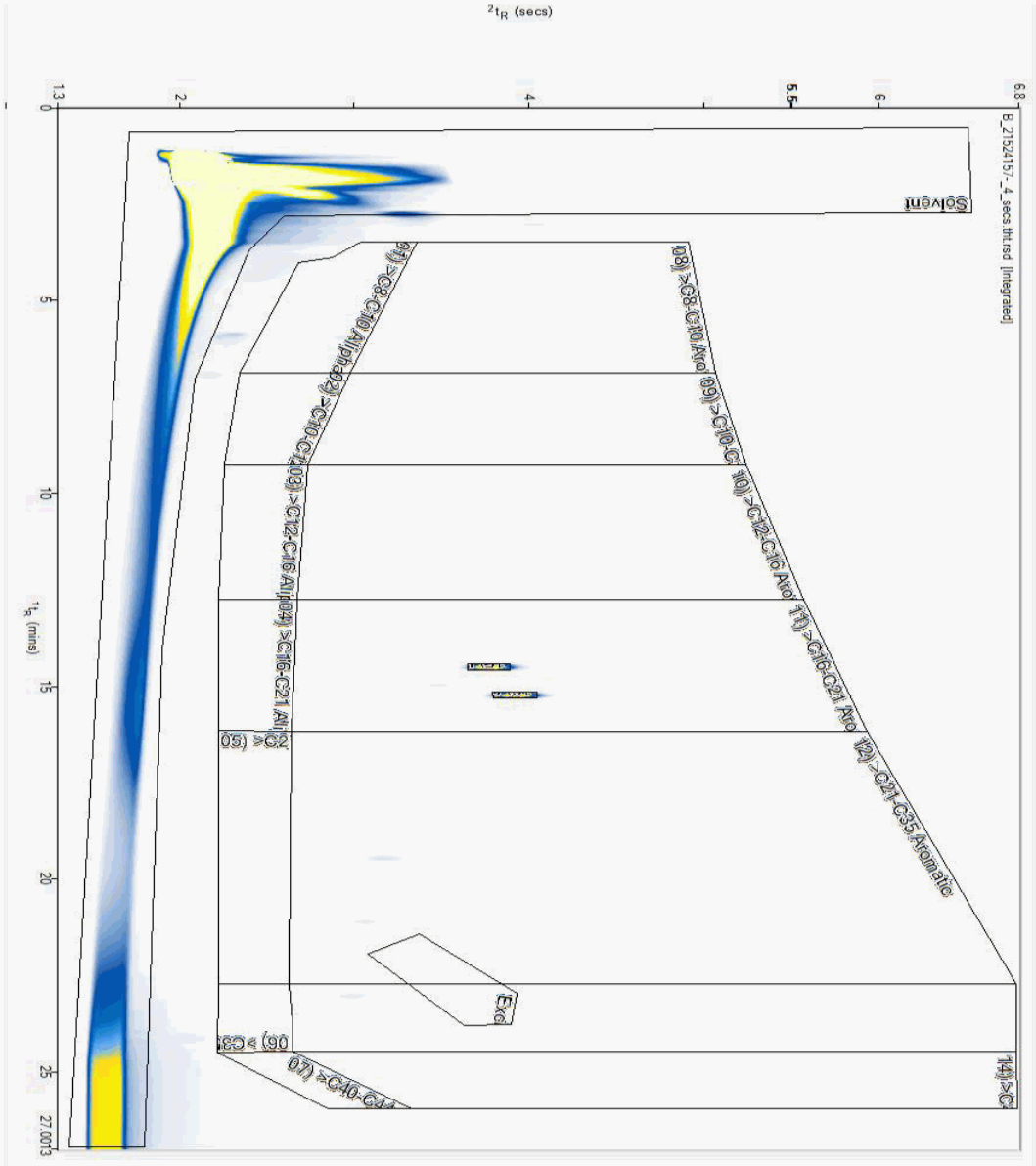
CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21524157 **Depth :** 1.20 - 1.30
Sample ID : WS103

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  B_21524157-_4_secs.tht
Date Acquired   :  23/01/20 03:24:10
Units           :  ppm
Dilution        :  0
CF              :
Multiplier      :
```



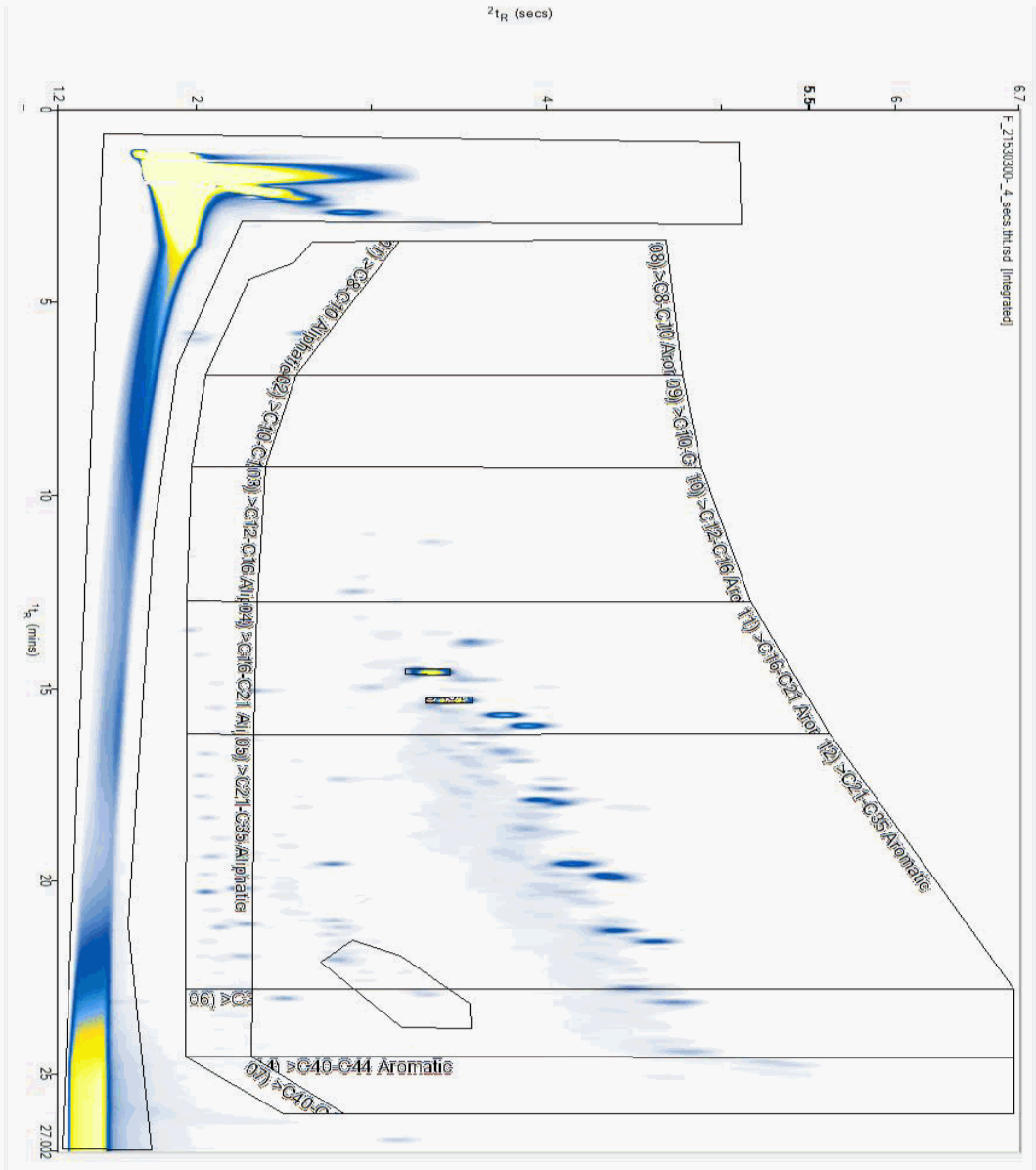
CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21530300 **Depth :** 0.35 - 0.45
Sample ID : WS102

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  F_21530300-_4_secs.tht
Date Acquired  :  24/01/20 12:07:11
Units          :  ppm
Dilution       :  0
CF             :
Multiplier     :
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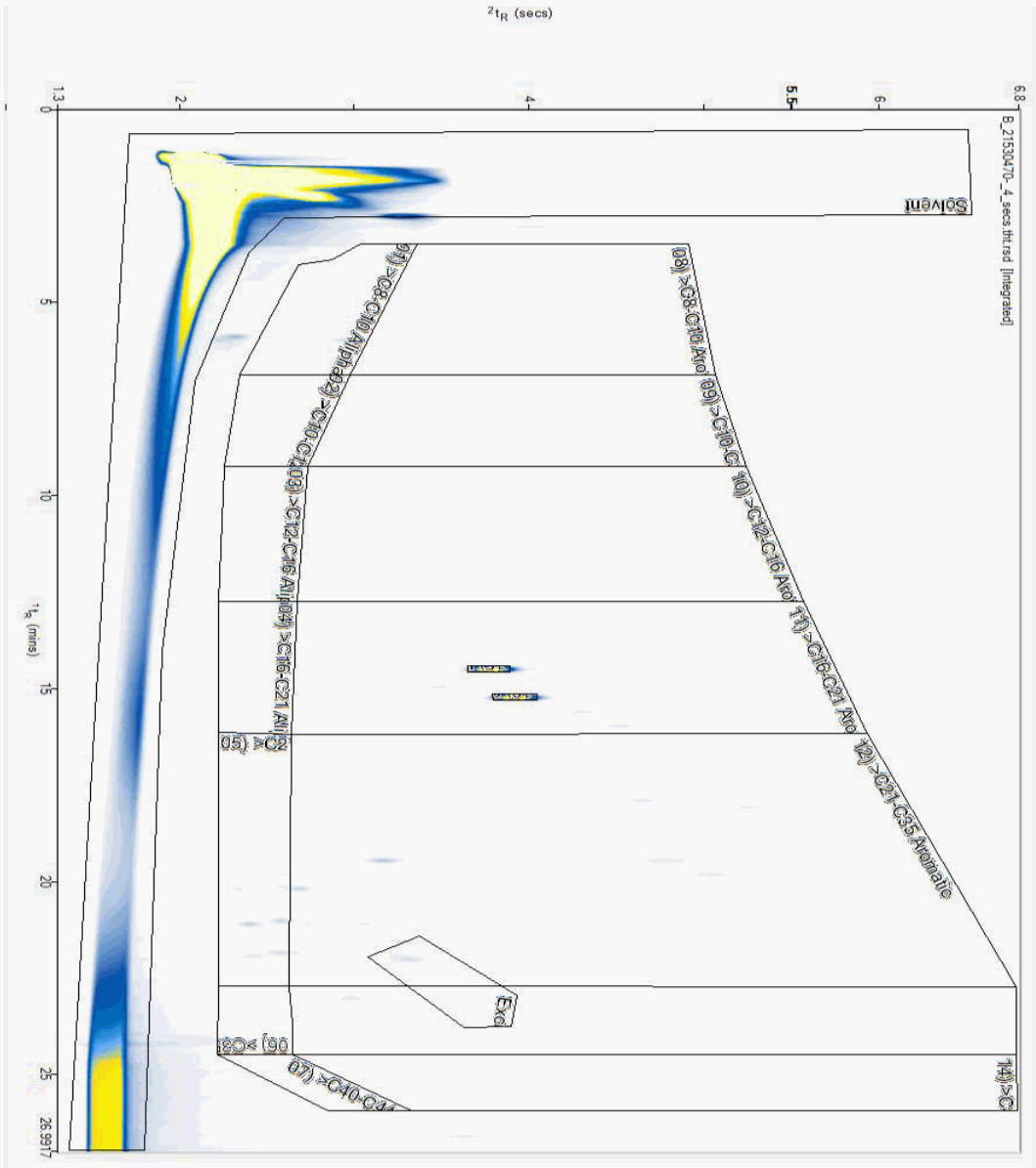
CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21530470 **Depth :** 0.30 - 0.40
Sample ID : WS103

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  B_21530470-_4_secs.tht
Date Acquired   :  24/01/20 01:09:20
Units           :  ppm
Dilution        :  0
CF              :
Multiplier      :
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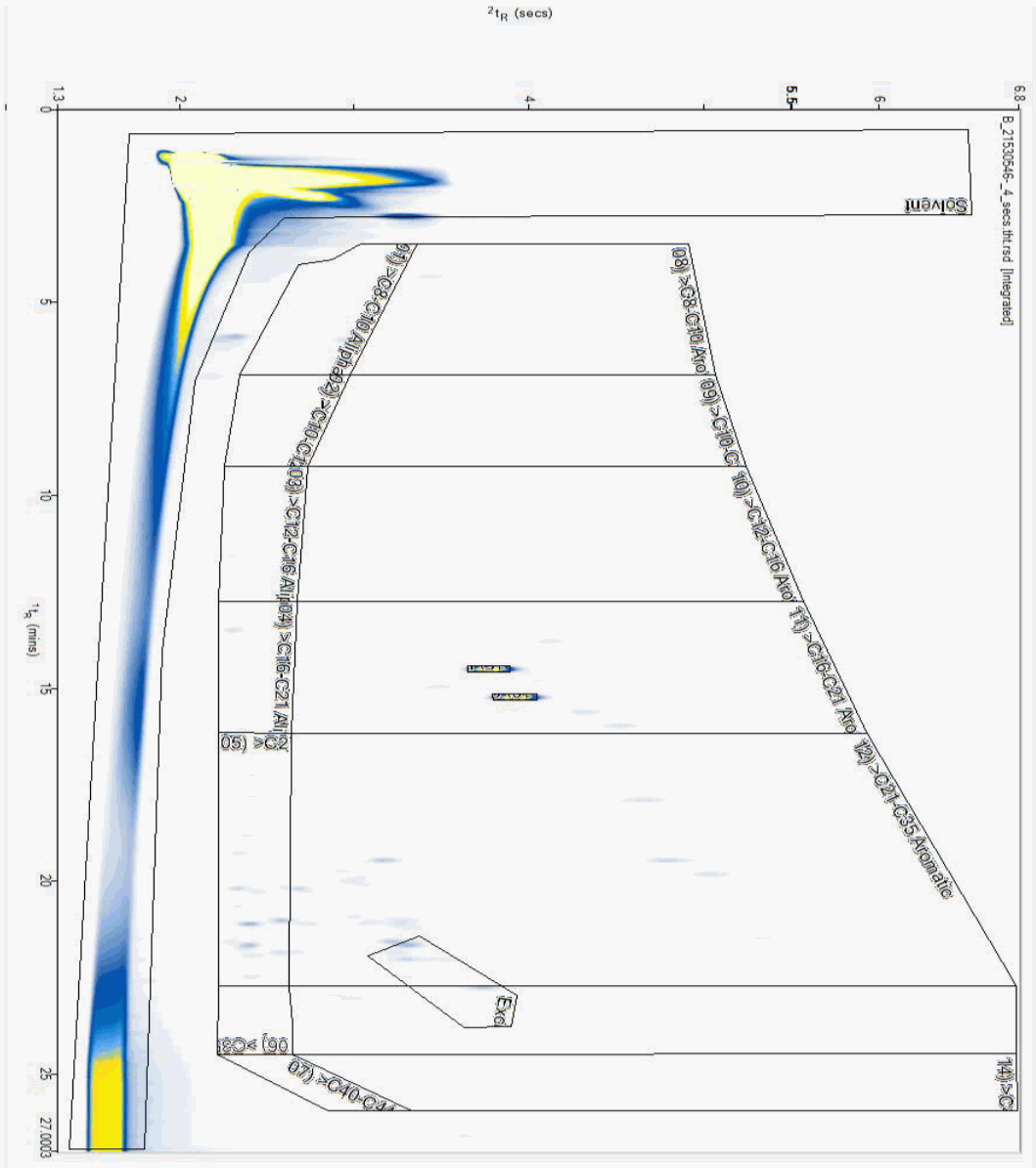
CERTIFICATE OF ANALYSIS

SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21530546 **Depth :** 1.40 - 1.50
Sample ID : WS102

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  B_21530546-_4_secs.tht
Date Acquired   :  24/01/20 05:17:48
Units           :  ppm
Dilution        :  0
CF              :
Multiplier      :
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CERTIFICATE OF ANALYSIS

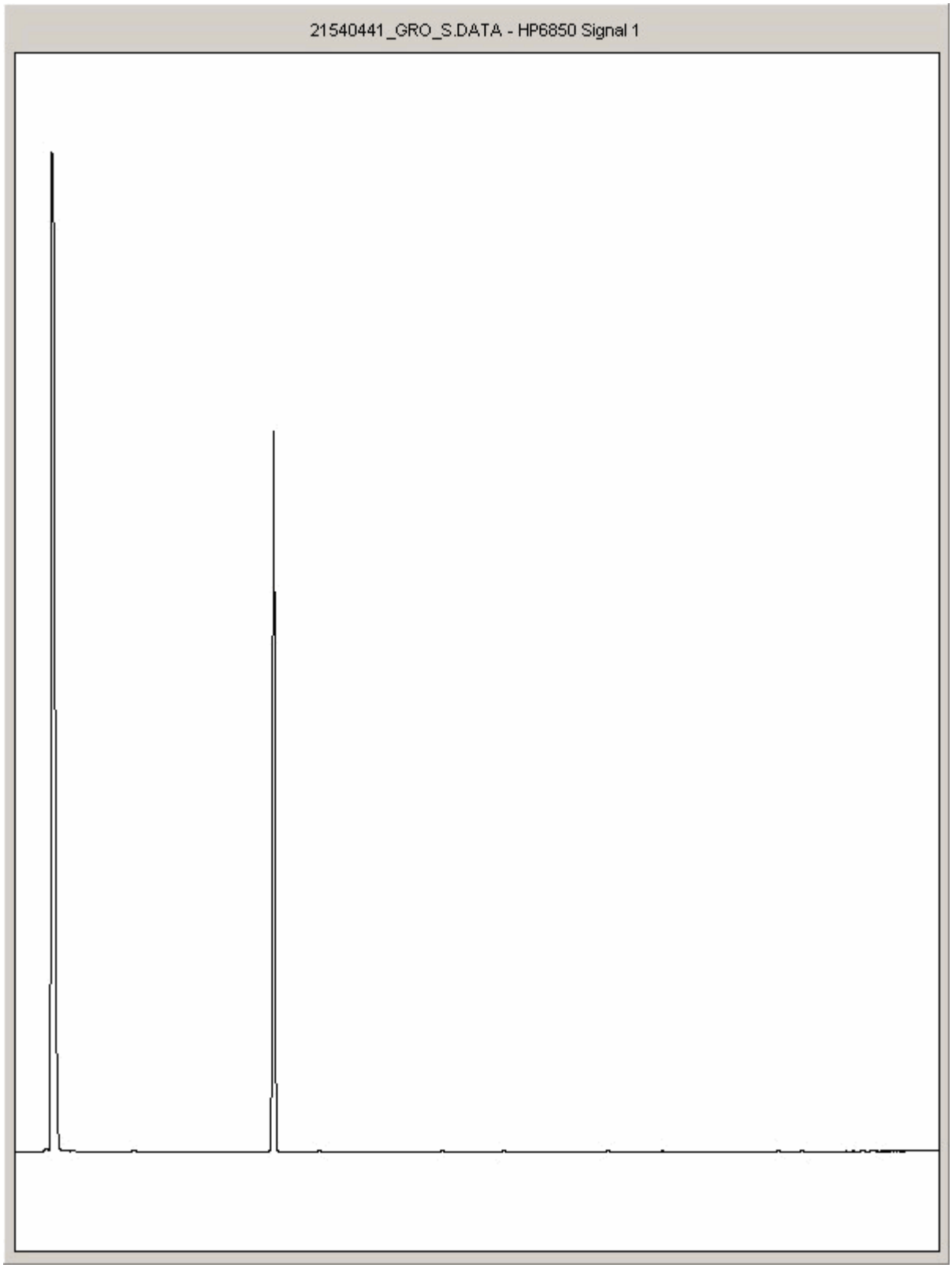
SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21540441
Sample ID : WS103

Depth : 0.30 - 0.40



CERTIFICATE OF ANALYSIS

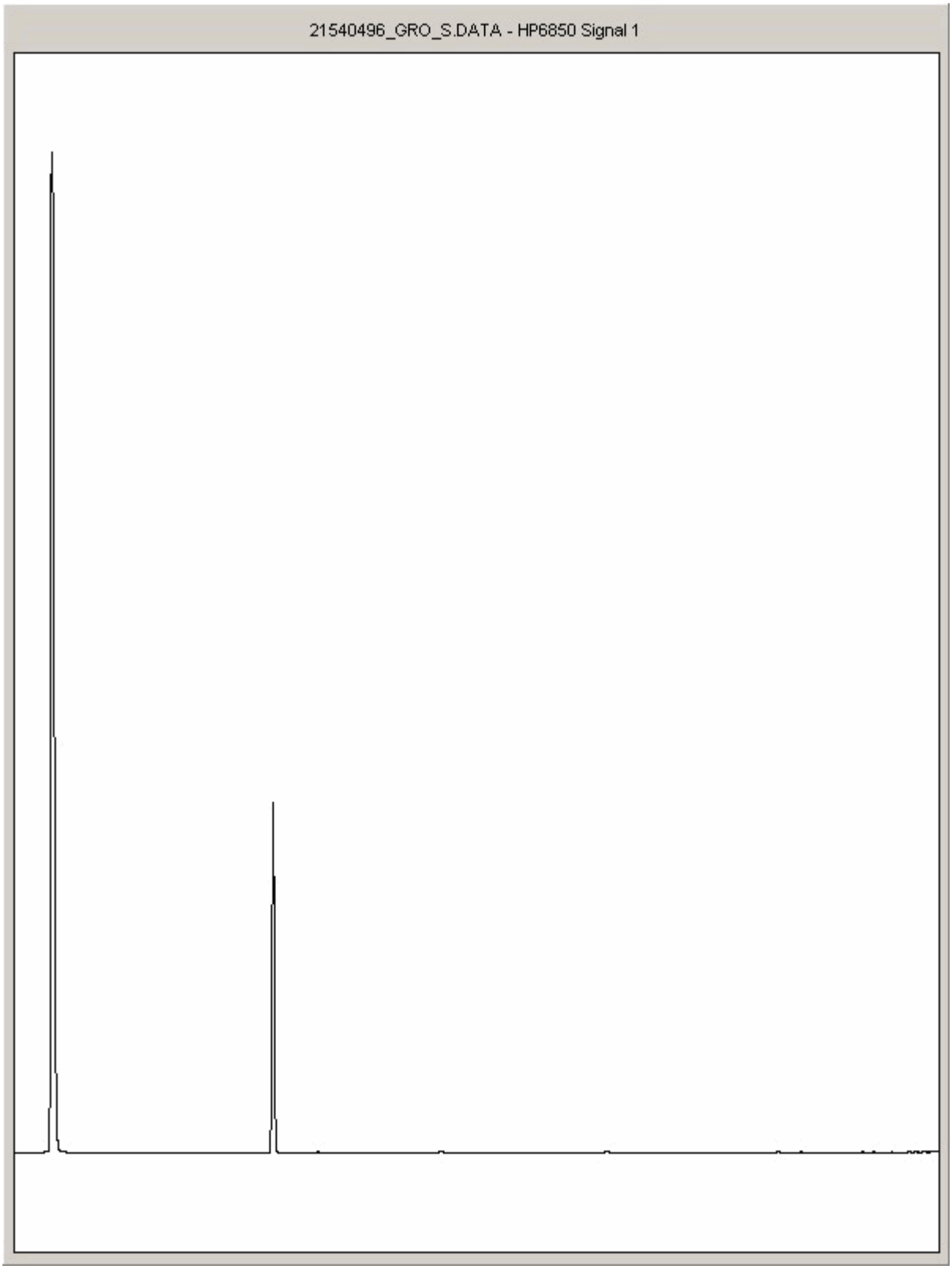
SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21540496
Sample ID : WS102

Depth : 1.40 - 1.50



CERTIFICATE OF ANALYSIS

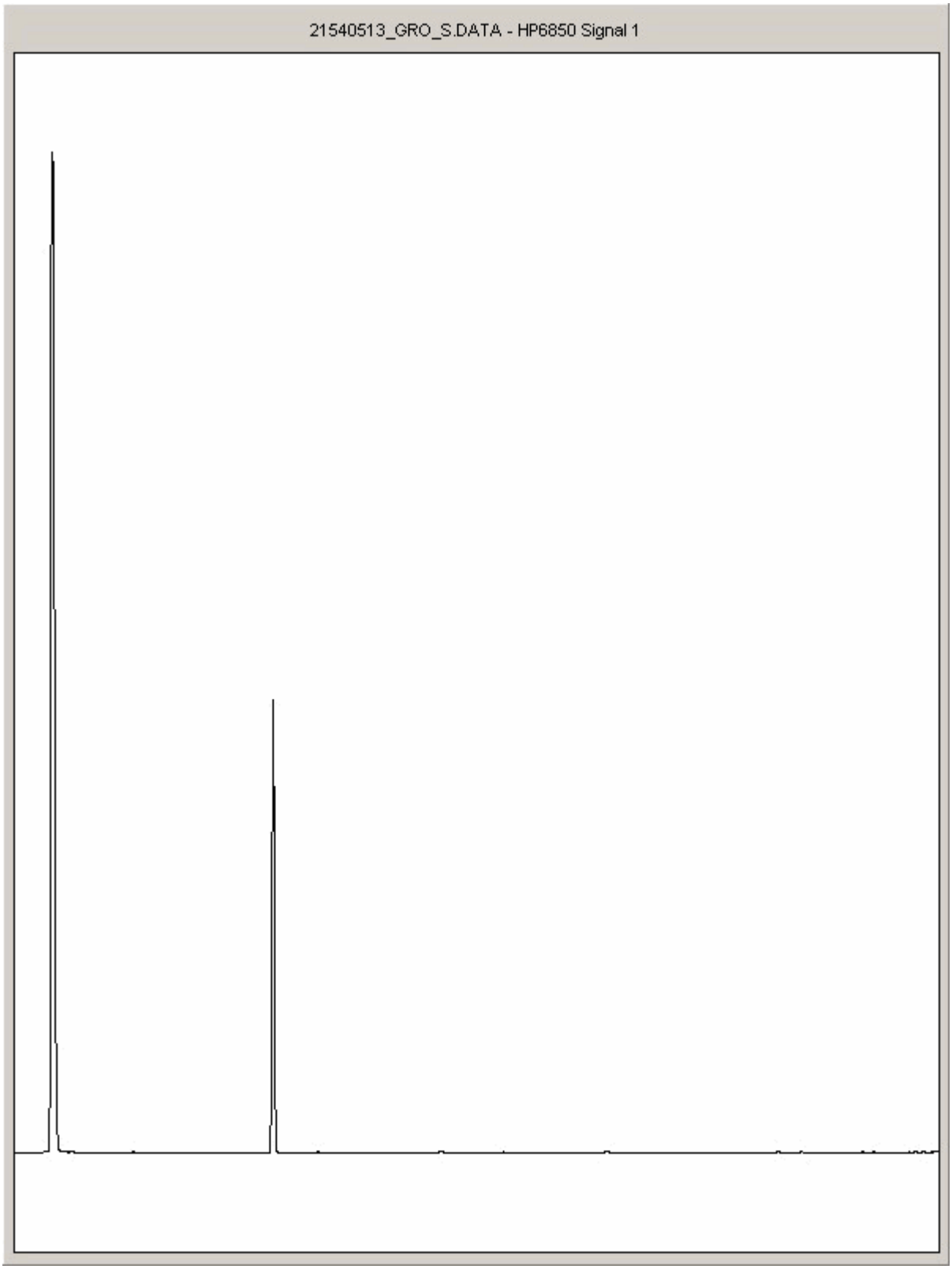
SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21540513
Sample ID : WS102

Depth : 0.35 - 0.45



CERTIFICATE OF ANALYSIS

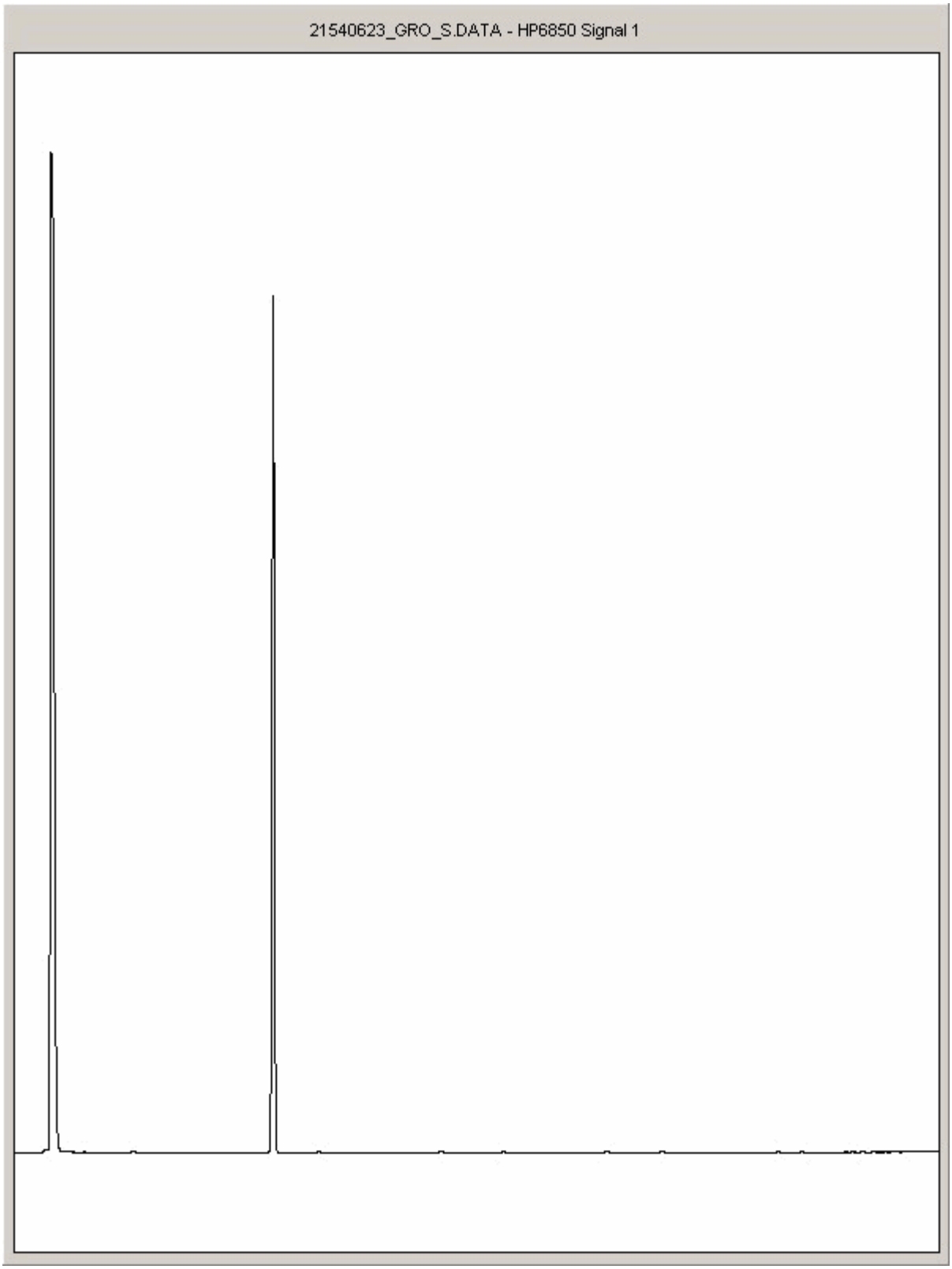
SDG:	200121-50	**Client Reference:**	70012984	**Report Number:**	539972
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539294

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21540623
Sample ID : WS103

Depth : 1.20 - 1.30



Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Tel: (01244) 528700
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email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

WSP PB BBC
3rd Floor, Kings Orchard,
1 Queen Street
Bristol
Gloucestershire
BS2 0HQ

Attention: Edward Jollands

CERTIFICATE OF ANALYSIS

Date of report Generation:	31 January 2020
Customer:	WSP PB BBC
Sample Delivery Group (SDG):	200122-112
Your Reference:	70012984
Location:	North Street, Reading
Report No:	539282

We received 1 sample on Wednesday January 22, 2020 and 1 of these samples were scheduled for analysis which was completed on Friday January 31, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



Sonia McWhan

Operations Manager

ALS Life Sciences Limited. ALS Life Sciences Limited registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21532194	WS101	ES	0.20 - 0.40	17/01/2020

Maximum Sample/Coolbox Temperature (°C) : **6.4**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
			21532194	WS101	ES	0.20 - 0.40	1kg TUB with Handle (ALE260)	S
							250g Amber Jar (ALE210)	S
							60g VOC (ALE215)	S
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 1		X				
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	X					
Boron Water Soluble	All	NDPs: 0 Tests: 1		X				
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1		X				
Easily Liberated Sulphide	All	NDPs: 0 Tests: 1		X				
EPH CWG GC (S)	All	NDPs: 0 Tests: 1		X				
Flashpoint	All	NDPs: 0 Tests: 1		X				
GRO by GC-FID (S)	All	NDPs: 0 Tests: 1					X	
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 1		X				
Loss on Ignition in soils	All	NDPs: 0 Tests: 1		X				
Metals in solid samples by OES	All	NDPs: 0 Tests: 1		X				
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 1		X				
PAH by GCMS	All	NDPs: 0 Tests: 1		X				
pH	All	NDPs: 0 Tests: 1		X				
Phenols by HPLC (S)	All	NDPs: 0 Tests: 1		X				

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21532194		
Customer Sample Reference			WS101		
AGS Reference			ES		
Depth (m)			0.20 - 0.40		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S
Sample description	All	NDPs: 0 Tests: 1		X	
Total Organic Carbon	All	NDPs: 0 Tests: 1		X	
Total Sulphate	All	NDPs: 0 Tests: 1		X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 1		X	
VOC MS (S)	All	NDPs: 0 Tests: 1			X

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	**fine**	0.063mm - 0.1mm	**medium**	0.1mm - 2mm	**coarse**	2mm - 10mm	**very coarse**	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21532194	WS101	0.20 - 0.40	Dark Brown	Sandy Silt Loam	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Customer Sample Ref.	WS101							
Depth (m)	0.20 - 0.40							
Sample Type	Soil/Solid (S)							
Date Sampled	17/01/2020							
Sampled Time	.							
Date Received	22/01/2020							
SDG Ref	200122-112							
Lab Sample No.(s)	21532194							
AGS Reference	ES							
Component	**LOD/Units**	**Method**						
Moisture Content Ratio (% of as received sample)	%	PM024	16					
Loss on ignition	<0.7 %	TM018	9.82 M					
Phenol	<0.01 mg/kg	TM062 (S)	<0.01 M					
Cresols	<0.01 mg/kg	TM062 (S)	<0.01 M					
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015 M					
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)	<0.035 M					
Organic Carbon, Total	<0.2 %	TM132	3.24 M					
pH	1 pH Units	TM133	8.13 M					
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6 #					
Cyanide, Total	<1 mg/kg	TM153	<1 M					
Cyanide, Free	<1 mg/kg	TM153	<1 M					
Cyanide, Complex	<1 mg/kg	TM153	<1					
Sulphide, Easily liberated	<15 mg/kg	TM180	<15 @ M					
Arsenic	<0.6 mg/kg	TM181	18.3 M					
Barium	<0.6 mg/kg	TM181	252 #					
Beryllium	<0.01 mg/kg	TM181	1.49 M					
Cadmium	<0.02 mg/kg	TM181	0.539 M					
Chromium	<0.9 mg/kg	TM181	13.6 M					
Copper	<1.4 mg/kg	TM181	58.7 M					
Lead	<0.7 mg/kg	TM181	206 M					
Mercury	<0.14 mg/kg	TM181	<0.14 M					
Nickel	<0.2 mg/kg	TM181	21.3 M					
Selenium	<1 mg/kg	TM181	<1 #					
Vanadium	<0.2 mg/kg	TM181	30.1 #					
Zinc	<1.9 mg/kg	TM181	377 M					
Sulphate, Total	<48 mg/kg	TM221	980 M					
Boron, water soluble	<1 mg/kg	TM222	1.01 M					
Flashpoint	°C	TM225	>70					
Nitrite as NO2, 2:1 water soluble	<0.1 mg/kg	TM243	0.38					
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248	0.00349					

Validated

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref. WS101	Depth (m) 0.20 - 0.40	Sample Type Soil/Solid (S)	Date Sampled 17/01/2020	Sampled Time .	Date Received 22/01/2020	SDG Ref 200122-112	Lab Sample No.(s) 21532194	AGS Reference ES
Naphthalene-d8 % recovery**	%	TM218	91.7								
Acenaphthene-d10 % recovery**	%	TM218	91.9								
Phenanthrene-d10 % recovery**	%	TM218	90.2								
Chrysene-d12 % recovery**	%	TM218	90								
Perylene-d12 % recovery**	%	TM218	91.8								
Naphthalene	<0.009 mg/kg	TM218	0.0172 M								
Acenaphthylene	<0.012 mg/kg	TM218	0.156 M								
Acenaphthene	<0.008 mg/kg	TM218	0.0341 M								
Fluorene	<0.01 mg/kg	TM218	0.0927 M								
Phenanthrene	<0.015 mg/kg	TM218	1.42 M								
Anthracene	<0.016 mg/kg	TM218	0.26 M								
Fluoranthene	<0.017 mg/kg	TM218	2.28 M								
Pyrene	<0.015 mg/kg	TM218	1.96 M								
Benz(a)anthracene	<0.014 mg/kg	TM218	1.04 M								
Chrysene	<0.01 mg/kg	TM218	0.915 M								
Benzo(b)fluoranthene	<0.015 mg/kg	TM218	0.987 M								
Benzo(k)fluoranthene	<0.014 mg/kg	TM218	0.416 M								
Benzo(a)pyrene	<0.015 mg/kg	TM218	1.02 M								
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218	0.593 M								
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218	0.119 M								
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218	0.696 M								
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218	12								

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

TPH CWG (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.					
			WS101					
			Depth (m)					
			0.20 - 0.40					
			Sample Type					
			Soil/Solid (S)					
			Date Sampled					
			17/01/2020					
			Sampled Time					
			.					
			Date Received					
			22/01/2020					
			SDG Ref					
			200122-112					
			Lab Sample No.(s)					
			21532194					
			AGS Reference					
			ES					
GRO Surrogate % recovery**	%	TM089	86.6					
Aliphatics >C5-C6	<0.01 mg/kg	TM089	<0.01					
Aliphatics >C6-C8	<0.01 mg/kg	TM089	<0.01					
Aliphatics >C8-C10	<0.01 mg/kg	TM089	<0.01					
Aliphatics >C10-C12	<1 mg/kg	TM414	<1					
Aliphatics >C12-C16	<1 mg/kg	TM414	<1					
Aliphatics >C16-C35	<1 mg/kg	TM414	6.26					
Aliphatics >C35-C44	<1 mg/kg	TM414	<1					
Total Aliphatics >C10-C44	<5 mg/kg	TM414	6.4					
Total Aliphatics & Aromatics >C10-C44	<10 mg/kg	TM414	45.9					
Aromatics >EC5-EC7	<0.01 mg/kg	TM089	<0.01					
Aromatics >EC7-EC8	<0.01 mg/kg	TM089	<0.01					
Aromatics >EC8-EC10	<0.01 mg/kg	TM089	<0.01					
Aromatics > EC10-EC12	<1 mg/kg	TM414	<1					
Aromatics > EC12-EC16	<1 mg/kg	TM414	<1					
Aromatics > EC16-EC21	<1 mg/kg	TM414	9.62					
Aromatics > EC16-EC35	<1 mg/kg	TM414	37.2					
Aromatics > EC21-EC35	<1 mg/kg	TM414	27.6					
Aromatics >EC35-EC44	<1 mg/kg	TM414	1.46					
Aromatics > EC40-EC44	<1 mg/kg	TM414	<1					
Total Aromatics > EC10-EC44	<5 mg/kg	TM414	39.5					
Total Aliphatics & Aromatics >C5-C44	<10 mg/kg	TM414	45.9					
Total Aliphatics >C5-C10	<0.05 mg/kg	TM089	<0.05					
Total Aromatics >EC5-EC10	<0.05 mg/kg	TM089	<0.05					
GRO >C5-C10	<0.02 mg/kg	TM089	<0.02					

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Customer Sample Ref.	WS101
Depth (m)	0.20 - 0.40
Sample Type	Soil/Solid (S)
Date Sampled	17/01/2020
Sampled Time	.
Date Received	22/01/2020
SDG Ref	200122-112
Lab Sample No.(s)	21532194
AGS Reference	ES

Component	LOD/Units	Method	
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116	<0.2 M
Benzene	<0.009 mg/kg	TM116	<0.18 M
Toluene	<0.007 mg/kg	TM116	<0.14 M
Ethylbenzene	<0.004 mg/kg	TM116	<0.08 M
p/m-Xylene	<0.01 mg/kg	TM116	<0.2 #
o-Xylene	<0.01 mg/kg	TM116	<0.2 M
Tert-amyl methyl ether	<0.01 mg/kg	TM116	<0.2 #

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref.	WS101ES	24/01/20	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	0.20 - 0.40										
Sample Type	SOLID										
Date Sampled	17/01/2020 00:00:00										
Date Receieved	22/01/2020 16:25:00										
SDG	200122-112										
Original Sample	21532194										
Method Number	TM048										

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM180	Sulphide in waters and waste waters 1991 ISBN 01 175 7186 SCA rec. 2007 (unpublished)'	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM225	Standard Methods for Analysis and Testing of Petroleum and Related Products 1989 Volume 1	Determination of Closed Cup Flash Point for Contamination in Solids
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	21532194
Customer Sample Ref.	WS101
AGS Ref.	ES
Depth	0.20 - 0.40
Type	Soil/Solid (S)
Ammoniacal N as NH4 in 2:1 extract	23-Jan-2020
Asbestos ID in Solid Samples	24-Jan-2020
Boron Water Soluble	27-Jan-2020
Cyanide Comp/Free/Total/Thiocyanate	27-Jan-2020
Easily Liberated Sulphide	28-Jan-2020
EPH CWG GC (S)	27-Jan-2020
Flashpoint	28-Jan-2020
GRO by GC-FID (S)	28-Jan-2020
Hexavalent Chromium (s)	28-Jan-2020
Loss on Ignition in soils	29-Jan-2020
Metals in solid samples by OES	30-Jan-2020
NO3, NO2 and TON by KONE (s)	31-Jan-2020
PAH by GCMS	24-Jan-2020
pH	28-Jan-2020
Phenols by HPLC (S)	24-Jan-2020
Sample description	23-Jan-2020
Total Organic Carbon	29-Jan-2020
Total Sulphate	29-Jan-2020
TPH CWG GC (S)	28-Jan-2020
VOC MS (S)	29-Jan-2020

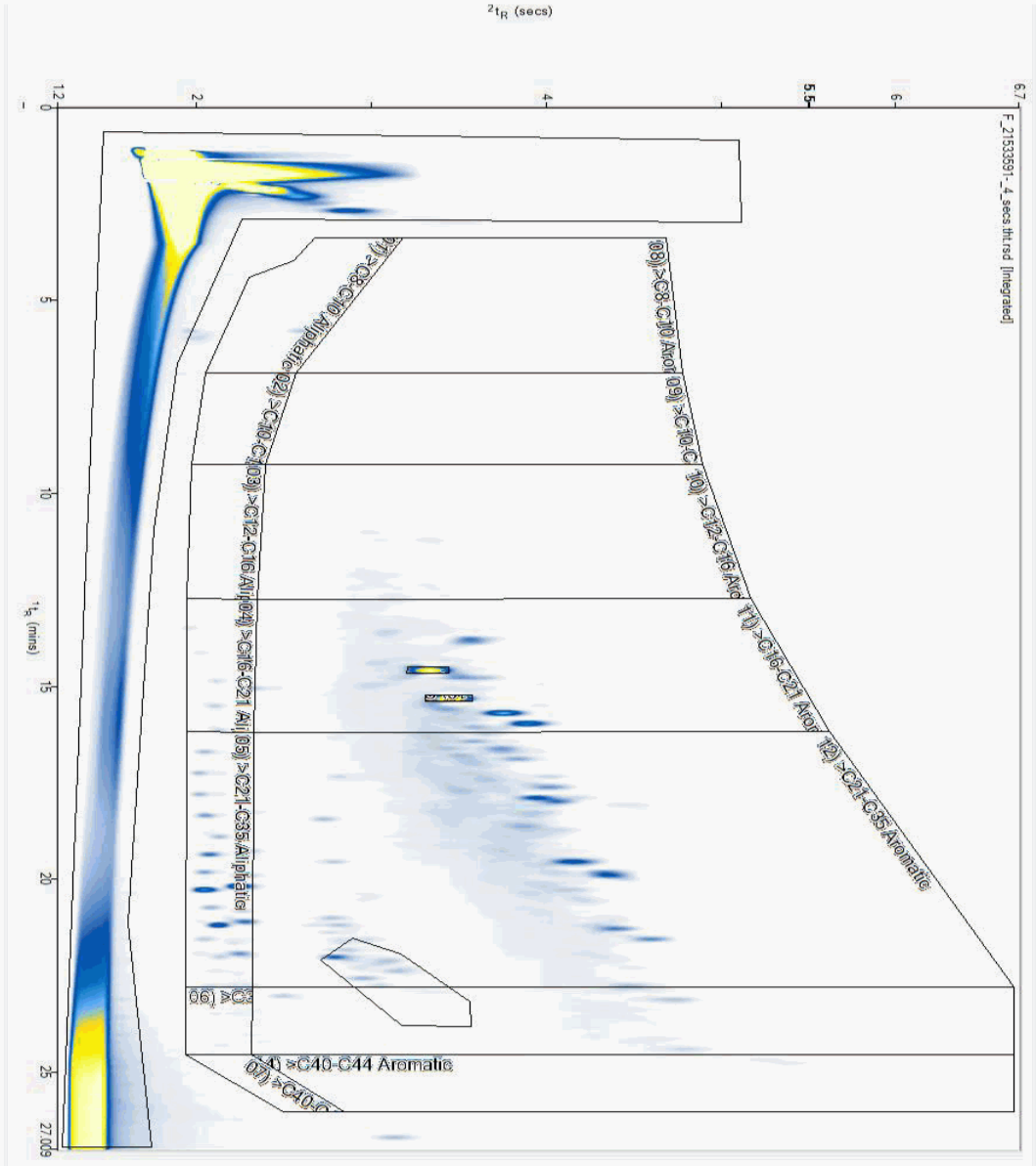
CERTIFICATE OF ANALYSIS

SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21533591 **Depth :** 0.20 - 0.40
Sample ID : WS101

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  F_21533591-_4_secs.tht
Date Acquired  :  26/01/20 06:47:47
Units          :  ppm
Dilution       :  0
CF             :
Multiplier     :
```



CERTIFICATE OF ANALYSIS

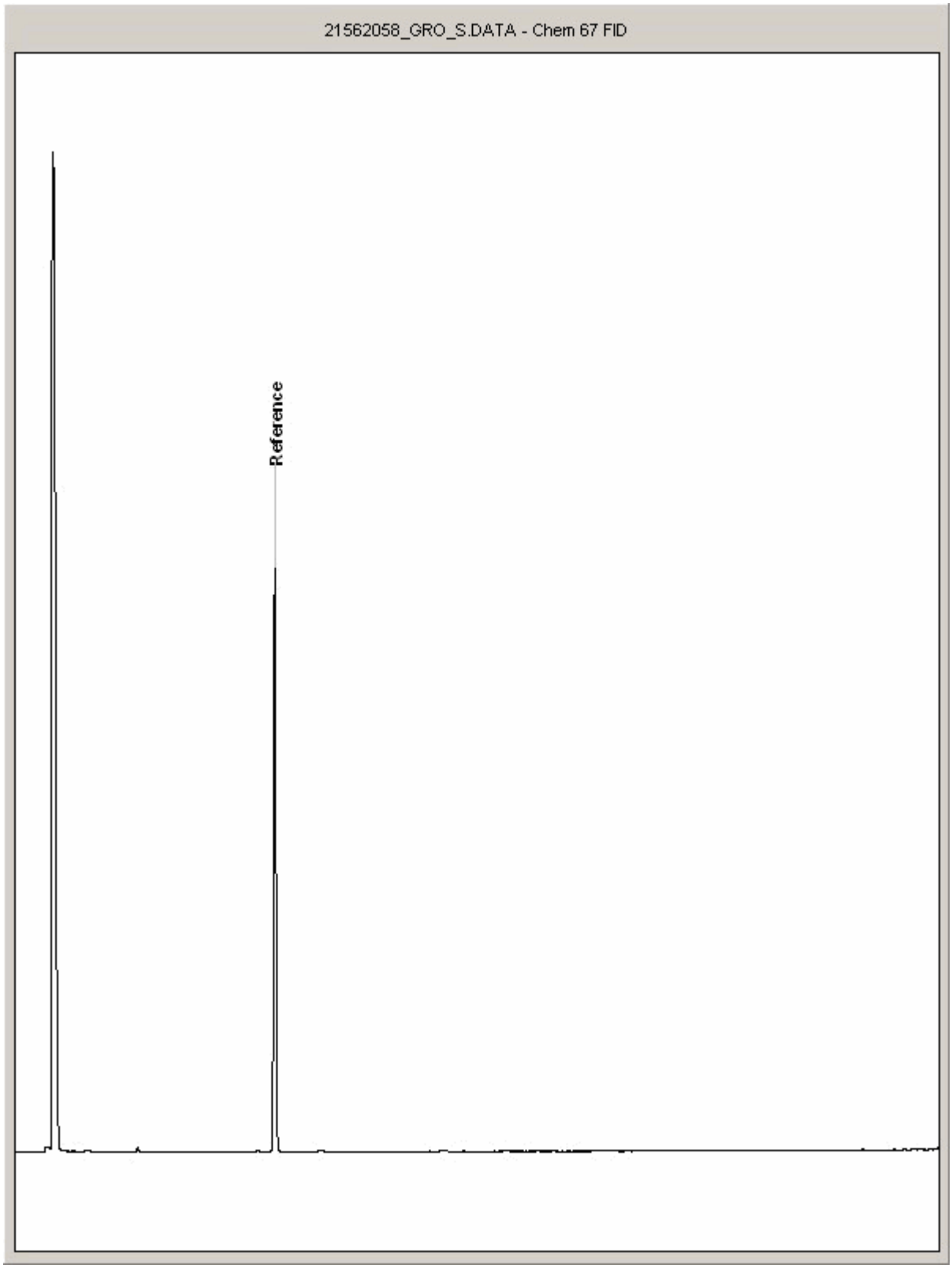
SDG:	200122-112	**Client Reference:**	70012984	**Report Number:**	539282
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21562058
Sample ID : WS101

Depth : 0.20 - 0.40



Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Website: www.alsenvironmental.co.uk

WSP PB BBC
3rd Floor, Kings Orchard,
1 Queen Street
Bristol
Gloucestershire
BS2 0HQ

Attention: Edward Jollands

CERTIFICATE OF ANALYSIS

Date of report Generation:	31 January 2020
Customer:	WSP PB BBC
Sample Delivery Group (SDG):	200122-117
Your Reference:	70012984
Location:	North Street, Reading
Report No:	539283

This report has been revised and directly supersedes 539253 in its entirety.

We received 2 samples on Wednesday January 22, 2020 and 2 of these samples were scheduled for analysis which was completed on Friday January 31, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. ALS Life Sciences Limited registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21532855	BH103	ES	0.40 - 0.50	20/01/2020
21532860	BH103	ES	1.50 - 1.60	20/01/2020

Maximum Sample/Coolbox Temperature (°C) : **7.0**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21532855				21532860		
Customer Sample Reference			BH103				BH103		
AGS Reference			ES				ES		
Depth (m)			0.40 - 0.50				1.50 - 1.60		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)		
Sample Type			S	S	S	S	S		
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 2		X		X			
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	X						
Asbestos Quantification - Full	All	NDPs: 0 Tests: 1	X						
Boron Water Soluble	All	NDPs: 0 Tests: 2		X		X			
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2		X		X			
Easily Liberated Sulphide	All	NDPs: 0 Tests: 2		X		X			
EPH CWG GC (S)	All	NDPs: 0 Tests: 2		X		X			
Flashpoint	All	NDPs: 1 Tests: 0		N					
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2			X		X		
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2		X		X			
Loss on Ignition in soils	All	NDPs: 0 Tests: 1		X					
Metals in solid samples by OES	All	NDPs: 0 Tests: 2		X		X			
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 2		X		X			
PAH by GCMS	All	NDPs: 0 Tests: 2		X		X			
pH	All	NDPs: 0 Tests: 2		X		X			

Validated

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21532855				21532860	
Customer Sample Reference			BH103				BH103	
AGS Reference			ES				ES	
Depth (m)			0.40 - 0.50				1.50 - 1.60	
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)	
Sample Type			S	S	S	S	S	
Phenols by HPLC (S)	All	NDPs: 0 Tests: 2		X		X		
Sample description	All	NDPs: 0 Tests: 2		X		X		
Total Organic Carbon	All	NDPs: 0 Tests: 1		X				
Total Sulphate	All	NDPs: 0 Tests: 2		X		X		
TPH CWG GC (S)	All	NDPs: 0 Tests: 2		X		X		
VOC MS (S)	All	NDPs: 0 Tests: 2			X		X	

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Sample Descriptions

Grain Sizes

very fine	<0.063mm	**fine**	0.063mm - 0.1mm	**medium**	0.1mm - 2mm	**coarse**	2mm - 10mm	**very coarse**	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21532855	BH103	0.40 - 0.50	Dark Brown	Sandy Silt Loam	Glass & Stones	Brick
21532860	BH103	1.50 - 1.60	Light Brown	Silty Clay	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH103	BH103
			Depth (m)	0.40 - 0.50	1.50 - 1.60
			Sample Type	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	20/01/2020	20/01/2020
			Sampled Time	.	.
			Date Received	22/01/2020	22/01/2020
			SDG Ref	200122-117	200122-117
			Lab Sample No.(s)	21532855	21532860
			AGS Reference	ES	ES
Moisture Content Ratio (% of as received sample)	%	PM024		15	13
Loss on ignition	<0.7 %	TM018		6.58 M	
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	0.0115 M
Cresols	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M
Xylenols	<0.015 mg/kg	TM062 (S)		<0.015 M	<0.015 M
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)		<0.035 M	<0.035 M
Organic Carbon, Total	<0.2 %	TM132		3.46 M	
pH	1 pH Units	TM133		7.98 M	8.13 M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #
Cyanide, Total	<1 mg/kg	TM153		<1 M	<1 M
Cyanide, Free	<1 mg/kg	TM153		<1 M	<1 M
Cyanide, Complex	<1 mg/kg	TM153		<1	<1
Sulphide, Easily liberated	<15 mg/kg	TM180		<15 ♦ M	<15 ♦ M
Arsenic	<0.6 mg/kg	TM181		28.3 M	15.3 M
Barium	<0.6 mg/kg	TM181		333 #	45.5 #
Beryllium	<0.01 mg/kg	TM181		1.4 M	0.493 M
Cadmium	<0.02 mg/kg	TM181		0.184 M	<0.02 M
Chromium	<0.9 mg/kg	TM181		16.8 M	12 M
Copper	<1.4 mg/kg	TM181		109 M	8.38 M
Lead	<0.7 mg/kg	TM181		312 M	24.3 M
Mercury	<0.14 mg/kg	TM181		0.357 M	<0.14 M
Nickel	<0.2 mg/kg	TM181		28.6 M	16.8 M
Selenium	<1 mg/kg	TM181		<1 #	<1 #
Vanadium	<0.2 mg/kg	TM181		29.6 #	33.9 #
Zinc	<1.9 mg/kg	TM181		381 M	38.6 M
Sulphate, Total	<48 mg/kg	TM221		1030 M	<48 M
Boron, water soluble	<1 mg/kg	TM222		<1 M	<1 M
Nitrite as NO2, 2:1 water soluble	<0.1 mg/kg	TM243		0.54	<0.1
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248		0.00372	0.00314
Asbestos Quantification - Gravimetric - %	<0.001 %	TM304		<0.001 #	
Asbestos Quantification - PCOM Evaluation - %	<0.001 %	TM304		<0.001 #	
Additional Asbestos Components (Using TM048)		TM304		None #	

Validated

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH103	BH103
			Depth (m)	0.40 - 0.50	1.50 - 1.60
			Sample Type	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	20/01/2020	20/01/2020
			Sampled Time	-	-
			Date Received	22/01/2020	22/01/2020
			SDG Ref	200122-117	200122-117
			Lab Sample No.(s)	21532855	21532860
			AGS Reference	ES	ES
Analysts Comments		TM304		N/C	
Asbestos Quantification - Total - %	<0.001 %	TM304		<0.001 #	

Validated

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH103	BH103
			Depth (m)	0.40 - 0.50	1.50 - 1.60
			Sample Type	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	20/01/2020	20/01/2020
			Sampled Time	.	.
			Date Received	22/01/2020	22/01/2020
			SDG Ref	200122-117	200122-117
			Lab Sample No.(s)	21532855	21532860
			AGS Reference	ES	ES
Naphthalene-d8 % recovery**	%	TM218		87.7	92.3
Acenaphthene-d10 % recovery**	%	TM218		88.2	90.8
Phenanthrene-d10 % recovery**	%	TM218		87	90.6
Chrysene-d12 % recovery**	%	TM218		86.5	88.6
Perylene-d12 % recovery**	%	TM218		84.3	91.6
Naphthalene	<0.009 mg/kg	TM218		0.0131 M	<0.009 M
Acenaphthylene	<0.012 mg/kg	TM218		0.104 M	<0.012 M
Acenaphthene	<0.008 mg/kg	TM218		<0.008 M	<0.008 M
Fluorene	<0.01 mg/kg	TM218		0.0181 M	<0.01 M
Phenanthrene	<0.015 mg/kg	TM218		0.381 M	<0.015 M
Anthracene	<0.016 mg/kg	TM218		0.0913 M	<0.016 M
Fluoranthene	<0.017 mg/kg	TM218		1.27 M	<0.017 M
Pyrene	<0.015 mg/kg	TM218		1.17 M	<0.015 M
Benz(a)anthracene	<0.014 mg/kg	TM218		0.653 M	<0.014 M
Chrysene	<0.01 mg/kg	TM218		0.592 M	<0.01 M
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		0.739 M	<0.015 M
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		0.34 M	<0.014 M
Benzo(a)pyrene	<0.015 mg/kg	TM218		0.834 M	<0.015 M
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		0.604 M	<0.018 M
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		0.173 M	<0.023 M
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		0.841 M	<0.024 M
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		7.83	<0.118

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

TPH CWG (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH103	BH103				
			Depth (m)	0.40 - 0.50	1.50 - 1.60				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	20/01/2020	20/01/2020				
			Sampled Time	.	.				
			Date Received	22/01/2020	22/01/2020				
			SDG Ref	200122-117	200122-117				
			Lab Sample No.(s)	21532855	21532860				
			AGS Reference	ES	ES				
GRO Surrogate % recovery**	%	TM089		76.5	107				
Aliphatics >C5-C6	<0.01 mg/kg	TM089		<0.01	<0.01				
Aliphatics >C6-C8	<0.01 mg/kg	TM089		<0.01	<0.01				
Aliphatics >C8-C10	<0.01 mg/kg	TM089		<0.01	<0.01				
Aliphatics >C10-C12	<1 mg/kg	TM414		<1	<1				
Aliphatics >C12-C16	<1 mg/kg	TM414		<1	<1				
Aliphatics >C16-C35	<1 mg/kg	TM414		4.34	<1				
Aliphatics >C35-C44	<1 mg/kg	TM414		<1	<1				
Total Aliphatics >C10-C44	<5 mg/kg	TM414		<5	<5				
Total Aliphatics & Aromatics >C10-C44	<10 mg/kg	TM414		35	<10				
Aromatics >EC5-EC7	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics >EC7-EC8	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics >EC8-EC10	<0.01 mg/kg	TM089		<0.01	<0.01				
Aromatics > EC10-EC12	<1 mg/kg	TM414		<1	<1				
Aromatics > EC12-EC16	<1 mg/kg	TM414		<1	<1				
Aromatics > EC16-EC21	<1 mg/kg	TM414		5.37	<1				
Aromatics > EC16-EC35	<1 mg/kg	TM414		28.2	1.03				
Aromatics > EC21-EC35	<1 mg/kg	TM414		22.8	<1				
Aromatics >EC35-EC44	<1 mg/kg	TM414		2.04	<1				
Aromatics > EC40-EC44	<1 mg/kg	TM414		<1	<1				
Total Aromatics > EC10-EC44	<5 mg/kg	TM414		30.3	<5				
Total Aliphatics & Aromatics >C5-C44	<10 mg/kg	TM414		30.3	<10				
Total Aliphatics >C5-C10	<0.05 mg/kg	TM089		<0.05	<0.05				
Total Aromatics >EC5-EC10	<0.05 mg/kg	TM089		<0.05	<0.05				
GRO >C5-C10	<0.02 mg/kg	TM089		<0.02	<0.02				

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH103	BH103
			Depth (m)	0.40 - 0.50	1.50 - 1.60
			Sample Type	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	20/01/2020	20/01/2020
			Sampled Time	.	.
			Date Received	22/01/2020	22/01/2020
			SDG Ref	200122-117	200122-117
			Lab Sample No.(s)	21532855	21532860
			AGS Reference	ES	ES
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116		<0.2 M	<0.1 M
Benzene	<0.009 mg/kg	TM116		<0.18 M	<0.09 M
Toluene	<0.007 mg/kg	TM116		<0.14 M	<0.07 M
Ethylbenzene	<0.004 mg/kg	TM116		<0.08 M	<0.04 M
p/m-Xylene	<0.01 mg/kg	TM116		<0.2 #	<0.1 #
o-Xylene	<0.01 mg/kg	TM116		<0.2 M	<0.1 M
Tert-amyl methyl ether	<0.01 mg/kg	TM116		<0.2 #	<0.1 #

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref.	BH103ES	24/01/2020	Barbara Urbanek-Walsh	Loose fibres in soil.	Not Detected (#)	Trace (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Depth (m)	0.40 - 0.50										
Sample Type	SOLID										
Date Sampled	20/01/2020 00:00:00										
Date Receieved	22/01/2020 19:40:00										
SDG	200122-117										
Original Sample	21532855										
Method Number	TM048										

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Asbestos Quantification - Full

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

		Additional Asbestos Components	Analysts Comments	Asbestos Quantification - Gravimetric - %	Asbestos Quantification - PCOM Evaluation	Asbestos Quantification - Total - %
Cust. Sample Ref.	BH103ES	None (#)	N/C	<0.001 (#)	<0.001 (#)	<0.001 (#)
Depth (m)	0.40 - 0.50					
Sample Type	SOLID					
Date Sampled	20/01/2020 00:00:00					
Date Receieved	22/01/2020 19:40:00					
SDG	200122-117					
Original Sample	21532855					
Method Number	TM304					

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Notification of NDPs (No determination possible)

Date Received : 22/01/2020 19:40:24

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
21532855	BH103 ESZ	0.40 - 0.50	Flashpoint	Unsuitable sample for analysis

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM180	Sulphide in waters and waste waters 1991 ISBN 01 175 7186 SCA rec. 2007 (unpublished)'	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM304	HSE Contract research Report no 83/1996	Asbestos Quantification in Soil: Fibres identified by morphology only
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Test Completion Dates

Lab Sample No(s)	21532855	21532860
Customer Sample Ref.	BH103	BH103
AGS Ref.	ES	ES
Depth	0.40 - 0.50	1.50 - 1.60
Type	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal N as NH4 in 2:1 extract	23-Jan-2020	23-Jan-2020
Asbestos ID in Solid Samples	24-Jan-2020	
Asbestos Quantification - Full	31-Jan-2020	
Boron Water Soluble	27-Jan-2020	28-Jan-2020
Cyanide Comp/Free/Total/Thiocyanate	27-Jan-2020	28-Jan-2020
Easily Liberated Sulphide	28-Jan-2020	28-Jan-2020
EPH CWG GC (S)	26-Jan-2020	27-Jan-2020
GRO by GC-FID (S)	28-Jan-2020	28-Jan-2020
Hexavalent Chromium (s)	28-Jan-2020	28-Jan-2020
Loss on Ignition in soils	29-Jan-2020	
Metals in solid samples by OES	29-Jan-2020	31-Jan-2020
NO3, NO2 and TON by KONE (s)	31-Jan-2020	31-Jan-2020
PAH by GCMS	24-Jan-2020	24-Jan-2020
pH	28-Jan-2020	28-Jan-2020
Phenols by HPLC (S)	24-Jan-2020	24-Jan-2020
Sample description	23-Jan-2020	23-Jan-2020
Total Organic Carbon	27-Jan-2020	
Total Sulphate	28-Jan-2020	28-Jan-2020
TPH CWG GC (S)	28-Jan-2020	28-Jan-2020
VOC MS (S)	29-Jan-2020	29-Jan-2020

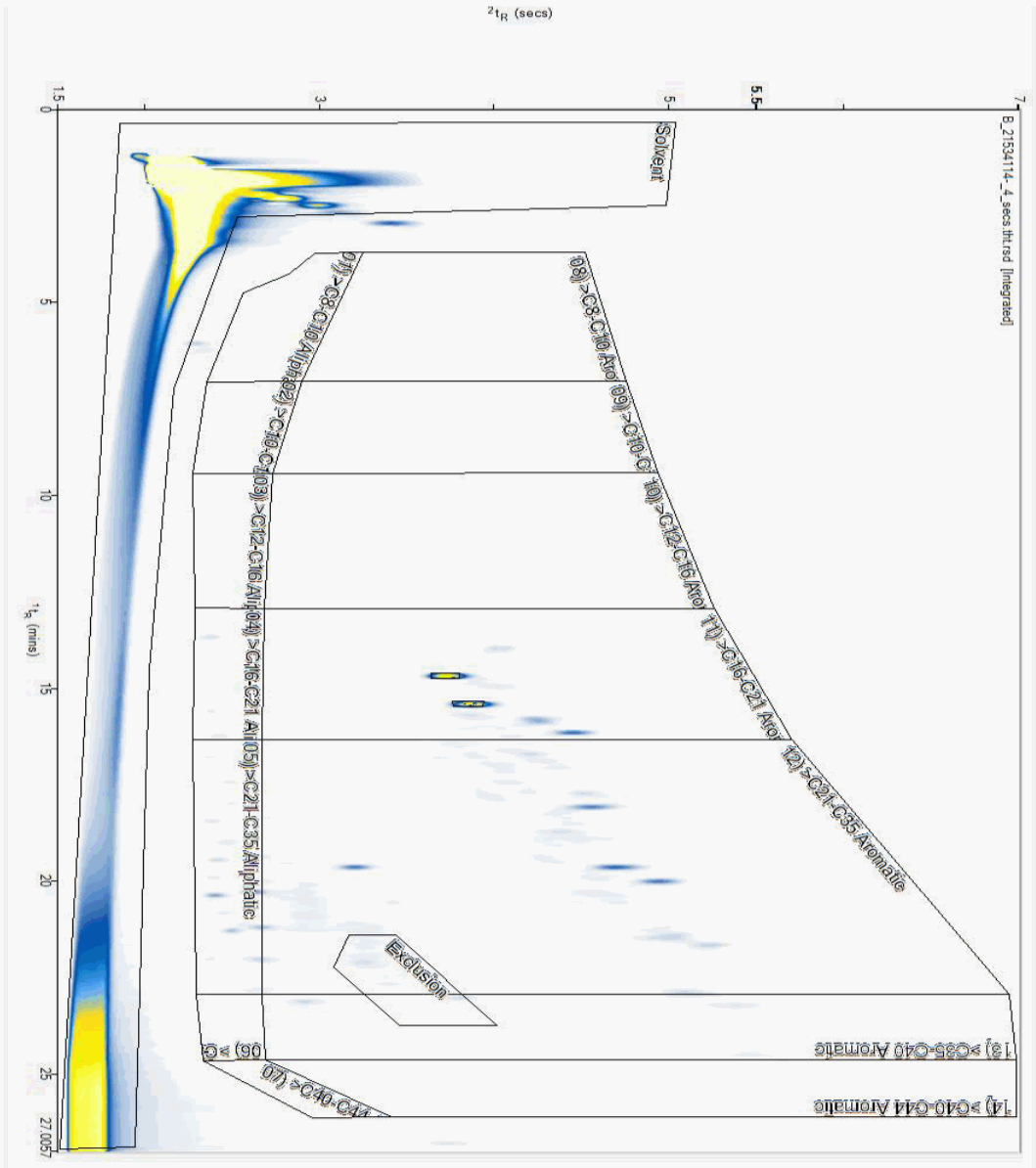
CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21534114 **Depth :** 0.40 - 0.50
Sample ID : BH103

ChromSpace LIMS export
Current batch
Sample Identity: B_21534114-_4_secs.tht
Date Acquired : 25/01/20 05:22:32
Units : ppm
Dilution : 0
CF :
Multiplier :



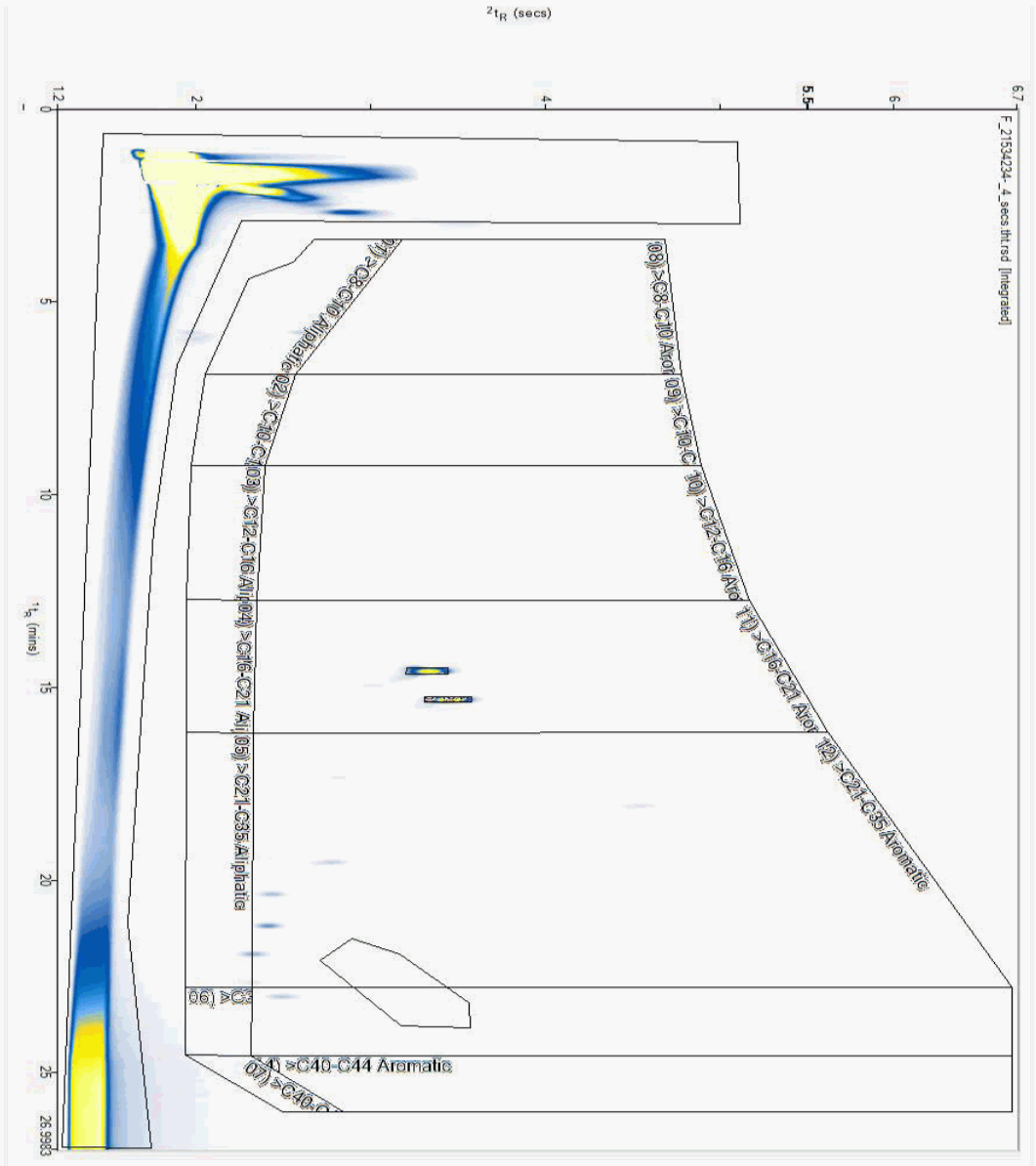
CERTIFICATE OF ANALYSIS

SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Chromatogram

Analysis: EPH CWG GC (S) **Sample No :** 21534234 **Sample ID :** BH103 **Depth :** 1.50 - 1.60

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  F_21534234-_4_secs.tht
Date Acquired  :  26/01/20 03:41:17
Units          :  ppm
Dilution       :  0
CF             :
Multiplier     :
```



CERTIFICATE OF ANALYSIS

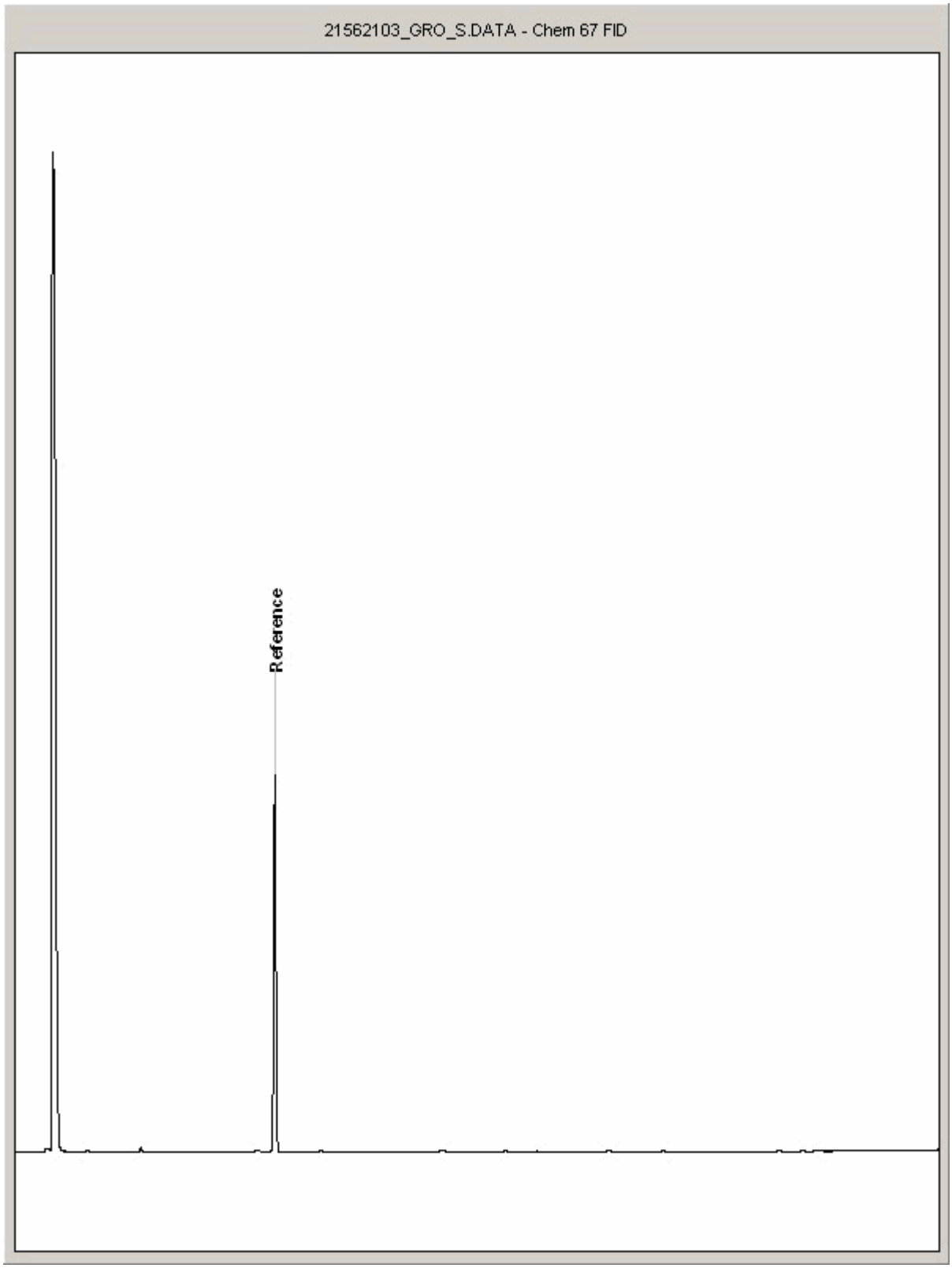
SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21562103
Sample ID : BH103

Depth : 0.40 - 0.50



CERTIFICATE OF ANALYSIS

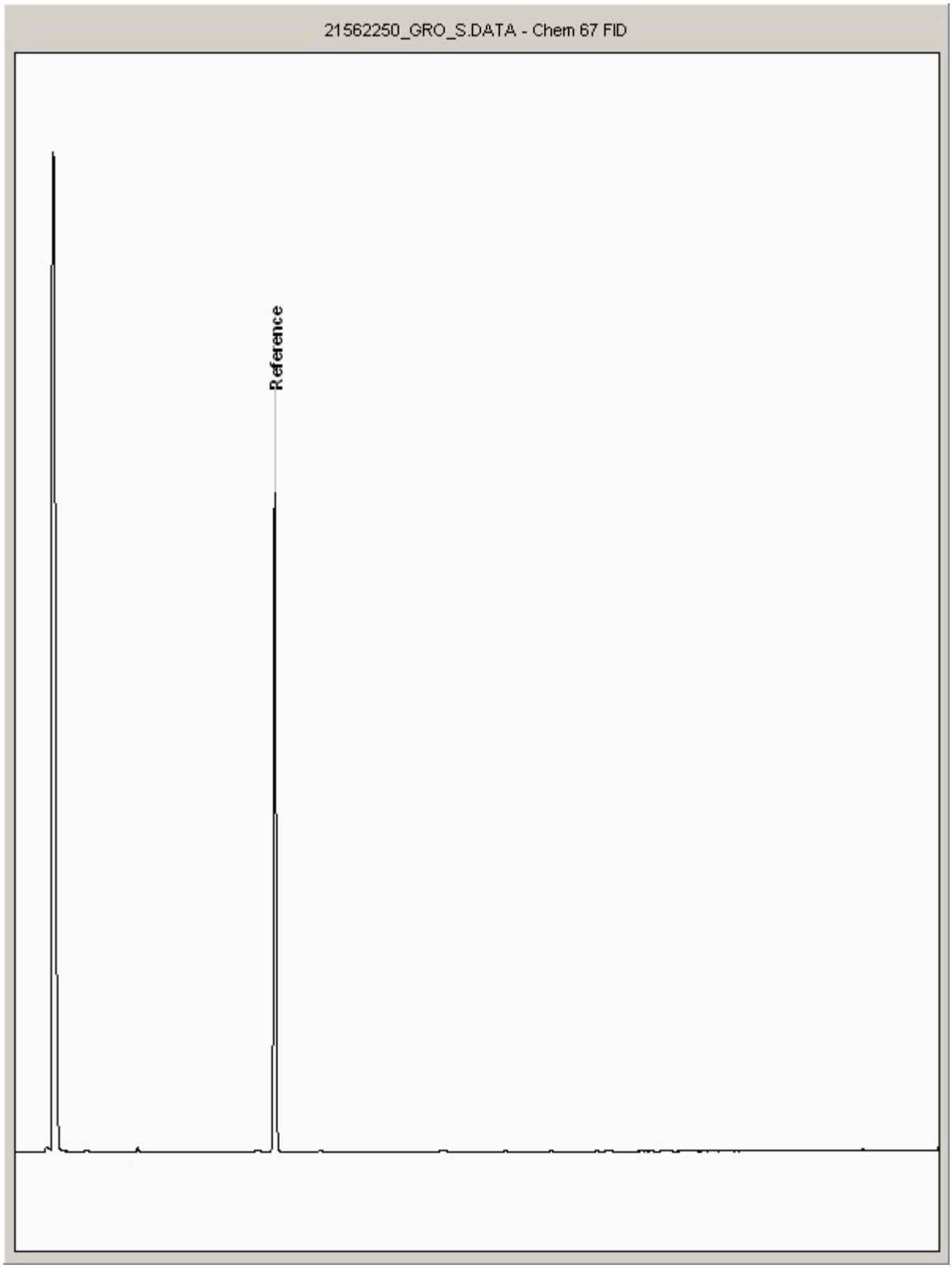
SDG:	200122-117	**Client Reference:**	70012984	**Report Number:**	539283
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	539253

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 21562250
Sample ID : BH103

Depth : 1.50 - 1.60



Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix G

CHEMICAL RESULTS - WATER

Confidential

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

WSP PB BBC
3rd Floor, Kings Orchard,
1 Queen Street
Bristol
Gloucestershire
BS2 0HQ

Attention: Edward Jollands

CERTIFICATE OF ANALYSIS

Date of report Generation:	07 February 2020
Customer:	WSP PB BBC
Sample Delivery Group (SDG):	200130-16
Your Reference:	70012984
Location:	North Street, Reading
Report No:	540245

We received 3 samples on Thursday January 30, 2020 and 3 of these samples were scheduled for analysis which was completed on Friday February 07, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21582021	BH101	EW200129	0.00 - 0.00	29/01/2020
21582033	BH102	EW200129	0.00 - 0.00	29/01/2020
21582046	BH103	EW200129	0.00 - 0.00	29/01/2020

Maximum Sample/Coolbox Temperature (°C) : 5.2

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21582021	21582033	21582046
Customer Sample Reference			BH101	BH102	BH103
AGS Reference			EW200129	EW200129	EW200129
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Container			250ml Amber Gl. PTFE/PE	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	250ml Amber Gl. PTFE/PE	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	250ml Amber Gl. PTFE/PE	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 3			X						X						X			
Anions by ion Chromatography	All	NDPs: 0 Tests: 3		X						X						X				
Anions by Kone (w)	All	NDPs: 0 Tests: 3		X						X						X				
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3					X						X						X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3				X						X						X		
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 3	X						X						X					
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 3	X						X						X					
GRO by GC-FID (W)	All	NDPs: 0 Tests: 3						X						X						X
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 3		X						X						X				
Low Level Phenols by HPLC (W)	All	NDPs: 0 Tests: 3			X						X						X			
Mercury Dissolved	All	NDPs: 0 Tests: 3				X						X						X		
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 3	X						X						X					
pH Value	All	NDPs: 0 Tests: 3		X						X						X				
TPH CWG (W)	All	NDPs: 0 Tests: 3	X						X						X					
VOC MS (W)	All	NDPs: 0 Tests: 3						X						X						X

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH102	BH103			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	29/01/2020	29/01/2020	29/01/2020			
			Sampled Time	.	.	.			
			Date Received	30/01/2020	30/01/2020	30/01/2020			
			SDG Ref	200130-16	200130-16	200130-16			
			Lab Sample No.(s)	21582021	21582033	21582046			
			AGS Reference	EW200129	EW200129	EW200129			
Ammoniacal Nitrogen as NH4	<300 µg/l	TM099		1110 #	<300 #	1260 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #	<0.5 #			
Barium (diss.filt)	<0.2 µg/l	TM152		29.4 #	33.3 #	43.4 #			
Beryllium (diss.filt)	<0.1 µg/l	TM152		<0.1 #	<0.1 #	<0.1 #			
Boron (diss.filt)	<10 µg/l	TM152		102 #	91.6 #	102 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #	<0.08 #			
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #	<1 #			
Copper (diss.filt)	<0.3 µg/l	TM152		0.434 #	0.692 #	0.502 #			
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #	<0.2 #			
Nickel (diss.filt)	<0.4 µg/l	TM152		2.88 #	1.57 #	7.13 #			
Selenium (diss.filt)	<1 µg/l	TM152		1.67 #	1.61 #	3.76 #			
Vanadium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #	<1 #			
Zinc (diss.filt)	<1 µg/l	TM152		2.1 #	2.7 #	2.33 #			
Hardness, Total as CaCO3	<650 µg/l	TM152		309000	357000	373000			
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #	0.0102 #			
Sulphate as %SO4	<0.0002 %	TM184		0.00472 #	0.00495 #	0.00592 #			
Nitrate as N	<20 µg/l	TM226		8190 #	9820 #	6990 #			
Cyanide, Total	<50 µg/l	TM227		<50 #	<50 #	<50 #			
Cyanide, Free	<50 µg/l	TM227		<50 #	<50 #	<50 #			
Cyanide, Complex	<50 µg/l	TM227		<50	<50	<50			
Chromium, Hexavalent	<30 µg/l	TM241		<30 #	<30 #	<30 #			
Resorcinol (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
Catechol (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
Phenol (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
Cresols (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
Xylenols (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
1-Naphthol (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
2,3,5-Trimethylphenol (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
2-Isopropylphenol (low level)	<0.5 µg/l	TM255		<0.5	<0.5	<0.5			
pH	<1 pH Units	TM256		7.59 #	7.46 #	7.61 #			

CERTIFICATE OF ANALYSIS

SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

PAH Spec MS - Aqueous (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH102	BH103			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	29/01/2020	29/01/2020	29/01/2020			
			Sampled Time	.	.	.			
			Date Received	30/01/2020	30/01/2020	30/01/2020			
			SDG Ref	200130-16	200130-16	200130-16			
			Lab Sample No.(s)	21582021	21582033	21582046			
			AGS Reference	EW200129	EW200129	EW200129			
Naphthalene (aq)	<0.01 µg/l	TM178		0.0106 #	<0.01 #	0.0186 #			
Acenaphthene (aq)	<0.005 µg/l	TM178		0.00612 #	<0.005 #	0.00763 #			
Acenaphthylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Phenanthrene (aq)	<0.005 µg/l	TM178		0.00525 #	<0.005 #	0.0104 #			
Fluorene (aq)	<0.005 µg/l	TM178		0.00766 #	<0.005 #	0.0119 #			
Chrysene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		<0.002 #	<0.002 #	<0.002 #			
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #			
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		<0.082 #	<0.082 #	<0.082 #			

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

TPH CWG (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH102	BH103			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	29/01/2020	29/01/2020	29/01/2020			
			Sampled Time	.	.	.			
			Date Received	30/01/2020	30/01/2020	30/01/2020			
			SDG Ref	200130-16	200130-16	200130-16			
			Lab Sample No.(s)	21582021	21582033	21582046			
			AGS Reference	EW200129	EW200129	EW200129			
GRO Surrogate % recovery**	%	TM245		101	93	91			
GRO >C5-C12	<50 µg/l	TM245		<50 #	<50 #	<50 #			
Aliphatics >C5-C6	<10 µg/l	TM245		<10	<10	<10			
Aliphatics >C6-C8	<10 µg/l	TM245		<10	<10	<10			
Aliphatics >C8-C10	<10 µg/l	TM245		<10	<10	<10			
Aliphatics >C10-C12	<10 µg/l	TM245		<10	<10	<10			
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174		<10	<10	<10			
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174		<10	<10	<10			
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174		<10	<10	<10			
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174		<10	<10	<10			
Aromatics >EC5-EC7	<10 µg/l	TM245		<10	<10	<10			
Aromatics >EC7-EC8	<10 µg/l	TM245		<10	<10	<10			
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10	<10			
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10	<10			
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174		<10	<10	<10			
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174		<10	<10	<10			
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174		<10	<10	<10			
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174		<10	<10	<10			
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174		<10	<10	<10			
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174		<10	<10	<10			
Aromatics >EC16-EC35 (aq)	<10 µg/l	TM174		<10	<10	<10			

CERTIFICATE OF ANALYSIS

SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH102	BH103			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	29/01/2020	29/01/2020	29/01/2020			
			Sampled Time	.	.	.			
			Date Received	30/01/2020	30/01/2020	30/01/2020			
			SDG Ref	200130-16	200130-16	200130-16			
			Lab Sample No.(s)	21582021	21582033	21582046			
			AGS Reference	EW200129	EW200129	EW200129			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #			
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #			
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #			
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #			
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #			
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #			
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #	<1 #			
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2	<2			

Table of Results - Appendix

Method No	Reference	Description
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM226	In-House Method	Determination of Anions in Waters using Ion Chromatography
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	21582021	21582033	21582046
Customer Sample Ref.	BH101	BH102	BH103
AGS Ref.	EW200129	EW200129	EW200129
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water
Ammoniacal Nitrogen	03-Feb-2020	03-Feb-2020	03-Feb-2020
Anions by ion Chromatography	01-Feb-2020	01-Feb-2020	01-Feb-2020
Anions by Kone (w)	01-Feb-2020	01-Feb-2020	01-Feb-2020
Cyanide Comp/Free/Total/Thiocyanate	07-Feb-2020	07-Feb-2020	07-Feb-2020
Dissolved Metals by ICP-MS	05-Feb-2020	05-Feb-2020	05-Feb-2020
EPH CWG (Aliphatic) Aqueous GC (W)	07-Feb-2020	07-Feb-2020	07-Feb-2020
EPH CWG (Aromatic) Aqueous GC (W)	07-Feb-2020	07-Feb-2020	07-Feb-2020
GRO by GC-FID (W)	31-Jan-2020	31-Jan-2020	31-Jan-2020
Hexavalent Chromium (w)	04-Feb-2020	04-Feb-2020	04-Feb-2020
Low Level Phenols by HPLC (W)	03-Feb-2020	04-Feb-2020	04-Feb-2020
Mercury Dissolved	06-Feb-2020	06-Feb-2020	06-Feb-2020
PAH Spec MS - Aqueous (W)	07-Feb-2020	07-Feb-2020	07-Feb-2020
pH Value	04-Feb-2020	04-Feb-2020	04-Feb-2020
TPH CWG (W)	07-Feb-2020	07-Feb-2020	07-Feb-2020
VOC MS (W)	31-Jan-2020	31-Jan-2020	31-Jan-2020

CERTIFICATE OF ANALYSIS

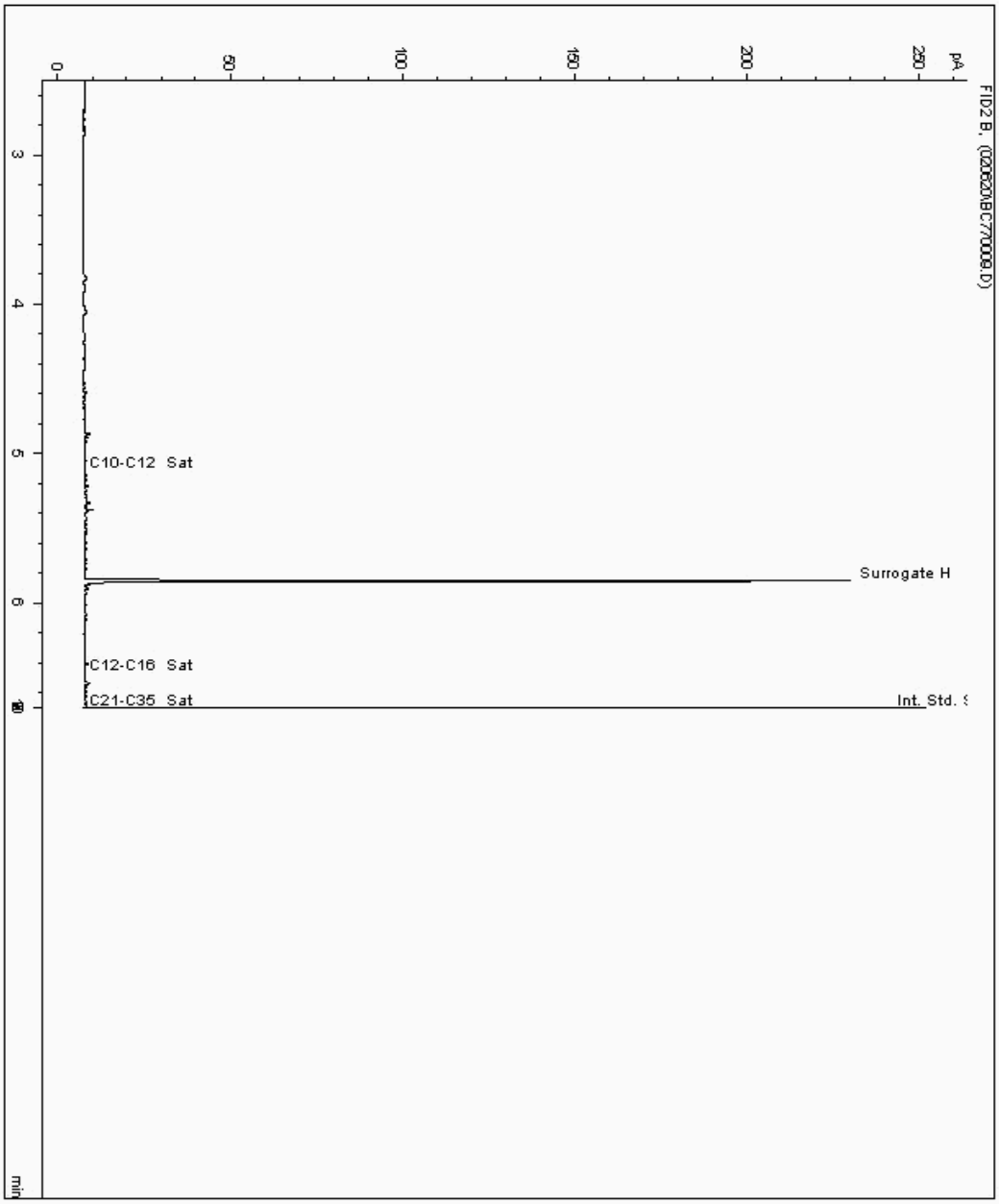
SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 21595304 **Sample ID :** BH102 **Depth :** 0.00 - 0.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 20269612-
Date Acquired : 2/6/2020 3:08:39 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

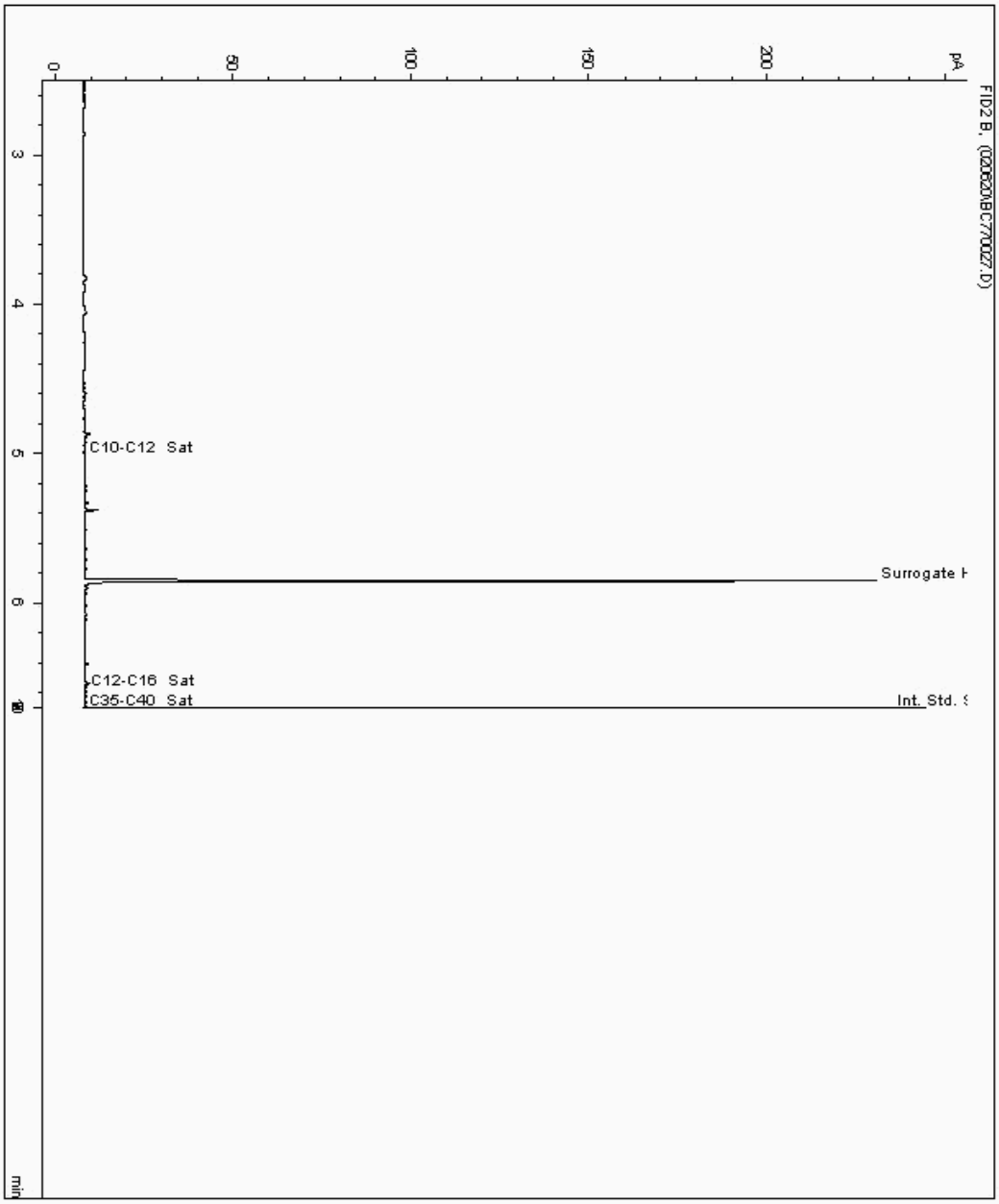
SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 21595371 **Depth :** 0.00 - 0.00
Sample ID : BH101

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 20269590-
Date Acquired : 2/6/2020 10:07:39 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

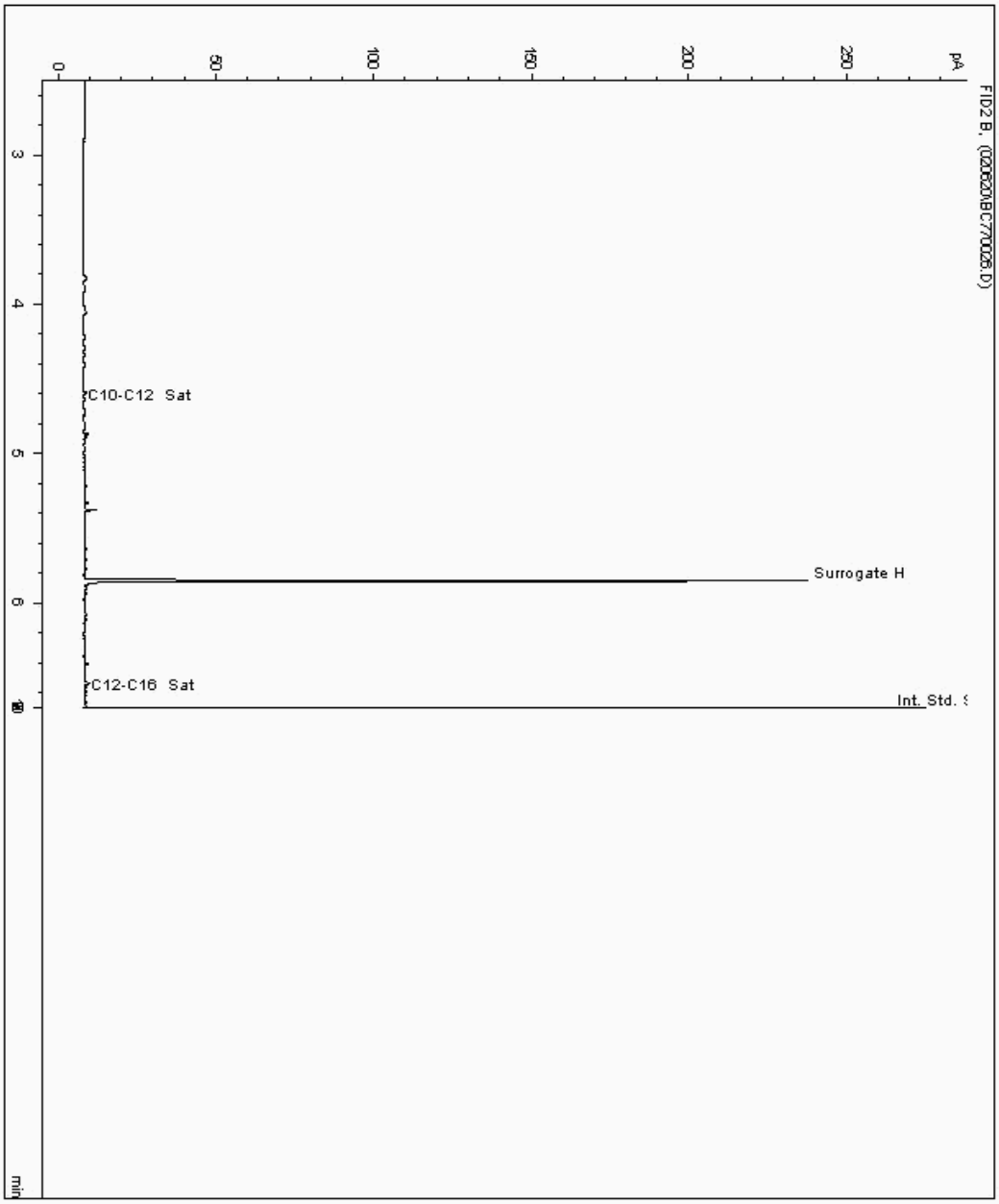
SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 21595374 **Depth :** 0.00 - 0.00
Sample ID : BH103

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 20269629-
Date Acquired : 2/6/2020 9:44:17 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

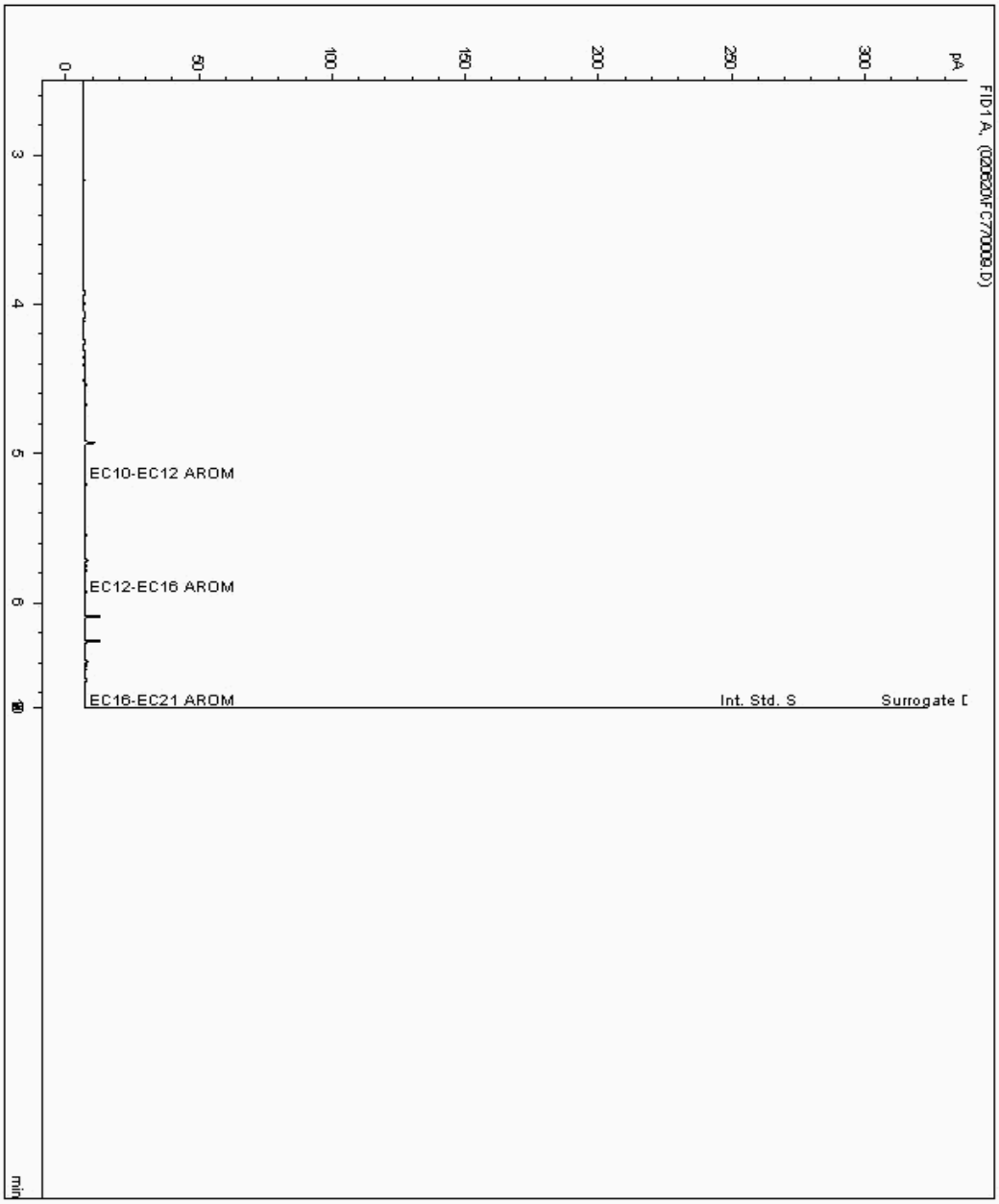
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Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 21595304 **Sample ID :** BH102 **Depth :** 0.00 - 0.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 20269613-
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Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

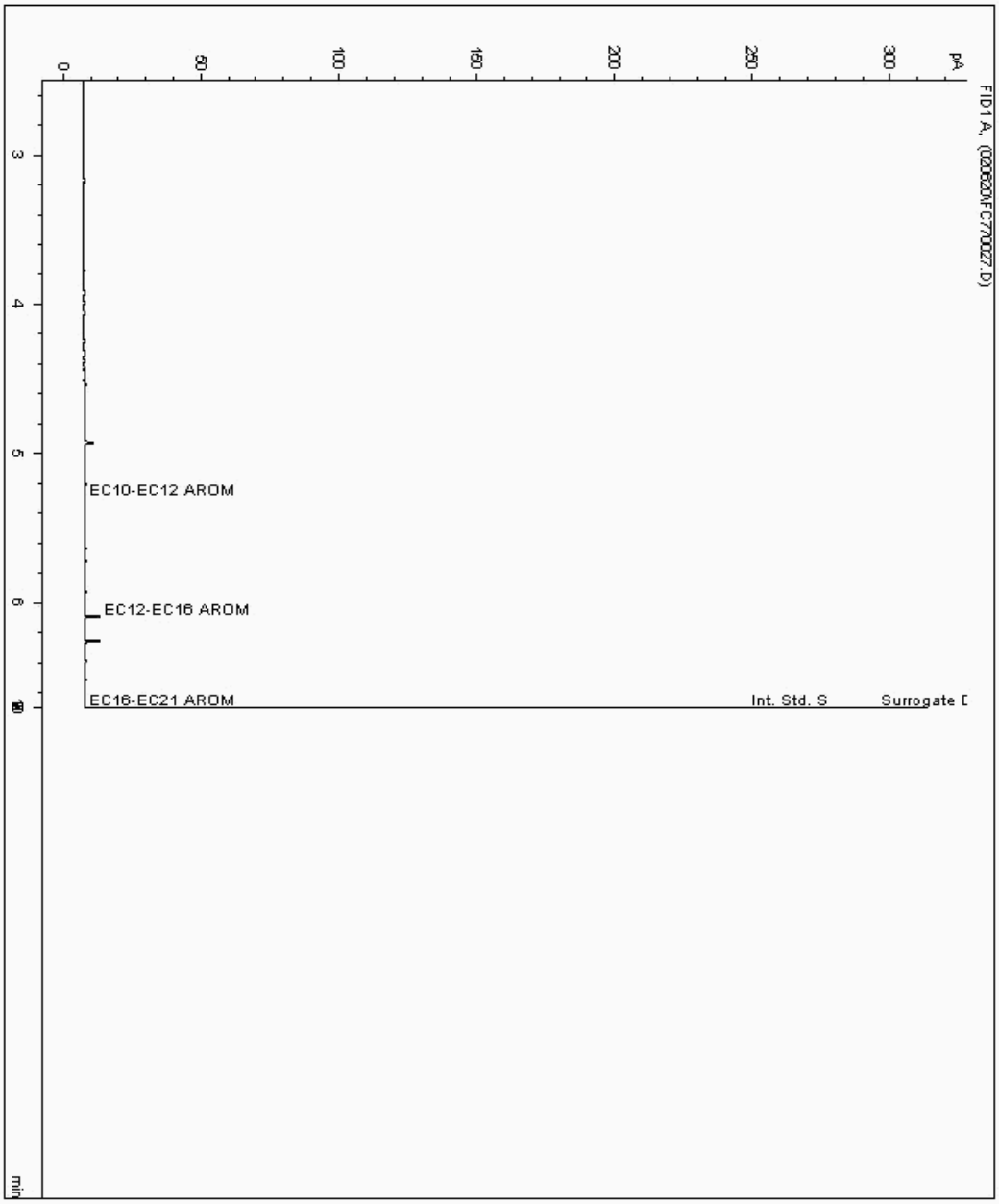
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Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 21595371 **Depth :** 0.00 - 0.00
Sample ID : BH101

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 20269591-
Date Acquired : 2/6/2020 10:07:39 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

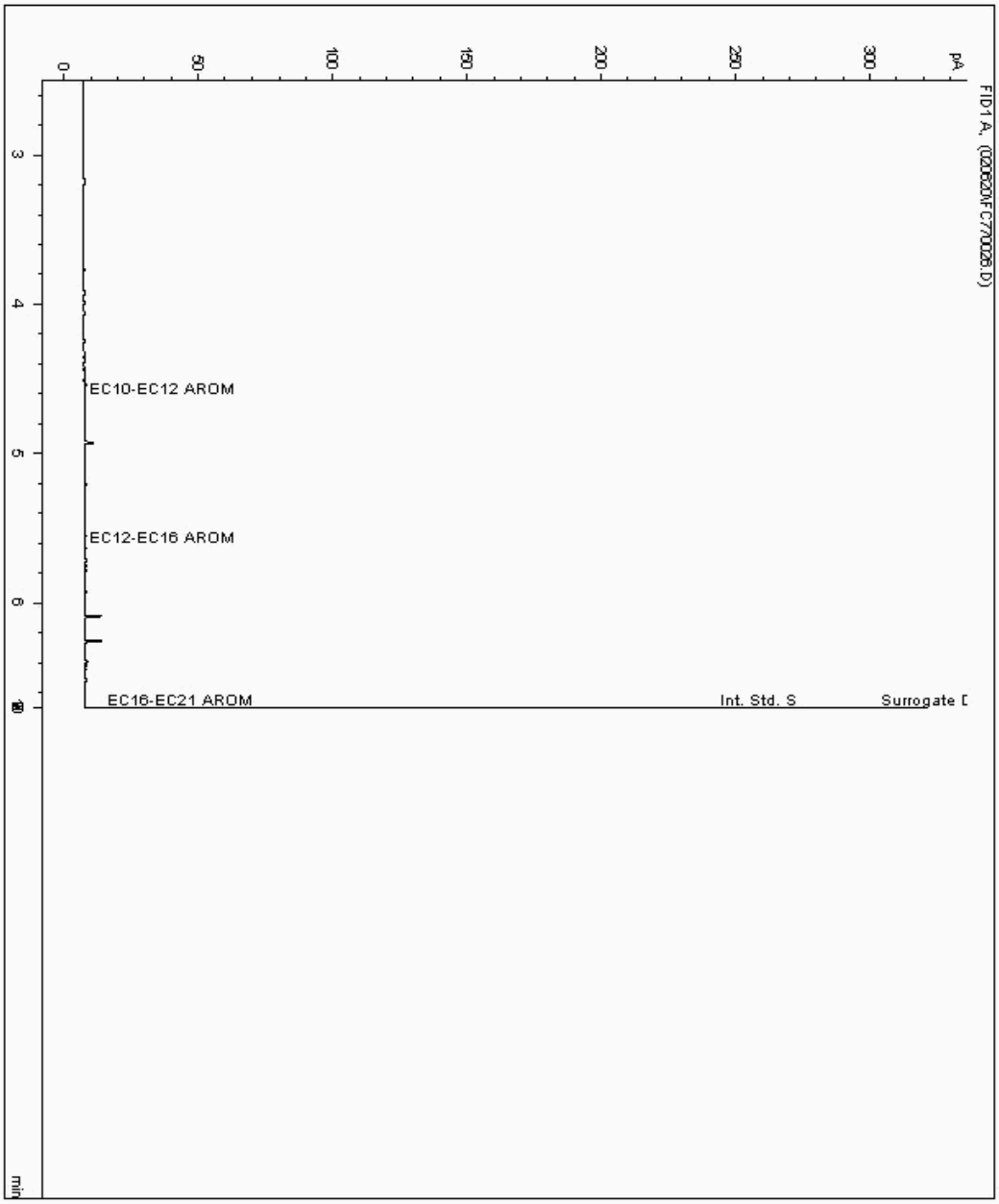
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Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 21595374 **Depth :** 0.00 - 0.00
Sample ID : BH103

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 20269630-
Date Acquired : 2/6/2020 9:44:18 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

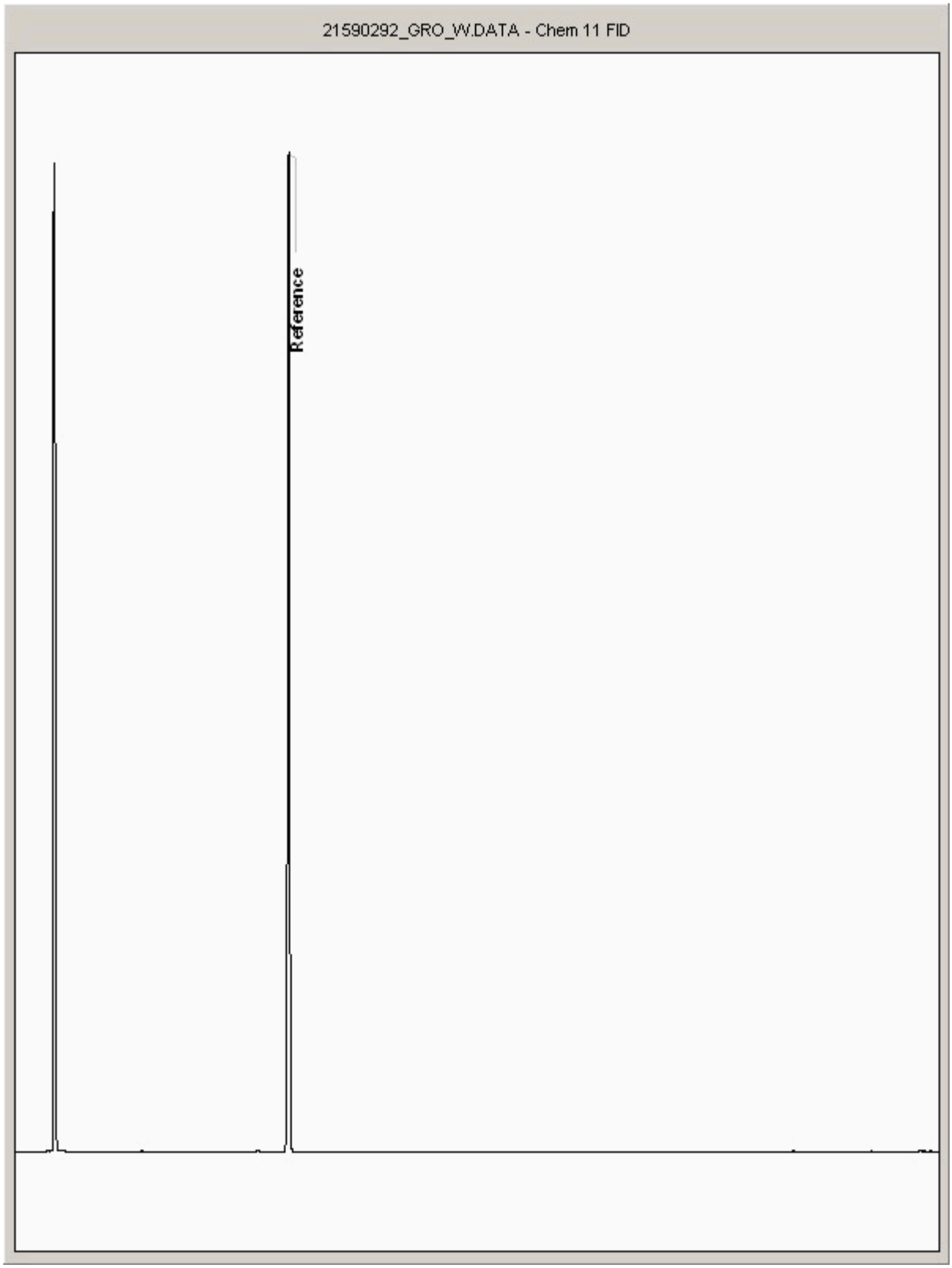
SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 21590292
Sample ID : BH102

Depth : 0.00 - 0.00



CERTIFICATE OF ANALYSIS

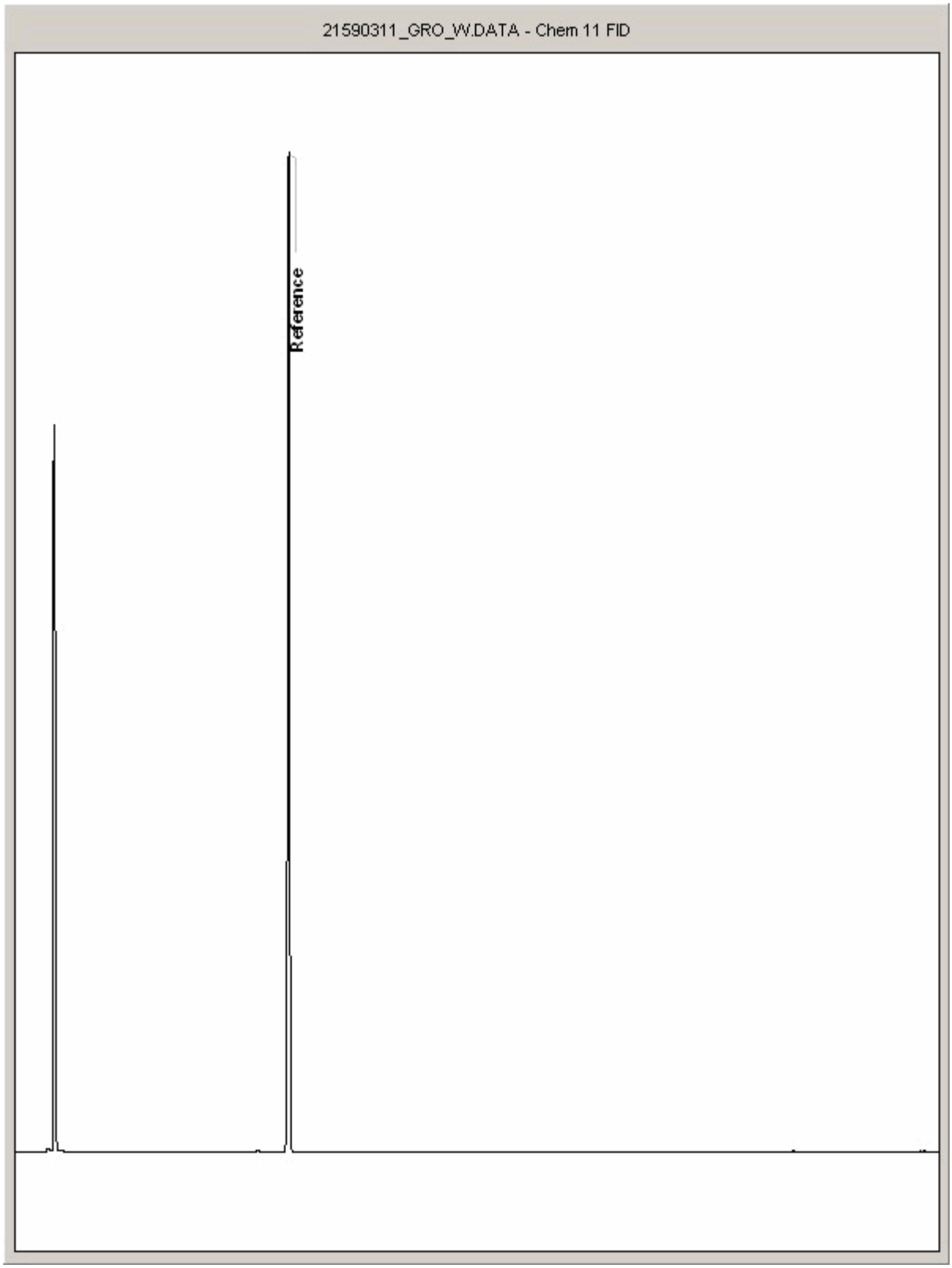
SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 21590311
Sample ID : BH103

Depth : 0.00 - 0.00



CERTIFICATE OF ANALYSIS

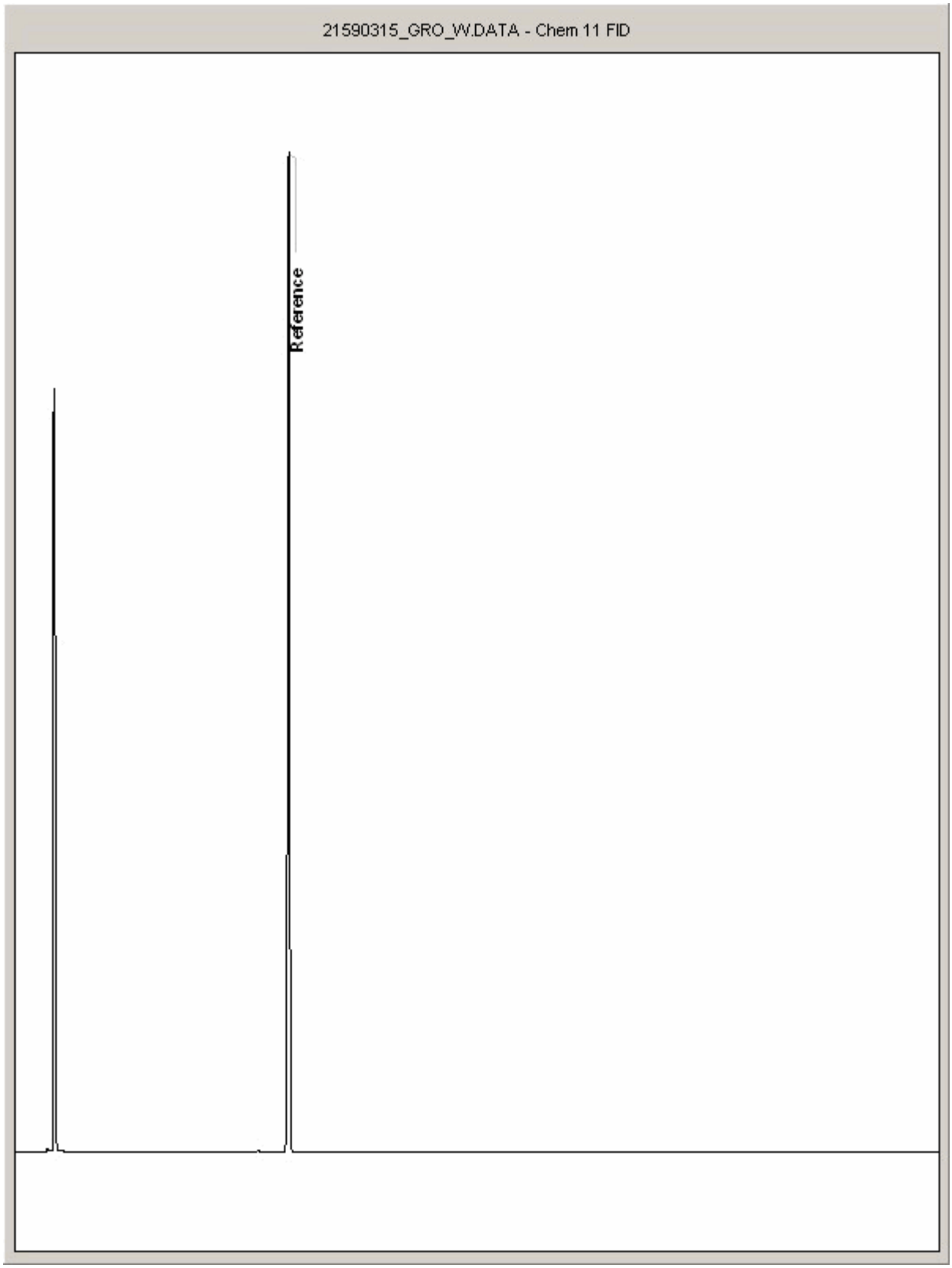
SDG:	200130-16	**Client Reference:**	70012984	**Report Number:**	540245
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 21590315
Sample ID : BH101

Depth : 0.00 - 0.00



Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix H

WATER AND SOILS SCREENING METHODOLOGY

Confidential

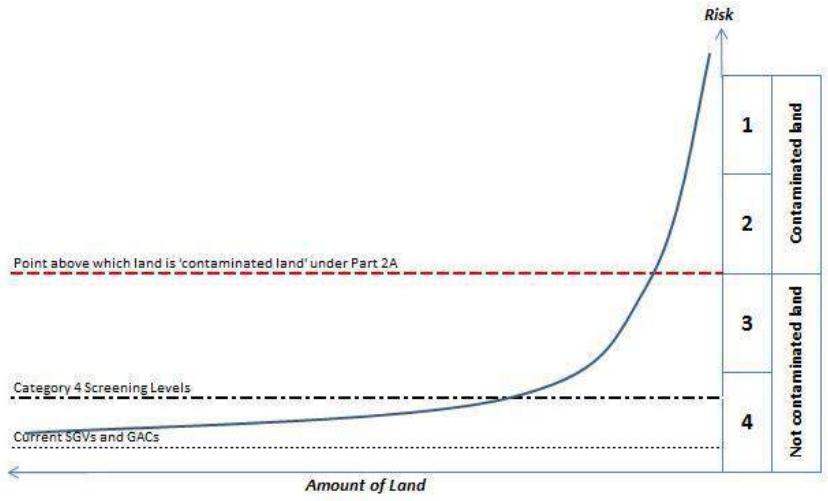
METHODOLOGY FOR THE DERIVATION OF GENERIC QUANTITATIVE ASSESSMENT CRITERIA TO EVALUATE RISKS TO HUMAN HEALTH FROM SOIL & GROUNDWATER CONTAMINATION

UK APPROACH

In the UK, the potential risks to human health from contamination in the ground are usually evaluated through a generic quantitative risk assessment (GQRA) approach. This allows generic and conservative exposure assumptions to be readily applied to risk assessments and can be a useful tool for rapidly screening data and to identify those contaminants or scenarios that could benefit from further investigation and/or site-specific detailed quantitative risk assessment (DQRA). Current industry good practice is to use the approach presented in the Environment Agency (EA) publications SR2[1] and SR3[2]. This approach allows the derivation of Generic Assessment Criteria (GACs), primarily for chronic exposure.

In April 2012, the Department of Environment, Food and Rural Affairs (Defra) published updated statutory guidance[3] which introduced a four category approach to determining whether land in England and Wales is contaminated or not on the grounds of significant possibility of significant harm (SPOSH). **Figure 1** presents a graphical representation of the categories.

Figure 1: Four Categories for Determining if Land Represent a SPOSH



Cases classified as Category 1 are considered to be SPOSH based on actual evidence or an unacceptably high probability of harm existing. Category 4 cases are those where there is no risk, or a low risk of SPOSH.

[1] Environment Agency '*Human Health Toxicological Assessment of Contaminants in Soil',* Report SC050021/SR2. January 2009.
[2] Environment Agency '*Updated Technical Background to the CLEA Model*,' Report SC050021/SR3. January 2009.
[3] Defra '*Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance'.* April 2012.

GACs represent a minimal risk level, well within Category 4. A 2014 publication by Contaminated Land: Applicatons in Real Environments (CL:AIRE),SP1010[4] and endorsed by Defra[5] provided an approach to determine Category 4 Screening Levels (C4SLs) which are higher than the GACs whilst being "more pragmatic but still strongly precautionary". It also provided C4SLs for six contaminants of concern. Although the C4SLs were designed to support Part 2A assessments to determine 'contaminated land' they are specifically mentioned, along with reference to the Part 2A statutory guidance, by the Department for Communities and Local Government (DCLG) for use in a planning context[6].

An updated version the Contaminated Land Exposure Assessment (CLEA) Workbook (v1.071) was released by the EA in September 2015 to take into account the publication of SP1010. The updates comprised: additional toxicity data for the six chemicals for which C4SLs were derived; two new public open space land use scenarios; updated exposure parameters; options to run the model using C4SL exposure assumptions; and increased functionality. There were no changes to algorithms, so it is still possible to replicate the withdrawn SGVs using the input parameters held within v1.071.

It should be noted that the four category approach has not been adopted in Scotland under Part 2A or the planning regime. The Part 2A statutory guidance applicable in Scotland (Paper SE/2006/44 dated May 2006) does not reflect the changes introduced by Defra in April 2012 which allow for the use of C4SLs within Part 2A risk assessments. Additionally, it is considered that the principal of 'minimal risk' should still apply under planning in Scotland, based on current guidance.

WSP APPROACH

Following the withdrawal of the SGVs, and in the absence of an industry-wide, accepted set of GACs it is down to individual practitioners to derive their own soil assessment criteria. WSP has used the approach provided within SR2, SR3, SP1010, CLEA Workbook v1.071and SR4[7] to produce a set of minimal risk GACs. The chemical-specific data within two key publications were considered during their production: CL:AIRE 2010[8] and LQM 2015[9]. Both documents provide comprehensive sets of GACs for different contaminants of concern.

The LQM Suitable For Use Levels (S4ULs) have selected exposure parameters someway between those of the SR3 land uses and the C4SL exposure scenarios. This approach was rejected by WSP as not representing minimal risk, however, the LQM S4UL document was critically reviewed and the approach and chemical input parameters were utilised where considered to be appropriate.

An industry-led C4SL Working Group is in the process of deriving a larger set of C4SLs in the near future, for approximately 20 contaminants. This will include a critical review of the chemical input data for all selected substances, and may therefore lead to further amendments to the chemical input data used in the WSP in-house screening values. It is considered likely that the contaminant list will

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[4] CL:AIRE *'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'* SP1010, Final Project Report (Revision 2). September 2014.
[5] Defra 'SP1010: *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document'*. December 2014.
[6] DCLG Planning Practice Guidance '*Land Affected by Contamination'*, particularly Paragraphs 001 and 007. Ref IDs: 33-001-20140306 & 33-007-20140612.
[7] Environment Agency '*CLEA Software (Version 1.05) Handbook (and Software)',* Report SC050021/SR4. September 2009.
[8] CL:AIRE 'The EIC/AGS/CL:AIRE *Soil Generic Assessment Criteria for Human Health Risk Assessment'.* ISBN 978-1-05046-20-1. January 2010.
[9] Nathanail et al '*The LQM/CIEH S4ULs for Human Health Risk Assessment*', Land Quality Press, ISBN 978-0-9931084-0-2. 2015.

crossover with the current CL:AIRE GACs. As such, this document was not critically reviewed by WSP.

WSP's current approach to the assessment of risks to human health is to continue to evaluate minimal risk through the use of in-house derived GACs, and to use the published C4SLs as a secondary tier of assessment until such time as additional C4SLs are published and/or in-house values are derived.

EXPOSURE MODELS

LAND USES

WSP has largely adopted the exposure assumptions of the generic land use scenarios included within SR3, with two additional public open space scenarios included from within SP1010:

- Residential with homegrown produce consumption;
- Residential without homegrown produce consumption;
- Allotments;
- Commercial;
- Public open space near residential housing (POS_{resi}); and
- Public park (POS_{park}).

Exceptions are described in the following Sections.

SOIL PROPERTIES

SR3 assumes a sandy loam soil with a pH of 7 and a Soil Organic Matter (SOM) content of 6% for its generic land uses, based on the geographical spread of topsoils in the UK. WSP has adopted these default values. In addition, GACs based on an SOM of 1% and 2.5% have been derived, based on common experience of the nature of Made Ground and lack of topsoil on many brownfield sites.

RECEPTOR CHARACTERISTICS AND BEHAVIOURS

SP1010 provides some updated exposure parameters for long-term inhalation rates[10] and the consumption rates for homegrown produce[11] compared to those provided in SR3. This data was used to derived WSP's GACs.

The changes in inhalation rates do not apply to the allotment generic land use scenario, as these are based on the breathing rates for short-term exposure of light to moderate intensity activity which were derived from a study that was not updated in USEPA 2011, so the SR3 rates were retained.

[10] USEPA, National Centre for Environmental Assessment '*Exposure Factors Handbook: 2011 Edition*' EPA/600/R-09/052F. September 2011.
[11] National Diet and Nutrition Survey 2008/2009 to 2010/2011.

CHEMICAL DATA

PHYSICO-CHEMICAL PARAMETERS

Physico-chemical properties for the contaminants for which GACs have been derived have been obtained following critical review of the following hierarchy of data sources:

1. Environment Agency/Defra SGV reports where available.
2. Environment Agency '*Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values*', Report SC050021/SR7, November 2008.
3. Published fate and transport reviews within Nathanail et. al 2015 and CL:AIRE 2010.

Where appropriate, and where sufficient data is available, values were adjusted to reflect a UK soil temperature of 10ºC (e.g. K_{aw}).

TOXICOLOGICAL DATA

Toxicological data for the derivation of minimal risk Health Criteria Values (HCV) for each contaminant was selected with due regard to the approach presented in SR2. Where appropriate, the following hierarchy of data sources was used:

1. UK toxicity reviews published by authoritative bodies including:
   - EA;
   - Public Health England (PHE);
   - Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT); and
   - Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC).
2. Authoritative European sources such as European Food Standards Agency (EFSA)
3. International organisations including:
   - World Health Organisation (WHO); and
   - Joint FAO/WHO Expert Committee on Food Additives (JECFA).
4. Authoritative country-specific sources including:
   - United States Environmental Protection Agency (USEPA);
   - US Agency for Toxic Substances and Disease Registry (ATSDR);
   - US Integrated Risk Information System (IRIS); and
   - Netherlands National Institute for Public Health and the Environment (RIVM).

Factors such as the applicability of the data to human health (e.g. epidemiological vs. animal studies), the quality of the data, the level of uncertainty in the results and the age of the data were also taken into account in the final selection. Details for specific substances are available on request.

MEAN DAILY INTAKES

Estimations of background exposure for each threshold substance have been updated. In line with the SR2 approach, the exposure from non-threshold substances in the soil does not take into account exposure from other sources, and as such GACs were derived without consideration of the Mean Daily Intake (MDI) for those substances.

The data published by the EA in its series of TOX reports between 2002 and 2009 was evaluated to determine whether the values were considered to remain valid today. Values from these current UK published sources were not amended unless they were considered to be significantly different so that the GACs remained as comparable as possible with the revoked SGVs.

ORAL MEAN DAILY INTAKES

Oral MDI were generally estimated as the sum of exposure via the ingestion of food and drinking water using the default adult physiological parameters presented in Table 3.3 of SR2.

Data on the exposure of substances from food ingestion was generally obtained from UK Total Diet Studies (TDS) published by the Food Standards Agency (FSA) and its predecessor the Ministry of Agriculture, Fisheries and Food (MAFF) and from studies commissioned by COT. Where no UK-specific data was available, MDI were derived from the European Food Safety Authority (EFSA), Health Canada and US sources. This was a rare occurrence, and in these instances, the data was evaluated to determine its applicability to the UK.

Data on the concentrations of substances in tap water was obtained from a variety of sources. UK data was used where available, with preference given to Drinking Water Inspectorate (DWI) 2014 data from water company tap water testing (LOD, 1st and 99th percentile data is available). Where the substance was not included in tap water testing, other UK sources of information were considered including:

- à DWI data from water company tap water testing from previous years;
- à COT; and
- à FSA.

Where UK data was not available, a number of other data sources were considered, largely WHO International Programme on Chemical Safety (IPCS) Concise International Chemical Assessment Documents (CICADs) and background documents for the development of Guidelines for Drinking Water Quality, using professional judgement on the relevance of the data to the UK. The final decision on the MDI from drinking water was made using professional judgement on the balance of relevance and probability, taking into account the detection limit where not detected, Koc and solubility, reduction in use of the substance, banned substances, tight controls (e.g. on explosives) and with due consideration to the SR2 instruction that “if no data or information in background exposure are available, background exposure should be assumed to be negligible and the MDI set to zero….”.

Data from other countries was generally not used because it was considered that the hydrogeology of these countries along with industrial practices were unlikely to be reflective of the UK.

INHALATION MEAN DAILY INTAKES

Inhalation MDIs were based on estimates of average daily exposure by the inhalation pathway and calculated using the default adult physiological parameters presented in Table 3.3 of SR2.

The inhalation MDIs were generally estimated using background exposure data from the UK, derived from Defra's UK-AIR: Air Information Resource[12], which provides ambient air quality data from a number of sites forming a UK-wide monitoring network. The MDIs for heavy metals were based on rolling annual average metal mass concentration data from Defra's UK Heavy Metals Monitoring Network from the period October 2009 to September 2010[13].

Information for some substances was obtained from UK sources including Environment Agency TOX reports and data from the UK Expert Panel on Air Quality Standards (EPAQS). Where recent UK data was not available, data was sourced from the International Programme on Chemical Safety (IPCS), the World Health Organisation (WHO), the Agency for Toxic Substances and Diseases Registry (ATSDR), Health Canada, and various other peer-reviewed sources summarised by LQM/CIEH[14].

For other substances, where no data or information on background exposure was available, background exposure was assumed to be negligible and the MDI set at 0.5*TDI in accordance with guidance in SR2.

PLANT UPTAKE

Soil to plant concentration factors are available in CLEA v1.071 for arsenic, cadmium, hexavalent chromium, lead, mercury, nickel and selenium. For all remaining inorganic chemicals, concentration factors were obtained using the PRISM model. Substance-specific correction factors have been selected in accordance with the guidance established within SR3. This is consistent to the approach utilised in the derivation of the LQM S4UL values and the EIC/AGS/CL:AIRE GAC.

Where there is a lack of appropriate data to enable the derivation of specific soil to plant concentrations factors for organic chemicals, plant uptake was modelled within CLEA v1.071 using the generic equations recommended within SR3, as follows:

- Green Vegetables – Ryan et al. (1988);
- Root Vegetables – Trapp (2002);
- Tuber Vegetables – Trapp et al. (2007); and
- Tree Fruit – Trapp et al. (2003).

There are no suitable models available for modelling uptake for herbaceous fruit or shrub fruit. Exposure is considered negligible.

[12] Crown 2016 copyright Defra via uk-air.defra.gov.uk, licenced under the Open Government Licence (OGL).
[13] Defra, 2013 Spreadsheet of historic data for multiple years for the Metals network. Available online at: http://uk-air.defra.gov.uk/data/metals-data. [Accessed 13/03/2016].
[14] LQM/CIEH, 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment.

SOIL SATURATION LIMITS

GACs are not limited to their theoretical soil saturation within CLEA, although where either the aqueous or the vapour-based saturation is exceeded, this is highlighted within the Workbook (compared with the lower of the two values). This affects pathways which depend on partitioning calculations so in reality this only affects the vapour pathways and is relevant to organic substances and other substances, such as elemental mercury, that have a significant volatile component. However, the Workbook highlights saturation for direct contact pathways to indicate to the user where further qualitative consideration of free phase contamination at surface may be required.

Where the lower of the two saturation limits is exceeded and the vapour pathway is the only exposure route being considered, the chronic risks to human health are likely to be negligible. Further evaluation could be undertaken using an alternative model suitable for evaluating non-aqueous phase liquids (NAPLs), such as the Johnson & Ettinger (J&E) approach described in USEPA 2003. However, WSP considers that if NAPLs are suspected, given the known limitations and over-simplifications of J&E, soil vapour monitoring is a more accurate way of assessing potential risks.

Where the lower saturation limit is exceeded for the vapour pathway and a number of exposure routes are being considered, then the contribution from the NAPL via vapour inhalation to the overall exposure can be evaluated using the procedure provided in SR4. WSP would evaluate this as part of a DQRA process or through soil vapour monitoring on-site to determine site-specific soil vapour concentrations.

CHEMICAL SPECIFIC ASSUMPTIONS

CYANIDES

Cyanide has high acute toxicity, and short term exposure is an important consideration when assessing the risks from soils contaminated with cyanide. The primary risk to human receptors from free cyanide in soils is an acute risk.

There is no current UK guidance available for calculating acute risks from free cyanide. Consequently, GAC for acute exposure were derived using the algorithms presented in MADEP 1992[15] and assuming a one-off ingestion of 10g of soil (this conservative value has been taken as an upper bound estimate for a one-off soil ingestion rate amongst children). Receptor body weights have been selected according to the critical receptor for each exposure scenario. The lowest of the chronic and acute GAC for each land use scenario were adopted by WSP. Brinckerhoff.

LEAD

The SGV for lead was withdrawn by the EA in 2009, and in 2011 the EA withdrew their published TOX report in light of new scientific evidence. The C4SL for lead was derived using the latest scientific evidence from a large human dataset. As such, no chemical-specific margin was applied in the derivation of the C4SL for lead. It may be possible for WSP to derive a GAC for lead using the same dataset and applying a chemical-specific margin, but the value is likely to be lower than UK natural background concentrations. Therefore, WSP has adopted the toxicological data used to derive the C4SLs in deriving the GAC for lead until such time as alternative GACs are published by an authoritative body. The relative bioavailability was set at 100% in line with the approach taken for other GACs, whereas the C4SL assumes 60% for soil and 64% for airborne dust. Thus, the WSP GAC are lower than the C4SLs.

[15] MADEP '*Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration'* 1992. http://www.mass.gov/dep/toxics/cn_soil.htm

POLYCYCLIC AROMATIC HYDROCARBONS

WSP's approach to the assessment of polycyclic aromatic hydrocarbons (PAHs) uses the surrogate marker approach. BaP was used as a surrogate marker for all genotoxic PAHs in line with the Health Protection Agency 2010[16] recommendations and SP1010. This assumes that the PAH profile of the data is similar to that of the coal tars used in the Culp *et al* oral carcinogenicity study from which the toxicity data for BaP was produced. In reality, this profile has been shown by HPA to be applicable on the majority of contaminated sites based on assessment of sites across the country.

The alternative is the Toxic Equivalency Factor (TEF) approach which uses a reference compound and assigns TEFs for other compounds based on estimates of potency. Key uncertainties with this approach include the assumption that all compounds have the same toxic mechanism of action within the body and that no compounds with a greater potency than the reference compound are present. It is considered by the HPA that the TEF approach is likely to under predict the true carcinogenicity of PAHs and therefore favours the surrogate marker approach.

For these reasons, WSP considers that the adoption of BaP as a surrogate marker for genotoxic PAHs as opposed to the TEF approach is reasonable, even in cases where the PAH profile may differ from that of the Culp *et al* study. In addition, WSP has derived a GAC for naphthalene, which is commonly a risk driver due to its high volatility, relative to other PAH compounds, as an indicator compound for threshold PAHs.

TRIMETHYLBENZENES

The GAC for trimethylbenzenes can be used for the assessment of any individual isomer (1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene or 1,3,5-trimethylbenzene), or a mixture of the three isomers.

CHEMICAL GROUPS

For a number of chemical groups, the available toxicity data is for combinations of chemicals. Given that the physico-chemical parameters may differ between the chemicals, the GACs for the chemicals within the groups have been calculated and then the lowest GAC selected to represent the entire group. This was the approach taken by the EA for m-, o- and p-xylenes, and has also been adopted by WSP for:

- 2-chlorophenol, 2,4-dichlorophenol, 2,4,6-trichlorophenol and 2,3,4,6-tetrachlorophenol;
- 2-, 3- and 4-methylphenol (total cresols);
- aldrin and dieldrin; and
- α- and β-endosulphan.

[16] HPA Contaminated Land Information Sheet '*Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)* 2010

EXPOSURE TO VAPOURS

INHALATION OF MEASURED VAPOURS

WSP has derived a set of soil vapour GACs (GAC_{sv}) that allow for the assessment of measured site soil vapour concentrations, using J&E, in order to establish potential risks via indoor inhalation of vapours. This methodology enables a more robust assessment of exposure via the inhalation of soil vapours indoors than using CLEA-derived soil GAC, as it is based upon measured soil vapour concentrations beneath the site. It also allows for the assessment of vapours from all source terms (i.e. groundwater, soil or NAPL). Outdoor inhalation was not included. WSP considers that the indoor inhalation pathway is the significantly dominant risk-driver.

The generic land use scenarios within CLEA (residential and commercial) that were used to derive the soil GAC were used to define the receptor and building characteristics for the soil vapour GAC. Only residential and commercial generic land use scenarios include the indoor inhalation of vapours pathway.

The GAC_{sv} were derived for three different soil types; sand, sandy loam and clay, reflecting the importance of this parameter within the J&E model. A depth to contamination of 0.85 m below the base of the building foundation was assumed (i.e. 1 m below ground level). This differs from the depth assumed for the soil GAC (0.5 m bgl), but was selected by WSP as a reasonable worst case scenario.

It is acknowledged that the J&E commonly over-predicts indoor vapour concentrations. In particular, it will significantly over-predict vapour concentrations for suspended floor slabs, which many new builds are constructed with, it does not take into account lateral migration and assumes an infinite source of contamination at steady state conditions. In addition, it is common for soil gas/vapour wells to be installed with at least 1 m of plain riser at the surface and this equates to a total depth of 0.85 m below the building foundation plus a 0.15 m thick foundation, and so is more representative of the depth that samples will be taken from.

The TDSIs and IDs for each substance were converted from $\mu gkg^{-1}{}_{bw}day^{-1}$ to μgm^{-3} using the standard conversions quoted in Table 3.3 of SR2, thereby replacing the need to model C_{air} in the equation:

$$C_{air} = \alpha . C_{vap} . 1{,}000{,}000 cm^3 m^{-3}$$

Where:

C_{air} is the concentration of vapours within the building, mg^{-3}

α is the steady state attenuation coefficient between soil and indoor air, dimensionless

C_{vap} is the soil vapour concentration, $mgcm^{-3}$

The target concentrations within indoor air for each substance (C_{air}) are a function of receptor inhalation rates and occupancy periods, as defined by the site conceptual exposure model (assuming standard CLEA occupancy periods and receptors).

The attenuation factor was calculated using J&E (Equation 10.4 in SR3) and the resulting C_{vap} is equivalent to the GAC_{sv} for the modelled exposure scenario.

Where the calculated GAC_{sv} for a substance exceeds the vapour saturation limit, no GAC_{sv} has been proposed.

INHALATION OF GROUNDWATER-DERIVED VAPOURS

The CLEA model does not have the capacity to derive GACs to assess vapours derived from dissolved phase contamination. WSP has derived a set of groundwater GACs (GAC_{gw}) to evaluate the potential risks through the indoor inhalation of groundwater-derived vapours by first applying the approach described above for the derivation of the WSP GAC_{sv} to determine the acceptable concentration in soil vapour directly above the water table.

The depth to groundwater was assumed to be 1 m bgl (i.e. 0.85 m below the base of the building foundation). This depth was considered to be more representative of commonly encountered groundwater conditions than the 0.5 m below the base of the building foundation (i.e. 0.65 m bgl) that is used by CLEA for an unsaturated source present in the overlying soil.

The GAC_{gw} was then back-calculated from the GAC_{sv} using the air-water partition coefficient (K_{aw}) for each substance.

Where the calculated GAC_{gw} for a substance exceeds the solubility limit, no GAC_{gw} has been proposed.

1. CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

1.1. GUIDANCE

The Risk Assessment for water environment has been undertaken in line with UK Environment Agency (EA) guidance: Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination, 2006.

Following development of a conceptual model, including identification of pollutant linkages, there are two stages to the water environment risk assessment:

- Generic quantitative risk assessment (GQRA):
  - For soils, Level 1 site specific assessment criteria (SSAC) are derived based on theoretical calculations of soil/water partitioning for comparison with in-situ soil concentrations; and
  - For water, groundwater quality data is compared directly with relevant generic assessment criteria (GAC).
- Detail quantitative risk assessment (DQRA):
  - For soils, Level 2 and 3 assessments are undertaken to derive Level 3 SSAC for comparison with in-situ soil concentrations; and
  - For waters, groundwater quality data is compared with derived Level 3 SSAC.

Each assessment level provides a more detailed model representation. A summary of the assessment levels is provided in Table 1.

Table 1 - 2006 Remedial Targets Method Assessment Levels

Level	Assessment Level Summary
1	(Soil) Theoretical pore water concentration compared directly with applicable Water Quality Standards (WQS).
2	(Soil) Attenuation of pollutants in unsaturated zone and dilution by groundwater flow (Groundwater). Measured groundwater quality compared directly with applicable WQS.
3	(Soil and Groundwater) Attenuation in the saturated zone down gradient of the site.
4	Dilution in the receptor.

At the generic assessment stage, any assessed risk drivers present at concentrations in soil or groundwater that exceed either the Level 1 SSACs or GACs, respectively, are identified as potential contaminants of concern (CoC) and are carried forward for further detailed assessment.

1.2. SELECTED RISK DRIVER COMPOUNDS

A number of contaminants have been selected which represent the key risk drivers for contaminants associated with site use. These compounds and groups of compounds represent the most abundant in fuels and/or are potentially toxic to water environment receptors.

A wide range of specific petroleum compounds are often detected in groundwater samples potentially impacted by hydrocarbon fuel sources. In order to simplify the risk assessment process, a range of key contaminants of varying solubility and mobility were selected to represent a wide range of associated hydrocarbon compounds and groups.

In keeping with EA guidance document "Petroleum Hydrocarbons in Groundwater: Supplementary Guidance for Hydrogeological Risk Assessment, 2017", only light end aliphatic hydrocarbon groups are included in the water environment risk assessment given their high overall risk ranking with respect to their chemical properties.

Selected compounds have been screened against the appropriate GAC and presented in Table A. Only compounds with detectable concentrations in soil or groundwater have been included.

1.3. SELECTION OF COMPLIANCE ASSESSMENT CRITERIA

EA guidance for the assessment of groundwater advises on the appropriate generic assessment criteria (GAC) to adopt, as follows: 'a general approach is to use an environmental standard. This standard should be relevant to the current or intended use of the aquifer'.

1.3.1. PRIORITY ORDER OF ASSESSMENT CRITERIA

The standards adopted for GAC are from the following sources, selected as relevant to the identified receptor/s:

- Water Supply (Water Quality Regulations, 2000) – UK DWS;
- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 – UK EQS;
- Surface Waters (Dangerous Substances) (Classification) Regulations 1998 – UK EQS;
- International Standards (European Council Directive, WHO, USEPA, Surface Water Abstraction Directive) – appropriate for the receptor and in accordance with UK approach, and, in the absence of a relevant alternative;
- Laboratory analytical limits of detection (LOD).

Where a number of standards are available for a particular compound, statutory standards are prioritised over non-statutory standards.

Relevant GAC are presented for each CoC in Table A.

1.3.2. RISK ASSESSMENT AND IDENTIFICATION OF CONTAMINANTS OF CONCERN

The screening table presented within the Table A section of this report present the groundwater results compared with the applicable GAC respectively.

The concentrations exceeding the screening criteria for the Level 1 assessment are highlighted.

Appendix I

WATER AND SOILS SCREENING

Confidential

PRE-REPORT DATA CHECK

All GEOL_GEO2 codes are complete.

All GEOL_GEO2 codes are recognised and suitable for this report.

All SampleMatrix fields are complete

All result and screening units match

The following samples do not have the correct number of TPH fractions
The TPH Hazard Index calculation will be incomplete for these samples.

PointID	Depth	Samp Ref	Samp Type
BH101	0.4		ES
BH101	1.3		ES
BH102	0.2		ES
BH102	0.6		ES
BH103	0.4		ES
BH103	1.5		ES
WS101	0.2		ES
WS102	0.35		ES
WS102	1.4		ES
WS103	0.3		ES
WS103	1.2		ES

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Unrecognised analytes

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aliphatics & Aromatics >C10-44 (Unrecognised code)	10.0	30.5	67.8	10.0	5.00	10.0	-	mg/kg	6	11	4	0	
Aliphatics >C10-44 (Unrecognised code)	5.00	4.77	14.5	5.00	2.50	5.00	-	mg/kg	6	11	2	0	
Aliphatics >C5-10 (Unrecognised code)	0.050	0.037	0.11	0.050	0.025	0.050	-	mg/kg	6	11	1	0	
Aromatics >C10-44 (Unrecognised code)	5.00	26.4	53.3	5.00	2.50	5.00	-	mg/kg	6	11	6	0	
Aromatics >C5-10 (Unrecognised code)	0.050	0.025	0.050	0.050	0.025	0.050	-	mg/kg	6	11	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Aliphatics and Aromatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aliphatic C05-C06	0.010	0.006	0.014	0.010	0.005	0.010	78.0	mg/kg	6	11	1	0	
Aliphatic C06-C08	0.010	0.009	0.033	0.010	0.005	0.010	231	mg/kg	6	11	1	0	
Aliphatic C08-C10	0.010	0.013	0.061	0.010	0.005	0.010	65.0	mg/kg	6	11	1	0	
Aliphatic C10-C12	1.00	0.50	1.00	1.00	0.50	1.00	325	mg/kg	6	11	0	0	
Aliphatic C12-C16	1.00	0.50	1.00	1.00	0.50	1.00	2,230	mg/kg	6	11	0	0	
Aliphatic C16-C35	1.00	4.44	12.5	1.00	0.50	1.00	89,100	mg/kg	6	11	6	0	
Aliphatic C35-C44	1.00	0.66	1.61	1.00	0.50	1.00	89,100	mg/kg	6	11	1	0	
Aromatic C06-C07	0.010	0.005	0.010	0.010	0.005	0.010	-	mg/kg	6	11	0	0	
Aromatic C07-C08	0.010	0.005	0.010	0.010	0.005	0.010	1,790	mg/kg	6	11	0	0	
Aromatic C08-C10	0.010	0.010	0.041	0.010	0.005	0.010	114	mg/kg	6	11	1	0	
Aromatic C10-C12	1.00	0.50	1.00	1.00	0.50	1.00	571	mg/kg	6	11	0	0	
Aromatic C12-C16	1.00	0.50	1.00	1.00	0.50	1.00	1,660	mg/kg	6	11	0	0	
Aromatic C16-C21	1.00	4.89	9.80	1.00	0.50	1.00	1,340	mg/kg	6	11	4	0	
Aromatic C16-C35	1.70	24.0	48.5	1.00	1.01	2.01	-	mg/kg	6	11	9	0	
Aromatic C21-C35	1.41	19.0	38.7	1.00	0.84	1.84	1,340	mg/kg	6	11	8	0	
Aromatic C35-C44	1.00	1.95	4.35	1.00	0.50	1.00	1,340	mg/kg	6	11	4	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Aliphatics and Aromatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aromatic C40-C44	1.00	0.50	1.00	1.00	0.50	1.00	-	mg/kg	6	11	0	0	
Total Aliphatics and Aromatics (C5-C44)	10.0	29.3	67.9	10.0	5.00	10.0	-	mg/kg	6	11	4	0	
TPH Hazard Index	0.005	0.023	0.044	0.004	0.005	0.005	1.00	mg/kg	6	11	N/A	0	

Alkali and Alkaline Earth Metals

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Barium	82.2	208	345	45.5	101	233	1,350	mg/kg	6	11	11	0	
Beryllium	0.78	1.63	2.78	0.49	0.72	0.82	1.70	mg/kg	6	11	11	1	WS102

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Asbestos

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Asbestos Quantification - Gravimetric	0.001	0.0005	0.001	-	-	-	-	%	1	1	0	0	
Asbestos Quantification - PCM Evaluation	0.001	0.0005	0.001	-	-	-	-	%	1	1	0	0	
Asbestos Quantification - Total %	0.001	0.0005	0.001	-	-	-	-	%	1	1	0	0	
Additional Asbestos Components using TM048 (Quantification)	-	-	-	-	-	-	-	No units	1	1	0	0	
Asbestos Ex. actinolite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. Amosite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. anthophyllite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. Chrysotile	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. crocidolite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. tremolite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Quantification Comments	-	-	-	-	-	-	-	No units	1	1	0	0	
Non-Asbestos Fibres	-	-	-	-	-	-	-	No units	6	7	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

BTEX and Fuel Additives

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Benzene	0.090	0.058	0.18	0.090	0.045	0.090	0.69	mg/kg	6	11	0	0	
Ethylbenzene	0.040	0.026	0.080	0.040	0.020	0.040	191	mg/kg	6	11	0	0	
Methyl t-butylether (MTBE)	0.10	0.064	0.20	0.10	0.050	0.10	168	mg/kg	6	11	0	0	
Tertiary Amyl Methyl Ether (TAME)	0.10	0.064	0.20	0.10	0.050	0.10	-	mg/kg	6	11	0	0	
Toluene	0.070	0.045	0.14	0.070	0.035	0.070	1,820	mg/kg	6	11	0	0	
Xylene - Total (Summed)	0.10	0.13	0.20	0.10	0.10	0.10	184	mg/kg	6	11	11	0	
Xylene-m & p	0.10	0.064	0.20	0.10	0.050	0.10	184	mg/kg	6	11	0	0	
Xylene-o	0.10	0.064	0.20	0.10	0.050	0.10	184	mg/kg	6	11	0	0	

General Chemistry

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
pH	7.12	7.92	8.53	8.13	8.27	8.48	-	pH Units	6	11	11	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Inorganics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Cyanide (Complex)	1.00	0.50	1.00	1.00	0.50	1.00	-	mg/kg	6	11	0	0	
Cyanide (Free)	1.00	0.50	1.00	1.00	0.50	1.00	15.0	mg/kg	6	11	0	0	
Cyanide (Total)	1.00	0.50	1.00	1.00	0.50	1.00	-	mg/kg	6	11	0	0	
Nitrite	0.13	0.42	1.00	0.10	0.18	0.24	-	mg/kg	6	11	10	0	
Sulphate as SO4	253	2,219	11,100	48.0	179	354	-	mg/kg	6	11	10	0	
Sulphide	15.0	17.5	77.8	15.0	7.50	15.0	-	mg/kg	6	11	1	0	
2:1 Water Soluble Ammonium	1,570	4,016	5,460	1,480	2,073	3,140	-	ug/l	6	11	11	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Metals

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Arsenic	18.3	26.2	34.2	15.0	16.9	20.4	35.0	mg/kg	6	11	11	0	
Boron	1.00	1.82	3.35	1.00	0.76	1.52	10,500	mg/kg	6	11	6	0	
Cadmium	0.020	0.53	1.57	0.020	0.010	0.020	87.0	mg/kg	6	11	6	0	
Chromium	10.6	13.9	16.8	10.6	13.7	18.6	-	mg/kg	6	11	11	0	
Copper	30.5	73.5	109	8.38	12.9	17.6	7,520	mg/kg	6	11	11	0	
Hexavalent Chromium	0.60	0.30	0.60	0.60	0.30	0.60	4.50	mg/kg	6	11	0	0	
Lead	122	273	530	21.3	29.7	51.6	188	mg/kg	6	11	11	4	BH101, BH103, WS101, WS102
Mercury	0.14	0.50	0.88	0.14	0.070	0.14	56.0	mg/kg	6	11	6	0	
Nickel	17.4	26.4	35.4	16.4	20.6	26.3	181	mg/kg	6	11	11	0	
Selenium	1.00	0.50	1.00	1.00	0.50	1.00	430	mg/kg	6	11	0	0	
Vanadium	28.9	32.8	39.4	33.9	38.4	43.1	1,170	mg/kg	6	11	11	0	
Zinc	87.4	573	2,170	38.6	68.3	132	40,400	mg/kg	6	11	11	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Other

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Total organic carbon (TOC)	1.27	3.41	4.84	0.26	0.32	0.44	-	%	6	8	8	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

PAHs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Acenaphthene	0.008	0.008	0.034	0.008	0.004	0.008	-	mg/kg	6	11	1	0	
Acenaphthylene	0.012	0.064	0.16	0.012	0.006	0.012	-	mg/kg	6	11	5	0	
Anthracene	0.016	0.089	0.26	0.016	0.013	0.029	-	mg/kg	6	11	6	0	
Benzo (a) anthracene	0.075	0.44	1.04	0.014	0.033	0.11	-	mg/kg	6	11	8	0	
Benzo (a) pyrene	0.068	0.46	1.02	0.015	0.029	0.093	1.70	mg/kg	6	11	8	0	
Benzo (b) fluoranthene	0.086	0.47	0.99	0.015	0.042	0.14	-	mg/kg	6	11	9	0	
Benzo (ghi) perylene	0.054	0.38	0.84	0.024	0.023	0.057	-	mg/kg	6	11	8	0	
Benzo (k) fluoranthene	0.027	0.20	0.42	0.014	0.017	0.046	-	mg/kg	6	11	8	0	
Chrysene	0.072	0.40	0.92	0.010	0.031	0.11	-	mg/kg	6	11	8	0	
Dibenzo (ah) anthracene	0.023	0.075	0.17	0.023	0.012	0.023	-	mg/kg	6	11	5	0	
Fluoranthene	0.15	0.97	2.28	0.017	0.069	0.24	-	mg/kg	6	11	9	0	
Fluorene	0.010	0.025	0.093	0.010	0.005	0.010	-	mg/kg	6	11	4	0	
Indeno (1,2,3-cd) pyrene	0.047	0.32	0.60	0.018	0.021	0.057	-	mg/kg	6	11	8	0	
Naphthalene	0.009	0.010	0.019	0.009	0.005	0.009	5.60	mg/kg	6	11	3	0	
PAH Total (EPA 16)	0.79	5.16	12.0	0.12	0.34	1.19	-	mg/kg	6	11	8	0	
Phenanthrene	0.053	0.43	1.42	0.015	0.034	0.11	-	mg/kg	6	11	8	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

PAHs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Pyrene	0.13	0.84	1.96	0.015	0.059	0.20	-	mg/kg	6	11	9	0	

PCBs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
PCB101	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB118	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB138	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB153	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB180	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB28	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB52	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
Total PCB Congeners ICES 7	0.021	0.011	0.021	-	-	-	0.45	mg/kg	2	2	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Phenols

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Cresols	0.010	0.005	0.010	0.010	0.005	0.010	6,090	mg/kg	6	11	0	0	
Phenol	0.010	0.005	0.010	0.010	0.007	0.012	353	mg/kg	6	11	1	0	
Phenol (Monohydric)	0.035	0.018	0.035	0.035	0.018	0.035	-	mg/kg	6	11	0	0	
Xylenols	0.015	0.008	0.015	0.015	0.008	0.015	-	mg/kg	6	11	0	0	

Physical

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Loss on ignition	4.23	11.0	24.4	2.78	2.78	2.78	-	%	5	6	6	0	
Flashpoint	70.0	35.0	70.0	70.0	35.0	70.0	-	DegC	4	5	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

QA Standard

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Acenaphthene-d10	84.9	89.9	93.5	86.4	95.9	112	-	%	6	11	11	0	
Chrysene-d12	74.3	82.8	90.7	85.4	90.3	101	-	%	6	11	11	0	
Naphthalene-d8	81.7	87.8	92.0	83.8	95.1	111	-	%	6	11	11	0	
Perylene-d12**	78.1	84.0	92.0	84.6	92.5	107	-	%	6	11	11	0	
Phenanthrene-d10**	82.7	90.6	103	86.4	94.8	111	-	%	6	11	11	0	

TPH/EPH

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
GRO Surrogate	73.6	92.9	123	97.9	107	113	-	%	6	11	11	0	
PRO (>C5-C10)	0.020	0.024	0.11	0.020	0.010	0.020	-	mg/kg	6	11	1	0	

EXCEEDANCES OF Residential no HG Veg, SOM=2.5%

Alkali and Alkaline Earth Metals

Analyte	Point ID	Depth	Result	Threshold	Units	Stratum
Beryllium	WS102	0.35 - 0.45	2.64	1.70	mg/kg	Made Ground Cohesive
	WS102	1.4 - 1.5	2.78	1.70	mg/kg	Made Ground Cohesive

Metals

Analyte	Point ID	Depth	Result	Threshold	Units	Stratum
Lead	BH101	0.4 - 0.6	312	188	mg/kg	Made Ground Cohesive/ALLUVIUM
	BH103	0.4 - 0.5	312	188	mg/kg	Made Ground Cohesive
	WS101	0.2 - 0.4	206	188	mg/kg	Made Ground Cohesive
	WS102	0.35 - 0.45	530	188	mg/kg	Made Ground Cohesive
	WS102	1.4 - 1.5	284	188	mg/kg	Made Ground Cohesive

PRE-REPORT DATA CHECK

The following analyte codes are not recognised in the gINT library.
These analytes cannot be compared to exceedance values but can still be mapped.

CNMT_WATER
ItemKey / Analyte code
C16C35AR

All SampleMatrix fields are complete

The following result units are different to the screening units.
Check the units reported by the lab are correct. Otherwise, seek advice to add the result units to the Gint library.
These analytes cannot be compared to exceedance values but can still be mapped.

Analyte	Result Units	Screening Units
Sulphate as SO4	%	ug/l

Region	Wales and England
Water Body	Groundwater
Water Body Type	NA
Surface Water Type	NA

Hardness	NA
Recieving surface water status	NA
Altitude	NA

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Unrecognised analytes — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
C16-C35 Aromatics (Unrecognised code)	10.00	5.00	10.00	-		ug/l	3	-	0	

Aliphatics and Aromatics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aliphatic C05-C06	10.00	5.00	10.00	15,000	WHO 2008	ug/l	3	-	0	
Aliphatic C06-C08	10.00	5.00	10.00	15,000	WHO 2008	ug/l	3	-	0	
Aliphatic C08-C10	10.00	5.00	10.00	300	WHO 2008	ug/l	3	-	0	
Aliphatic C10-C12	10.00	5.00	10.00	300	WHO 2008	ug/l	3	-	0	
Aliphatic C12-C16	10.00	5.00	10.00	300	WHO 2008	ug/l	3	-	0	
Aliphatic C16-C21	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C16-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C21-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatics C12-C35	10.00	5.00	10.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Aliphatics and Aromatics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aromatic C06-C07	10.00	5.00	10.00	-		ug/l	3	-	0	
Aromatic C07-C08	10.00	5.00	10.00	-		ug/l	3	-	0	
Aromatic C08-C10	10.00	5.00	10.00	300	WHO 2008	ug/l	3	-	0	
Aromatic C10-C12	10.00	5.00	10.00	90.0	WHO 2008	ug/l	3	-	0	
Aromatic C12-C16	10.00	5.00	10.00	90.0	WHO 2008	ug/l	3	-	0	
Aromatic C12-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aromatic C16-C21	10.00	5.00	10.00	90.0	WHO 2008	ug/l	3	-	0	
Aromatic C21-C35	10.00	5.00	10.00	90.0	WHO 2008	ug/l	3	-	0	
Total Aliphatics and Aromatics (C5-C35)	10.00	5.00	10.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Alkali and Alkaline Earth Metals — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Barium	29.4	35.4	43.4	700	WHO 2017	ug/l	3	3	0	
Beryllium	0.100	0.050	0.100	12.0	WHO 2017	ug/l	3	-	0	

BTEX and Fuel Additives — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Benzene	1.00	0.50	1.00	1.00	UK DWS	ug/l	3	-	0	
Ethylbenzene	1.00	0.50	1.00	300	WHO 2017	ug/l	3	-	0	
Methyl t-butylether (MTBE)	1.00	0.50	1.00	15.0	WHO 2017	ug/l	3	-	0	
Tertiary Amyl Methyl Ether (TAME)	1.00	0.50	1.00	-		ug/l	3	-	0	
Toluene	1.00	0.50	1.00	700	WHO 2017	ug/l	3	-	0	
Xylene	2.00	1.00	2.00	500	WHO 2017	ug/l	3	-	0	
Xylene-m & p	1.00	0.50	1.00	-		ug/l	3	-	0	
Xylene-o	1.00	0.50	1.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

General Chemistry — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
pH	7.18	7.39	7.61	6.50/10.0	UK DWS	pH Units	3	6	0	

Inorganics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Sulphate as SO4	0.005	0.005	0.006	-		%	3	3	0	
Ammoniacal Nitrogen as NH4	300	840	1260	500	UK DWS	ug/l	3	2	2	BH101, BH103
Calcium hardness as Calcium carbonate	309000	346333	373000	-		ug/l	3	3	0	
Cyanide (Complex)	50.0	25.0	50.0	50.0	UK DWS - Assumes Total Cyanide	ug/l	3	-	0	
Cyanide (Free)	50.0	25.0	50.0	50.0	UK DWS - Assumes Total Cyanide	ug/l	3	-	0	
Cyanide (Total)	50.0	25.0	50.0	50.0	UK DWS	ug/l	3	-	0	
Nitrate	6990	8333	9820	50,000	UK DWS	ug/l	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

INSITU — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Temperature	11.6	11.8	12.1	-		degC	3	3	0	
Dissolved Oxygen	1.00	2.56	5.07	-		mg/l	3	3	0	
Redox Potential	22.5	64.8	94.0	-		mV	3	3	0	
pH	7.18	7.39	7.61	6.50/10.0	UK DWS	pH Units	3	6	0	
Electrical Conductivity	723	791	830	2,500	UK DWS	uS/cm	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Metals — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Arsenic	0.50	0.25	0.50	10.0	UK DWS	ug/l	3	-	0	
Boron	91.6	98.5	102.0	1,000	UK DWS	ug/l	3	3	0	
Cadmium	0.080	0.040	0.080	5.00	UK DWS	ug/l	3	-	0	
Chromium	1.00	0.50	1.00	50.0	UK DWS	ug/l	3	-	0	
Copper	0.43	0.54	0.69	2,000	UK DWS	ug/l	3	3	0	
Hexavalent Chromium	30.0	15.0	30.0	-		ug/l	3	-	0	
Lead	0.20	0.10	0.20	10.0	UK DWS	ug/l	3	-	0	
Mercury	0.010	0.007	0.010	1.00	UK DWS	ug/l	3	1	0	
Nickel	1.57	3.86	7.13	20.0	UK DWS	ug/l	3	3	0	
Selenium	1.61	2.35	3.76	10.0	UK DWS	ug/l	3	3	0	
Vanadium	1.00	0.50	1.00	-		ug/l	3	-	0	
Zinc	2.10	2.38	2.70	-		ug/l	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Other — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Catechol	0.50	0.25	0.50	-		ug/l	3	-	0	
Naphthols	0.50	0.25	0.50	-		ug/l	3	-	0	
Resorcinol	0.50	0.25	0.50	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Acenaphthene	0.005	0.005	0.008	-		ug/l	3	2	0	
Acenaphthylene	0.005	0.003	0.005	-		ug/l	3	-	0	
Anthracene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (a) anthracene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (a) pyrene	0.002	0.001	0.002	0.010	UK DWS	ug/l	3	-	0	
Benzo (b) fluoranthene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (ghi) perylene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (k) fluoranthene	0.005	0.003	0.005	-		ug/l	3	-	0	
Chrysene	0.005	0.003	0.005	-		ug/l	3	-	0	
Dibenzo (ah) anthracene	0.005	0.003	0.005	-		ug/l	3	-	0	
Fluoranthene	0.005	0.003	0.005	-		ug/l	3	-	0	
Fluorene	0.005	0.007	0.012	-		ug/l	3	2	0	
Indeno (1,2,3-cd) pyrene	0.005	0.003	0.005	-		ug/l	3	-	0	
Naphthalene	0.010	0.011	0.019	-		ug/l	3	2	0	
PAH (Total)	0.082	0.041	0.082	-		ug/l	3	-	0	
Phenanthrene	0.005	0.006	0.010	-		ug/l	3	2	0	
Pyrene	0.005	0.003	0.005	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Phenols — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Cresols	0.50	0.25	0.50	-		ug/l	3	-	0	
Isopropyl phenol	0.50	0.25	0.50	-		ug/l	3	-	0	
Phenol	0.50	0.25	0.50	-		ug/l	3	-	0	
Trimethylphenols	0.50	0.25	0.50	-		ug/l	3	-	0	
Xylenols	0.50	0.25	0.50	-		ug/l	3	-	0	

TPH/EPH — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
GRO Surrogate	91.0	95.0	101.0	-		%	3	3	0	
PRO (C5-C12)	50.0	25.0	50.0	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

BTEX and Fuel Additives — Aquifer: N/A

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Xylene - Total (Summed)	1.00	1.00	1.00	-		ug/l	3	3	0	

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

Inorganics

Analyte	Point ID	Response Zone Depth (m bgl)	Result	Criteria Source	Threshold	Units	Stratum
Ammoniacal Nitrogen as NH4	BH101	5.00 - 10.00	1110	UK DWS	500	ug/l	Seaford Chalk Formation
	BH103	6.00 - 8.00	1260	UK DWS	500	ug/l	

PRE-REPORT DATA CHECK

All GEOL_GEO2 codes are complete.

All GEOL_GEO2 codes are recognised and suitable for this report.

All SampleMatrix fields are complete

All result and screening units match

The following samples do not have the correct number of TPH fractions
The TPH Hazard Index calculation will be incomplete for these samples.

PointID	Depth	Samp Ref	Samp Type
BH101	0.4		ES
BH101	1.3		ES
BH102	0.2		ES
BH102	0.6		ES
BH103	0.4		ES
BH103	1.5		ES
WS101	0.2		ES
WS102	0.35		ES
WS102	1.4		ES
WS103	0.3		ES
WS103	1.2		ES

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Unrecognised analytes

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aliphatics & Aromatics >C10-44 (Unrecognised code)	10.0	30.5	67.8	10.0	5.00	10.0	-	mg/kg	6	11	4	0	
Aliphatics >C10-44 (Unrecognised code)	5.00	4.77	14.5	5.00	2.50	5.00	-	mg/kg	6	11	2	0	
Aliphatics >C5-10 (Unrecognised code)	0.050	0.037	0.11	0.050	0.025	0.050	-	mg/kg	6	11	1	0	
Aromatics >C10-44 (Unrecognised code)	5.00	26.4	53.3	5.00	2.50	5.00	-	mg/kg	6	11	6	0	
Aromatics >C5-10 (Unrecognised code)	0.050	0.025	0.050	0.050	0.025	0.050	-	mg/kg	6	11	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Aliphatics and Aromatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aliphatic C05-C06	0.010	0.006	0.014	0.010	0.005	0.010	78.0	mg/kg	6	11	1	0	
Aliphatic C06-C08	0.010	0.009	0.033	0.010	0.005	0.010	231	mg/kg	6	11	1	0	
Aliphatic C08-C10	0.010	0.013	0.061	0.010	0.005	0.010	65.0	mg/kg	6	11	1	0	
Aliphatic C10-C12	1.00	0.50	1.00	1.00	0.50	1.00	325	mg/kg	6	11	0	0	
Aliphatic C12-C16	1.00	0.50	1.00	1.00	0.50	1.00	2,230	mg/kg	6	11	0	0	
Aliphatic C16-C35	1.00	4.44	12.5	1.00	0.50	1.00	89,100	mg/kg	6	11	6	0	
Aliphatic C35-C44	1.00	0.66	1.61	1.00	0.50	1.00	89,100	mg/kg	6	11	1	0	
Aromatic C06-C07	0.010	0.005	0.010	0.010	0.005	0.010	-	mg/kg	6	11	0	0	
Aromatic C07-C08	0.010	0.005	0.010	0.010	0.005	0.010	1,790	mg/kg	6	11	0	0	
Aromatic C08-C10	0.010	0.010	0.041	0.010	0.005	0.010	114	mg/kg	6	11	1	0	
Aromatic C10-C12	1.00	0.50	1.00	1.00	0.50	1.00	571	mg/kg	6	11	0	0	
Aromatic C12-C16	1.00	0.50	1.00	1.00	0.50	1.00	1,660	mg/kg	6	11	0	0	
Aromatic C16-C21	1.00	4.89	9.80	1.00	0.50	1.00	1,340	mg/kg	6	11	4	0	
Aromatic C16-C35	1.70	24.0	48.5	1.00	1.01	2.01	-	mg/kg	6	11	9	0	
Aromatic C21-C35	1.41	19.0	38.7	1.00	0.84	1.84	1,340	mg/kg	6	11	8	0	
Aromatic C35-C44	1.00	1.95	4.35	1.00	0.50	1.00	1,340	mg/kg	6	11	4	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Aliphatics and Aromatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aromatic C40-C44	1.00	0.50	1.00	1.00	0.50	1.00	-	mg/kg	6	11	0	0	
Total Aliphatics and Aromatics (C5-C44)	10.0	29.3	67.9	10.0	5.00	10.0	-	mg/kg	6	11	4	0	
TPH Hazard Index	0.005	0.023	0.044	0.004	0.005	0.005	1.00	mg/kg	6	11	N/A	0	

Alkali and Alkaline Earth Metals

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Barium	82.2	208	345	45.5	101	233	1,350	mg/kg	6	11	11	0	
Beryllium	0.78	1.63	2.78	0.49	0.72	0.82	1.70	mg/kg	6	11	11	1	WS102

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Asbestos

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Asbestos Quantification - Gravimetric	0.001	0.0005	0.001	-	-	-	-	%	1	1	0	0	
Asbestos Quantification - PCM Evaluation	0.001	0.0005	0.001	-	-	-	-	%	1	1	0	0	
Asbestos Quantification - Total %	0.001	0.0005	0.001	-	-	-	-	%	1	1	0	0	
Additional Asbestos Components using TM048 (Quantification)	-	-	-	-	-	-	-	No units	1	1	0	0	
Asbestos Ex. actinolite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. Amosite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. anthophyllite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. Chrysotile	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. crocidolite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Ex. tremolite	-	-	-	-	-	-	-	No units	6	7	0	0	
Asbestos Quantification Comments	-	-	-	-	-	-	-	No units	1	1	0	0	
Non-Asbestos Fibres	-	-	-	-	-	-	-	No units	6	7	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

BTEX and Fuel Additives

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Benzene	0.090	0.058	0.18	0.090	0.045	0.090	0.69	mg/kg	6	11	0	0	
Ethylbenzene	0.040	0.026	0.080	0.040	0.020	0.040	191	mg/kg	6	11	0	0	
Methyl t-butylether (MTBE)	0.10	0.064	0.20	0.10	0.050	0.10	168	mg/kg	6	11	0	0	
Tertiary Amyl Methyl Ether (TAME)	0.10	0.064	0.20	0.10	0.050	0.10	-	mg/kg	6	11	0	0	
Toluene	0.070	0.045	0.14	0.070	0.035	0.070	1,820	mg/kg	6	11	0	0	
Xylene - Total (Summed)	0.10	0.13	0.20	0.10	0.10	0.10	184	mg/kg	6	11	11	0	
Xylene-m & p	0.10	0.064	0.20	0.10	0.050	0.10	184	mg/kg	6	11	0	0	
Xylene-o	0.10	0.064	0.20	0.10	0.050	0.10	184	mg/kg	6	11	0	0	

General Chemistry

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
pH	7.12	7.92	8.53	8.13	8.27	8.48	-	pH Units	6	11	11	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Inorganics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Cyanide (Complex)	1.00	0.50	1.00	1.00	0.50	1.00	-	mg/kg	6	11	0	0	
Cyanide (Free)	1.00	0.50	1.00	1.00	0.50	1.00	15.0	mg/kg	6	11	0	0	
Cyanide (Total)	1.00	0.50	1.00	1.00	0.50	1.00	-	mg/kg	6	11	0	0	
Nitrite	0.13	0.42	1.00	0.10	0.18	0.24	-	mg/kg	6	11	10	0	
Sulphate as SO4	253	2,219	11,100	48.0	179	354	-	mg/kg	6	11	10	0	
Sulphide	15.0	17.5	77.8	15.0	7.50	15.0	-	mg/kg	6	11	1	0	
2:1 Water Soluble Ammonium	1,570	4,016	5,460	1,480	2,073	3,140	-	ug/l	6	11	11	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Metals

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Arsenic	18.3	26.2	34.2	15.0	16.9	20.4	35.0	mg/kg	6	11	11	0	
Boron	1.00	1.82	3.35	1.00	0.76	1.52	10,500	mg/kg	6	11	6	0	
Cadmium	0.020	0.53	1.57	0.020	0.010	0.020	87.0	mg/kg	6	11	6	0	
Chromium	10.6	13.9	16.8	10.6	13.7	18.6	-	mg/kg	6	11	11	0	
Copper	30.5	73.5	109	8.38	12.9	17.6	7,520	mg/kg	6	11	11	0	
Hexavalent Chromium	0.60	0.30	0.60	0.60	0.30	0.60	4.50	mg/kg	6	11	0	0	
Lead	122	273	530	21.3	29.7	51.6	188	mg/kg	6	11	11	4	BH101, BH103, WS101, WS102
Mercury	0.14	0.50	0.88	0.14	0.070	0.14	56.0	mg/kg	6	11	6	0	
Nickel	17.4	26.4	35.4	16.4	20.6	26.3	181	mg/kg	6	11	11	0	
Selenium	1.00	0.50	1.00	1.00	0.50	1.00	430	mg/kg	6	11	0	0	
Vanadium	28.9	32.8	39.4	33.9	38.4	43.1	1,170	mg/kg	6	11	11	0	
Zinc	87.4	573	2,170	38.6	68.3	132	40,400	mg/kg	6	11	11	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Other

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Total organic carbon (TOC)	1.27	3.41	4.84	0.26	0.32	0.44	-	%	6	8	8	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

PAHs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Acenaphthene	0.008	0.008	0.034	0.008	0.004	0.008	-	mg/kg	6	11	1	0	
Acenaphthylene	0.012	0.064	0.16	0.012	0.006	0.012	-	mg/kg	6	11	5	0	
Anthracene	0.016	0.089	0.26	0.016	0.013	0.029	-	mg/kg	6	11	6	0	
Benzo (a) anthracene	0.075	0.44	1.04	0.014	0.033	0.11	-	mg/kg	6	11	8	0	
Benzo (a) pyrene	0.068	0.46	1.02	0.015	0.029	0.093	1.70	mg/kg	6	11	8	0	
Benzo (b) fluoranthene	0.086	0.47	0.99	0.015	0.042	0.14	-	mg/kg	6	11	9	0	
Benzo (ghi) perylene	0.054	0.38	0.84	0.024	0.023	0.057	-	mg/kg	6	11	8	0	
Benzo (k) fluoranthene	0.027	0.20	0.42	0.014	0.017	0.046	-	mg/kg	6	11	8	0	
Chrysene	0.072	0.40	0.92	0.010	0.031	0.11	-	mg/kg	6	11	8	0	
Dibenzo (ah) anthracene	0.023	0.075	0.17	0.023	0.012	0.023	-	mg/kg	6	11	5	0	
Fluoranthene	0.15	0.97	2.28	0.017	0.069	0.24	-	mg/kg	6	11	9	0	
Fluorene	0.010	0.025	0.093	0.010	0.005	0.010	-	mg/kg	6	11	4	0	
Indeno (1,2,3-cd) pyrene	0.047	0.32	0.60	0.018	0.021	0.057	-	mg/kg	6	11	8	0	
Naphthalene	0.009	0.010	0.019	0.009	0.005	0.009	5.60	mg/kg	6	11	3	0	
PAH Total (EPA 16)	0.79	5.16	12.0	0.12	0.34	1.19	-	mg/kg	6	11	8	0	
Phenanthrene	0.053	0.43	1.42	0.015	0.034	0.11	-	mg/kg	6	11	8	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

PAHs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Pyrene	0.13	0.84	1.96	0.015	0.059	0.20	-	mg/kg	6	11	9	0	

PCBs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
PCB101	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB118	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB138	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB153	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB180	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB28	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
PCB52	0.003	0.002	0.003	-	-	-	-	mg/kg	2	2	0	0	
Total PCB Congeners ICES 7	0.021	0.011	0.021	-	-	-	0.45	mg/kg	2	2	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Phenols

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Cresols	0.010	0.005	0.010	0.010	0.005	0.010	6,090	mg/kg	6	11	0	0	
Phenol	0.010	0.005	0.010	0.010	0.007	0.012	353	mg/kg	6	11	1	0	
Phenol (Monohydric)	0.035	0.018	0.035	0.035	0.018	0.035	-	mg/kg	6	11	0	0	
Xylenols	0.015	0.008	0.015	0.015	0.008	0.015	-	mg/kg	6	11	0	0	

Physical

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Loss on ignition	4.23	11.0	24.4	2.78	2.78	2.78	-	%	5	6	6	0	
Flashpoint	70.0	35.0	70.0	70.0	35.0	70.0	-	DegC	4	5	0	0	

Residential no HG Veg, SOM=2.5%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

QA Standard

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Acenaphthene-d10	84.9	89.9	93.5	86.4	95.9	112	-	%	6	11	11	0	
Chrysene-d12	74.3	82.8	90.7	85.4	90.3	101	-	%	6	11	11	0	
Naphthalene-d8	81.7	87.8	92.0	83.8	95.1	111	-	%	6	11	11	0	
Perylene-d12**	78.1	84.0	92.0	84.6	92.5	107	-	%	6	11	11	0	
Phenanthrene-d10**	82.7	90.6	103	86.4	94.8	111	-	%	6	11	11	0	

TPH/EPH

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
GRO Surrogate	73.6	92.9	123	97.9	107	113	-	%	6	11	11	0	
PRO (>C5-C10)	0.020	0.024	0.11	0.020	0.010	0.020	-	mg/kg	6	11	1	0	

EXCEEDANCES OF Residential no HG Veg, SOM=2.5%

Alkali and Alkaline Earth Metals

Analyte	Point ID	Depth	Result	Threshold	Units	Stratum
Beryllium	WS102	0.35 - 0.45	2.64	1.70	mg/kg	Made Ground Cohesive
	WS102	1.4 - 1.5	2.78	1.70	mg/kg	Made Ground Cohesive

Metals

Analyte	Point ID	Depth	Result	Threshold	Units	Stratum
Lead	BH101	0.4 - 0.6	312	188	mg/kg	Made Ground Cohesive/ALLUVIUM
	BH103	0.4 - 0.5	312	188	mg/kg	Made Ground Cohesive
	WS101	0.2 - 0.4	206	188	mg/kg	Made Ground Cohesive
	WS102	0.35 - 0.45	530	188	mg/kg	Made Ground Cohesive
	WS102	1.4 - 1.5	284	188	mg/kg	Made Ground Cohesive

PRE-REPORT DATA CHECK

The following analyte codes are not recognised in the gINT library.
These analytes cannot be compared to exceedance values but can still be mapped.

CNMT_WATER
ItemKey / Analyte code
C16C35AR

All SampleMatrix fields are complete

The following result units are different to the screening units.
Check the units reported by the lab are correct. Otherwise, seek advice to add the result units to the Gint library.
These analytes cannot be compared to exceedance values but can still be mapped.

Analyte	Result Units	Screening Units
Sulphate as SO4	%	ug/l

Region	Wales and England
Water Body	Surface water
Water Body Type	Inland
Surface Water Type	River or Stream

Hardness	0-50 mg/l
Recieving surface water status	Good (or below)
Altitude	< 80m Elevation

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Unrecognised analytes — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
C16-C35 Aromatics (Unrecognised code)	10.00	5.00	10.00	-		ug/l	3	-	0	

Aliphatics and Aromatics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aliphatic C05-C06	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C06-C08	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C08-C10	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C10-C12	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C12-C16	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C16-C21	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C16-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C21-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatics C12-C35	10.00	5.00	10.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Aliphatics and Aromatics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aromatic C06-C07	10.00	5.00	10.00	10.0	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C07-C08	10.00	5.00	10.00	74.0	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C08-C10	10.00	5.00	10.00	20.0	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C10-C12	10.00	5.00	10.00	2.00	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C12-C16	10.00	5.00	10.00	2.00	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C12-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aromatic C16-C21	10.00	5.00	10.00	0.10	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C21-C35	10.00	5.00	10.00	0.0002	CL:AIRE 2017	ug/l	3	-	0	
Total Aliphatics and Aromatics (C5-C35)	10.00	5.00	10.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Alkali and Alkaline Earth Metals — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Barium	29.4	35.4	43.4	-		ug/l	3	3	0	
Beryllium	0.100	0.050	0.100	-		ug/l	3	-	0	

BTEX and Fuel Additives — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Benzene	1.00	0.50	1.00	10.0	EQS 2015	ug/l	3	-	0	
Ethylbenzene	1.00	0.50	1.00	20.0	Proposed EQS	ug/l	3	-	0	
Methyl t-butylether (MTBE)	1.00	0.50	1.00	-		ug/l	3	-	0	
Tertiary Amyl Methyl Ether (TAME)	1.00	0.50	1.00	-		ug/l	3	-	0	
Toluene	1.00	0.50	1.00	74.0	EQS 2015	ug/l	3	-	0	
Xylene	2.00	1.00	2.00	30.0	CL:AIRE 2017	ug/l	3	-	0	
Xylene-m & p	1.00	0.50	1.00	-		ug/l	3	-	0	
Xylene-o	1.00	0.50	1.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

General Chemistry — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
pH	7.18	7.39	7.61	6.00/9.00	EQS 2015	pH Units	3	6	0	

Inorganics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Sulphate as SO4	0.005	0.005	0.006	-		%	3	3	0	
Ammoniacal Nitrogen as NH4	300	840	1260	385	EQS 2015	ug/l	3	2	2	BH101, BH103
Calcium hardness as Calcium carbonate	309000	346333	373000	-		ug/l	3	3	0	
Cyanide (Complex)	50.0	25.0	50.0	1.00	EQS 2015 - Assumes Free Cyanide	ug/l	3	-	0	
Cyanide (Free)	50.0	25.0	50.0	1.00	EQS 2015	ug/l	3	-	0	
Cyanide (Total)	50.0	25.0	50.0	1.00	EQS 2015 - Assumes Free Cyanide	ug/l	3	-	0	
Nitrate	6990	8333	9820	-		ug/l	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

INSITU — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Temperature	11.6	11.8	12.1	-		degC	3	3	0	
Dissolved Oxygen	1.00	2.56	5.07	-		mg/l	3	3	0	
Redox Potential	22.5	64.8	94.0	-		mV	3	3	0	
pH	7.18	7.39	7.61	6.00/9.00	EQS 2015	pH Units	3	6	0	
Electrical Conductivity	723	791	830	-		uS/cm	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Metals — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Arsenic	0.50	0.25	0.50	50.0	EQS 2015	ug/l	3	-	0	
Boron	91.6	98.5	102.0	-		ug/l	3	3	0	
Cadmium	0.080	0.040	0.080	0.080	EQS 2015	ug/l	3	-	0	
Chromium	1.00	0.50	1.00	4.70	EQS 2015	ug/l	3	-	0	
Copper	0.43	0.54	0.69	1.00	EQS 2015 - Bioavailable	ug/l	3	3	0	
Hexavalent Chromium	30.0	15.0	30.0	3.40	EQS 2015	ug/l	3	-	0	
Lead	0.20	0.10	0.20	1.20	EQS 2015 - Bioavailable	ug/l	3	-	0	
Mercury	0.010	0.007	0.010	0.070	EQS 2015 MAC	ug/l	3	1	0	
Nickel	1.57	3.86	7.13	4.00	EQS 2015 - Bioavailable	ug/l	3	3	1	BH103
Selenium	1.61	2.35	3.76	-		ug/l	3	3	0	
Vanadium	1.00	0.50	1.00	-		ug/l	3	-	0	
Zinc	2.10	2.38	2.70	10.9	EQS 2015 - Bioavailable	ug/l	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Other — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Catechol	0.50	0.25	0.50	-		ug/l	3	-	0	
Naphthols	0.50	0.25	0.50	-		ug/l	3	-	0	
Resorcinol	0.50	0.25	0.50	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Acenaphthene	0.005	0.005	0.008	-		ug/l	3	2	0	
Acenaphthylene	0.005	0.003	0.005	-		ug/l	3	-	0	
Anthracene	0.005	0.003	0.005	0.10	EQS 2015	ug/l	3	-	0	
Benzo (a) anthracene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (a) pyrene	0.002	0.001	0.002	0.0002	EQS 2015	ug/l	3	-	0	
Benzo (b) fluoranthene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (ghi) perylene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (k) fluoranthene	0.005	0.003	0.005	-		ug/l	3	-	0	
Chrysene	0.005	0.003	0.005	-		ug/l	3	-	0	
Dibenzo (ah) anthracene	0.005	0.003	0.005	-		ug/l	3	-	0	
Fluoranthene	0.005	0.003	0.005	0.006	EQS 2015	ug/l	3	-	0	
Fluorene	0.005	0.007	0.012	-		ug/l	3	2	0	
Indeno (1,2,3-cd) pyrene	0.005	0.003	0.005	-		ug/l	3	-	0	
Naphthalene	0.010	0.011	0.019	2.00	EQS 2015	ug/l	3	2	0	
PAH (Total)	0.082	0.041	0.082	-		ug/l	3	-	0	
Phenanthrene	0.005	0.006	0.010	-		ug/l	3	2	0	
Pyrene	0.005	0.003	0.005	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Phenols — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Cresols	0.50	0.25	0.50	-		ug/l	3	-	0	
Isopropyl phenol	0.50	0.25	0.50	-		ug/l	3	-	0	
Phenol	0.50	0.25	0.50	7.70	EQS 2015	ug/l	3	-	0	
Trimethylphenols	0.50	0.25	0.50	-		ug/l	3	-	0	
Xylenols	0.50	0.25	0.50	-		ug/l	3	-	0	

TPH/EPH — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
GRO Surrogate	91.0	95.0	101.0	-		%	3	3	0	
PRO (C5-C12)	50.0	25.0	50.0	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

BTEX and Fuel Additives — Aquifer: N/A

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Xylene - Total (Summed)	1.00	1.00	1.00	-		ug/l	3	3	0	

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

Inorganics

Analyte	Point ID	Response Zone Depth (m bgl)	Result	Criteria Source	Threshold	Units	Stratum
Ammoniacal Nitrogen as NH4	BH101	5.00 - 10.00	1110	EQS 2015	385	ug/l	Seaford Chalk Formation
	BH103	6.00 - 8.00	1260	EQS 2015	385	ug/l	

Metals

Analyte	Point ID	Response Zone Depth (m bgl)	Result	Criteria Source	Threshold	Units	Stratum
Nickel	BH103	6.00 - 8.00	7.13	EQS 2015 - Bioavailable	4.00	ug/l	Seaford Chalk Formation

PRE-REPORT DATA CHECK

All GEOL_GEO2 codes are complete.

All GEOL_GEO2 codes are recognised and suitable for this report.

All SampleMatrix fields are complete

Water Vapour Screening, Landuse=Residential, Soil Type=Sandy Loam

Site Area(s): Whole site
Phase(s): All phases

Aliphatics and Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101	BH102	BH103
				Response Zone Depth (m bgl)	5 - 10	4 - 14	6 - 8
				Sample Date	29/01/20	29/01/20	29/01/20
Aliphatic C05-C06	ug/l	10.0	9,870		< 10	< 10	< 10
Aliphatic C06-C08	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aliphatic C08-C10	ug/l	10.0	275		< 10	< 10	< 10
Aliphatic C10-C12	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aliphatic C12-C16	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aromatic C07-C08	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aromatic C08-C10	ug/l	10.0	9,330		< 10	< 10	< 10
Aromatic C10-C12	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aromatic C12-C16	ug/l	10.0	GAC > Sol		< 10	< 10	< 10

Water Vapour Screening, Landuse=Residential, Soil Type=Sandy Loam

Site Area(s): Whole site
Phase(s): All phases

BTEX and Fuel Additives

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101	BH102	BH103
				Response Zone Depth (m bgl)	5 - 10	4 - 14	6 - 8
				Sample Date	29/01/20	29/01/20	29/01/20
Benzene	ug/l	1.00	1,040		<1	<1	<1
Ethylbenzene	ug/l	1.00	54,330		<1	<1	<1
Methyl t-butylether (MTBE)	ug/l	1.00	415,650		<1	<1	<1
Toluene	ug/l	1.00	GAC > Sol		<1	<1	<1
Xylene - Total (Summed)	ug/l	-999	51,730		1	1	1

Water Vapour Screening, Landuse=Residential, Soil Type=Sandy Loam

Site Area(s): Whole site
Phase(s): All phases

PAHs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	BH101	BH102	BH103
PointID				BH101	BH102	BH103
Response Zone Depth (m bgl)				5 - 10	4 - 14	6 - 8
Sample Date				29/01/20	29/01/20	29/01/20
Naphthalene	ug/l	0.010	1,210	0.0106	<0.01	0.0186

PRE-REPORT DATA CHECK

The following analyte codes are not recognised in the gINT library.
These analytes cannot be compared to exceedance values but can still be mapped.

CNMT_WATER
ItemKey / Analyte code
C16C35AR

All SampleMatrix fields are complete

The following result units are different to the screening units.
Check the units reported by the lab are correct. Otherwise, seek advice to add the result units to the Gint library.
These analytes cannot be compared to exceedance values but can still be mapped.

Analyte	Result Units	Screening Units
Sulphate as SO4	%	ug/l

Region	Wales and England
Water Body	Surface water
Water Body Type	Inland
Surface Water Type	River or Stream

Hardness	0-50 mg/l
Recieving surface water status	Good (or below)
Altitude	< 80m Elevation

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Unrecognised analytes — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
C16-C35 Aromatics (Unrecognised code)	10.00	5.00	10.00	-		ug/l	3	-	0	

Aliphatics and Aromatics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aliphatic C05-C06	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C06-C08	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C08-C10	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C10-C12	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C12-C16	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C16-C21	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C16-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatic C21-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aliphatics C12-C35	10.00	5.00	10.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Aliphatics and Aromatics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aromatic C06-C07	10.00	5.00	10.00	10.0	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C07-C08	10.00	5.00	10.00	74.0	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C08-C10	10.00	5.00	10.00	20.0	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C10-C12	10.00	5.00	10.00	2.00	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C12-C16	10.00	5.00	10.00	2.00	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C12-C35	10.00	5.00	10.00	-		ug/l	3	-	0	
Aromatic C16-C21	10.00	5.00	10.00	0.10	CL:AIRE 2017	ug/l	3	-	0	
Aromatic C21-C35	10.00	5.00	10.00	0.0002	CL:AIRE 2017	ug/l	3	-	0	
Total Aliphatics and Aromatics (C5-C35)	10.00	5.00	10.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Alkali and Alkaline Earth Metals — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Barium	29.4	35.4	43.4	-		ug/l	3	3	0	
Beryllium	0.100	0.050	0.100	-		ug/l	3	-	0	

BTEX and Fuel Additives — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Benzene	1.00	0.50	1.00	10.0	EQS 2015	ug/l	3	-	0	
Ethylbenzene	1.00	0.50	1.00	20.0	Proposed EQS	ug/l	3	-	0	
Methyl t-butylether (MTBE)	1.00	0.50	1.00	-		ug/l	3	-	0	
Tertiary Amyl Methyl Ether (TAME)	1.00	0.50	1.00	-		ug/l	3	-	0	
Toluene	1.00	0.50	1.00	74.0	EQS 2015	ug/l	3	-	0	
Xylene	2.00	1.00	2.00	30.0	CL:AIRE 2017	ug/l	3	-	0	
Xylene-m & p	1.00	0.50	1.00	-		ug/l	3	-	0	
Xylene-o	1.00	0.50	1.00	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

General Chemistry — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
pH	7.18	7.39	7.61	6.00/9.00	EQS 2015	pH Units	3	6	0	

Inorganics — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Sulphate as SO4	0.005	0.005	0.006	-		%	3	3	0	
Ammoniacal Nitrogen as NH4	300	840	1260	385	EQS 2015	ug/l	3	2	2	BH101, BH103
Calcium hardness as Calcium carbonate	309000	346333	373000	-		ug/l	3	3	0	
Cyanide (Complex)	50.0	25.0	50.0	1.00	EQS 2015 - Assumes Free Cyanide	ug/l	3	-	0	
Cyanide (Free)	50.0	25.0	50.0	1.00	EQS 2015	ug/l	3	-	0	
Cyanide (Total)	50.0	25.0	50.0	1.00	EQS 2015 - Assumes Free Cyanide	ug/l	3	-	0	
Nitrate	6990	8333	9820	-		ug/l	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

INSITU — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Temperature	11.6	11.8	12.1	-		degC	3	3	0	
Dissolved Oxygen	1.00	2.56	5.07	-		mg/l	3	3	0	
Redox Potential	22.5	64.8	94.0	-		mV	3	3	0	
pH	7.18	7.39	7.61	6.00/9.00	EQS 2015	pH Units	3	6	0	
Electrical Conductivity	723	791	830	-		uS/cm	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Metals — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Arsenic	0.50	0.25	0.50	50.0	EQS 2015	ug/l	3	-	0	
Boron	91.6	98.5	102.0	-		ug/l	3	3	0	
Cadmium	0.080	0.040	0.080	0.080	EQS 2015	ug/l	3	-	0	
Chromium	1.00	0.50	1.00	4.70	EQS 2015	ug/l	3	-	0	
Copper	0.43	0.54	0.69	1.00	EQS 2015 - Bioavailable	ug/l	3	3	0	
Hexavalent Chromium	30.0	15.0	30.0	3.40	EQS 2015	ug/l	3	-	0	
Lead	0.20	0.10	0.20	1.20	EQS 2015 - Bioavailable	ug/l	3	-	0	
Mercury	0.010	0.007	0.010	0.070	EQS 2015 MAC	ug/l	3	1	0	
Nickel	1.57	3.86	7.13	4.00	EQS 2015 - Bioavailable	ug/l	3	3	1	BH103
Selenium	1.61	2.35	3.76	-		ug/l	3	3	0	
Vanadium	1.00	0.50	1.00	-		ug/l	3	-	0	
Zinc	2.10	2.38	2.70	10.9	EQS 2015 - Bioavailable	ug/l	3	3	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Other — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Catechol	0.50	0.25	0.50	-		ug/l	3	-	0	
Naphthols	0.50	0.25	0.50	-		ug/l	3	-	0	
Resorcinol	0.50	0.25	0.50	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Acenaphthene	0.005	0.005	0.008	-		ug/l	3	2	0	
Acenaphthylene	0.005	0.003	0.005	-		ug/l	3	-	0	
Anthracene	0.005	0.003	0.005	0.10	EQS 2015	ug/l	3	-	0	
Benzo (a) anthracene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (a) pyrene	0.002	0.001	0.002	0.0002	EQS 2015	ug/l	3	-	0	
Benzo (b) fluoranthene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (ghi) perylene	0.005	0.003	0.005	-		ug/l	3	-	0	
Benzo (k) fluoranthene	0.005	0.003	0.005	-		ug/l	3	-	0	
Chrysene	0.005	0.003	0.005	-		ug/l	3	-	0	
Dibenzo (ah) anthracene	0.005	0.003	0.005	-		ug/l	3	-	0	
Fluoranthene	0.005	0.003	0.005	0.006	EQS 2015	ug/l	3	-	0	
Fluorene	0.005	0.007	0.012	-		ug/l	3	2	0	
Indeno (1,2,3-cd) pyrene	0.005	0.003	0.005	-		ug/l	3	-	0	
Naphthalene	0.010	0.011	0.019	2.00	EQS 2015	ug/l	3	2	0	
PAH (Total)	0.082	0.041	0.082	-		ug/l	3	-	0	
Phenanthrene	0.005	0.006	0.010	-		ug/l	3	2	0	
Pyrene	0.005	0.003	0.005	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Phenols — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Cresols	0.50	0.25	0.50	-		ug/l	3	-	0	
Isopropyl phenol	0.50	0.25	0.50	-		ug/l	3	-	0	
Phenol	0.50	0.25	0.50	7.70	EQS 2015	ug/l	3	-	0	
Trimethylphenols	0.50	0.25	0.50	-		ug/l	3	-	0	
Xylenols	0.50	0.25	0.50	-		ug/l	3	-	0	

TPH/EPH — Aquifer: 0

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
GRO Surrogate	91.0	95.0	101.0	-		%	3	3	0	
PRO (C5-C12)	50.0	25.0	50.0	-		ug/l	3	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

BTEX and Fuel Additives — Aquifer: N/A

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Xylene - Total (Summed)	1.00	1.00	1.00	-		ug/l	3	3	0	

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

Inorganics

Analyte	Point ID	Response Zone Depth (m bgl)	Result	Criteria Source	Threshold	Units	Stratum
Ammoniacal Nitrogen as NH4	BH101	5.00 - 10.00	1110	EQS 2015	385	ug/l	Seaford Chalk Formation
	BH103	6.00 - 8.00	1260	EQS 2015	385	ug/l	

Metals

Analyte	Point ID	Response Zone Depth (m bgl)	Result	Criteria Source	Threshold	Units	Stratum
Nickel	BH103	6.00 - 8.00	7.13	EQS 2015 - Bioavailable	4.00	ug/l	Seaford Chalk Formation

PRE-REPORT DATA CHECK

All GEOL_GEO2 codes are complete.

All GEOL_GEO2 codes are recognised and suitable for this report.

All SampleMatrix fields are complete

Water Vapour Screening, Landuse=Residential, Soil Type=Sandy Loam

Site Area(s): Whole site
Phase(s): All phases

Aliphatics and Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101	BH102	BH103
				Response Zone Depth (m bgl)	5 - 10	4 - 14	6 - 8
				Sample Date	29/01/20	29/01/20	29/01/20
Aliphatic C05-C06	ug/l	10.0	9,870		< 10	< 10	< 10
Aliphatic C06-C08	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aliphatic C08-C10	ug/l	10.0	275		< 10	< 10	< 10
Aliphatic C10-C12	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aliphatic C12-C16	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aromatic C07-C08	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aromatic C08-C10	ug/l	10.0	9,330		< 10	< 10	< 10
Aromatic C10-C12	ug/l	10.0	GAC > Sol		< 10	< 10	< 10
Aromatic C12-C16	ug/l	10.0	GAC > Sol		< 10	< 10	< 10

Water Vapour Screening, Landuse=Residential, Soil Type=Sandy Loam

Site Area(s): Whole site
Phase(s): All phases

BTEX and Fuel Additives

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101	BH102	BH103
				Response Zone Depth (m bgl)	5 - 10	4 - 14	6 - 8
				Sample Date	29/01/20	29/01/20	29/01/20
Benzene	ug/l	1.00	1,040		<1	<1	<1
Ethylbenzene	ug/l	1.00	54,330		<1	<1	<1
Methyl t-butylether (MTBE)	ug/l	1.00	415,650		<1	<1	<1
Toluene	ug/l	1.00	GAC > Sol		<1	<1	<1
Xylene - Total (Summed)	ug/l	-999	51,730		1	1	1

Water Vapour Screening, Landuse=Residential, Soil Type=Sandy Loam

Site Area(s): Whole site
Phase(s): All phases

PAHs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	BH101	BH102	BH103
PointID				BH101	BH102	BH103
Response Zone Depth (m bgl)				5 - 10	4 - 14	6 - 8
Sample Date				29/01/20	29/01/20	29/01/20
Naphthalene	ug/l	0.010	1,210	0.0106	<0.01	0.0186

Appendix J

FIELD MONITORING

Confidential

PRE-REPORT DATA CHECK

- All Response Zone depths are complete.
- All visit dates match in the Monitoring Results and Monitoring Visit tables.
- All visit dates match in the Dip and Monitoring Visit tables.
- All event names match in the Monitoring Point and Dips tables

North Street

Key:

Depth to water

- Response zone *fully* flooded during sampling
- Response zone *significantly* flooded during sampling
- Datum or reponse zone information missing. Response zone flooding cannot be calculated

Methane	Carbon Dioxide	Gas Flow
> 1% v/v	> 5% v/v	> 70 l/hr

Visit 1, Event: Round 1, Date: 21/01/2020

Engineer	Edward Jollands
Start/End Time	11:56 - 16:06
Pressure Start/End (mB)	1036 - 1034
Temperature (Deg C)	0.00
Weather Conditions	Fine

Equipment	SerialNo	Calibrated
Gas Analyser	12450	Yes
PID	WSP000123	Yes
Interface Probe	WSP000111	Yes

Comments and Ground Conditions:

Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Differential Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gases (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled ?
	Top	Base	Initial	Steady	Pa	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	m	m	mm	Y/N
WS101	1.00	2.00	0.00	0.00	0	0.00	0.00	0.00	4.10	19.80	15.20	0.00	0.00	0.00	2.02	2.12	N/A	No
WS102	1.00	2.00	0.00	0.00	0	0.00	0.00	0.00	4.00	19.80	15.20	0.00	0.00	0.00		2.09	N/A	No
WS103	2.00	3.00	0.00	0.00	0	0.00	0.00	0.00	1.00	20.00	16.80	0.00	0.00	0.00	2.95	3.06	N/A	No

North Street

Key:

Depth to water

- Response zone *fully* flooded during sampling
- Response zone *significantly* flooded during sampling
- Datum or reponse zone information missing. Response zone flooding cannot be calculated

Methane	Carbon Dioxide	Gas Flow
> 1% v/v	> 5% v/v	> 70 l/hr

Visit 2, Event: Round 2, Date: 29/01/2020

Engineer	Edward Jollands
Start/End Time	09:54 - 12:28
Pressure Start/End (mB)	1004 - 1004
Temperature (Deg C)	3.00
Weather Conditions	Clear

Equipment	SerialNo	Calibrated
YSI 556 multi-parameter	Wsp437	Yes
Gas Analyser	12450	Yes
PID	WSP000123	Yes
Dipmeter	WSP000111	Yes

Comments and Ground Conditions:

Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Differential Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gases (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled ?
	Top	Base	Initial	Steady	Pa	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	m	m	mm	Y/N
WS101	1.00	2.00	-2.30			0.00	0.00	1.00	5.30	17.10	14.60	0.00	0.00	0.00	2.08	2.12	N/A	No
WS102	1.00	2.00	-2.30			0.00	0.00	1.50	4.10	16.50	14.50	0.00	0.00	0.00		2.10	N/A	No
WS103	2.00	3.00	-2.10			0.00	0.00	2.60	2.90	18.60	16.40	0.00	0.00	0.00		3.03	N/A	No

North Street

Key:

Depth to water

- Response zone *fully* flooded during sampling
- Response zone *significantly* flooded during sampling
- Datum or reponse zone information missing. Response zone flooding cannot be calculated

Methane	Carbon Dioxide	Gas Flow
> 1% v/v	> 5% v/v	> 70 l/hr

Visit 3, Event: Round 3, Date: 05/02/2020

Engineer	Chloe Thompson
Start/End Time	10:01 - 10:46
Pressure Start/End (mB)	1032 - 1032
Temperature (Deg C)	4.00
Weather Conditions	Dry

Equipment	SerialNo	Calibrated
Gas Analyser	12450	Yes
PID	SN:595-000678	Yes
Interface Probe	WSP000111	Yes

Comments and Ground Conditions:

Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Differential Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gases (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled ?
	Top	Base	Initial	Steady	Pa	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	m	m	mm	Y/N
WS101	1.00	2.00	0.00	-0.20	-2	0.00	0.00	0.00	4.90	19.50	15.40	0.00	0.00	0.00	2.10	2.13	N/A	No
WS102	1.00	2.00	1.80	0.10	1	0.00	0.00	1.80	4.50	20.00	15.50	0.00	0.00	0.00	2.08	2.09	N/A	No
WS103	2.00	3.00	0.10	0.10	1	0.00	0.00	0.00	2.40	20.30	17.30	0.00	0.00	0.00		3.00	N/A	No

North Street

Key:

Depth to water

- Response zone *fully* flooded during sampling
- Response zone *significantly* flooded during sampling
- Datum or reponse zone information missing. Response zone flooding cannot be calculated

Methane	Carbon Dioxide	Gas Flow
> 1% v/v	> 5% v/v	> 70 l/hr

Visit 4, Event: Round 4, Date: 12/02/2020

Engineer	Edward Jollands
Start/End Time	10:39 - 12:22
Pressure Start/End (mB)	1010 - 1011
Temperature (Deg C)	4.00
Weather Conditions	Clear

Equipment	SerialNo	Calibrated
Gas Analyser	12450	Yes
PID	595-000678	Yes
Interface Probe	WSP000111	Yes

Comments and Ground Conditions:

Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Differential Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gases (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled ?
	Top	Base	Initial	Steady	Pa	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	m	m	mm	Y/N
WS101	1.00	2.00	-0.50	-0.10	-2	0.00	0.00	0.00	4.50	19.30	16.00	0.00	0.00	0.00	2.10	2.12	N/A	No
WS102	1.00	2.00	0.10	0.00	0	0.00	0.00	0.00	3.80	19.30	15.00	0.00	0.00	0.00	2.08	2.09	N/A	No
WS103	2.00	3.00	0.90	0.00	1	0.00	0.00	0.00	2.30	19.80	17.10	0.00	0.00	0.00		2.99	N/A	No

North Street

Key:

Depth to water

- Response zone *fully* flooded during sampling
- Response zone *significantly* flooded during sampling
- Datum or reponse zone information missing. Response zone flooding cannot be calculated

Methane	Carbon Dioxide	Gas Flow
> 1% v/v	> 5% v/v	> 70 l/hr

Visit 5, Event: Round 5, Date: 18/02/2020

Engineer	Nadia Mustafa
Start/End Time	09:00 - 10:00
Pressure Start/End (mB)	1014 - 1014
Temperature (Deg C)	7.00
Weather Conditions	Fine

Equipment	SerialNo	Calibrated
Gas Analyser	12450	Yes
PID	SN:595-000678	Yes
Interface Probe	WSP000111	Yes

Comments and Ground Conditions:

Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Differential Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gases (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled ?
	Top	Base	Initial	Steady	Pa	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	m	m	mm	Y/N
WS101	1.00	2.00	-1.50	-1.60		0.00	0.00	2.40	4.30	19.60	15.90	0.00	0.00	0.00		2.12	N/A	No
WS102	1.00	2.00	-1.90	-1.90		0.00	0.00	2.00	3.10	18.50	15.60	0.00	0.00	0.00	2.08	2.09	N/A	No
WS103	2.00	3.00	-1.80	-1.90		0.00	0.00	1.40	3.20	19.30	16.60	0.00	0.00	0.00	2.93	3.00	N/A	No

North Street

Key:

Depth to water

- Response zone *fully* flooded during sampling
- Response zone *significantly* flooded during sampling
- Datum or reponse zone information missing. Response zone flooding cannot be calculated

Methane	Carbon Dioxide	Gas Flow
> 1% v/v	> 5% v/v	> 70 l/hr

Visit 6, Event: Round 6, Date: 25/02/2020

Engineer	Nadia Mustafa
Start/End Time	09:00 - 13:00
Pressure Start/End (mB)	997 - 997
Temperature (Deg C)	8.00
Weather Conditions	Fine

Equipment	SerialNo	Calibrated
Gas Analyser	GS501281	Yes
PID	SN:595-000678	Yes
Interface Probe	WSP000111	Yes

Comments and Ground Conditions:

Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Differential Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gases (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled ?
	Top	Base	Initial	Steady	Pa	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	m	m	mm	Y/N
WS101	1.00	2.00	0.10	0.20		0.00	0.00	2.20	3.70	20.70	18.30	0.00	0.00			2.12	N/A	No
WS102	1.00	2.00	0.20	0.20		0.00	0.00	2.40	2.60	17.70	17.60	0.00	0.00			2.10	N/A	No
WS103	2.00	3.00	0.10	0.10		0.00	0.00	1.40	2.80	19.50	18.00	0.00	0.00			3.03	N/A	No

Round 1	21/10/2020	
Borehole	Dip to Groundwater	Dip to Base
BH101	2.705	10.19
BH102	2.815	14.03
BH103	2.88	8.2
WS101	2.02	2.12
WS102	Dry	2.09
WS103	2.95	3.06
Round 2	20/01/2020	
BH101	2.909	10.17
BH102	2.928	14.05
BH103	2.995	8.25
WS101	2.08	2.12
WS102	Dry	2.095
WS103	Dry	3.03
Round 3	05/02/2020	
BH101	2.98	10.15
BH102	2.985	14.01
BH103	3.05	8.26
WS101	2.1	2.13
WS102	2.08	2.09
WS103	Dry	3
Round 4	12/02/2020	
BH101	2.946	10.15
BH102	2.967	14.06
BH103	3.025	8.26
WS101	2.1	2.12
WS102	2.08	2.09
WS103	Dry	2.99
Round 5	18/02/2020	
BH101	2.81	8.25
BH102	2.74	14.12
BH103	2.73	10.17
WS101	Dry	2.12
WS102	2.08	2.09
WS103	2.93	3
Round 6	25/02/2020	
BH101	2.8	10.27
BH102	2.81	14.16
BH103	2.875	8.26
WS101	Dry	2.12
WS102	Dry	2.1
WS103	Dry	3.03

Appendix K

GEOTECHNICAL LABORATORY RESULTS

Confidential

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

WSP PB BBC
3rd Floor, Kings Orchard,
1 Queen Street
Bristol
Gloucestershire
BS2 0HQ

Attention: Edward Jollands

CERTIFICATE OF ANALYSIS

Date of report Generation:	21 February 2020
Customer:	WSP PB BBC
Sample Delivery Group (SDG):	200130-123
Your Reference:	70012984
Location:	North Street, Reading
Report No:	542501

This report has been revised and directly supersedes 542427 in its entirety.

We received 76 samples on Thursday January 30, 2020 and 45 of these samples were scheduled for analysis which was completed on Friday February 21, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



Sonia McWhan
Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21588329	BH101	B	0.90 - 1.30	15/01/2020
21588385	BH101	SPT	1.50 - 1.95	16/01/2020
21588413	BH101	D	1.70 - 1.80	15/01/2020
21588354	BH101	D	10.50 - 10.60	16/01/2020
21588356	BH101	SPT	11.00 - 11.45	16/01/2020
21588360	BH101	D	11.70 - 11.80	16/01/2020
21588365	BH101	SPT	12.50 - 12.95	16/01/2020
21588372	BH101	D	13.50 - 13.60	16/01/2020
21588376	BH101	SPT	14.00	16/01/2020
21588387	BH101	D	14.90 - 15.00	16/01/2020
21588390	BH101	SPT	15.50 - 15.78	16/01/2020
21588459	BH101	SPT	2.00 - 2.45	16/01/2020
21588497	BH101	B	2.20 - 3.00	15/01/2020
21588540	BH101	D	2.50 - 2.60	15/01/2020
21588585	BH101	B	3.00 - 4.00	15/01/2020
21588612	BH101	D	3.70 - 3.80	15/01/2020
21588617	BH101	D	6.00 - 6.10	15/01/2020
21588339	BH101	SPT	6.50 - 6.95	16/01/2020
21588347	BH101	D	7.60 - 7.70	15/01/2020
21588350	BH101	SPT	8.00 - 8.45	16/01/2020
21588352	BH101	D	9.30 - 9.40	15/01/2020
21588392	BH102	B	0.00 - 0.50	13/01/2020
21588394	BH102	D	0.20	13/01/2020
21588400	BH102	D	0.50	13/01/2020
21588396	BH102	B	0.50 - 1.00	13/01/2020
21588402	BH102	B	1.60 - 2.60	15/01/2020
21588451	BH102	D	10.50 - 10.60	14/01/2020
21588467	BH102	SPT	11.00 - 11.45	15/01/2020
21588473	BH102	D	12.20 - 12.30	14/01/2020
21588476	BH102	SPT	12.50 - 12.95	15/01/2020
21588478	BH102	D	13.70 - 13.80	14/01/2020
21588481	BH102	SPT	14.00 - 14.45	15/01/2020
21588483	BH102	D	14.60 - 14.70	15/01/2020
21588486	BH102	SPT	15.50 - 15.95	15/01/2020
21588489	BH102	D	16.00 - 16.10	15/01/2020
21588492	BH102	SPT	17.00 - 17.50	15/01/2020
21588405	BH102	D	2.80 - 2.90	14/01/2020
21588407	BH102	SPT	3.00 - 3.45	15/01/2020
21588410	BH102	D	3.50 - 3.60	14/01/2020
21588415	BH102	SPT	4.00 - 4.50	15/01/2020
21588418	BH102	D	4.50 - 4.60	14/01/2020
21588422	BH102	SPT	5.00 - 5.45	15/01/2020
21588424	BH102	D	6.00 - 6.10	14/01/2020
21588427	BH102	SPT	6.50 - 6.95	15/01/2020
21588434	BH102	D	7.50 - 7.60	14/01/2020
21588438	BH102	SPT	8.00 - 8.45	15/01/2020
21588443	BH102	D	8.80 - 8.90	14/01/2020
21588447	BH102	SPT	9.50 - 9.95	15/01/2020
21588494	BH103	B	0.50 - 1.00	21/01/2020
21588499	BH103	D	1.10 - 1.40	20/01/2020
21588502	BH103	B	1.40 - 1.90	20/01/2020
21588506	BH103	D	1.70 - 1.80	20/01/2020
21588542	BH103	D	10.50 - 10.60	20/01/2020
21588545	BH103	D	11.90 - 12.00	21/01/2020
21588554	BH103	D	13.40 - 13.50	21/01/2020
21588556	BH103	D	15.20 - 15.30	21/01/2020
21588513	BH103	D	2.60 - 2.70	20/01/2020

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

21588518	BH103	B	2.80 - 3.90	20/01/2020
21588522	BH103	D	3.50 - 3.60	20/01/2020
21588526	BH103	D	4.50 - 4.60	20/01/2020
21588530	BH103	B	5.10 - 5.90	20/01/2020
21588534	BH103	D	6.10 - 6.20	20/01/2020
21588537	BH103	D	9.00 - 9.10	20/01/2020
21588559	WS101	B	0.50 - 1.00	16/01/2020
21588562	WS101	D	0.60	16/01/2020
21588564	WS101	B	1.50 - 2.30	16/01/2020
21588569	WS101	B	2.30 - 3.00	16/01/2020
21588579	WS102	B	0.25 - 0.75	17/01/2020
21588583	WS102	D	0.50	17/01/2020
21588587	WS102	D	1.50	17/01/2020
21588589	WS102	SPT	1.50 - 1.95	17/01/2020
21588591	WS102	D	3.80 - 4.00	17/01/2020
21588593	WS103	D	0.50	17/01/2020
21588598	WS103	B	0.70 - 1.20	17/01/2020
21588604	WS103	D	1.70 - 1.80	17/01/2020
21588608	WS103	B	2.00 - 3.00	17/01/2020

Maximum Sample/Coolbox Temperature (°C) :

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			21588329	21588385	21588356	21588372	21588387	21588497	21588540	21588612	21588617	21588347	21588350	21588392	21588394	21588400	21588396	21588402	21588451	21588467
Customer Sample Reference			BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH102	BH102	BH102	BH102	BH102	BH102	BH102
AGS Reference			B	SPT	SPT	D	D	B	D	D	D	D	SPT	B	D	D	B	B	D	SPT
Depth (m)			0.90 - 1.30	1.50 - 1.95	11.00 - 11.45	13.50 - 13.60	14.90 - 15.00	2.20 - 3.00	2.50 - 2.60	3.70 - 3.80	6.00 - 6.10	7.60 - 7.70	8.00 - 8.45	0.00 - 0.50	0.20	0.50	0.50 - 1.00	1.60 - 2.60	10.50 - 10.60	11.00 - 11.45
Container			1kg Cardboard Container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	1kg Cardboard Container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container	Geolabs container
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 6	X											X						
Anions by Kone (soil)	All	NDPs: 0 Tests: 6	X											X						
Geotechnical Testing*	All	NDPs: 2 Tests: 41		X	X	X	X	X	X	X	X	X	X		X	X	X	X	N	X
Magnesium (BRE)	All	NDPs: 0 Tests: 6	X											X						
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 6	X											X						
pH	All	NDPs: 0 Tests: 6	X											X						
Sample description	All	NDPs: 0 Tests: 5	X											X						
Total Sulphate	All	NDPs: 0 Tests: 6	X											X						
Total Sulphur	All	NDPs: 0 Tests: 6	X											X						

21588534	BH103	D	6.10 - 6.20	Geolabs container	S					X													
21588526	BH103	D	4.50 - 4.60	Geolabs container	S					X													
				1kg Cardboard Container	S		X		X				X		X		X		X		X		X
21588522	BH103	D	3.50 - 3.60	Geolabs container	S					X													
21588518	BH103	B	2.80 - 3.90	Geolabs container	S					X													
21588513	BH103	D	2.60 - 2.70	Geolabs container	S					X													
21588554	BH103	D	13.40 - 13.50	Geolabs container	S					X													
21588506	BH103	D	1.70 - 1.80	Geolabs container	S					X													
				1kg TUB with Handle (ALE260)	S		X		X				X		X		X		X		X		X
21588502	BH103	B	1.40 - 1.90	Geolabs container	S					X													
21588494	BH103	B	0.50 - 1.00	Geolabs container	S					X													
21588443	BH102	D	8.80 - 8.90	Geolabs container	S					X													
21588438	BH102	SPT	8.00 - 8.45	Geolabs container	S					X													
21588427	BH102	SPT	6.50 - 6.95	Geolabs container	S					X													
21588424	BH102	D	6.00 - 6.10	Geolabs container	S					X													
21588418	BH102	D	4.50 - 4.60	Geolabs container	S					X													
21588407	BH102	SPT	3.00 - 3.45	Geolabs container	S					X													
21588405	BH102	D	2.80 - 2.90	Geolabs container	S					X													
				1kg TUB with Handle (ALE260)	S		X		X				X		X		X				X		X
21588489	BH102	D	16.00 - 16.10	Geolabs container	S					X													
21588478	BH102	D	13.70 - 13.80	Geolabs container	S					X													

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)	**Customer Sample Reference**	**AGS Reference**	**Depth (m)**	**Container**	**Sample Type**
			21588537	BH103	D	9.00 - 9.10	Geolabs container	S
			21588562	WS101	D	0.60	Geolabs container	S
			21588564	WS101	B	1.50 - 2.30	Geolabs container	S
			21588587	WS102	D	1.50	1kg TUB with Handle (ALE260)	S
			21588589	WS102	SPT	1.50 - 1.95	Geolabs container	S
			21588593	WS103	D	0.50	Geolabs container	S
			21588598	WS103	B	0.70 - 1.20	Geolabs container	S
			21588604	WS103	D	1.70 - 1.80	Geolabs container	S
			21588608	WS103	B	2.00 - 3.00	Geolabs container	S
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 6					X	
Anions by Kone (soil)	All	NDPs: 0 Tests: 6					X	
Geotechnical Testing*	All	NDPs: 2 Tests: 41			N			
			X	X			X	X	X	X	X
Magnesium (BRE)	All	NDPs: 0 Tests: 6					X	
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 6					X	
pH	All	NDPs: 0 Tests: 6					X	
Sample description	All	NDPs: 0 Tests: 5					X	
Total Sulphate	All	NDPs: 0 Tests: 6					X	
Total Sulphur	All	NDPs: 0 Tests: 6					X	

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21588329	BH101	0.90 - 1.30	Dark Brown	Silty Clay Loam	Stones	None
21588392	BH102	0.00 - 0.50	Light Brown	Silty Clay Loam	None	None
21588506	BH103	1.70 - 1.80	Light Brown	Silty Clay Loam	Stones	None
21588526	BH103	4.50 - 4.60	Light Brown	Sand	Stones	None
21588587	WS102	1.50	Dark Brown	Sandy Silt Loam	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH101	BH101	BH101	BH101	BH101
			Depth (m)	0.90 - 1.30	1.50 - 1.95	11.00 - 11.45	13.50 - 13.60	14.90 - 15.00	2.20 - 3.00
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
			Date Sampled	15/01/2020	16/01/2020	16/01/2020	16/01/2020	16/01/2020	15/01/2020
			Sample Time	.	.	.	.	.	.
			Date Received	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
			SDG Ref	200130-123	200130-123	200130-123	200130-123	200130-123	200130-123
			Lab Sample No.(s)	21588329	21588385	21588356	21588372	21588387	21588497
			AGS Reference	B	SPT	SPT	D	D	B
Moisture Content Ratio (% of as received sample)	%	PM024		11					
Moisture Content (GEOTECH)*		SUB		See Attached		See Attached	See Attached	See Attached	
Plasticity Index 4 point*		SUB			See Attached				
PSD Wet/Dry sieve*		SUB		See Attached					See Attached
Sulphur, Total	<0.02 %	TM132		<0.02 @					
pH	1 pH Units	TM133		8.19 @					
Sulphate, acid soluble (total)	<0.02 %	TM221		0.0526					
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243		0.0234 @					
Chloride 2:1 water/soil extract BRE	<0.0025 g/l	TM243		0.003 @					
Nitrate as NO3, 2:1 water soluble (BRE)	<0.0003 g/l	TM243		0.0454					
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248		0.00122					
Magnesium (BRE)	<0.008 g/l	TM282		<0.008					

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH101	BH101	BH101	BH101	BH101	BH102
			Depth (m)	2.50 - 2.60	3.70 - 3.80	6.00 - 6.10	7.60 - 7.70	8.00 - 8.45	0.00 - 0.50
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
			Date Sampled	15/01/2020	15/01/2020	15/01/2020	15/01/2020	16/01/2020	13/01/2020
			Sample Time	.	.	.	.	.	.
			Date Received	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
			SDG Ref	200130-123	200130-123	200130-123	200130-123	200130-123	200130-123
			Lab Sample No.(s)	21588540	21588612	21588617	21588347	21588350	21588392
			AGS Reference	D	D	D	D	SPT	B
Moisture Content Ratio (% of as received sample)	%	PM024							14
Moisture Content (GEOTECH)*		SUB		See Attached		See Attached	See Attached		
Plasticity Index 4 point*		SUB			See Attached			See Attached	
Sulphur, Total	<0.02 %	TM132							<0.02 @
pH	1 pH Units	TM133							8.22 @
Sulphate, acid soluble (total)	<0.02 %	TM221							<0.02
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243							0.0179 @
Chloride 2:1 water/soil extract BRE	<0.0025 g/l	TM243							0.0054 @
Nitrate as NO3, 2:1 water soluble (BRE)	<0.0003 g/l	TM243							0.00162
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248							0.000863
Magnesium (BRE)	<0.008 g/l	TM282							<0.008

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102	BH102	BH102	BH102	BH102
			Depth (m)	0.20	0.50	0.50 - 1.00	1.60 - 2.60	11.00 - 11.45	13.70 - 13.80
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
			Date Sampled	13/01/2020	13/01/2020	13/01/2020	15/01/2020	15/01/2020	14/01/2020
			Sample Time	.	.	.	.	.	.
			Date Received	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
			SDG Ref	200130-123	200130-123	200130-123	200130-123	200130-123	200130-123
			Lab Sample No.(s)	21588394	21588400	21588396	21588402	21588467	21588478
			AGS Reference	D	D	B	B	SPT	D
Moisture Content (GEOTECH)*		SUB		See Attached	See Attached			See Attached	See Attached
Plasticity Index 4 point*		SUB				See Attached			
PSD Wet/Dry sieve*		SUB					See Attached		
Bulk/Dry Density Direct*		SUB			See Attached				

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102	BH102	BH102	BH102	BH102
			Depth (m)	16.00 - 16.10	2.80 - 2.90	3.00 - 3.45	4.50 - 4.60	6.00 - 6.10	6.50 - 6.95
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
			Date Sampled	15/01/2020	14/01/2020	15/01/2020	14/01/2020	14/01/2020	15/01/2020
			Sample Time	.	.	.	.	.	.
			Date Received	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
			SDG Ref	200130-123	200130-123	200130-123	200130-123	200130-123	200130-123
			Lab Sample No.(s)	21588489	21588405	21588407	21588418	21588424	21588427
			AGS Reference	D	D	SPT	D	D	SPT
Moisture Content Ratio (% of as received sample)	%	PM024			13				
Moisture Content (GEOTECH)*		SUB		See Attached	See Attached		See Attached		See Attached
Plasticity Index 4 point*		SUB				See Attached		See Attached	
Sulphur, Total	<0.02 %	TM132			<0.02 @				
pH	1 pH Units	TM133			8.92 @				
Sulphate, acid soluble (total)	<0.02 %	TM221			0.0249				
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243			0.0156 @				
Chloride 2:1 water/soil extract BRE	<0.0025 g/l	TM243			0.0038 @				
Nitrate as NO3, 2:1 water soluble (BRE)	<0.0003 g/l	TM243			0.0013				
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248			0.0052				
Magnesium (BRE)	<0.008 g/l	TM282			<0.008				

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH102	BH102	BH103	BH103	BH103	BH103
			Depth (m)	8.00 - 8.45	8.80 - 8.90	0.50 - 1.00	1.40 - 1.90	1.70 - 1.80	13.40 - 13.50
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
			Date Sampled	15/01/2020	14/01/2020	21/01/2020	20/01/2020	20/01/2020	21/01/2020
			Sample Time	.	.	.	.	.	.
			Date Received	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
			SDG Ref	200130-123	200130-123	200130-123	200130-123	200130-123	200130-123
			Lab Sample No.(s)	21588438	21588443	21588494	21588502	21588506	21588554
			AGS Reference	SPT	D	B	B	D	D
Moisture Content Ratio (% of as received sample)	%	PM024						13	
Moisture Content (GEOTECH)*		SUB			See Attached		See Attached		See Attached
Plasticity Index 4 point*		SUB		See Attached				See Attached	
PSD Wet/Dry sieve*		SUB				See Attached			
Sulphur, Total	<0.02 %	TM132						<0.02	
pH	1 pH Units	TM133						8.31 @	
Sulphate, acid soluble (total)	<0.02 %	TM221						<0.02	
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243						0.0116 @	
Chloride 2:1 water/soil extract BRE	<0.0025 g/l	TM243						0.0036 @	
Nitrate as NO3, 2:1 water soluble (BRE)	<0.0003 g/l	TM243						0.004	
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248						0.00128	
Magnesium (BRE)	<0.008 g/l	TM282						<0.008	

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH103	BH103	BH103	BH103	BH103	BH103
			Depth (m)	2.60 - 2.70	2.80 - 3.90	3.50 - 3.60	4.50 - 4.60	6.10 - 6.20	9.00 - 9.10
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
			Date Sampled	20/01/2020	20/01/2020	20/01/2020	20/01/2020	20/01/2020	20/01/2020
			Sample Time	.	.	.	.	.	.
			Date Received	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
			SDG Ref	200130-123	200130-123	200130-123	200130-123	200130-123	200130-123
			Lab Sample No.(s)	21588513	21588518	21588522	21588526	21588534	21588537
			AGS Reference	D	B	D	D	D	D
Moisture Content Ratio (% of as received sample)	%	PM024					11		
Moisture Content (GEOTECH)*		SUB		See Attached		See Attached			See Attached
Plasticity Index 4 point*		SUB					See Attached		
PSD Wet/Dry sieve*		SUB			See Attached				
Bulk/Dry Density Direct*		SUB						See Attached	
Sulphur, Total	<0.02 %	TM132					0.0243		
pH	1 pH Units	TM133					8.9 @		
Sulphate, acid soluble (total)	<0.02 %	TM221					0.0413		
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243					0.021 @		
Chloride 2:1 water/soil extract BRE	<0.0025 g/l	TM243					0.0043 @		
Nitrate as NO3, 2:1 water soluble (BRE)	<0.0003 g/l	TM243					0.00498		
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248					0.00213		
Magnesium (BRE)	<0.008 g/l	TM282					<0.008		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS101	WS102	WS102	WS103	WS103	WS103
			Depth (m)	0.60	1.50	1.50 - 1.95	0.50	0.70 - 1.20	1.70 - 1.80
			Sample Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
			Date Sampled	16/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020	17/01/2020
			Sample Time	.	.	.	.	.	.
			Date Received	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
			SDG Ref	200130-123	200130-123	200130-123	200130-123	200130-123	200130-123
			Lab Sample No.(s)	21588562	21588587	21588589	21588593	21588598	21588604
			AGS Reference	D	D	SPT	D	B	D
Moisture Content Ratio (% of as received sample)	%	PM024			25				
CBR Remoulded 2.5Kg*		SUB						See Attached	
Moisture Content (GEOTECH)*		SUB		See Attached		See Attached			See Attached
Plasticity Index 4 point*		SUB					See Attached		
Sulphur, Total	<0.02 %	TM132			0.069				
pH	1 pH Units	TM133			7.63 @				
Sulphate, acid soluble (total)	<0.02 %	TM221			0.102				
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243			0.253 @				
Chloride 2:1 water/soil extract BRE	<0.0025 g/l	TM243			0.0068 @				
Nitrate as NO3, 2:1 water soluble (BRE)	<0.0003 g/l	TM243			0.239				
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248			0.00208				
Magnesium (BRE)	<0.008 g/l	TM282			<0.008				

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Customer Sample Ref.			WS103
Depth (m)			2.00 - 3.00
Sample Type			GeoTech Soils
Date Sampled			17/01/2020
Sample Time			.
Date Received			30/01/2020
SDG Ref			200130-123
Lab Sample No.(s)			21588608
AGS Reference			B
Component	**LOD/Units**	**Method**	
PSD Wet/Dry sieve*		SUB	See Attached

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Notification of NDPs (No determination possible)

Date Received : 30/01/2020 16:16:16

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
21588451	BH102 DZ	10.50 - 10.60	Geotechnical Testing*	Sample unsuitable for analysis
21588564	WS101 BZ	1.50 - 2.30	Geotechnical Testing*	Sample unsuitable for analysis

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
SUB		Subcontracted Test
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM282		Extraction of Magnesium by BRE Method

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Test Completion Dates

Lab Sample No(s)	21588329	21588347	21588350	21588356	21588372	21588385	21588387	21588497	21588540	21588612
Customer Sample Ref.	BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH101	BH101
AGS Ref.	B	D	SPT	SPT	D	SPT	D	B	D	D
Depth	0.90 - 1.30	7.60 - 7.70	8.00 - 8.45	11.00 - 11.45	13.50 - 13.60	1.50 - 1.95	14.90 - 15.00	2.20 - 3.00	2.50 - 2.60	3.70 - 3.80
Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
Ammoniacal N as NH4 in 2:1 extract	11-Feb-2020									
Anions by Kone (soil)	18-Feb-2020									
Geotechnical Testing*	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020
Magnesium (BRE)	18-Feb-2020									
NO3, NO2 and TON by KONE (s)	18-Feb-2020									
pH	20-Feb-2020									
Sample description	07-Feb-2020									
Total Sulphate	19-Feb-2020									
Total Sulphur	13-Feb-2020									

Lab Sample No(s)	21588617	21588392	21588394	21588396	21588400	21588402	21588405	21588407	21588418	21588424
Customer Sample Ref.	BH101	BH102	BH102	BH102	BH102	BH102	BH102	BH102	BH102	BH102
AGS Ref.	D	B	D	B	D	B	D	SPT	D	D
Depth	6.00 - 6.10	0.00 - 0.50	0.20	0.50 - 1.00	0.50	1.60 - 2.60	2.80 - 2.90	3.00 - 3.45	4.50 - 4.60	6.00 - 6.10
Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
Ammoniacal N as NH4 in 2:1 extract		11-Feb-2020					20-Feb-2020			
Anions by Kone (soil)		17-Feb-2020					21-Feb-2020			
Geotechnical Testing*	20-Feb-2020		20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	21-Feb-2020	21-Feb-2020	20-Feb-2020	20-Feb-2020
Magnesium (BRE)		18-Feb-2020					20-Feb-2020			
NO3, NO2 and TON by KONE (s)		18-Feb-2020					20-Feb-2020			
pH		20-Feb-2020					20-Feb-2020			
Sample description		07-Feb-2020								
Total Sulphate		19-Feb-2020					20-Feb-2020			
Total Sulphur		13-Feb-2020					19-Feb-2020			

Lab Sample No(s)	21588427	21588438	21588443	21588467	21588478	21588489	21588494	21588502	21588506	21588513
Customer Sample Ref.	BH102	BH102	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103
AGS Ref.	SPT	SPT	D	SPT	D	D	B	B	D	D
Depth	6.50 - 6.95	8.00 - 8.45	8.80 - 8.90	11.00 - 11.45	13.70 - 13.80	16.00 - 16.10	0.50 - 1.00	1.40 - 1.90	1.70 - 1.80	2.60 - 2.70
Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
Ammoniacal N as NH4 in 2:1 extract									11-Feb-2020	
Anions by Kone (soil)									18-Feb-2020	
Geotechnical Testing*	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020
Magnesium (BRE)									18-Feb-2020	
NO3, NO2 and TON by KONE (s)									18-Feb-2020	
pH									20-Feb-2020	
Sample description									07-Feb-2020	
Total Sulphate									19-Feb-2020	
Total Sulphur									13-Feb-2020	

Lab Sample No(s)	21588518	21588522	21588526	21588534	21588537	21588554	21588562	21588587	21588589	21588593
Customer Sample Ref.	BH103	BH103	BH103	BH103	BH103	BH103	WS101	WS102	WS102	WS103
AGS Ref.	B	D	D	D	D	D	D	D	SPT	D
Depth	2.80 - 3.90	3.50 - 3.60	4.50 - 4.60	6.10 - 6.20	9.00 - 9.10	13.40 - 13.50	0.60	1.50	1.50 - 1.95	0.50
Type	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils	GeoTech Soils
Ammoniacal N as NH4 in 2:1 extract			11-Feb-2020					11-Feb-2020		
Anions by Kone (soil)			19-Feb-2020					18-Feb-2020		
Geotechnical Testing*	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020	20-Feb-2020		20-Feb-2020	20-Feb-2020
Magnesium (BRE)			18-Feb-2020					18-Feb-2020		
NO3, NO2 and TON by KONE (s)			18-Feb-2020					18-Feb-2020		
pH			20-Feb-2020					20-Feb-2020		
Sample description			07-Feb-2020					07-Feb-2020		
Total Sulphate			19-Feb-2020					19-Feb-2020		
Total Sulphur			13-Feb-2020					13-Feb-2020		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200130-123	**Client Reference:**	70012984	**Report Number:**	542501
Location:	North Street, Reading	**Order Number:**	70012984-021	**Superseded Report:**	542427

Lab Sample No(s)	21588598	21588604	21588608
Customer Sample Ref.	WS103	WS103	WS103
AGS Ref.	B	D	B
Depth	0.70 - 1.20	1.70 - 1.80	2.00 - 3.00
Type	GeoTech Soils	GeoTech Soils	GeoTech Soils
Geotechnical Testing*	20-Feb-2020	20-Feb-2020	20-Feb-2020

ALS Environmental
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For the attention of Annabella Szelyes

TEST REPORT

PROJECT/SITE	North Street, Reading	Version No.	1
REPORT NUMBER	19/3389	Page No.	1 to 15
Your ref/PO:	200130-123 / 29784	Date of Issue	20/02/2020
		Status	Final

SUMMARY OF RESULTS ATTACHED

TEST METHOD & DESCRIPTION	QUANTITY
BS 1377: Part 2: Clause 3.2: 1990 Determination of moisture content by oven drying method	24
BS 1377: Part 2: Clause 4.2-4.4 & 5.2-5.4: 1990 Liquid & Plastic Limits	10
BS 1377: Part 2: Clause 3.3: 1990 Determination of the saturation moisture content of chalk	3
BS 1377: Part 2: Clause 9.2 & 9.3: 1990 Determination of particle size distribution – wet & dry sieving method	6
BS 1377: Part 2: Clause 7.2: 1990 Determination of Density by Linear measurement Method	2
BS 1377: Part 4: Clause 7.0: 1990 Determination of the California Bearing Ratio (CBR)	1

Remarks
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* Tests have been sub-contracted out.
Tests are not UKAS accredited.

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CONCEPT SITE INVESTIGATIONS

Site Name:	North Street, Reading	**Job No.:**	20/3389
Client:	ALS	**Date Reported:**	19/02/2020

Summary Test Report

Determination of Moisture Content and Liquid and Plastic Limits

Borehole No.	Sample Type	Sample No.	Depth m	Description	Natural Moisture Content %	[1] Passing 425 µm sieve %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Remarks
BH101	B	01	0.90	Brown clayey silty gravelly SAND. Gravel is fine to coarse flint	16					
BH101	SPT	02	1.50	Brown very sandy silty CLAY		100	22	14	8	
BH101	D	06	2.50	Light orangish brown gravelly SAND. Gravel is fine to medium flint	15					
BH101	D	08	3.70	Beige mottled off-white clayey silty very gravelly SAND. Gravel is fine to medium chalk fragments		87	18	NP		NP = Non Plastic
BH101	D	09	6.00	Off-white slightly clayey fine to coarse chalk GRAVEL	26					
BH101	D	11	7.60	Off-white slightly clayey fine to coarse chalk GRAVEL	27					
BH101	SPT	12	8.00	Off-white slightly clayey silty fine to medium chalk GRAVEL				N/P		NP = Non Plastic
BH101	SPT	15	11.00	Off-white very clayey very gravelly CHALK. Gravel comprises fine to medium chalk and flint	26					
BH101	D	18	13.50	Off-white very clayey fine chalk GRAVEL	28					

BS 1377: Part 2: Clause 4.3 & 4.4: 1990 Determination of the liquid limit by the cone penetrometer method

BS 1377: Part 2: Clause 5: 1990 Determination of the plastic limit and plasticity index

BS 1377: Part 2: Clause 3.2: 1990 Determination of the moisture content by the oven drying method

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UKAS TESTING 4503

Date - samples received:	04/02/2020		
Date - sample testing commenced :	04/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	17/02/2020	Date Approved:	19/02/2020

Approved Signatories: L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)

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CONCEPT SITE INVESTIGATIONS

Site Name:	North Street, Reading	**Job No.:**	20/3389
Client:	ALS	**Date Reported:**	19/02/2020

Summary Test Report

Determination of Moisture Content and Liquid and Plastic Limits

Borehole No.	Sample Type	Sample No.	Depth m	Description	Natural Moisture Content %	[1] Passing 425 µm sieve %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Remarks
BH101	D	20	14.90	Off-white clayey gravelly CHALK. Gravel comprises fine to medium flint and chalk fragments	22					
BH102	D	23	0.20	Dark brown very gravelly clayey SILT with occasional rootlets and wood fragments. Gravel comprises fine to medium flint, coal and brick fragments with 1 NO 70mm coarse flint. TOPSOIL	14					
BH102	D	25	0.50	Brown very sandy CLAY	19					
BH102	B	24	0.50	Orangish brown very sandy silty CLAY		99	32	17	15	
BH102	D	27	2.80	Off-white slightly clayey gravelly CHALK. Gravel comprises fine to medium flint and chalk fragments	11					
BH102	SPT	28	3.00	Off-white slightly clayey gravelly CHALK. Gravel comprises fine to medium flint and chalk fragments		36	22	N/P		NP = Non Plastic
BH102	D	31	4.50	Off-white slightly clayey fine to coarse chalk and flint GRAVEL	29					
BH102	D	33	6.00	Off-white slightly clayey fine to coarse chalk GRAVEL				N/P		NP = Non Plastic
BH102	SPT	34	6.50	Off-white very clayey very gravelly CHALK. Gravel comprises fine to medium flint and chalk fragments	28					

BS 1377: Part 2: Clause 4.3 & 4.4: 1990 Determination of the liquid limit by the cone penetrometer method

BS 1377: Part 2: Clause 5: 1990 Determination of the plastic limit and plasticity index

BS 1377: Part 2: Clause 3.2: 1990 Determination of the moisture content by the oven drying method

AGS Association of Geotechnical & Geoenvironmental Specialists

UKAS TESTING 4503

Date - samples received:	04/02/2020		
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Date - sample testing completed :	17/02/2020	Date Approved:	19/02/2020

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CONCEPT SITE INVESTIGATIONS

Site Name:	North Street, Reading	**Job No.:**	20/3389
Client:	ALS	**Date Reported:**	19/02/2020

Summary Test Report

Determination of Moisture Content and Liquid and Plastic Limits

Borehole No.	Sample Type	Sample No	Depth m	Description	Natural Moisture Content %	[1] Passing 425 µm sieve %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Remarks
BH102	SPT	36	8.00	Off white clayey silty gravelly CHALK. Gravel is fine to medium chalk fragments		94	31	N/P		NP = Non Plastic
BH102	D	37	8.80	Off-white very clayey very gravelly CHALK. Gravel comprises fine to medium flint and chalk fragments	28					
BH102	SPT	40	11.00	Off-white very clayey very gravelly CHALK. Gravel comprises fine to medium flint and chalk fragments	29					
BH102	D	43	13.70	Off-white clayey fine to coarse flint and chalk GRAVEL	22					
BH102	D	47	16.00	Off-white slightly clayey fine to medium chalk GRAVEL	25					
BH103	B	51	1.40	Brown very sandy very gravelly silty CLAY. Gravel comprises fine to medium flint and coal fragments	19					
BH103	D	52	1.70	Reddish brown very sandy slightly gravelly CLAY. Gravel is fine to coarse flint		75	34	18	16	
BH103	D	53	2.60	Beige slightly clayey fine to coarse flint and chalk GRAVEL	15					
BH103	D	55	3.50	Beige slightly clayey slightly sandy fine to coarse flint and chalk GRAVEL	13					

BS 1377: Part 2: Clause 4.3 & 4.4: 1990 Determination of the liquid limit by the cone penetrometer method

BS 1377: Part 2: Clause 5: 1990 Determination of the plastic limit and plasticity index

BS 1377: Part 2: Clause 3.2: 1990 Determination of the moisture content by the oven drying method

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UKAS TESTING 4503

Date - samples received:	04/02/2020		
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CONCEPT SITE INVESTIGATIONS

Site Name:	North Street, Reading	**Job No.:**	20/3389
Client:	ALS	**Date Reported:**	19/02/2020

Summary Test Report

Determination of Moisture Content and Liquid and Plastic Limits

Borehole No.	Sample Type	Sample No.	Depth m	Description	Natural Moisture Content %	[1] Passing 425 µm sieve %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Remarks
BH103	D	56	4.50	Beige clayey very gravelly SAND. Gravel comprises fine to coarse flint and chalk fragments				N/P		NP = Non Plastic
BH103	D	59	9.00	Off-white mottled orangish brown slightly clayey fine to coarse chalk GRAVEL	28					
BH103	D	62	13.40	Off-white slightly clayey fine to medium chalk GRAVEL	26					
WS101	D	65	0.60	Brown slightly sandy slightly gravelly SILT/CLAY with frequent rootlets. Gravel is fine to medium flint. TOPSOIL	17					
WS102	SPT	71	1.50	Orangish brown mottled black very clayey slightly silty slightly sandy GRAVEL. Gravel comprises of fine to medium flint and cola fragments	17					
WS103	D	73	0.50	Brown slightly clayey silty gravelly SAND. Gravel comprises fine to coarse flint and chalk fragments. TOPSOIL				N/P		NP = Non Plastic
WS103	D	75	1.70	Dark brown slightly sandy very gravelly silty CLAY. Gravel is fine to coarse flint	11					

BS 1377: Part 2: Clause 4.3 & 4.4: 1990 Determination of the liquid limit by the cone penetrometer method

BS 1377: Part 2: Clause 5: 1990 Determination of the plastic limit and plasticity index

BS 1377: Part 2: Clause 3.2: 1990 Determination of the moisture content by the oven drying method

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UKAS TESTING 4503

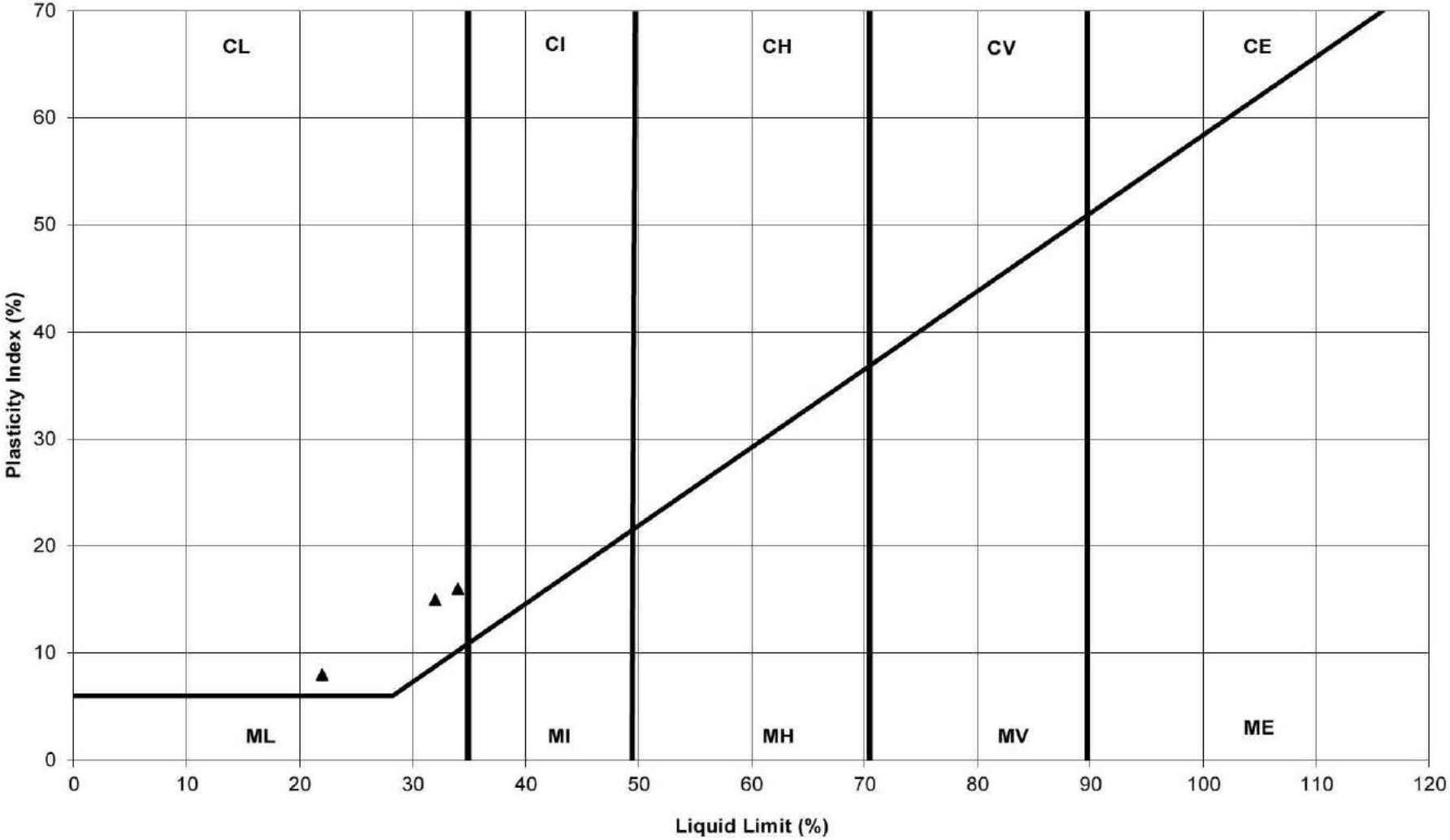
Date - samples received:	04/02/2020		
Date - sample testing commenced :	04/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	17/02/2020	Date Approved:	19/02/2020

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PLASTICITY CHART



CONCEPT SITE INVESTIGATIONS

Site Name:	North Street, Reading	**Job No.:**	20/3389
Client:	ALS	**Date Reported:**	19/02/2020

Summary Test Report
Determination of Bulk and Dry Density

BH/TP No	Sample Type	Sample No	Depth m	Description	Bulk Density Mg/m^3	Natural Moisture Content %	Dry Density Mg/m^3	(Method*) Remarks
BH102	D	25	0.50	Brown very sandy CLAY	2.08		1.74	(1)
BH102	D	41	12.20	Off-white clayey gravelly CHALK. Gravel comprises fine to medium flint and chalk fragments	2.03		1.63	(1)

BS 1377: Part 2: Clause 3.2: 1990 Determination of the moisture content by the oven drying method

(1) BS 1377: Part 2: Clause 7.2: 1990 Determination of Density. Linear Measurement Method

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UKAS TESTING
4503

Date - samples received:	04/02/2020		
Date - sample testing commenced :	12/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	12/02/2020	Date Approved:	19/02/2020
Approved Signatories:	L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)		

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CONCEPT SITE INVESTIGATIONS

Site Name:	North Street, Reading	Job No.	20/3389
Client:	ALS	Date	19/02/2020

Summary Test Report
Determination of Saturation Moisture Content

BH/TP No	Sample Type	Sample No	Depth m	Description	Bulk Density Mg/m³	Dry Density Mg/m³	Natural Moisture Content %	Saturation Moisture Content %	Remarks
BH101	D	09	6.00	Off-white slightly clayey fine to coarse chalk GRAVEL	2.06	1.67	23	23	
BH102	D	31	4.50	Off-white slightly clayey fine to coarse chalk and flint GRAVEL	2.06	1.68	22	22	
BH103	D	58	6.10	Off-white CHALK	2.04	1.65	23	24	

BS 1377: Part 2: Clause 3.3: 1990 Determination of the saturation moisture content of chalk

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UKAS TESTING
4503

Date - samples received:	04/02/2020		
Date - sample testing commenced :	12/02/2020	Checked / Approved by: LG	
Date - sample testing completed :	13/02/2020	Date Approved: 19/02/2020	
Approved Signatories:	L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)		

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CONCEPT SITE INVESTIGATIONS

PARTICLE SIZE DISTRIBUTION

TEST REPORT

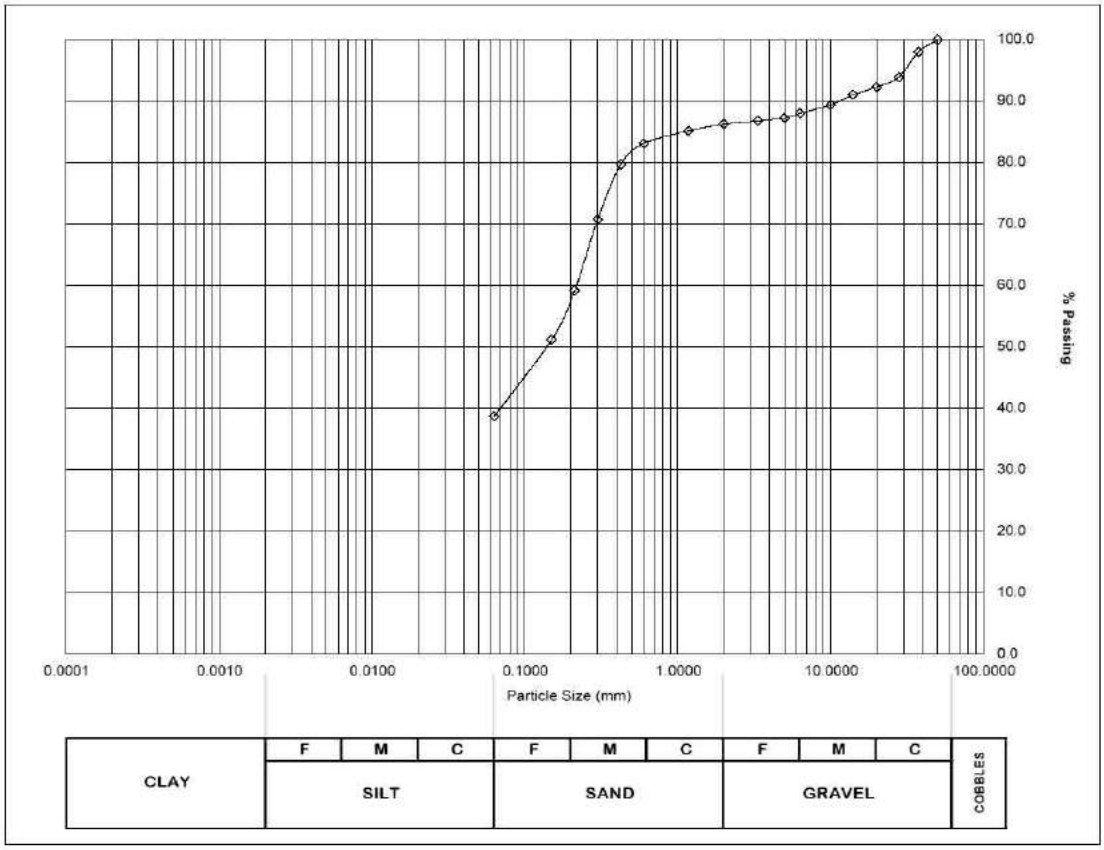
Site Name:	North Street, Reading					**Job Number:**	20/3389
Client:	ALS					**Date Reported:**	19/02/2020
Borehole No:	BH101	**Sample Type/No.**	B	01	**Top Depth:** 0.90 m	**Bottom Depth:**	1.30 m

Soil Description:

Brown clayey silty gravelly SAND. Gravel is fine to coarse flint

BS Test Sieves	
Size (mm)	% Passing
75.000	100
63.000	100
50.000	100
37.500	98
28.000	94
20.000	92
14.000	91
10.000	89
6.300	88
5.000	87
3.350	87
2.000	86
1.180	85
0.600	83
0.425	80
0.300	71
0.212	59
0.150	51
0.063	39

Sedimentation (*if applicable)	
Size (mm)	% Passing
0.020	
0.006	
0.002	



Method/type:	Wet Sieving

BS 1377: Part 2: Clause 9.2: 1990 Determination of particle size distribution - wet sieving method.

Particle Proportions %	
Cobbles	
Gravel	13.8
Sand	47.5
Silt and Clay	38.7

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UKAS TESTING
4503

Remarks:

Date - samples received:	04/02/2020		
Date - sample testing commenced :	18/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	19/02/2020	Date Approved:	19/02/2020

Approved Signatories: L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)

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CONCEPT SITE INVESTIGATIONS

PARTICLE SIZE DISTRIBUTION

TEST REPORT

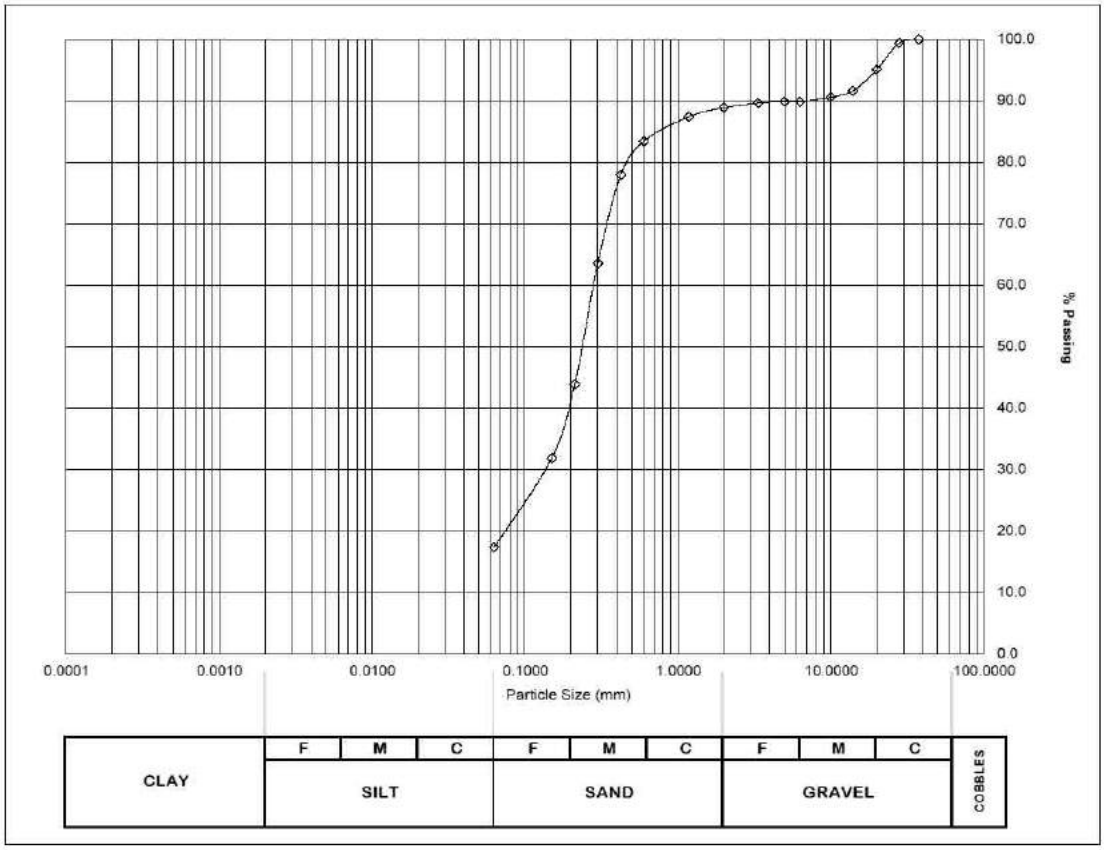
Site Name:	North Street, Reading					**Job Number:**	20/3389
Client:	ALS					**Date Reported:**	19/02/2020
Borehole No:	BH101	**Sample Type/No.**	B	05	**Top Depth:** 2.20 m	**Bottom Depth:**	3.00 m

Soil Description:

Brown clayey gravelly SAND. Gravel is fine to coarse flint

BS Test Sieves	
Size (mm)	% Passing
75.000	100
63.000	100
50.000	100
37.500	100
28.000	99
20.000	95
14.000	92
10.000	91
6.300	90
5.000	90
3.350	90
2.000	89
1.180	87
0.600	83
0.425	78
0.300	64
0.212	44
0.150	32
0.063	17

Sedimentation (*if applicable)	
Size (mm)	% Passing
0.020	
0.006	
0.002	



Method/type:	Wet Sieving

BS 1377: Part 2: Clause 9.2: 1990 Determination of particle size distribution - wet sieving method.

Particle Proportions %	
Cobbles	
Gravel	11.1
Sand	71.5
Silt and Clay	17.4

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UKAS TESTING
4503

Remarks:

Date - samples received:	04/02/2020		
Date - sample testing commenced :	18/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	19/02/2020	Date Approved:	19/02/2020

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CONCEPT SITE INVESTIGATIONS

PARTICLE SIZE DISTRIBUTION

TEST REPORT

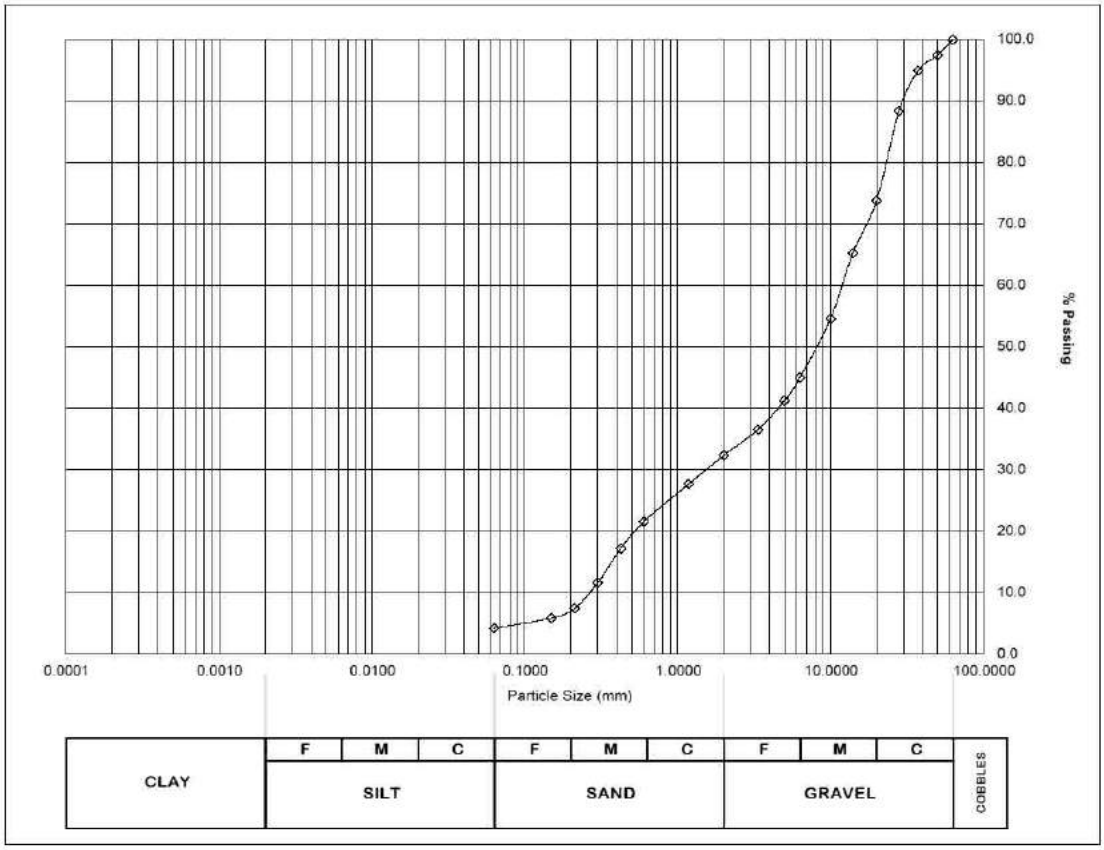
Site Name:	North Street, Reading					**Job Number:**	20/3389
Client:	ALS					**Date Reported:**	19/02/2020
Borehole No:	BH102	**Sample Type/No.**	B	26	**Top Depth:** 1.60 m	**Bottom Depth:**	2.60 m

Soil Description:

Brown slightly clayey very sandy fine to coarse flint GRAVEL

BS Test Sieves	
Size (mm)	% Passing
75.000	100
63.000	100
50.000	97
37.500	95
28.000	88
20.000	74
14.000	65
10.000	55
6.300	45
5.000	41
3.350	37
2.000	32
1.180	28
0.600	22
0.425	17
0.300	12
0.212	7
0.150	6
0.063	4

Sedimentation (*if applicable)	
Size (mm)	% Passing
0.020	
0.006	
0.002	



Method/type:	Wet Sieving

BS 1377: Part 2: Clause 9.2: 1990 Determination of particle size distribution - wet sieving method.

Particle Proportions %	
Cobbles	
Gravel	67.7
Sand	28.0
Silt and Clay	4.2

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UKAS TESTING
4503

Remarks:

Date - samples received:	04/02/2020		
Date - sample testing commenced :	18/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	19/02/2020	Date Approved:	19/02/2020

Approved Signatories: L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)

CONCEPT
47-49 Brunel Road, London W3 7XR
Tel: 02087401553
Email: lab@conceptconsultants.co.uk

CONCEPT SITE INVESTIGATIONS

PARTICLE SIZE DISTRIBUTION

TEST REPORT

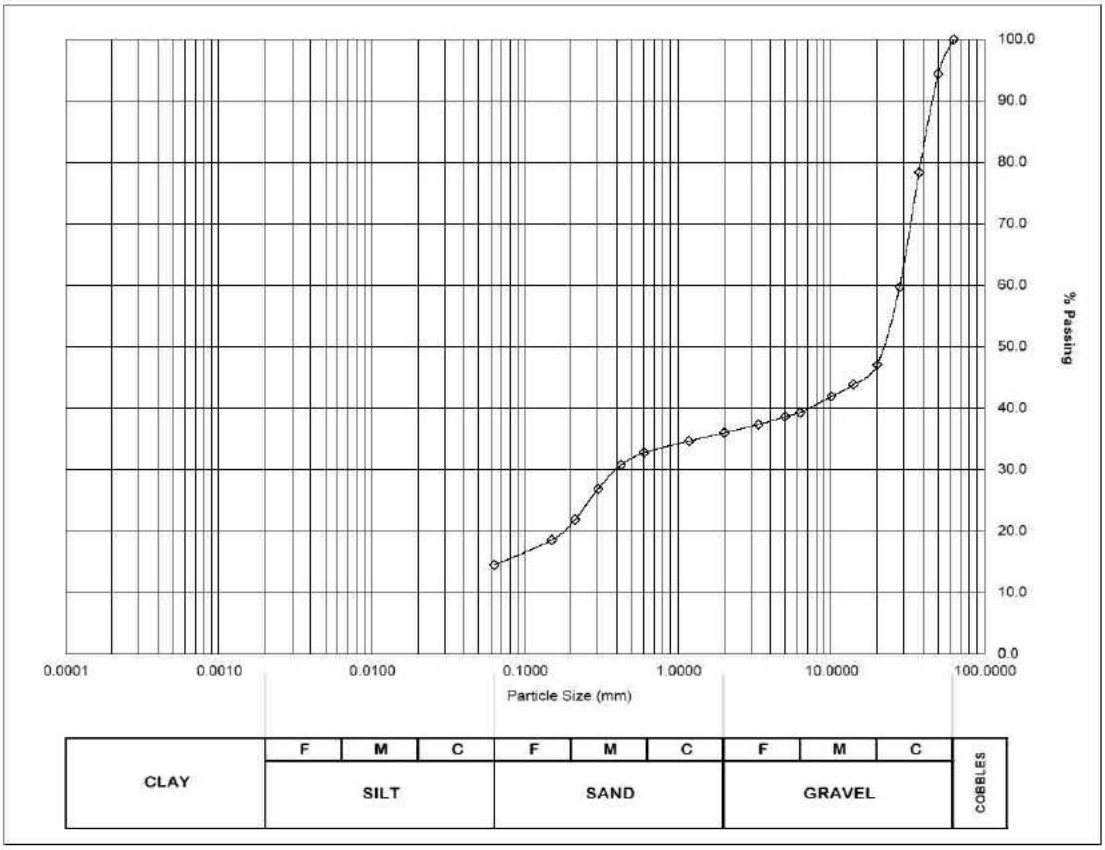
Site Name:	North Street, Reading					**Job Number:**	20/3389
Client:	ALS					**Date Reported:**	19/02/2020
Borehole No:	BH103	**Sample Type/No.**	B	54	**Top Depth:** 2.80 m	**Bottom Depth:**	3.90 m

Soil Description:

Beige mottled off-white clayey very sandy fine to coarse flint and chalk GRAVEL

BS Test Sieves	
Size (mm)	% Passing
75.000	100
63.000	100
50.000	94
37.500	78
28.000	60
20.000	47
14.000	44
10.000	42
6.300	39
5.000	39
3.350	37
2.000	36
1.180	35
0.600	33
0.425	31
0.300	27
0.212	22
0.150	19
0.063	14

Sedimentation (*if applicable)	
Size (mm)	% Passing
0.020	
0.006	
0.002	



Method/type:	Wet Sieving

BS 1377: Part 2: Clause 9.2: 1990 Determination of particle size distribution - wet sieving method.

Particle Proportions %	
Cobbles	
Gravel	64.0
Sand	21.5
Silt and Clay	14.5

AGS

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4503

Remarks:

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TEST REPORT

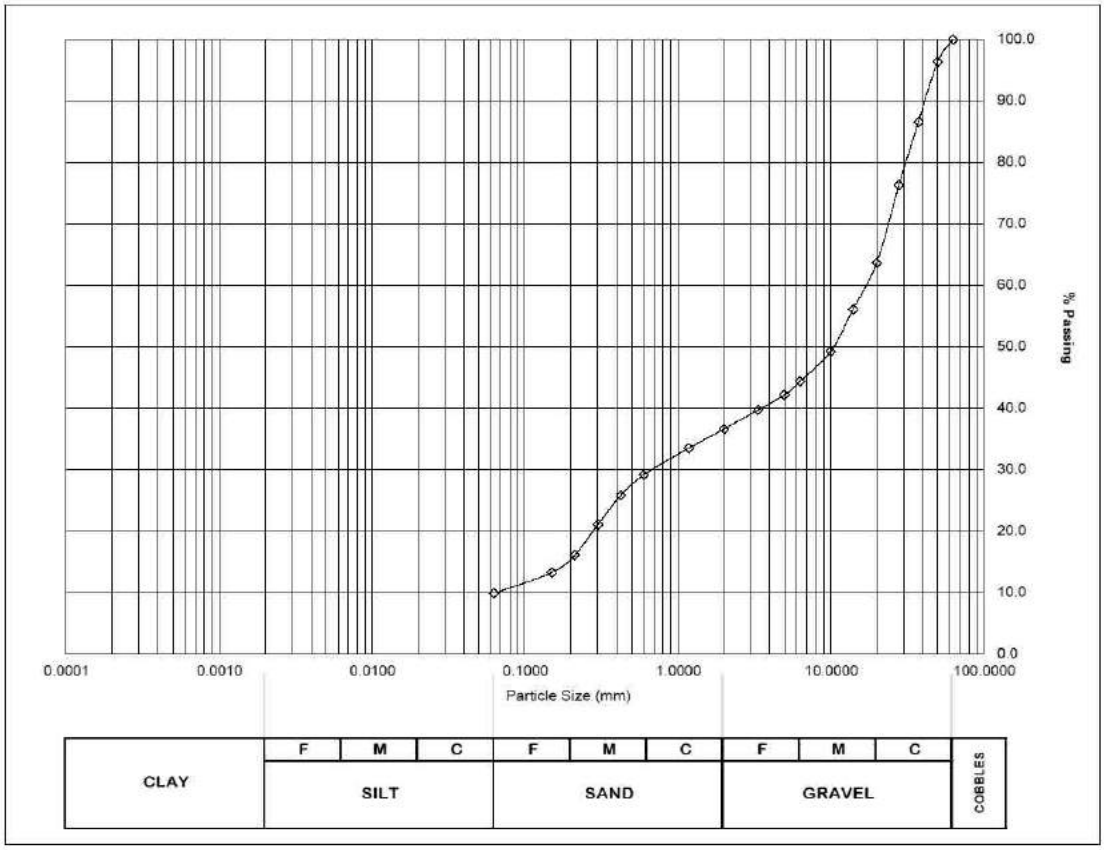
Site Name:	North Street, Reading					**Job Number:**	20/3389
Client:	ALS					**Date Reported:**	19/02/2020
Borehole No:	WS103	**Sample Type/No.**	B	76	**Top Depth:** 2.00 m	**Bottom Depth:**	3.00 m

Soil Description:

Brown mottled off-white clayey very sandy fine to coarse flint and chalk GRAVEL

BS Test Sieves	
Size (mm)	% Passing
75.000	100
63.000	100
50.000	96
37.500	87
28.000	76
20.000	64
14.000	56
10.000	49
6.300	44
5.000	42
3.350	40
2.000	37
1.180	33
0.600	29
0.425	26
0.300	21
0.212	16
0.150	13
0.063	10

Sedimentation (*if applicable)	
Size (mm)	% Passing
0.020	
0.006	
0.002	



Method/type:	Wet Sieving

BS 1377: Part 2: Clause 9.2: 1990 Determination of particle size distribution - wet sieving method.

Particle Proportions %	
Cobbles	
Gravel	63.4
Sand	26.7
Silt and Clay	9.9

AGS

UKAS TESTING
4503

Remarks:

Date - samples received:	04/02/2020		
Date - sample testing commenced :	18/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	19/02/2020	Date Approved:	19/02/2020

Approved Signatories: L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)

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CONCEPT SITE INVESTIGATIONS

PARTICLE SIZE DISTRIBUTION

TEST REPORT

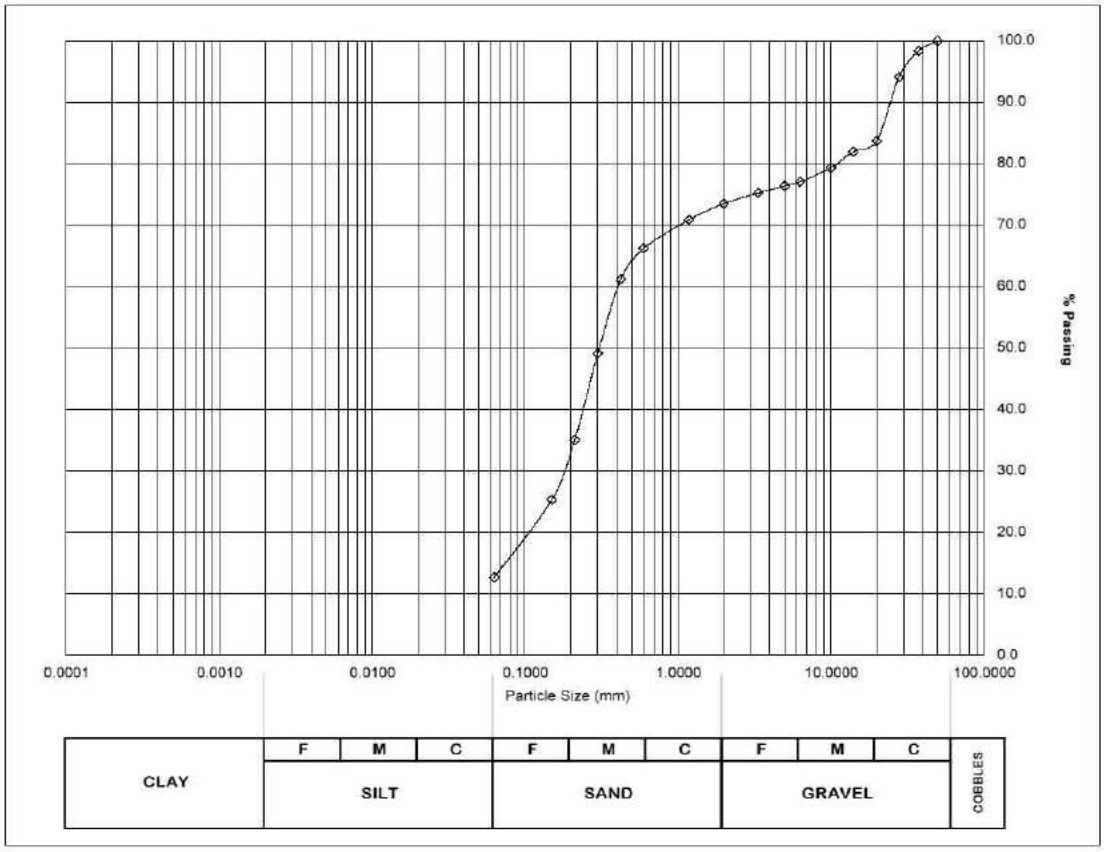
Site Name:	North Street, Reading					**Job Number:**	20/3389
Client:	ALS					**Date Reported:**	19/02/2020
Borehole No:	WS101	**Sample Type/No.**	B	66	**Top Depth:** 1.50 m	**Bottom Depth:**	2.30 m

Soil Description:

Brown slightly clayey very gravelly SAND with frequent roots. Gravel is fine to coarse flint

BS Test Sieves	
Size (mm)	% Passing
75.000	100
63.000	100
50.000	100
37.500	98
28.000	94
20.000	84
14.000	82
10.000	79
6.300	77
5.000	76
3.350	75
2.000	74
1.180	71
0.600	66
0.425	61
0.300	49
0.212	35
0.150	25
0.063	13

Sedimentation (*if applicable)	
Size (mm)	% Passing
0.020	
0.006	
0.002	



Method/type:	Wet Sieving

BS 1377: Part 2: Clause 9.2: 1990 Determination of particle size distribution - wet sieving method.

Particle Proportions %	
Cobbles	
Gravel	26.5
Sand	60.8
Silt and Clay	12.7

AGS

UKAS TESTING
4503

Remarks:

Date - samples received:	04/02/2020		
Date - sample testing commenced :	18/02/2020	Checked / Approved by:	LG
Date - sample testing completed :	19/02/2020	Date Approved:	19/02/2020

Approved Signatories: L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)

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CONCEPT SITE INVESTIGATIONS

Site Name:	North Street Reading	Job No.	20/3389
Client:	ALS	Date Reported:	19/02/2020

Test Report - CALIFORNIA BEARING RATIO (CBR)

BS 1377: Part 4: Clause 7.0: 1990 Determination of the California Bearing Ratio (CBR)

BH/TP No	WS103	Description:	Brown very sandy gravelly silty CLAY with rare rootlets. Gravel comprises fine to coarse flint
SampleType	B		
Sample No	74		
Depth (m)	0.70		

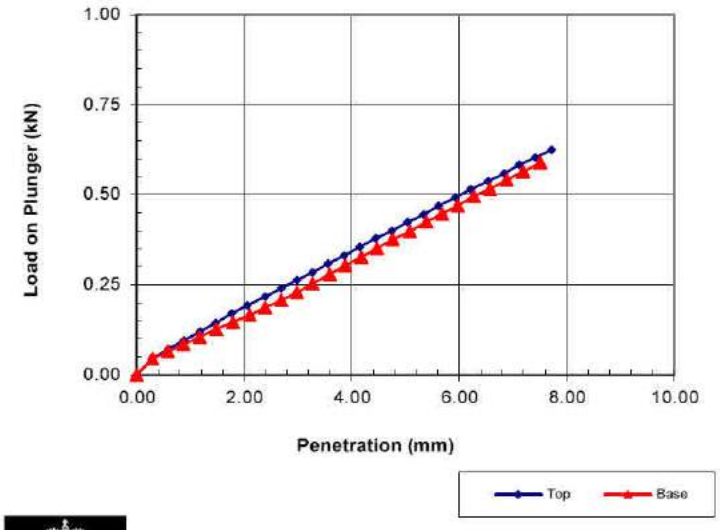
Preparation Procedure: *2.5 kg Rammer with specified effort (3 layers - 62 blows per layer)*

Test Results

Soaked/Unsoaked	Unsoaked
Surcharge	4.5kg
Rate of Strain	1.2mm/min
Mean Calibration N/div	1
Soaking Time (days)	N/A
Final Swell (mm)	N/A

Mass Retained on 20mm sieve (%)	2.2
Natural Moisture Content (%)	13
Moisture Content from Top (%)	14
Moisture Content from Bottom %)	14
Bulk Density (Unsoaked) (Mg/m^3)	2.13
Dry Density (Unsoaked) (Mg/m^3)	1.88
Dry Density (Soaked) (Mg/m^3)	N/A

CBR Test Graph



Readings

Sample TOP			Sample BASE		
Penetration of Plunger mm	Force on Plunger Reading div	Force on Plunger Force kN	Penetration of Plunger mm	Force on Plunger Reading div	Force on Plunger Force kN
0.00	0.0	0.00	0.00	0.0	0.00
0.28	43	0.04	0.29	45	0.05
0.59	72	0.07	0.58	65	0.07
0.88	96	0.10	0.87	85	0.09
1.18	120	0.12	1.17	105	0.11
1.47	144	0.14	1.48	127	0.13
1.77	170	0.17	1.79	146	0.15
2.06	193	0.19	2.10	166	0.17
2.39	217	0.22	2.39	186	0.19
2.69	240	0.24	2.69	207	0.21
2.98	262	0.26	2.98	229	0.23
3.27	284	0.28	3.27	253	0.25
3.56	309	0.31	3.59	279	0.28
3.86	330	0.33	3.88	304	0.30
4.15	355	0.36	4.18	326	0.33
4.45	379	0.38	4.47	351	0.35
4.75	399	0.40	4.76	376	0.38
5.04	424	0.42	5.08	398	0.40
5.34	445	0.45	5.39	425	0.43
5.62	469	0.47	5.68	447	0.45
5.93	493	0.49	5.97	470	0.47
6.22	515	0.52	6.27	496	0.50
6.54	538	0.54	6.57	516	0.52
6.84	559	0.56	6.88	541	0.54
7.12	583	0.58	7.19	564	0.56
7.42	603	0.60	7.51	589	0.59
7.72	625	0.63			
Correction	None applied			None applied	

Penetration mm	CBR Values % TOP		CBR Values % BASE
2.50	1.71		1.47
5.00	2.10		1.97
Accepted CBR	**2.10**		**1.97**

UKAS TESTING 4503

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Remarks:

Date - samples received:	04/02/2020		
Date - sample testing commenced :	12/02/2020	Checked / Approved by:	KM
Date - sample testing completed :	17/02/2020	Date Approved:	19/02/2020
Approved Signatories:	L Griffin LG (QA Technical & Lab Mngr) – K Mazerant KM (Lab Mngr)		

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Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix L

GROUNDWATER PARAMETERS

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GROUNDWATER PARAMETERS

BH101				
Conductivity	Dissolved Oxygen	pH	Redox Potential	Temperature
uS/cm	mg/l	pH Units	mV	ºC
720	6.33	7.29	99	10.6
722	1.93	7.28	95	11.9
724	1.76	7.28	95	12
725	1.62	7.28	95	12.1
723	1.6	7.28	94	12.1

BH102				
Conductivity	Dissolved Oxygen	pH	Redox Potential	Temperature
uS/cm	mg/l	pH Units	mV	ºC
805	6.2	7.14	71	9.7
816	5.26	7.18	66	11.4
820	5.22	7.18	69	11.7
819	5.2	7.18	73	11.5
820	5.15	7.18	76	11.7
820	5.07	7.18	78	11.6

BH103				
Conductivity	Dissolved Oxygen	pH	Redox Potential	Temperature
uS/cm	mg/l	pH Units	mV	ºC
832	4.48	7.3	97.4	10.7
839	0.65	7.27	81	11.7
841	0.4	7.27	71	11.9
841	0.35	7.27	63.2	12
840	0.34	7.26	55.2	12.1
839	0.33	7.26	48.2	12.1
837	0.34	7.26	38.1	12.2
836	0.4	7.26	31.4	12.2
831	0.71	7.25	27.1	12.3
830	1.04	7.24	24.8	12
830	1	7.24	22.5	11.6

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